

# A cross-dialect acoustic description of vowels: Peruvian versus European Spanish

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Peruvian versus European Spanish



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## Previous research

Assumption that Spanish vowels do not vary across dialects.

- L2 studies do not consider dialectal variation in L1 (Flege *et al.* 1997, Escudero & Boersma 2004)
- Some cross-dialectal differences may exist (Godínez 1978)

Vowels of Brazilian and European **Portuguese**

- Significant differences in **formant values** (Escudero *et al.* submitted)

Vowels of European and Peruvian **Spanish** produced in **isolation**

- Significant differences in **duration** and **F0**
- Hardly any difference in formants (Morrison & Escudero 2007)

## Aims of the present study

- Describe and compare acoustic properties of vowels of **European and Peruvian Spanish** (ES and PS)
- Further investigate differences between ES and PS vowels
- Test the effect of **different consonantal** environments on vowels across the two dialects
- Test properties of **isolated** vowels versus vowels produced in **words** and embedded in **sentences**

## Method

Materials analyzed in this study were taken from the recordings used by Morrison & Escudero (2007). The methodology of acoustic measurements is adopted from Escudero *et al.* (submitted).

### 1. Data collection: production experiment

Participants: 20 speakers from Madrid, 20 speakers from Lima

Materials: "CVCe / CVCo. En CVCe y CVCo tenemos V."

V in a phrase: one of /a/, /e/, /i/, /o/, /u/; C in a phrase: one of /p/, /t/, /k/, /f/, /s/

### 2. Acoustic analyses: testing for dialectal differences

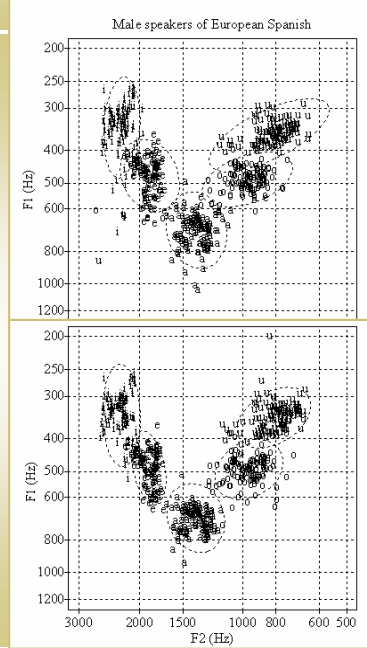
- **in all contexts** together = not considering the contextual variation as in Escudero *et al.* (in prep.)
- **In each consonantal context** = possible variation obscured by collapsing contexts
- **In words and sentences**
- **isolated vowels** = using the same methodology as for in context tokens (cf. Morrison & Escudero (2007) who analyzed the same data with a different method)

Measure for: **Duration, F0, F1 and F2**

Formant measurements:

1. a fixed gender ceiling was set (first 5 formants found up to 5500 Hz for F, 5000 Hz for M)
  - ➔ turned out to be problematic
2. the **ceiling** was **optimized** to the vowel and speaker (see Fig.1)
  - ➔ **all tokens of each vowel identity of each speaker were analyzed with the same ceiling**

**Figure 1:** Analysis of one of the contexts, isolated vowels. Using a fixed gender ceiling (top) and the optimized-ceiling method (bottom). The optimized ceiling yields much smaller standard deviation and 'repairs' strange cases

