

# An Acoustic Vowel Space Analysis of Pijal Media Lengua and Imbabura Quichua

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## What is Media Lengua?

- Mixed language (Spanish – Quichua)
- Quichua agglutinating morphosyntactic structure (SOV)
- Spanish content words (+ pronouns and demonstratives)
- 89% Relexification (Swadish list)
- Spoken by an est. 300 people aged 35+ in the community of Pijal in Ecuador as an L1 along side Quichua.

si no aceti-ta ocupa-kpika huebo-ka sarten-pi-mi pega-shpa queda-n

If not oil-ACC use-DS.COND egg-TOP pan-in-VAL stick-SSC remain-3.PRES

‘If you don’t use oil, your eggs will stick to the pan.’

## Media Lengua vowel inventory

- Quichua 3 vowel system [a], [i], [u]
- Spanish 5 vowel system [a], [e], [i], [o], [u]
- Media Lengua may manipulate up to all 8 vowels

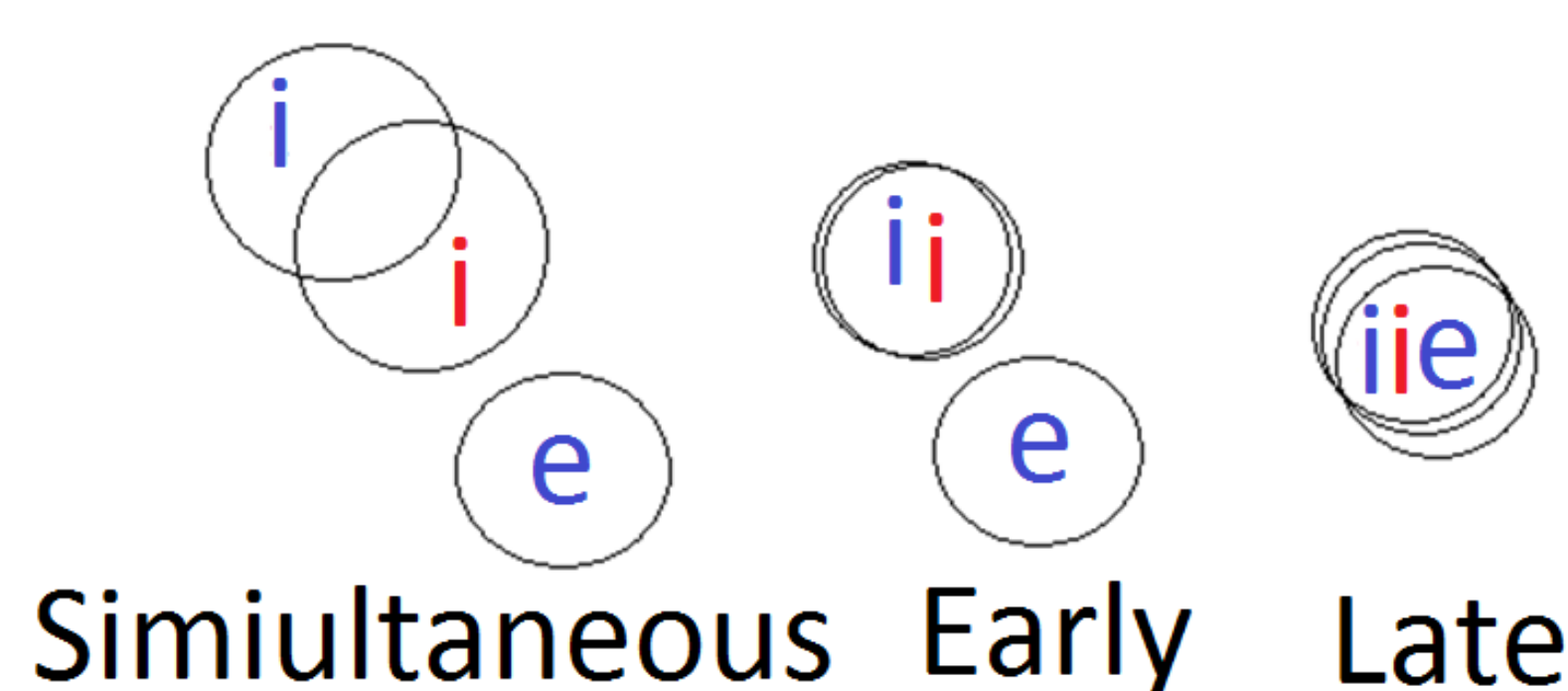
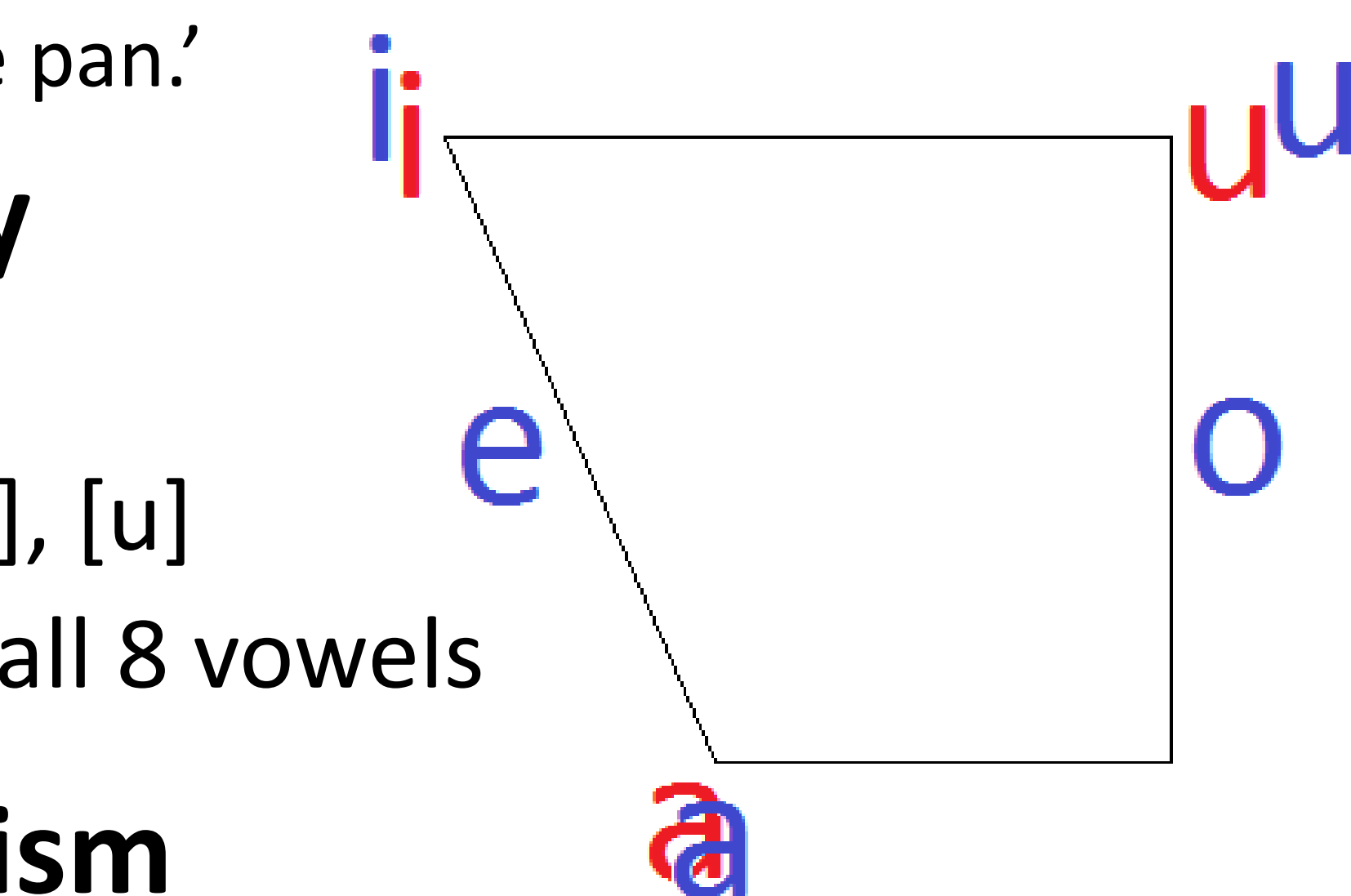
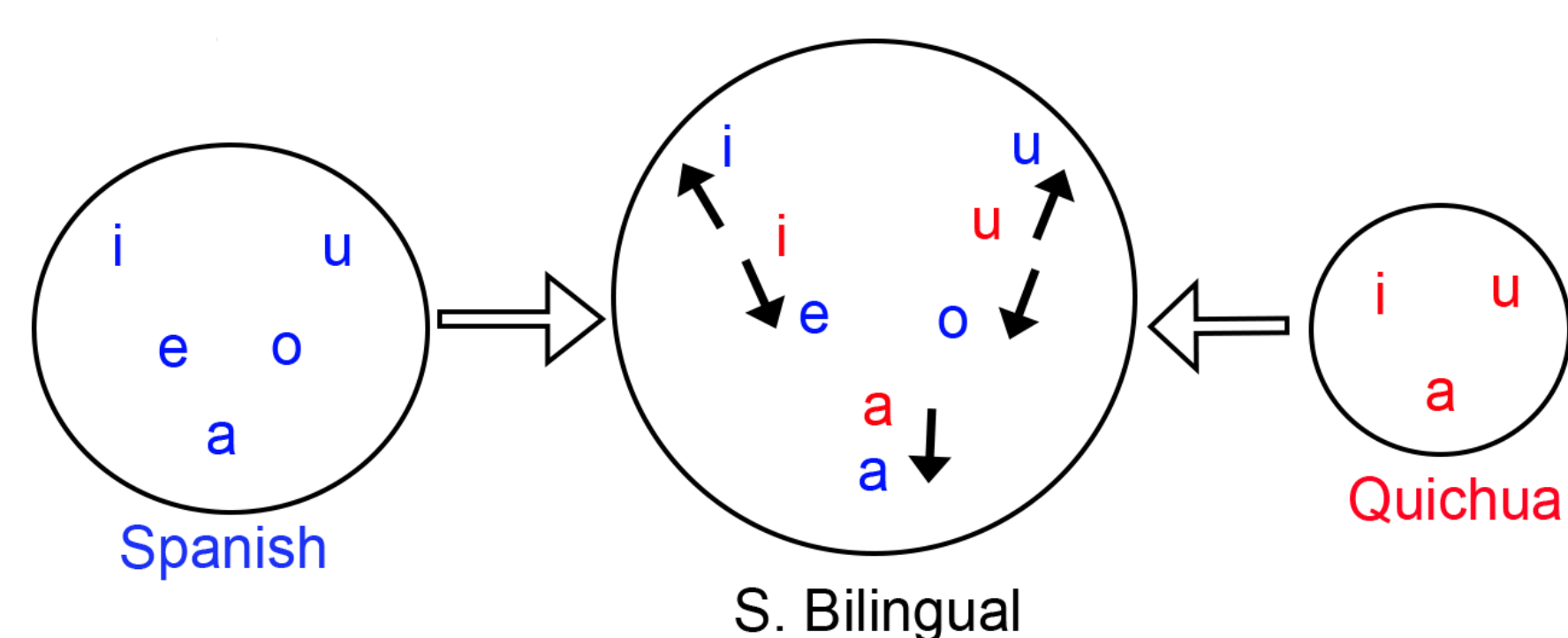
## Phonetic Duality and Bilingualism

