

# **L2 Status affects L3 learning from the onset of acquisition:**

**A developmental study of L1 English, L2 Spanish, and L3 Catalan**

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# L3 ACQUISITION

- What factors characterize L3 phonetic and phonological acquisition?
- How do they mediate the patterns of influence observed from previously acquired languages?

References: Williams & Hammarberg (1998), Cenoz (2001) De Angelis (2007), Tremblay (2007), Gut (2010), Llama et al. (2010), Wrembel (2011, 2014), Cabrelli Amaro (2012)

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- Primary L1 Influence
- Primary L2 Influence
- Combined Cross-Linguistic Influence

## Possible Factors

- Typological Distance
- Structural Similarity
- Relative Proficiency Levels
- L2 Status Factor

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# L2 STATUS FACTOR

- Learners activate L2 and suppress L1 during L3 production (Williams & Hammarberg, 1998/2009; De Angelis, 2007; Falk & Bardel, 2007).
  - Result of desire to suppress L1 as being ‘non-foreign’, and of cognitive similarity between non-native languages.
- L2 status shown to have stronger influence than genetic typological similarity on cross-linguistic influence in L3 production (Llama, Cardoso & Collins, 2010).
  - L1 English/L2 French and L1 French/L2 English, all learning L3 Spanish
- Previous work suggests that L2 status also takes precedence over structural similarity in determining sources of cross-linguistic influence (Harper, 2016).
  - L1 English / L2 Spanish / L3 Brazilian Portuguese

**Does L2 Status Factor override structural similarity at the Initial State?**

# **RESEARCH QUESTIONS AND HYPOTHESES**

# RESEARCH QUESTIONS

- 1) How influential is the L2 Status Factor at the very initial stages of L3 phonological acquisition?
- 2) What is the role of structural typology on cross-linguistic influence at the earliest stages of L3 acquisition?

## LANGUAGES:

- L1 English
- L2 Spanish
- L3 Catalan

## ALLOPHONIC PATTERNS:

- Intervocalic Voiced Stop Spirantization
- /l/ Velarization

# SPIRANTIZATION AND VELARIZATION IN ENGLISH, SPANISH AND CATALAN

- Allophonic voiced stop spirantization process systematically observed in native Spanish and Catalan speakers
  - /b d g/ → [β ð γ] in various environments (Cole, Hualde & Iskarous, 1999; Ortega-Llebaria, 2004; Kingston, 2008; Colantoni & Marinescu, 2010)
  - Difficult for L2 learners (L1 English) to reproduce (e.g., Zampini, 1997)
    - Pattern is transferred into typological similar L3 by L1 English/L2 Spanish learners (Harper, 2016)
- English and Catalan share similar allophonic /l/ velarization patterns, with ‘dark’ /l/ observed in syllable coda
  - Spanish lacks this pattern – ‘light’ /l/ is found in all positions
  - L2 Spanish learners approximate, but do not completely reach, L1 norms, with more advanced learners producing more native-like ‘light’ /l/ (Bean, 2013)

# CROSS-LANGUAGE COMPARISON: INTERVOCALIC VOICED STOP PRODUCTION

MORE

CONSTRICTED

/b/ → [b]

LESS

CONSTRICTED

/b/ → [β]

---

L1 ENGLISH

L2 SPANISH

L3 CATALAN

# CROSS-LANGUAGE COMPARISON: /I/ PRODUCTION

MORE  
VELARIZED  
/I/ → [t̪]

LESS  
VELARIZED  
/I/ → [ɪ]

L1 ENGLISH

L2 SPANISH

L3 CATALAN

# L1 → L3 INFLUENCE

SPIRANTIZATION

MORE  
CONSTRICTED

LESS  
CONSTRICTED

ENGLISH

SPANISH

CATALAN

VELARIZATION

MORE  
VELARIZED

LESS  
VELARIZED

ENGLISH

SPANISH

CATALAN

# HYPOTHESIS 1: SENSITIVITY TO SIMILARITY

INTERVOCALIC  
SPIRANTIZATION

MORE  
CONSTRICTED

LESS  
CONSTRICTED

---

L1 ENGLISH

L2 SPANISH

L3 CATALAN

VELARIZATION

MORE  
VELARIZED

LESS  
VELARIZED

---

L1 ENGLISH

L2 SPANISH

L3 CATALAN

# HYPOTHESIS 2: L2 → L3 INFLUENCE

INTERVOCALIC  
SPIRANTIZATION

MORE  
CONSTRICTED

LESS  
CONSTRICTED

---

L1 ENGLISH

L2 SPANISH

L3 CATALAN

VELARIZATION

MORE  
VELARIZED

LESS  
VELARIZED

---

L1 ENGLISH

L2 SPANISH

L3 CATALAN

# **EXPERIMENT DESIGN AND ANALYSIS**

# EXPERIMENT DESIGN

- 20 speakers participated in this study
  - All participants were L1 English/L2 Spanish speakers
  - University students enrolled in upper-level Spanish courses
    - Intermediate L2 Spanish proficiency
  - Average Age: 20.9 years
- Speakers divided into two experimental groups:
  - **L2/L3 Group** = 11 L2 Spanish/L3 Catalan learners
    - All were enrolled in their first semester of Catalan study
    - Instructed in Eastern Catalan dialect (Recasens, 2013)
    - 4 men, 7 women
  - **L2 Control Group** = 9 L2 Spanish learners
    - No exposure to an L3
    - 9 women

# EXPERIMENT DESIGN

- Speakers recorded twice over the course of the semester
  - Recording 1: near the beginning of the semester (weeks 4-5)
  - Recording 2: during the last week of classes (week 15)
- All participants recorded reading carrier sentences in their L1, L2 and (when applicable) L3
  - Presentation of stimuli was blocked by language
    - Active response videos presented to participants before each language block to get them into appropriate language mode
    - Stimuli randomized within each block

Example stimulus sentences:

English: I say **above** promptly

Spanish: Digo **abajo** para ti

Catalan: Em dic **abans** per a ti

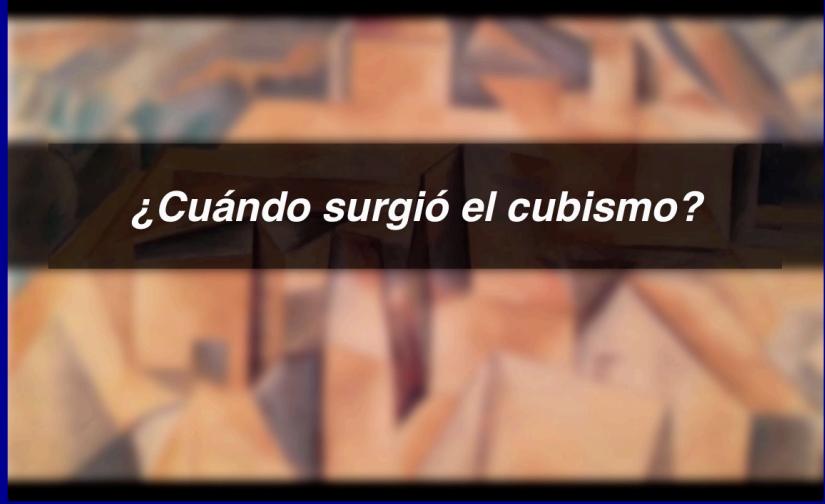
# EXPERIMENT DESIGN

- Speakers recorded twice over the course of the semester
  - Time 1: near the beginning of the semester (weeks 4-5)
  - Time 2: during the last week of classes (week 15)
- Protocol for each recording session:
  - 1) Speakers participated in active response videos before each language block to get them into appropriate language mode (cf. Grosjean, 1982; Antoniou et al., 2011)
    - Presentation of videos and stimuli was grouped by language
  - 2) Speakers read aloud a series of carrier sentences:
    - English: I say **above** promptly
    - Spanish: Digo **abajo** para ti
    - Catalan: Em dic **abans** per a ti



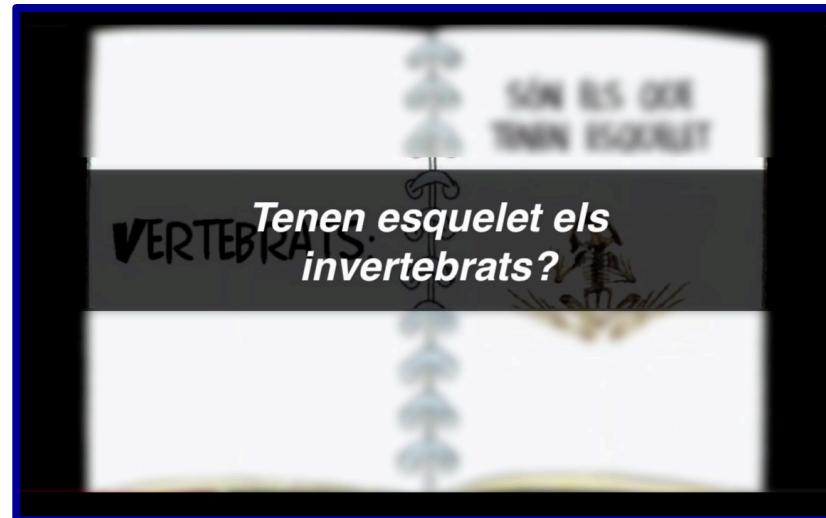
*Which country's telephone system did  
Tesla help develop?*

L1 ENGLISH



*¿Cuándo surgió el cubismo?*

L2 SPANISH

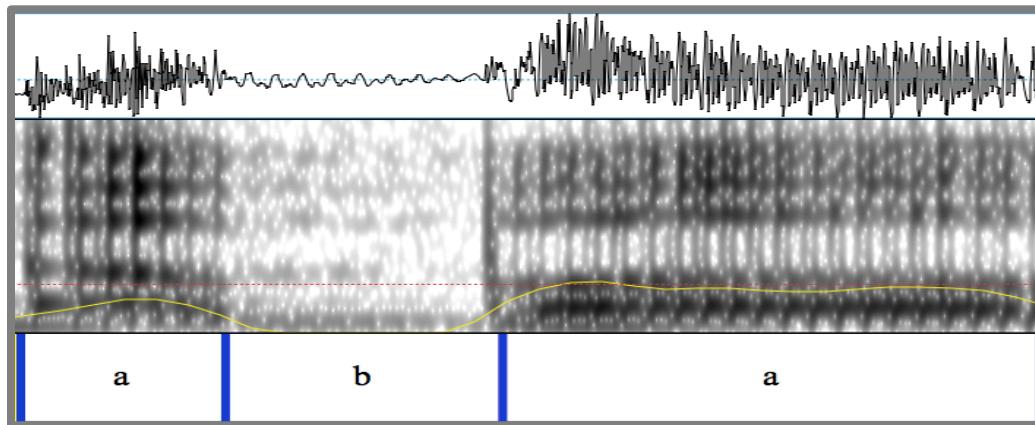


L3 CATALAN

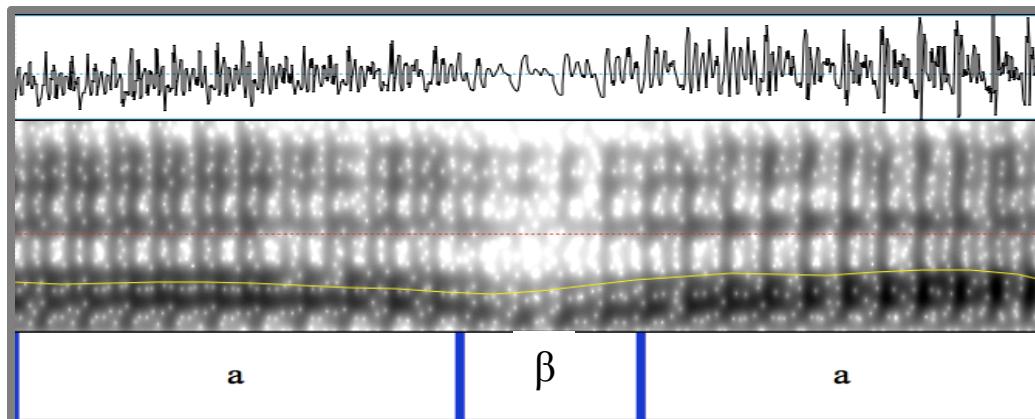
# EXPERIMENT DESIGN

- 48 spirantization target words and 48 velarization target words included in stimuli.
  - Same stimuli used for both recording sessions.
  - All target words controlled for the vocalic context surrounding the target consonant and for the word's cognate status in each language.
- Spirantization target words (/b/) evenly divided into two conditions: stressed and unstressed
- Velarization target words (/l/) divided into two conditions: syllable-initial and syllable-final

