

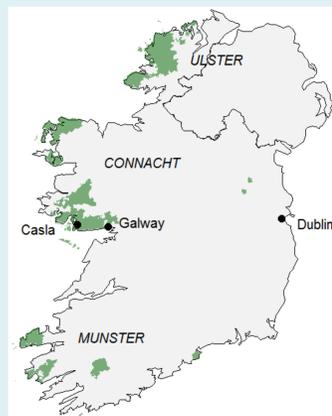
Tongue body shape during the production of Irish palatalization & velarization

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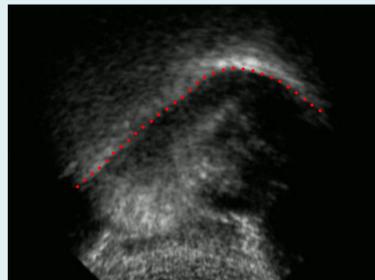
Irish

- An Indo-European, Celtic, Goidelic language
- Endangered: only 2-3% of population use it daily
- Palatalized and velarized consonants at every POA
- This contrast may be waning among younger speakers

	Labial	Coronal	Dorsal	Glottal
Stop	p ^h p ^j	t ^h t ^j	k ^h k ^j	
	b ^h b ^j	d ^h d ^j	g ^h g ^j	
Fric	f ^h f ^j	s ^h s ^j	x ^h x ^j	h ^h (h ^j)
	v ^h v ^j		(ɣ ^h)(ɣ ^j)	
Nasal	m ^h m ^j	n ^h n ^j	ŋ ^h ŋ ^j	
Liquid		l ^h l ^j		
		r ^h r ^j		



Irish-speaking regions (shaded)



Tongue image with EdgeTrak tracing

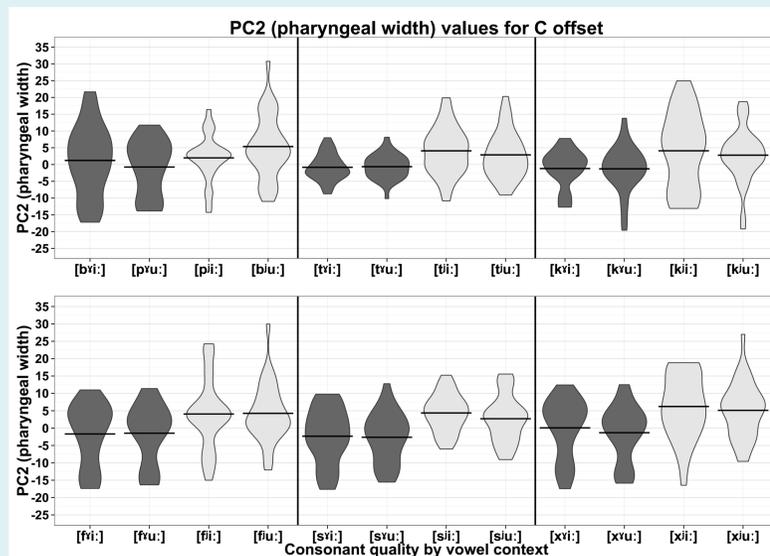
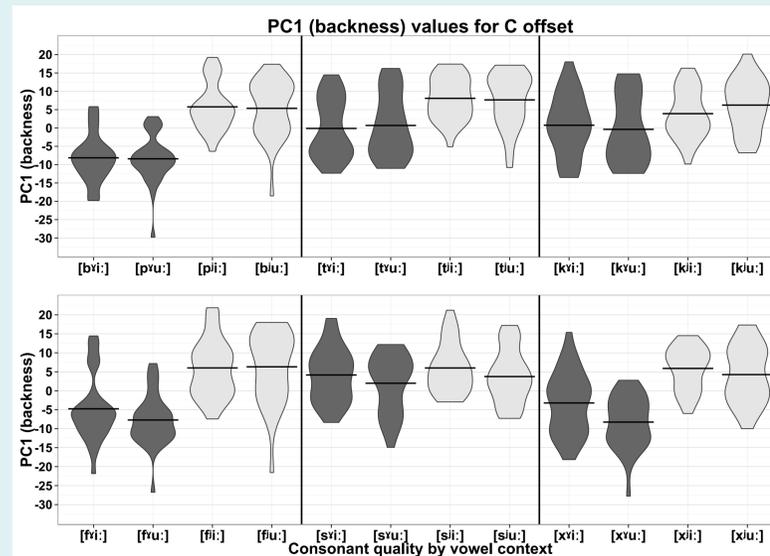
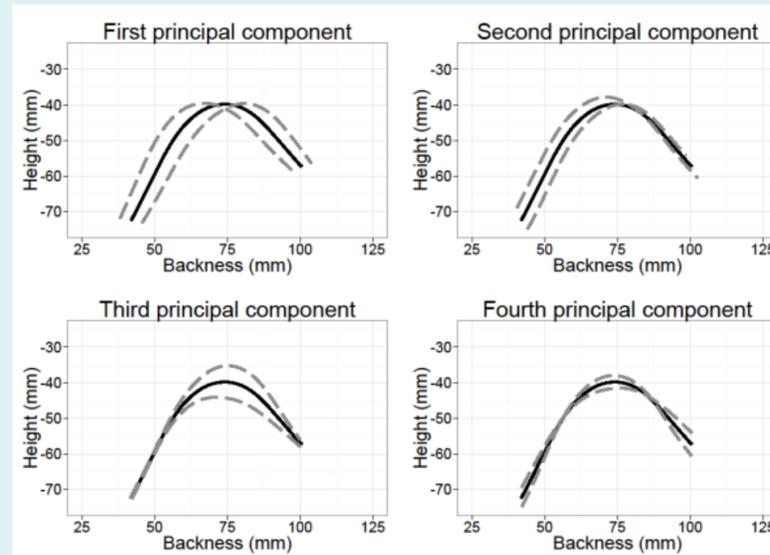
Methods

Overview

- Data gathered in Casla, Connemara
- 5 native speakers (35-60yo)

Materials and Procedure

- Stimuli:
 - Stops and fricatives
 - PoA: labial, coronal, dorsal
 - Contexts: [#Cu: ...], [#Ci: ...]
 - Voiceless consonants, except /b^hu:/ and /b^hi:/ where there were lexical gaps
- Terason T3000 with 8CM3 probe, 58-60 fps
- Head stabilization with Articulate Instruments headset (Wrench 2008)
- Frames from onset, midpoint, offset of consonant were traced in EdgeTrak



Results

Analysis

- The tongue contours were analyzed using Principal Component Analysis (PCA)
- PCA data normalized across speakers via z-scores
- Modeled with linear mixed-effects

Principal Component Interpretation

- PC1 (40.4% of variance): tongue body backness
- PC2 (30.0%): tongue root advancement/retraction
- PC3 (14.7%): tongue body height

Tongue Root

- Systematically advanced in palatalized vis-à-vis velarized consonants

Discussion

Summary

- The finding that palatalized consonants are produced with a fronter and higher tongue body, compared to velarized ones, jibes with literature and descriptions
- Surprisingly, palatalized consonants also involve an advanced tongue root compared to velarized ones
- Recalls Fant's (1960) claim (based on Russian) that palatalization is associated with pharyngeal cavity expansion

References

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