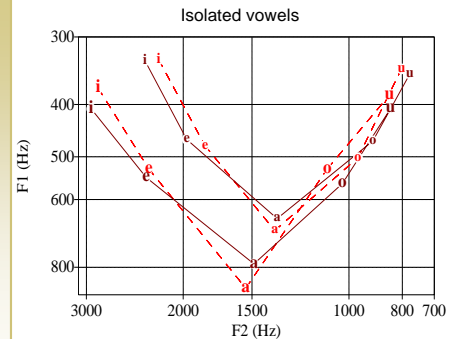


## Results

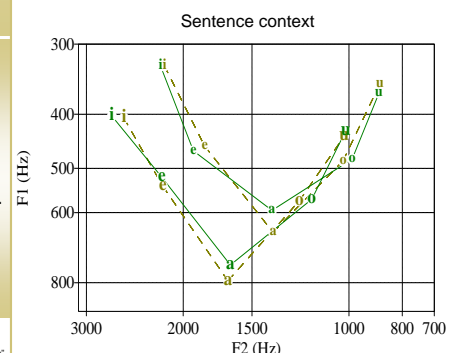
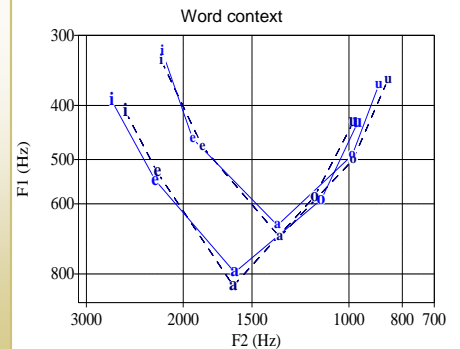
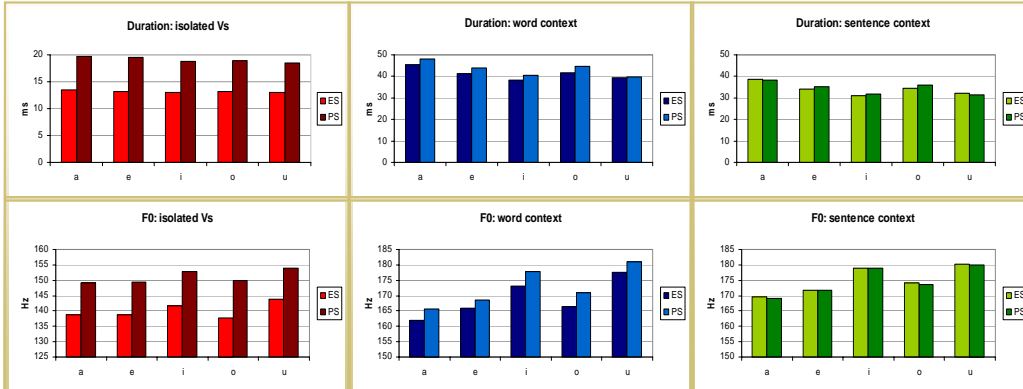
**Table 1: Differences between dialects (no interaction gender-dialect)**

Context:	Pooled	Consonant	Sentence	Word	Isolated
Duration	×	✓ e, i, o, s, e_p, o_f, p<.05	×	×	✓ p<0.001
F0	×	×	×	×	✓ p=.029
F1	✓ /a/, p=.001	✓ /a/, in all cons. p<.01	✓ /a/, p=.001	✓ /a/, p=.002	? /a/, p=.02
F2	? /e/, p=.036 ? /o/, p=.053	✓ o, s, p<0.001 ✓ i, u, a, s, p<0.05	✓ /o/, p=.003 ? /e/, p=.034	×	×

**Figure 2:** Vowel spaces for each sentential context. Dashed line: ES, solid line: PS, large curves: women, small curves: men.



**Figure 3:** Duration and F0 for each sentential context.



## Conclusions and further research

- The average F1 value of /a/ is higher in ES than in PS (by 7.1% when vowels are embedded in sentences, 5.6% in words, and 9.5% when produced in isolation at the end of a sentence).
- The sVsV context yielded the largest F2 difference; the sentence context yielded the largest dialectal difference.
- The present analysis of isolated vowels yields different results than those reported in Morrison&Escudero(2007). A comparison between studies' figures shows that the measured vowel spaces are quite different.
- Current research examines the difference between formant measurement methods.
- Additionally, dialectal differences between the /a/-/e/ and /a/-/o/ acoustic distances are being investigated.

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