# DATA ANALYSIS: SPIRANTIZATION



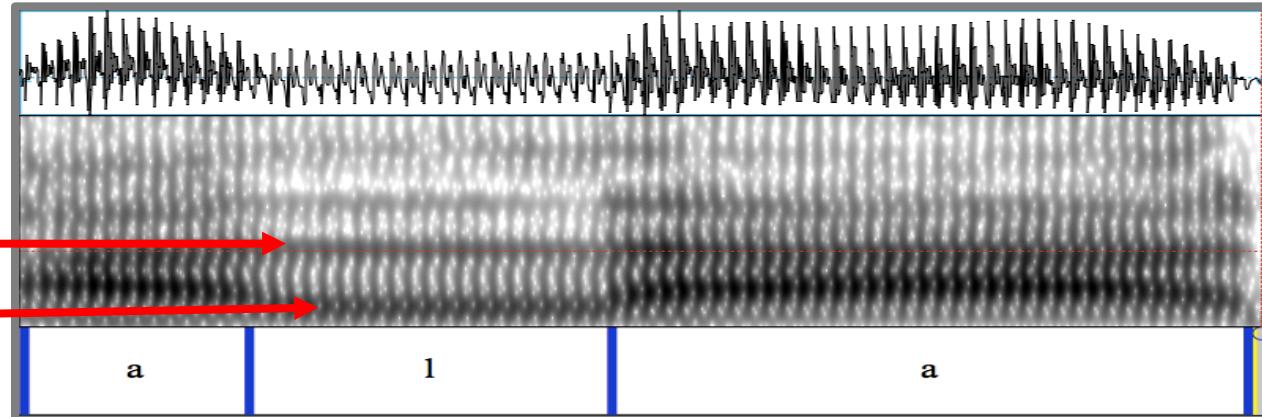
**Plosive [b]** = Low acoustic energy during consonant



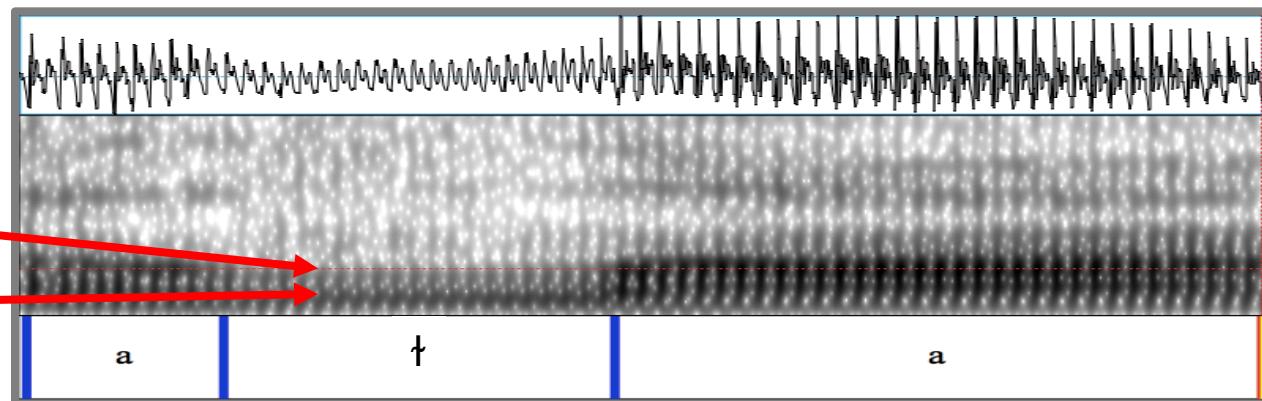
**Spirantized [β]** = High acoustic energy during consonant

Higher C/V  
intensity ratio →  
Greater  
spirantization

# DATA ANALYSIS: VELARIZATION



**Unvelarized [l]** = Higher F2, larger difference between F2 and F1

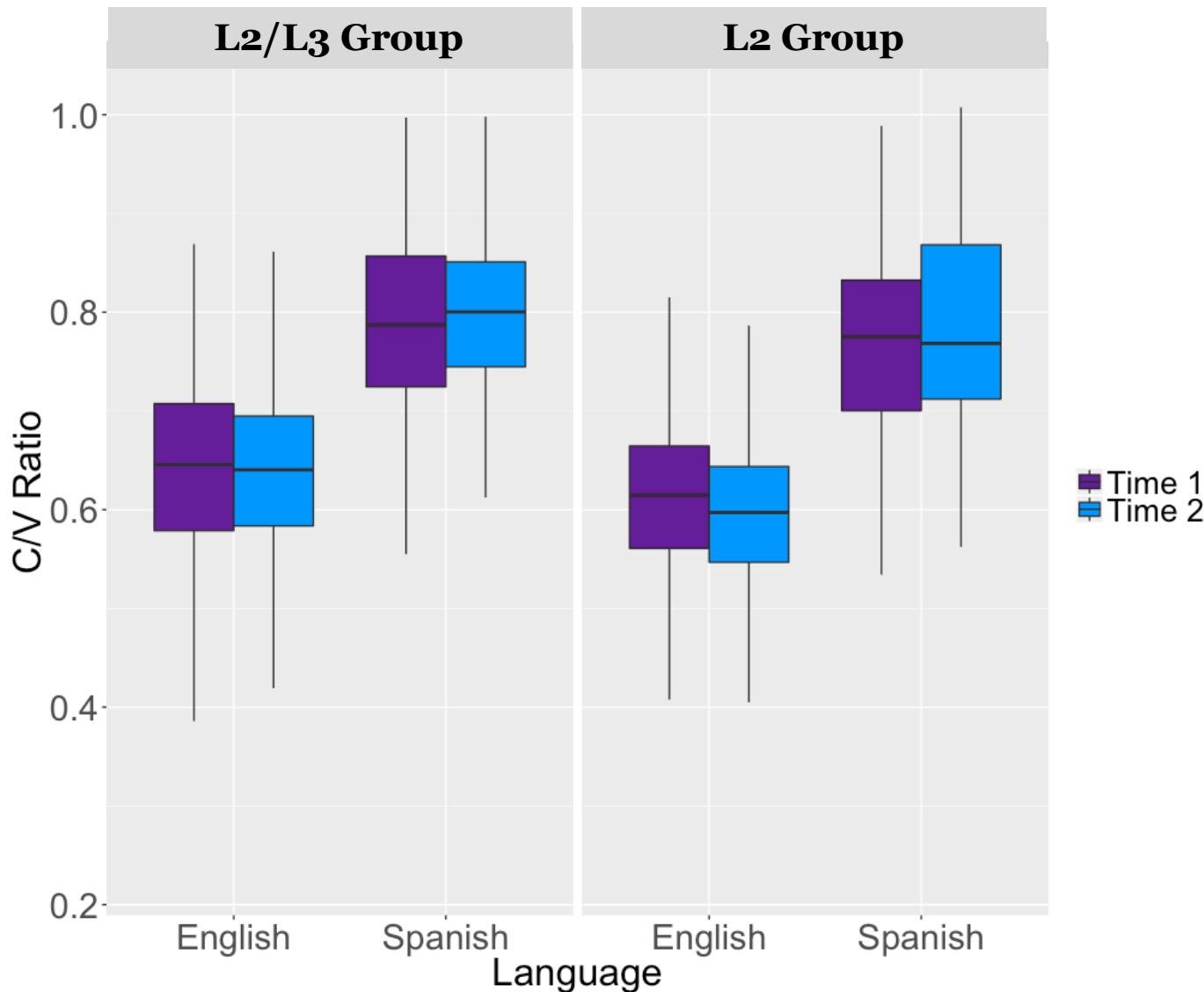


**Smaller F2-F1 difference →  
More velarization**

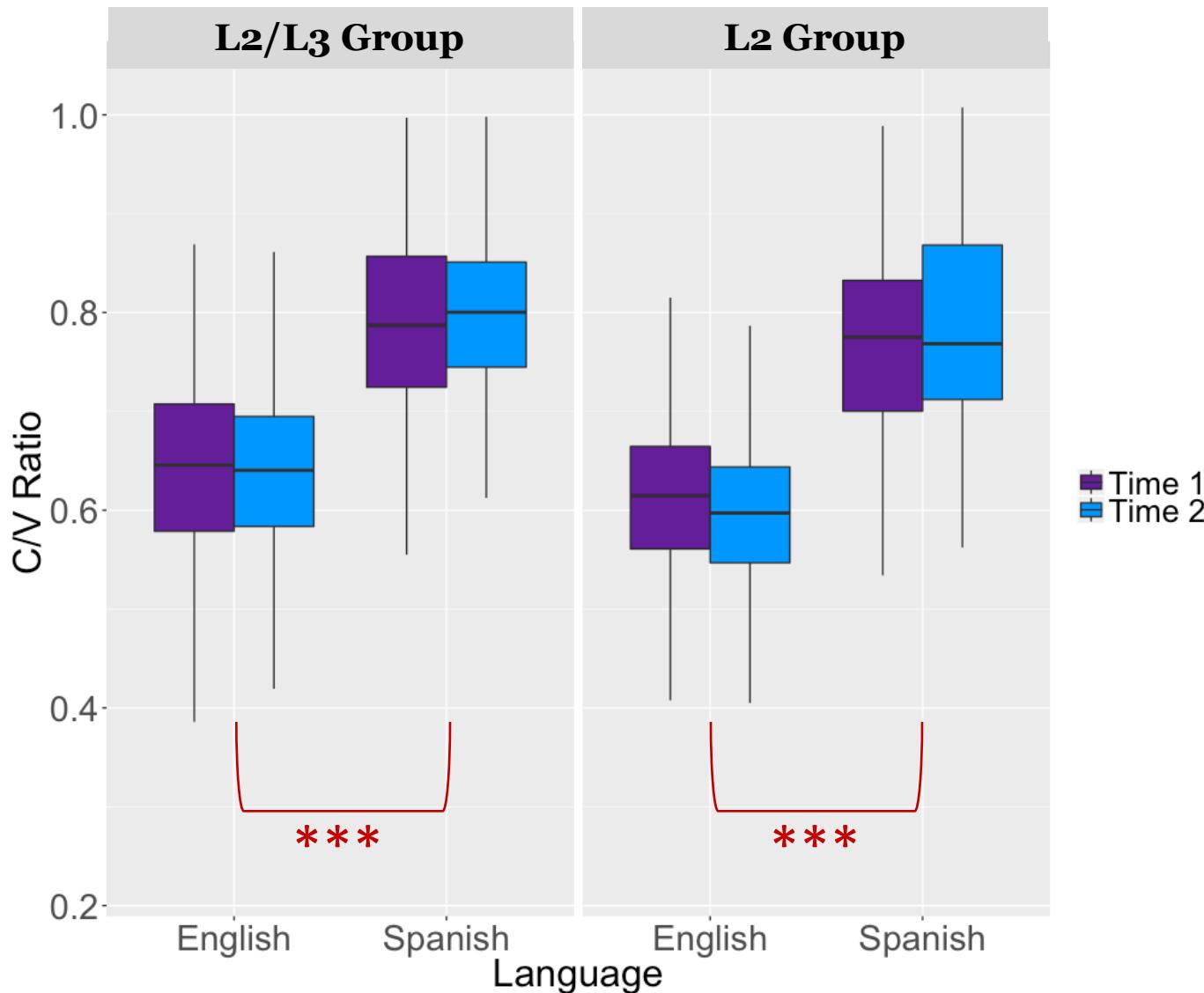
**Velarized [t̪]** = Low F2, smaller difference between F2 and F1