Best et al (2003): Perceptual Assimilation Model

- Single system • Dual system • Intermediate variety

Flege (2007): Categorical dispersion to maintain contrast.

Guion (2003): tested vowel production of Quichua L1 bilinguals:



What is the phonetic nature of vowel production in extreme contact situations?

## Method

### Procedure

- 100 Spanish sentences as prompts
- Oral translations

### Participants

- 10 trilinguals (ML-Q-SP): 6F 4M
- 10 bilinguals (Q-SP) 6F 4M

### Data measurements

F1 and F2 measurements of 4,706 vowel tokens:  
2,515 from Media Lengua & 2,191 Quichua

### Analysis

Mixed effects models in R: Each vowel pair F1 & F2 frequencies

**Fixed effects:** Lang of origin, Gender, Position of syllable in word, Pre/post-vowel environments (nasal, stop, etc.) PoS (NVA), Root/Suffix, Language switch

**Random effects:** Speaker, Morpheme

*Estudia-hurkani.* / *Estudia-hurkani.* ‘I was studying.’

\* Q derived high-vowels vs. Sp derived mid-vowels: all significantly different

F1: Sp /i/ vs. Q /i/ : non-significant, p-value = 0.61

F1: Sp /u/ vs. Q /u/ : non-significant, p-value = 0.28

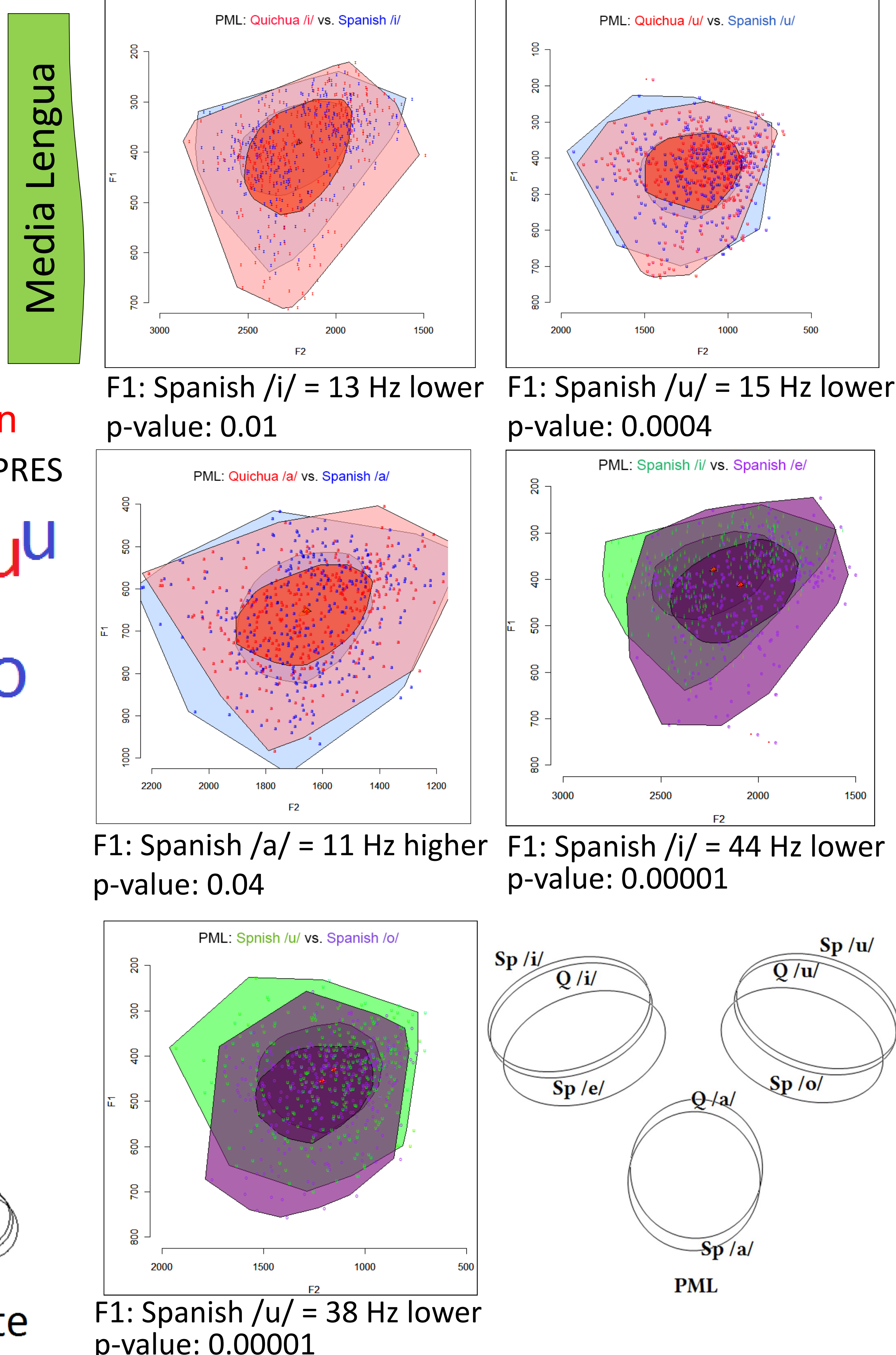
F1: Sp = /a/ 11 Hz higher, p-value = 0.045

F1: Sp /i/ = 27 Hz lower than Sp /e/, p-value = 0.00001

F1: Sp /u/ = 25 Hz lower than Sp /o/, p-value = 0.00001

\* Native Q high-vowels vs. Sp derived mid-vowels: All sign. different

50% and 95% concentrations



F1: Spanish /i/ = 13 Hz lower  
p-value: 0.01

F1: Spanish /u/ = 15 Hz lower  
p-value: 0.0004

F1: Spanish /a/ = 11 Hz higher  
p-value: 0.04

F1: Spanish /i/ = 44 Hz lower  
p-value: 0.00001

F1: Spanish /u/ = 38 Hz lower  
p-value: 0.00001

## Conclusions

**Covert contrasts (CC):** Impressionistically homophonous categories that can only be reliably distinguished at the phonetic level.

**Extreme contact situations (ML):** CCs appear to be resistant to merger over generations

- ML may manipulate up to 8 vowels:
  - Extreme merger Sp vs. Q high and low vowels
  - Partial merger Sp/Q high & Sp mid-vowels

**Moderate to high contact situations (Q):**

CC also introduced, but to a lesser degree

- Quichua may manipulate up to 6 vowels.
  - Complete merger Sp vs. Q high vowels
  - Extreme merger Sp vs. Q low vowels
  - Considerable merger Sp/Q high & Sp mid-vowels
  - Partial merger Sp/Q high & Sp mid-vowels

## Selected References

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