# **RESULTS: SPIRANTIZATION**

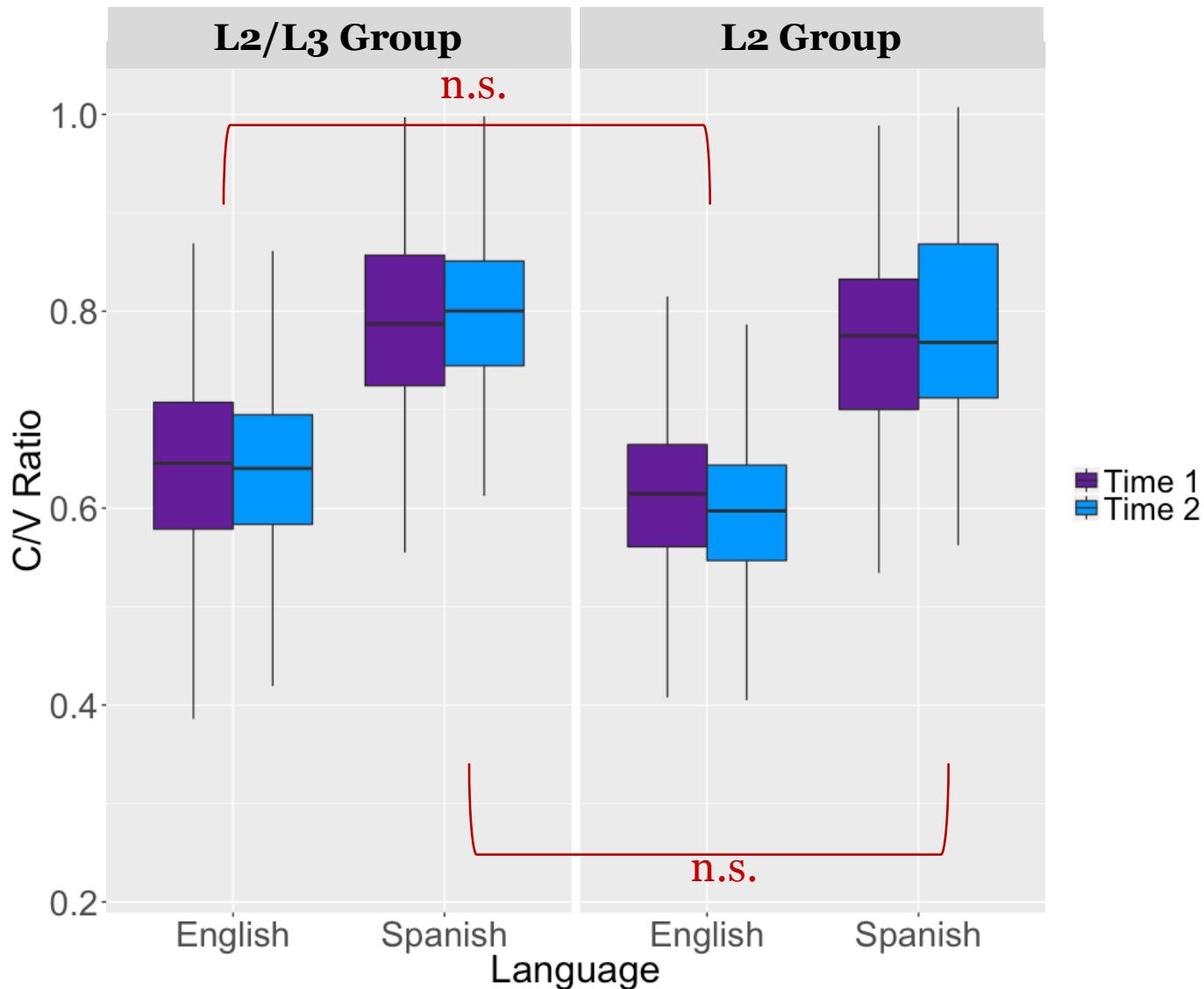
# BETWEEN-GROUPS COMPARISON: SPIRANTIZATION BY TIME



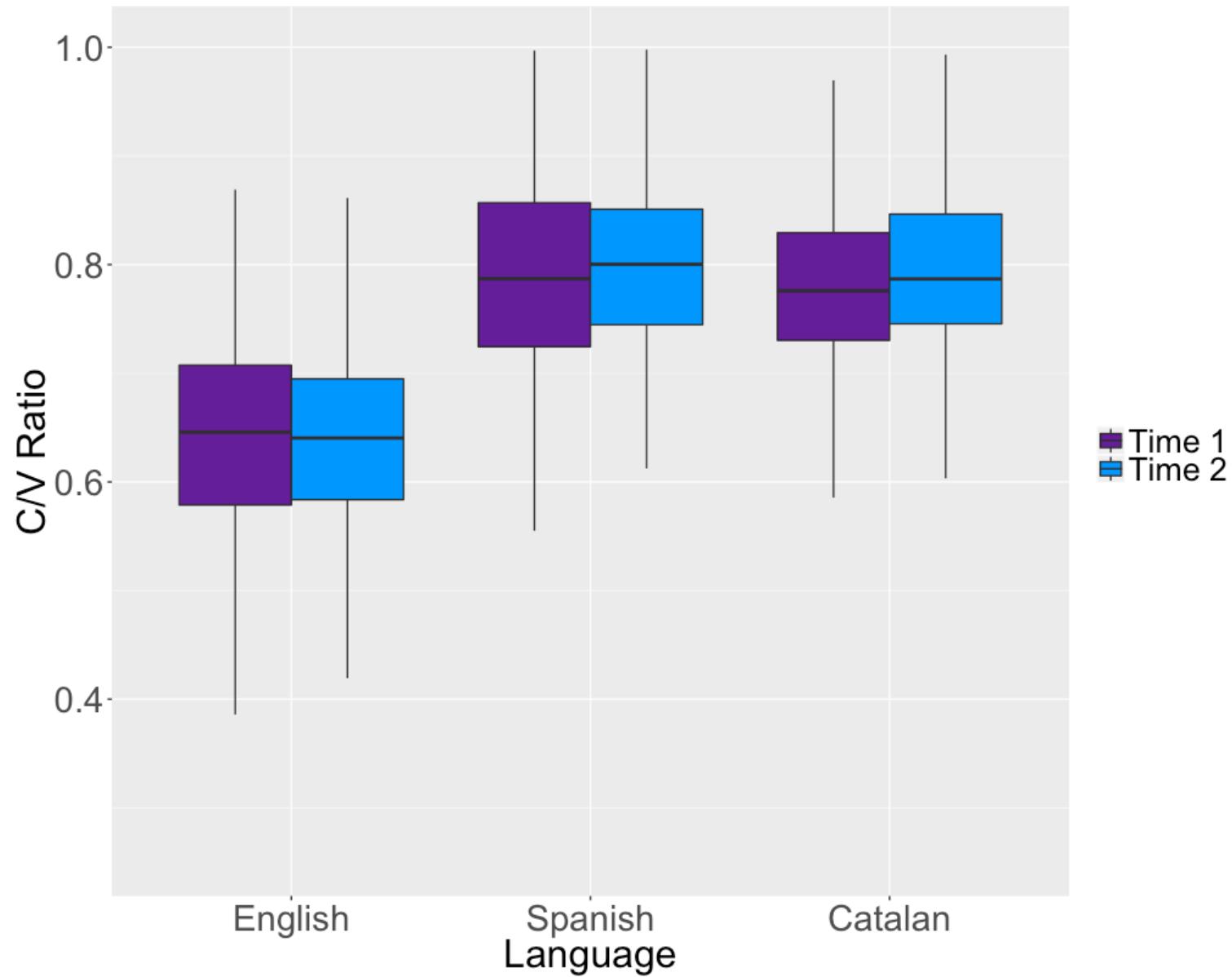
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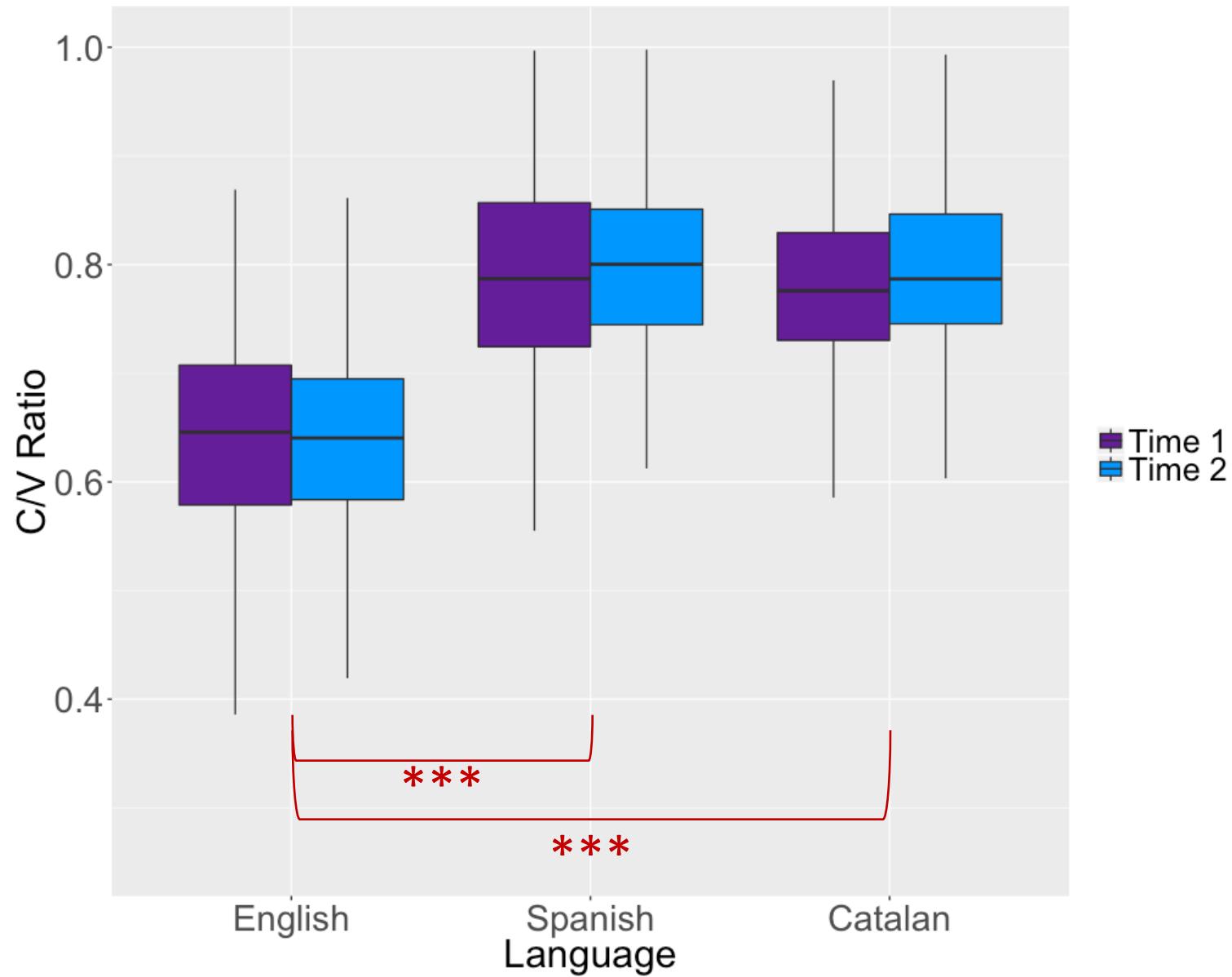
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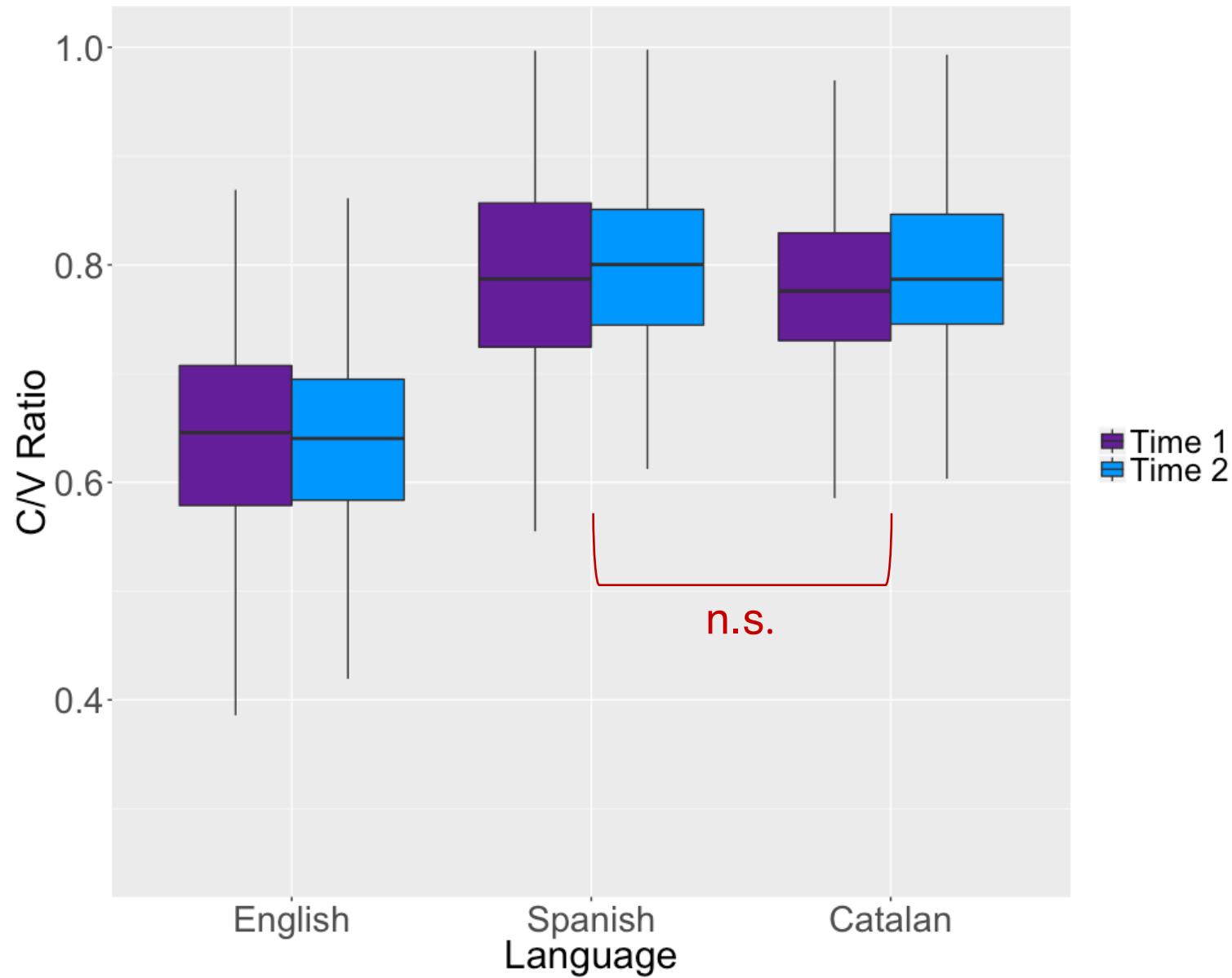
# L2/L3 GROUP: LANGUAGE BY TIME



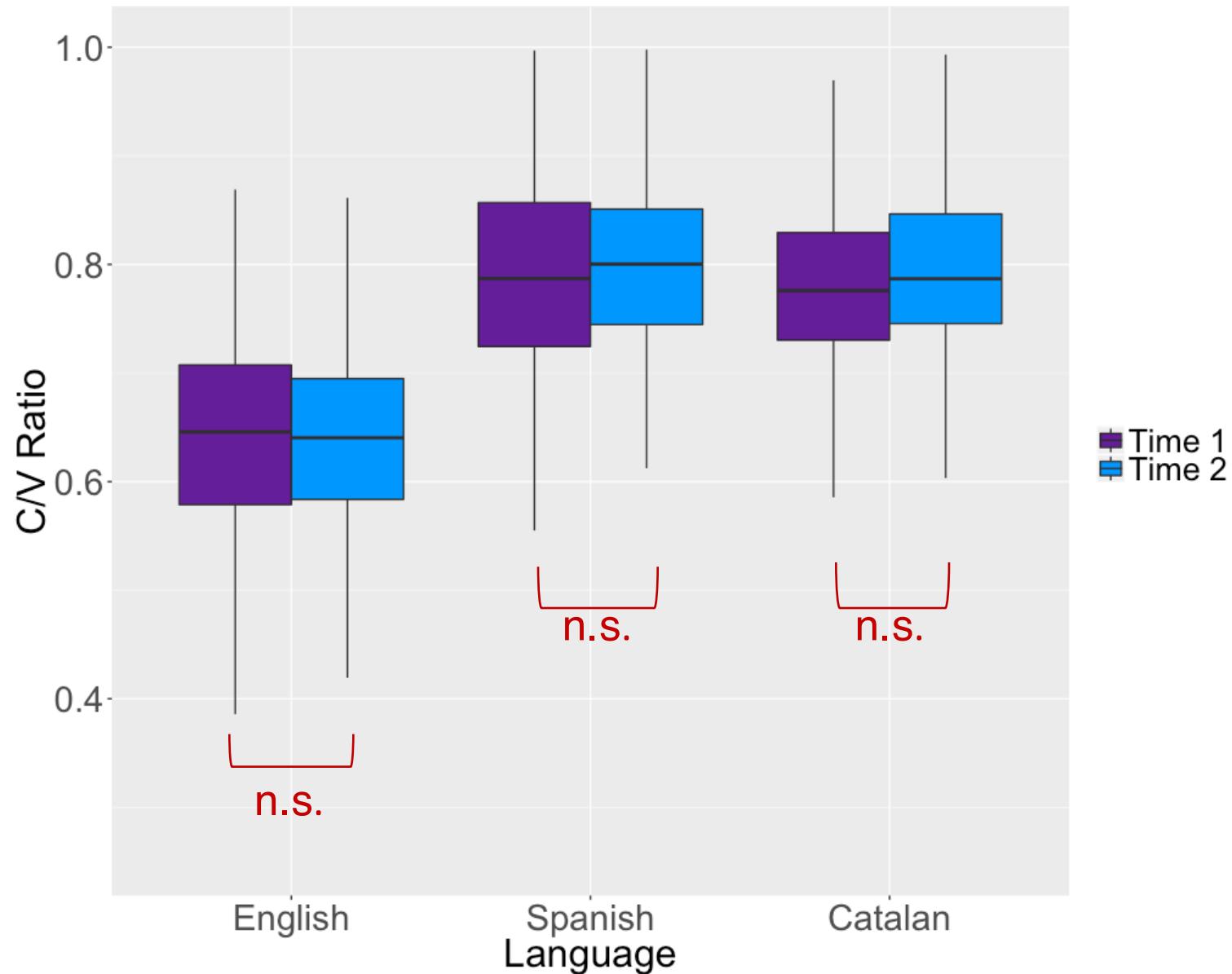
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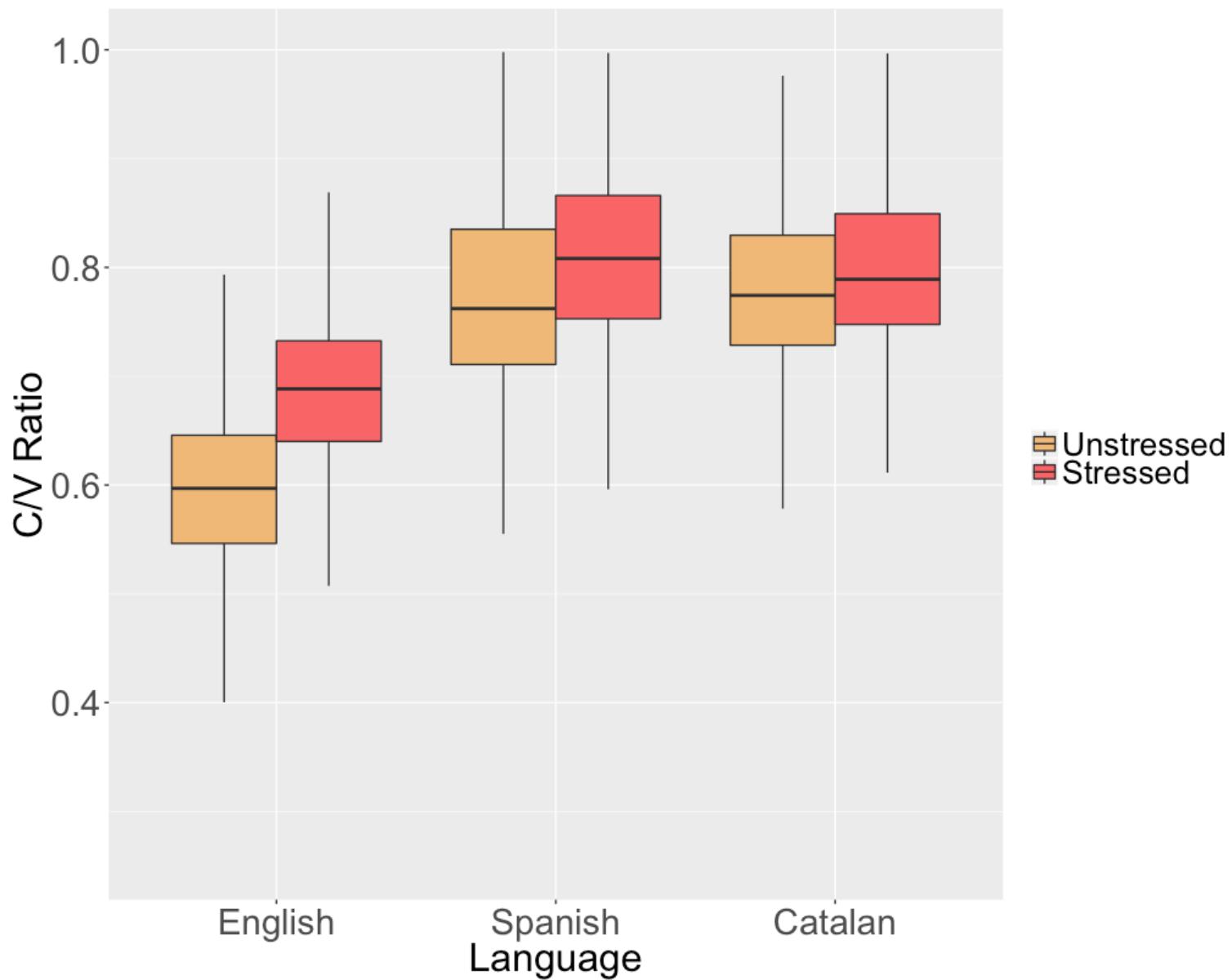
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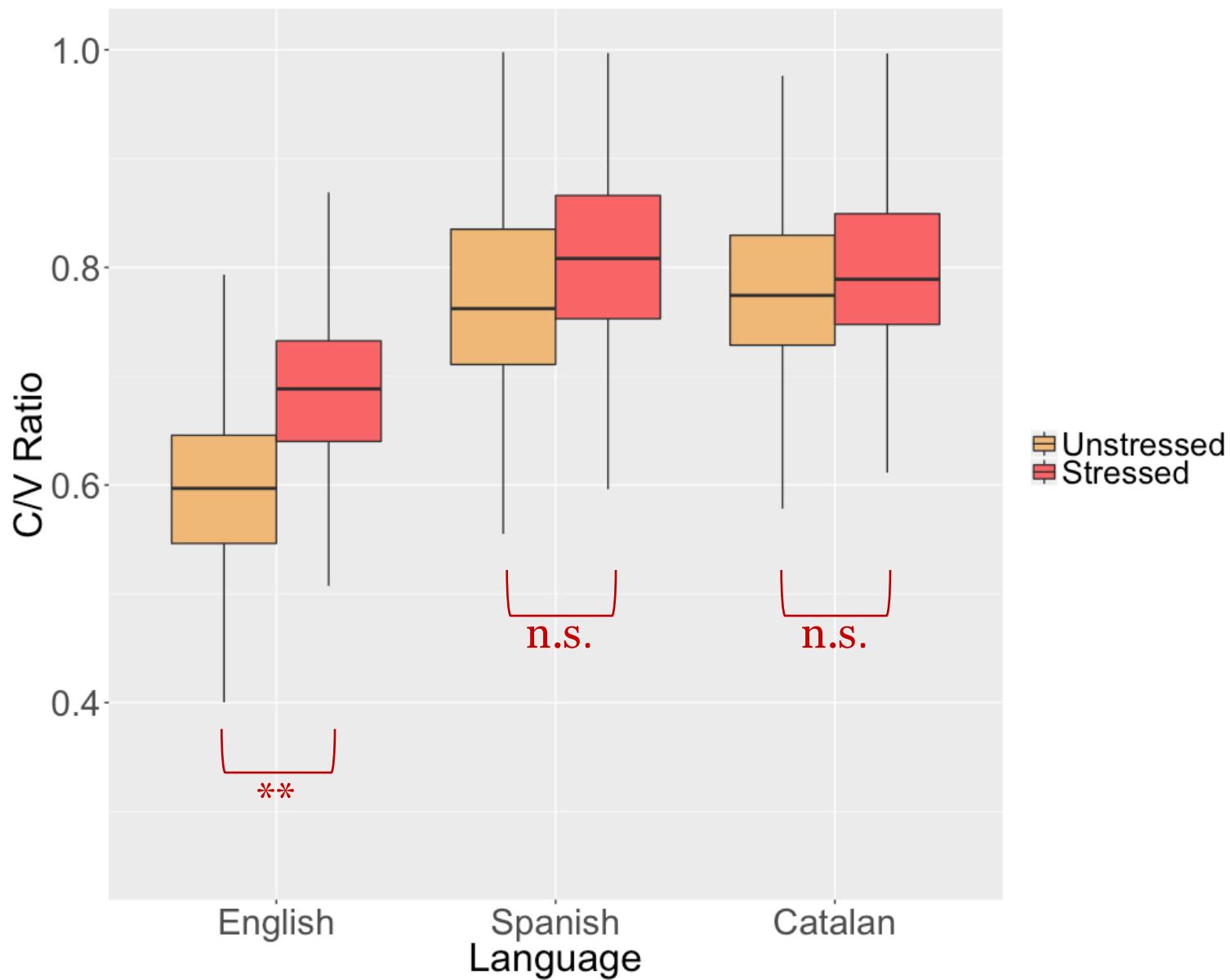
# L2/L3 GROUP: LANGUAGE BY TIME



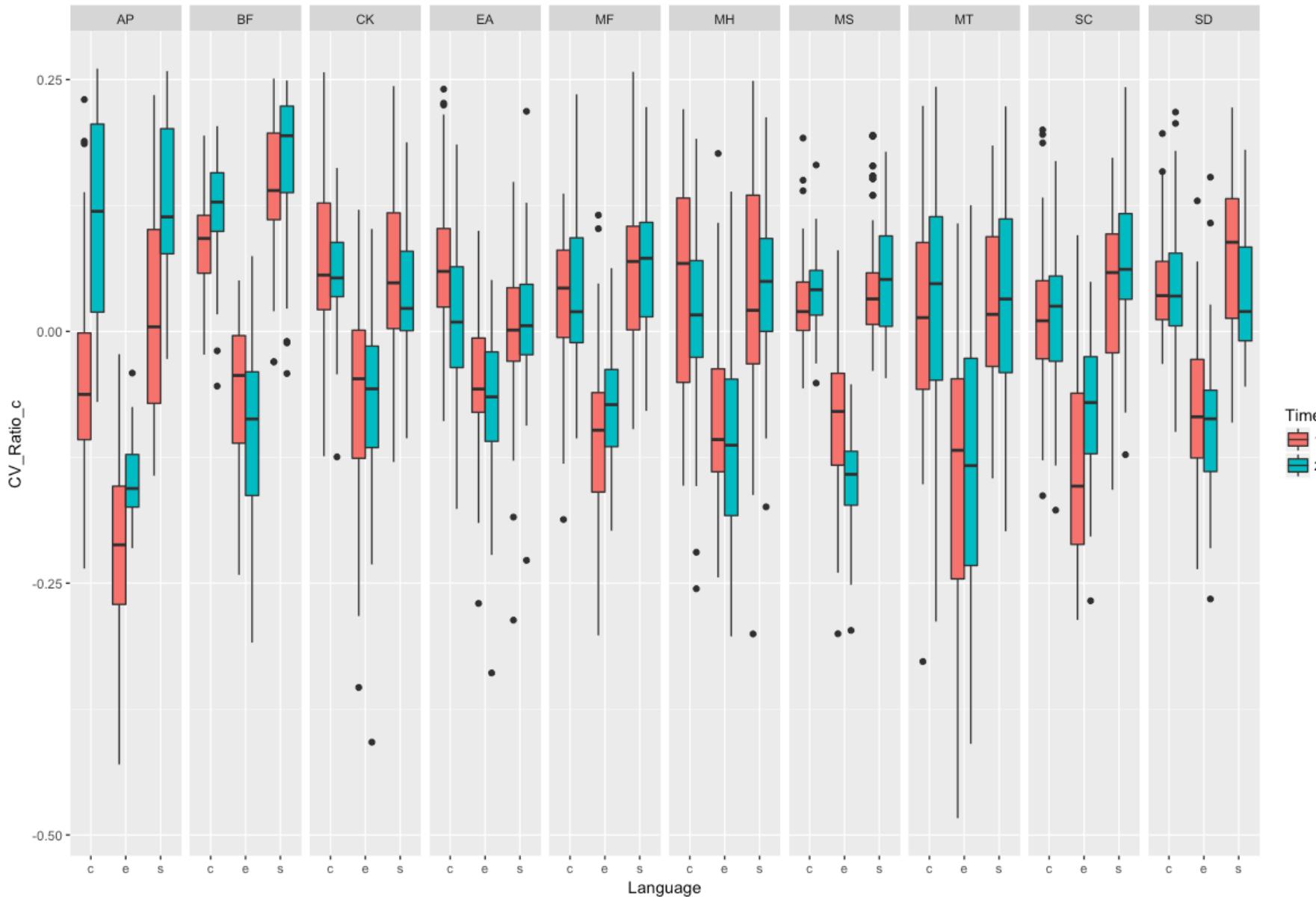
# L2/L3 GROUP: EFFECT OF STRESS



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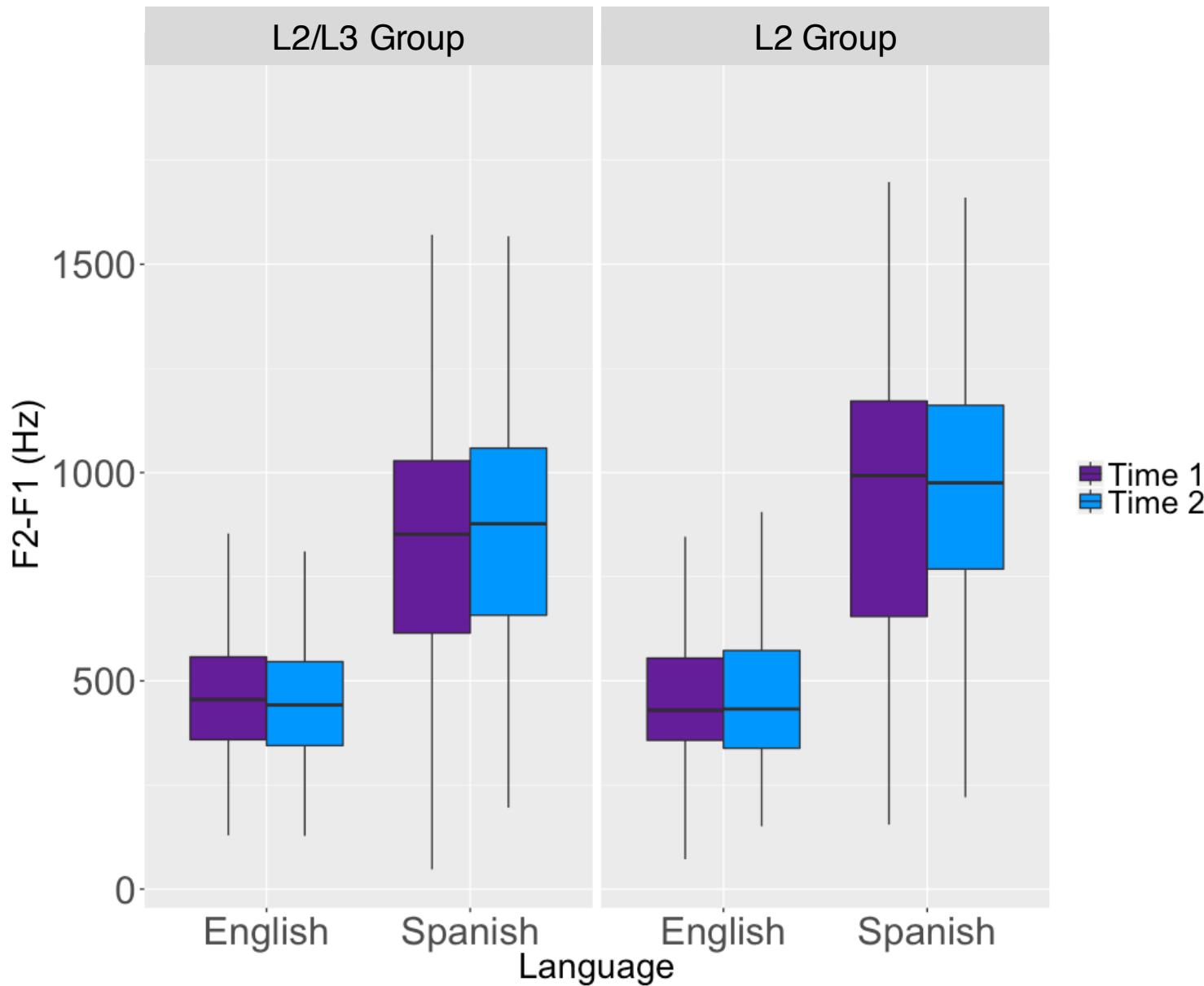


# MODEL 2: EXPERIMENTAL GROUP (SPIRANTIZATION)

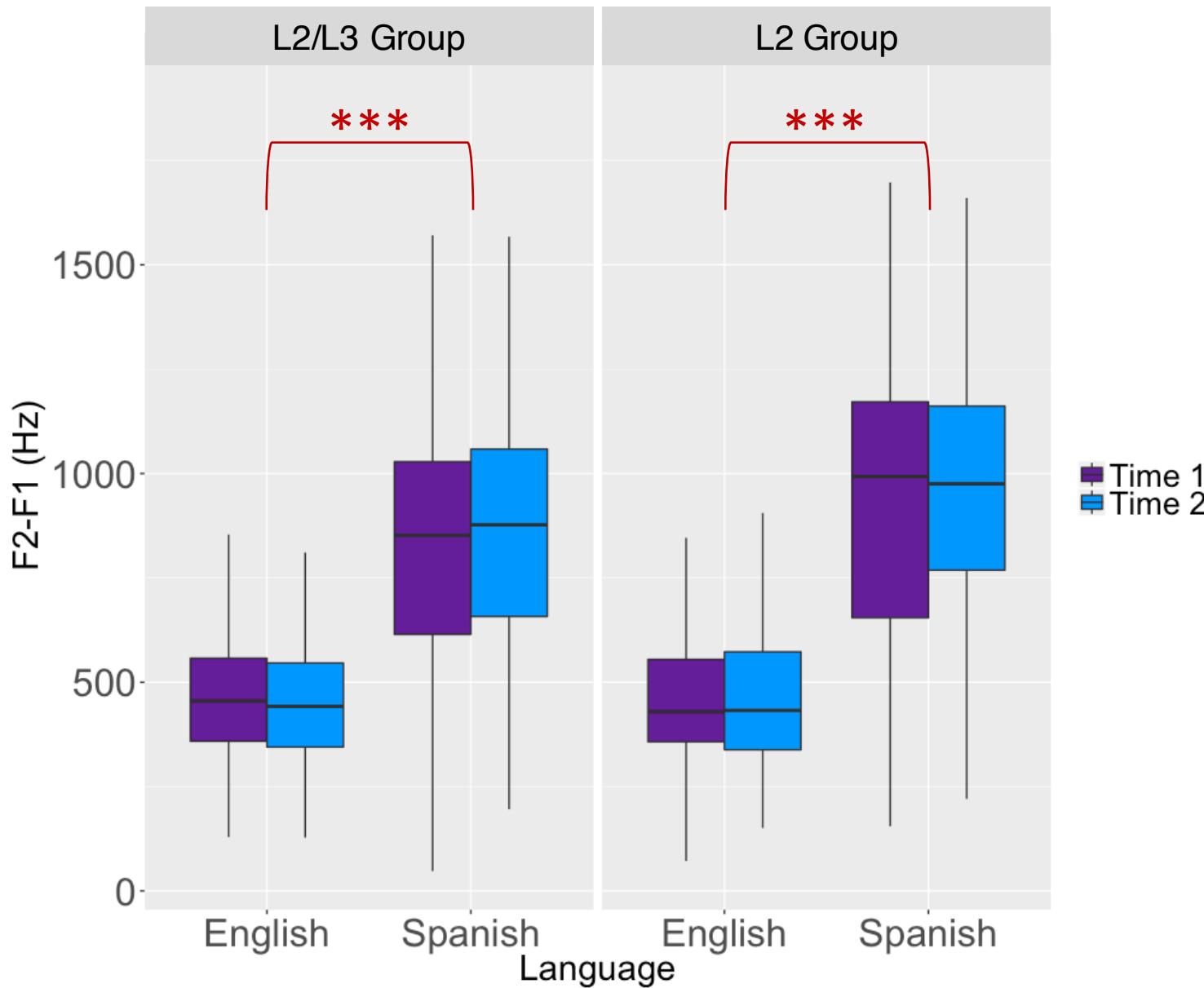


# **RESULTS: VELARIZATION**

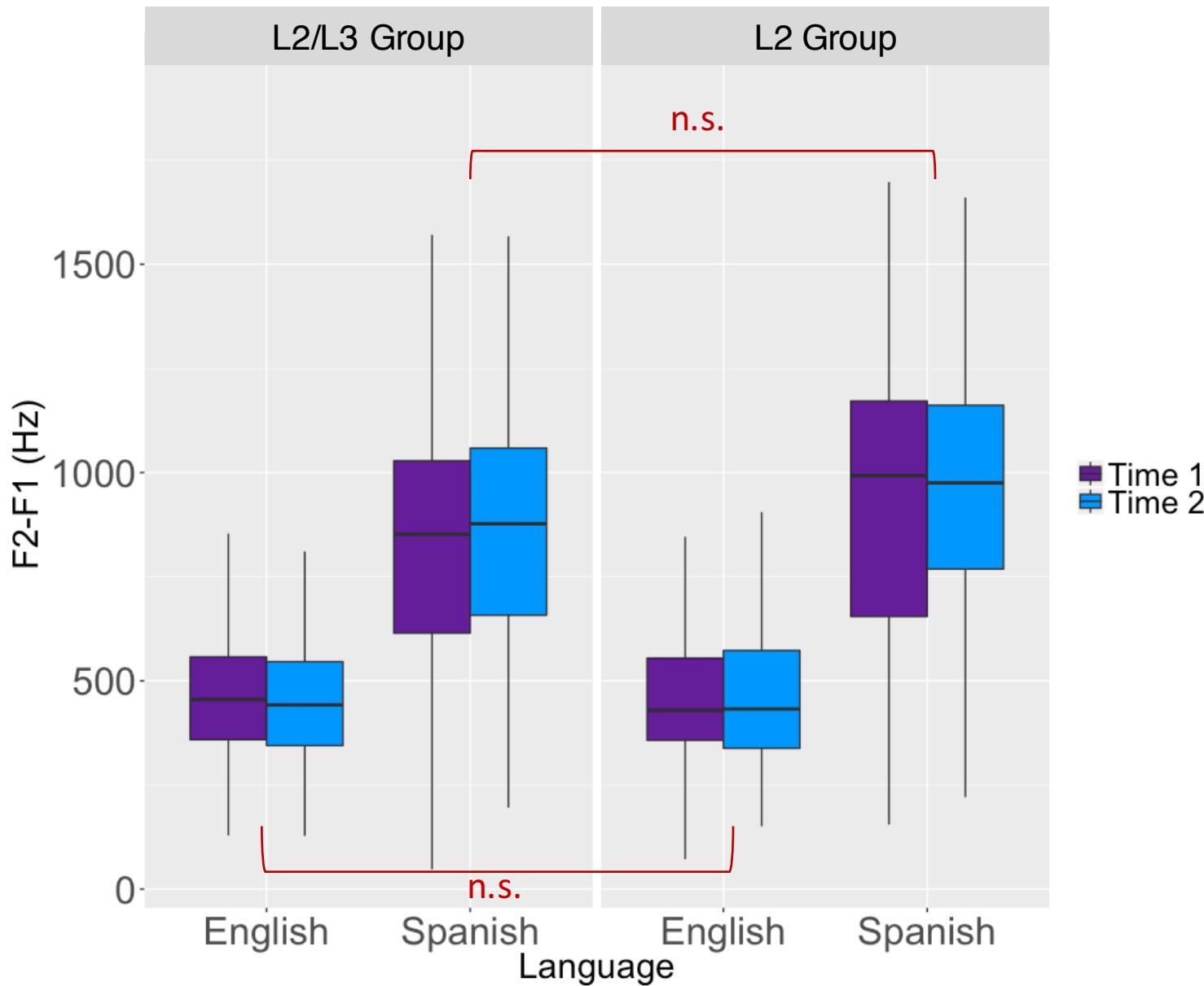
# BETWEEN-GROUPS COMPARISON: VELARIZATION BY TIME



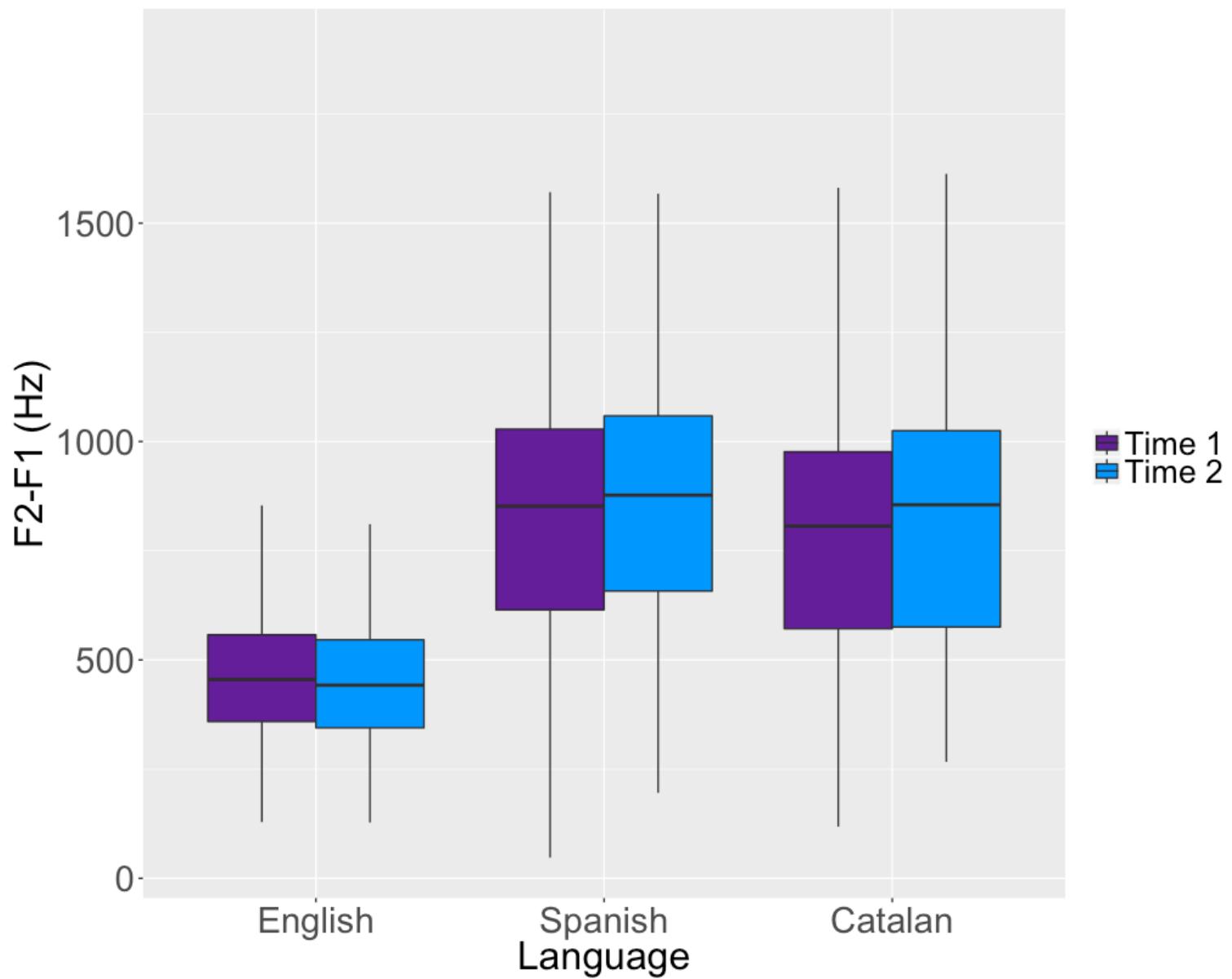
# BETWEEN-GROUPS COMPARISON: VELARIZATION BY TIME



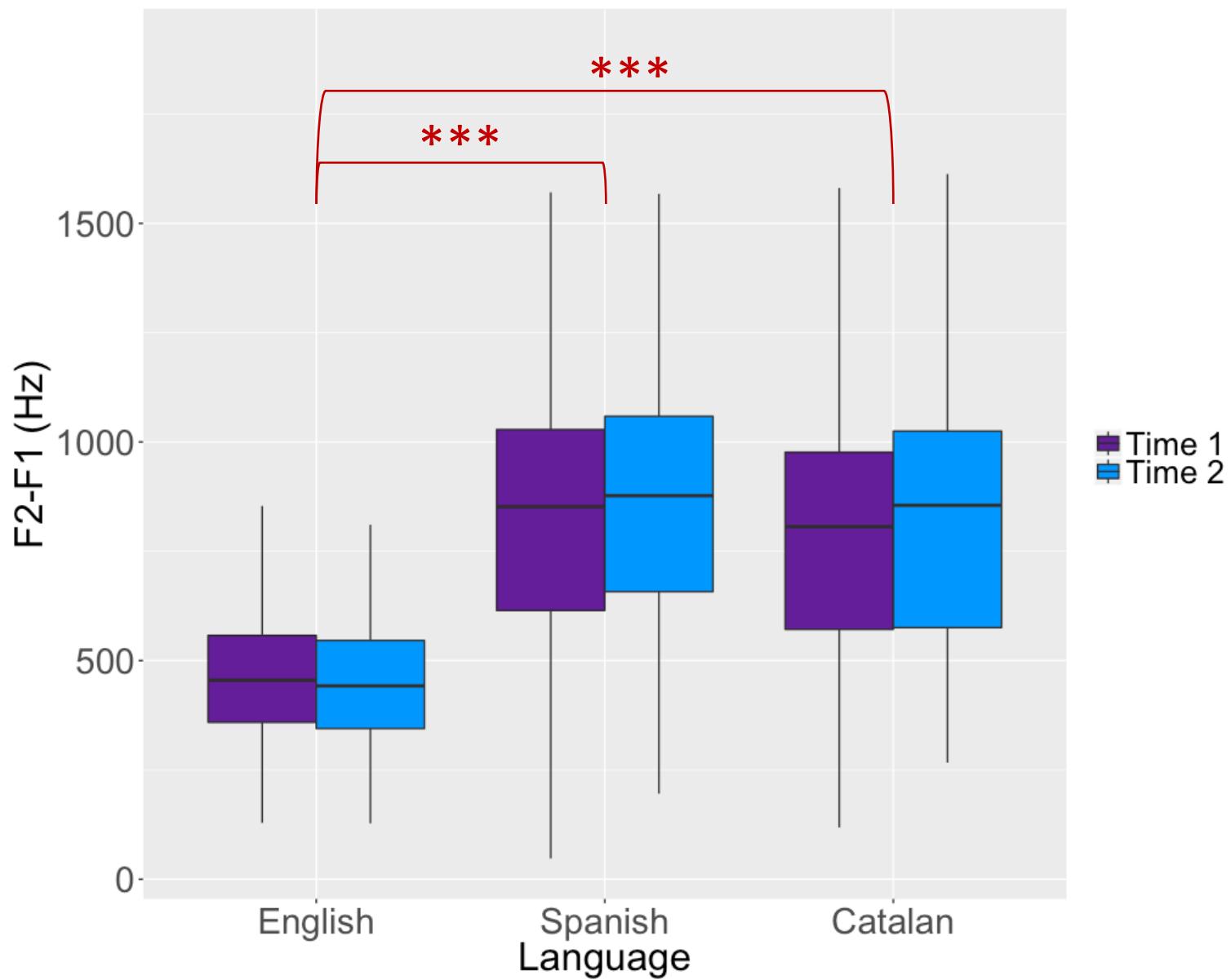
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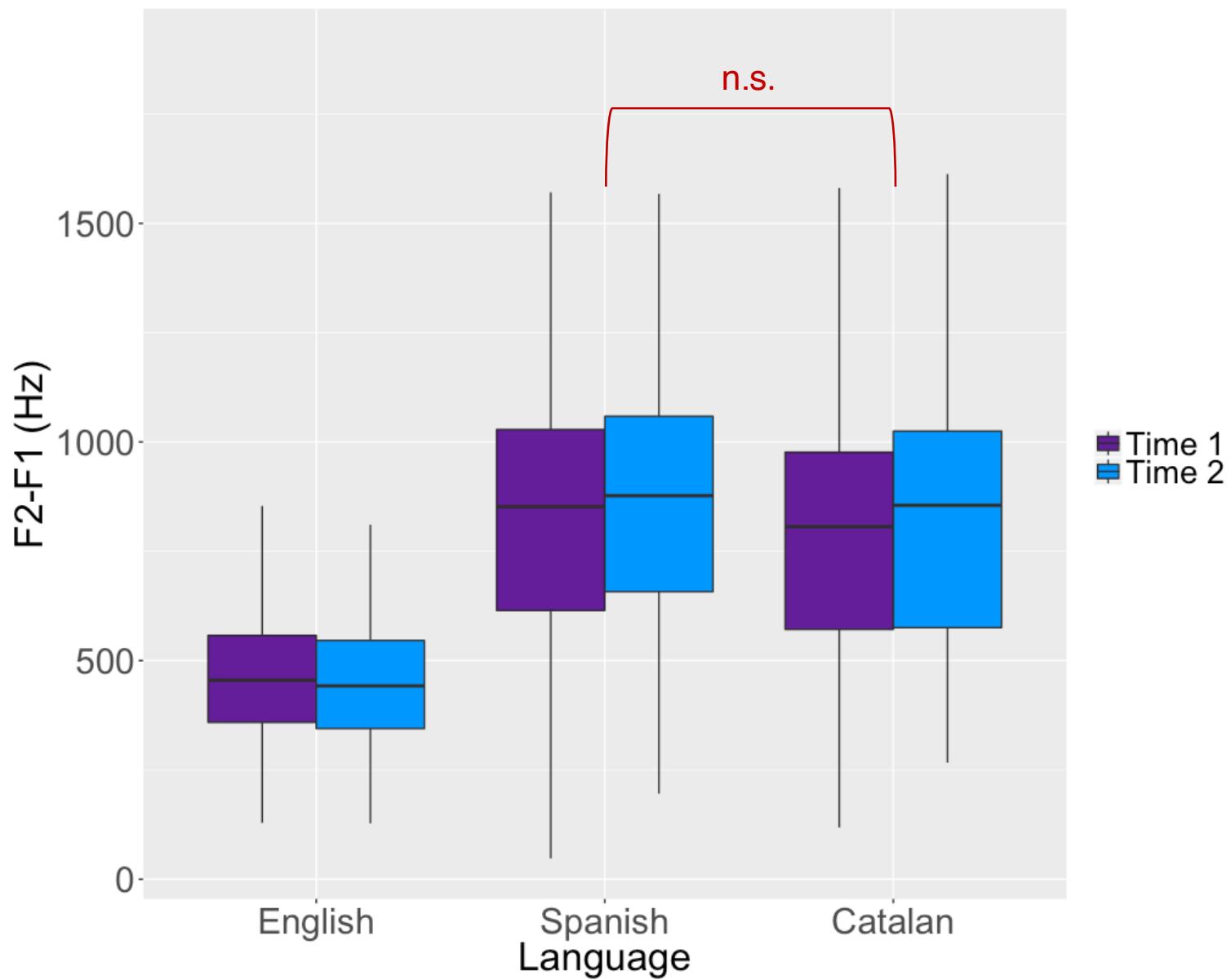
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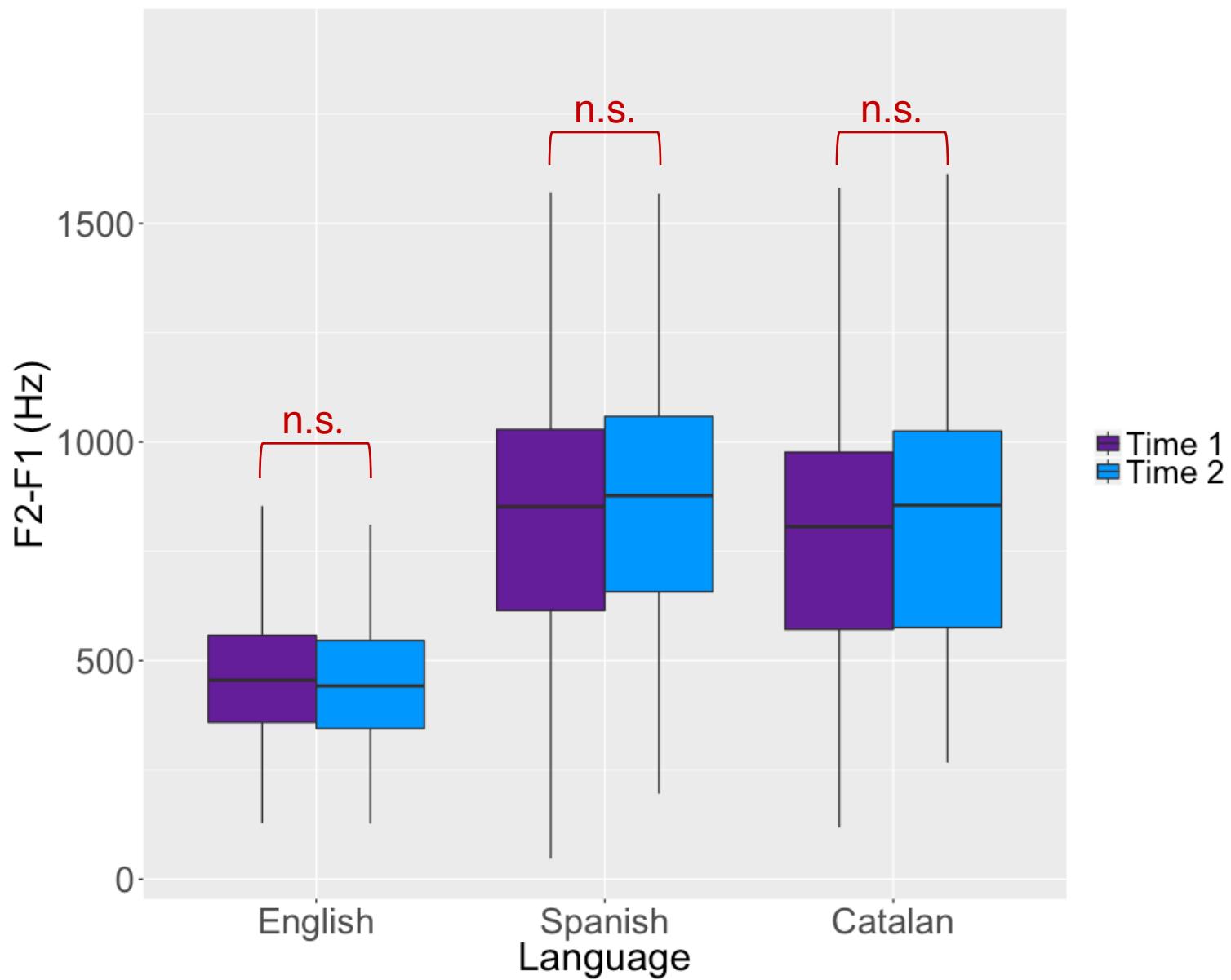
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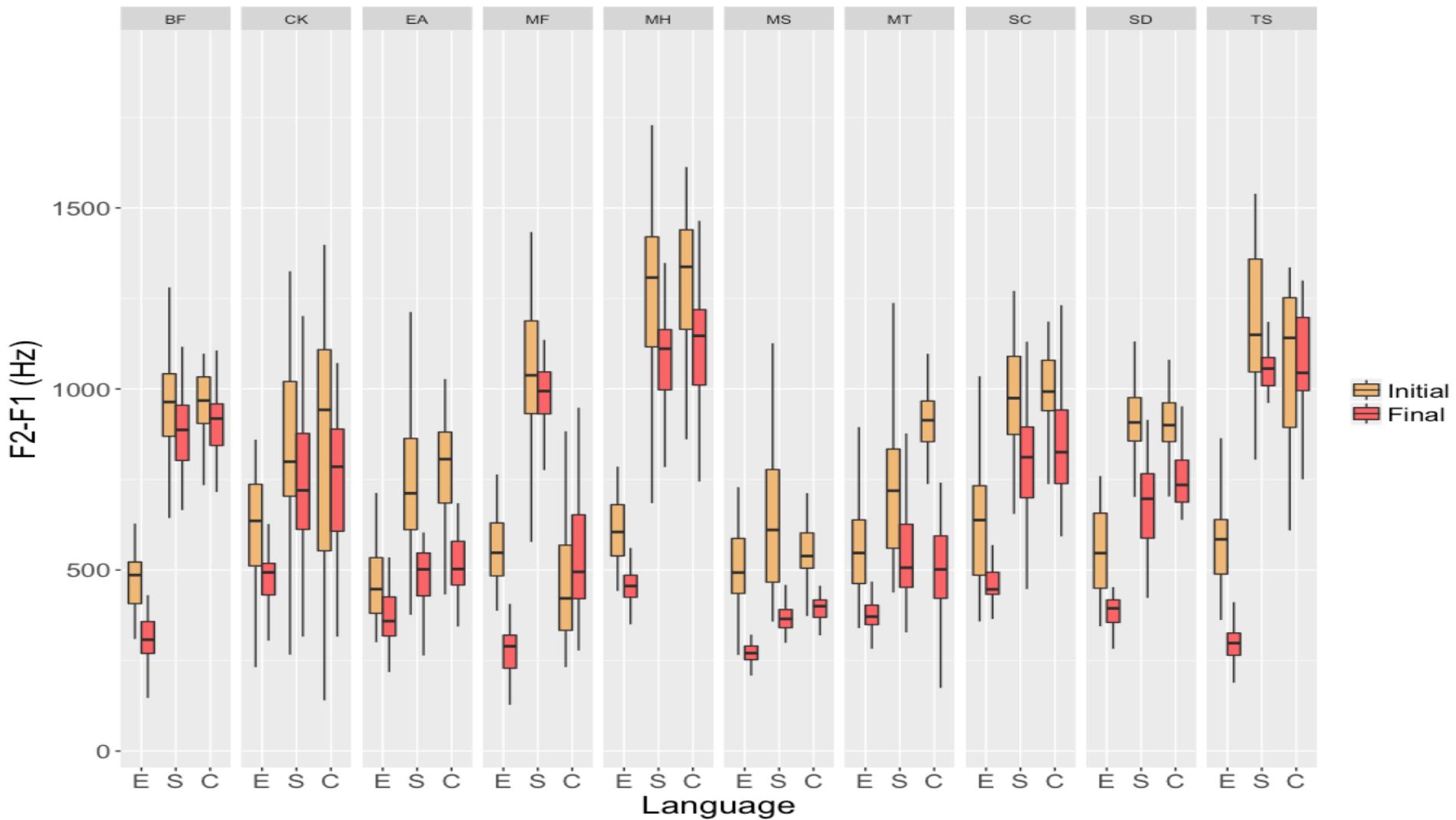
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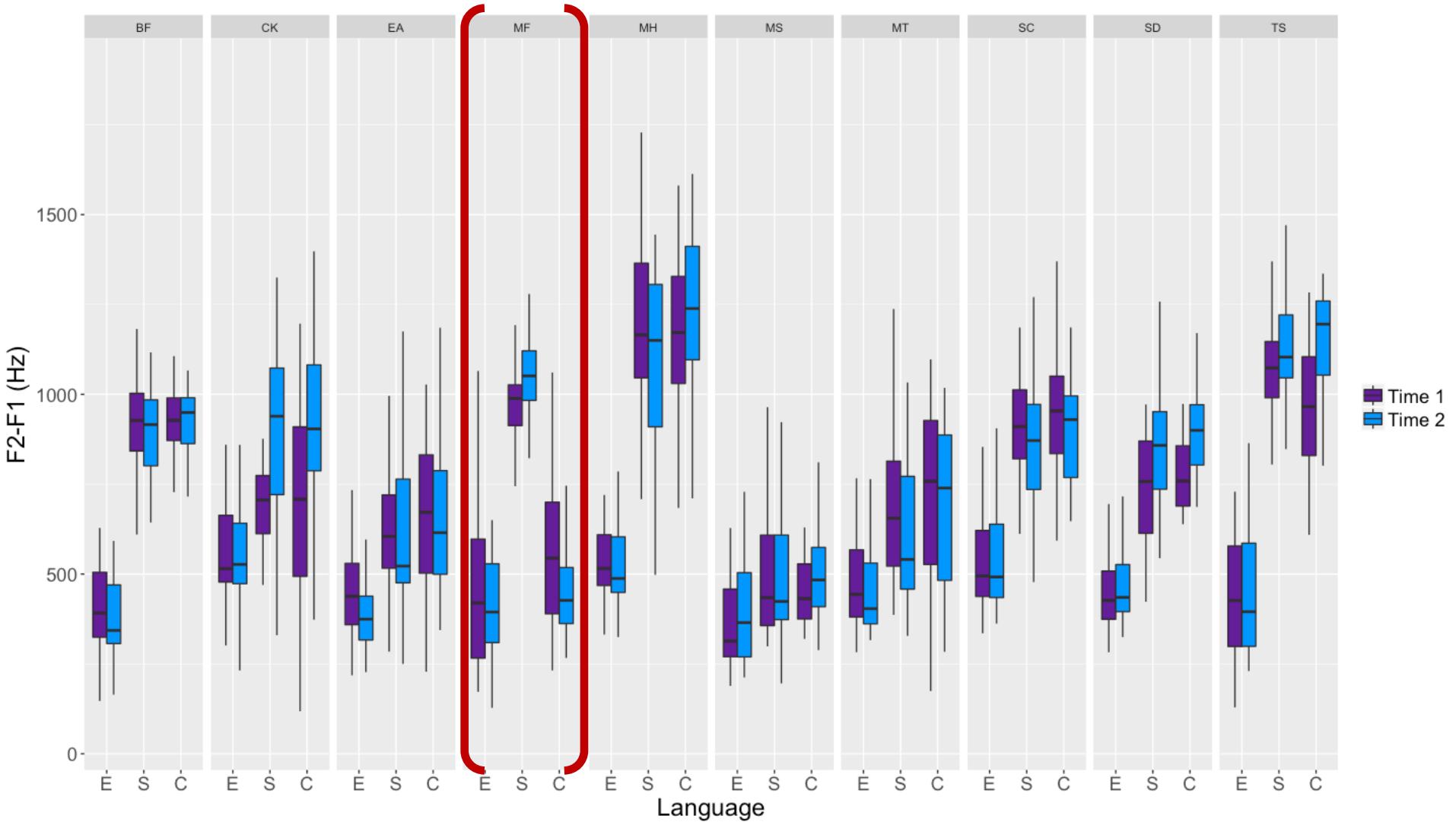
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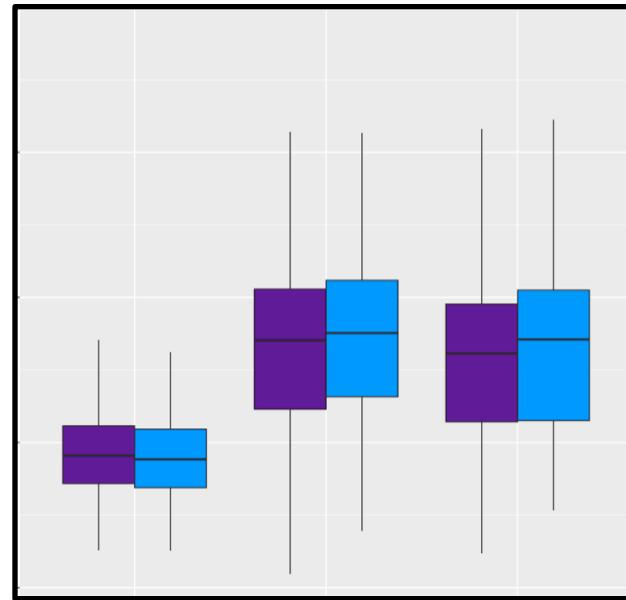
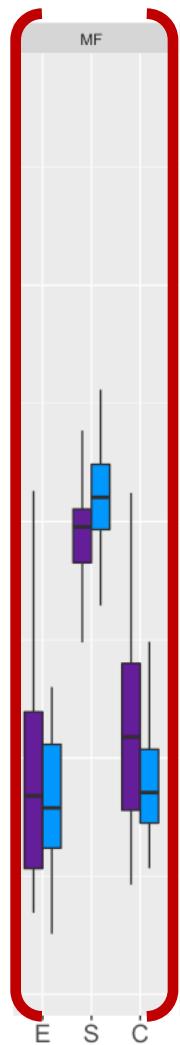
# INDIVIDUAL EFFECTS: POSITION



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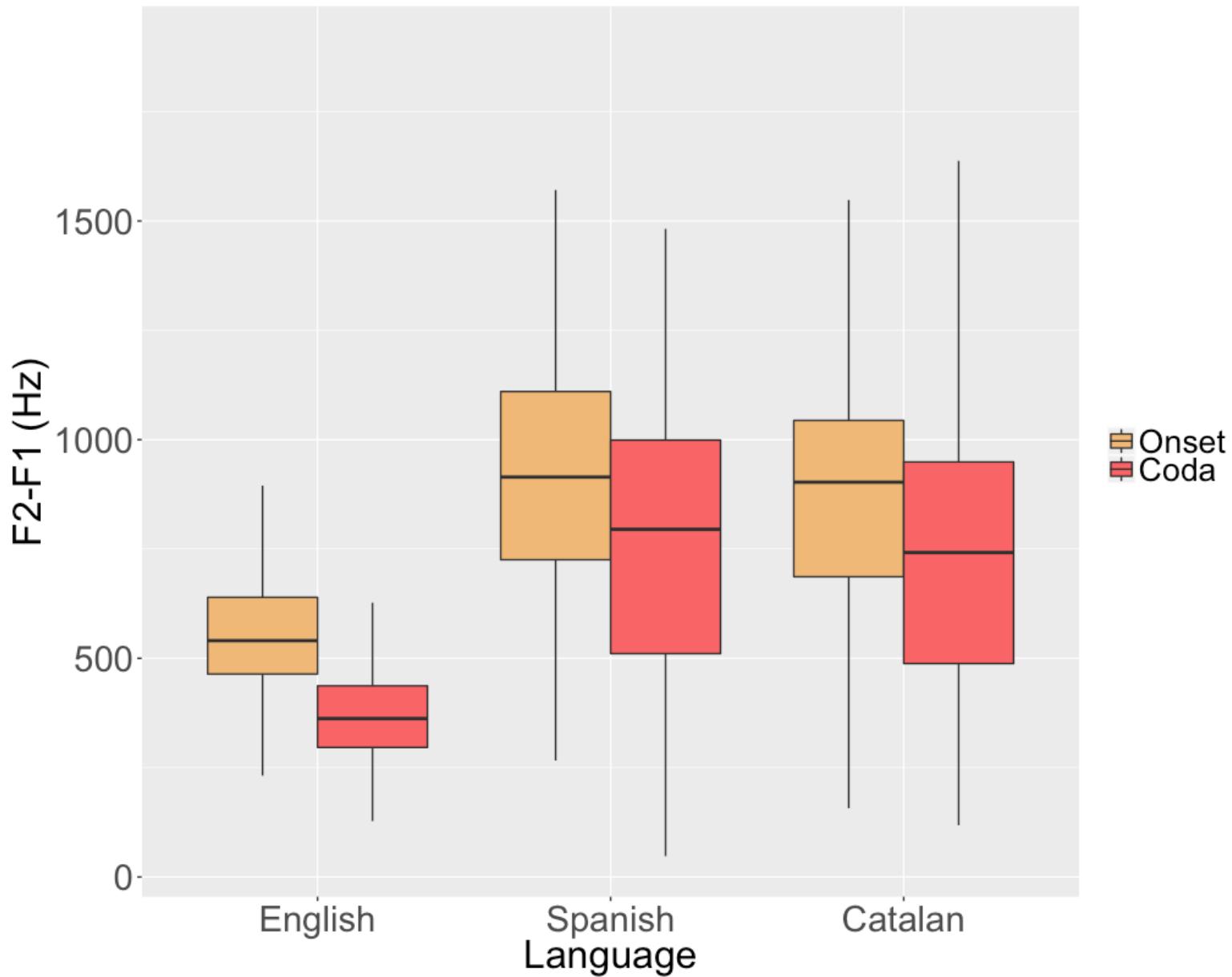
# INDIVIDUAL EFFECTS: TIME



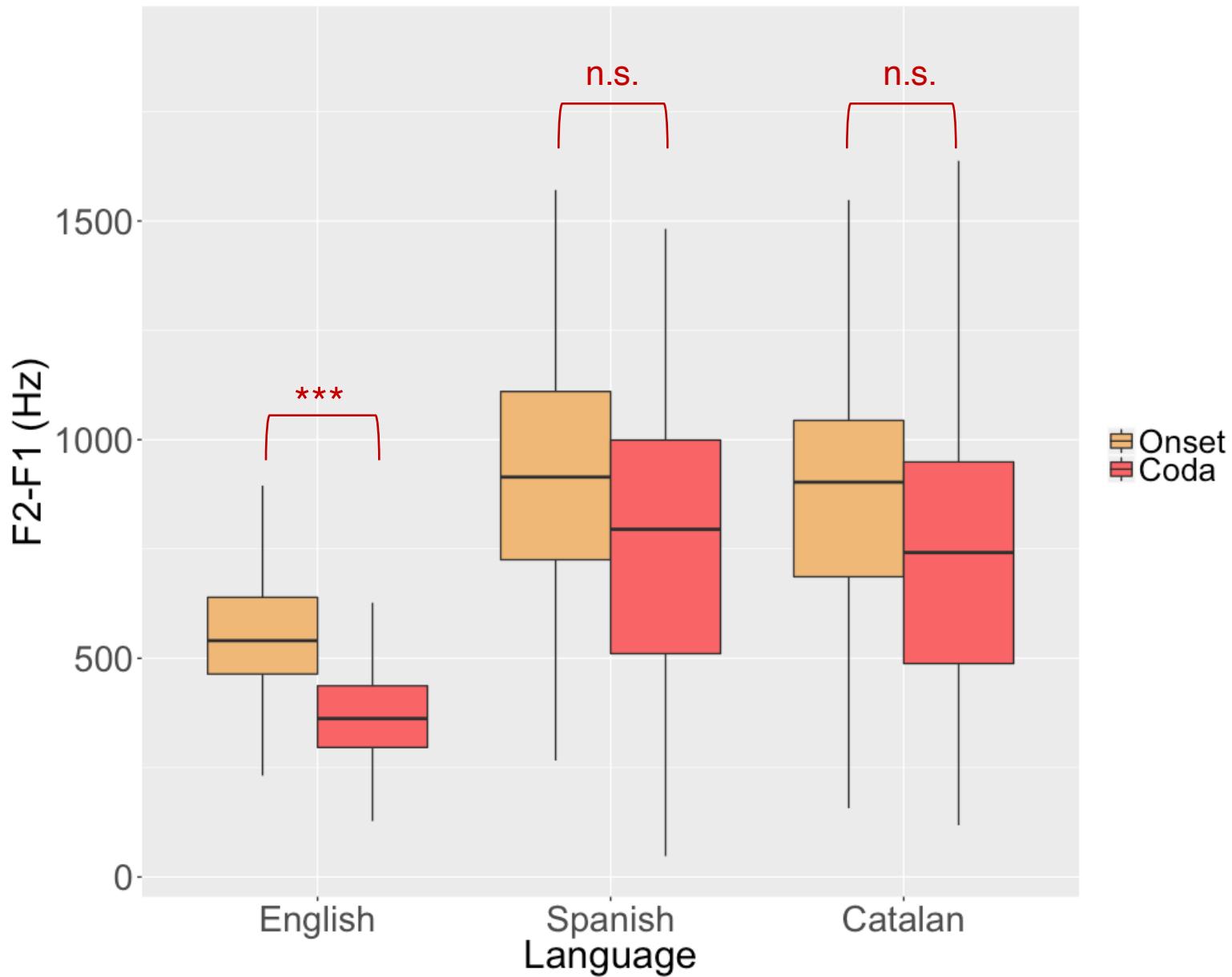
ALL L2/L3 LEARNERS

Time 1  
Time 2

# L2/L3 GROUP: POSITION



# L2/L3 GROUP: POSITION



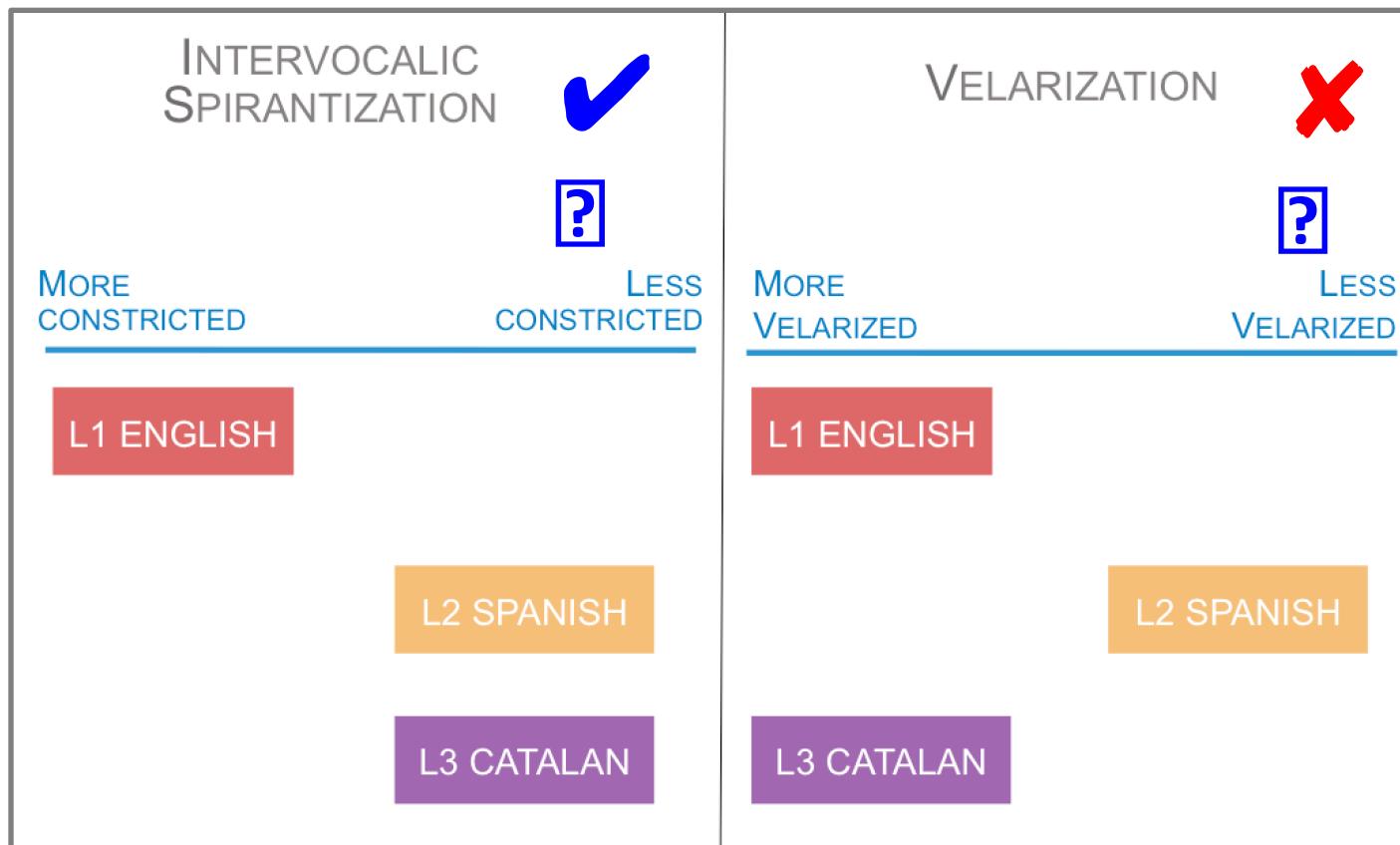
# **SUMMARY & DISCUSSION**

# SUMMARY OF RESULTS

- No differences observed between the two speaker groups for either /b/ or /l/
  - L2/L3 group's production of /b/ and /l/ was similar to L2 group's production of /b/ and /l/ in L1 English and L2 Spanish
  - Suggests no effect of L3 Catalan exposure on either L1 or L2
- For the L2/L3 group, production of both /b/ and /l/ in L3 Catalan was on par with their L2 Spanish production
  - More spirantized [β] in L2 Spanish and L3 Catalan, but plosive [b] in L1 English
  - Less velarization of [l] in Spanish and Catalan, but velarized [t̪] in L1 English
- Allophonic effects on production due to stress or position within the syllable observed in L1 English, but not in L2 Spanish or L3 Catalan

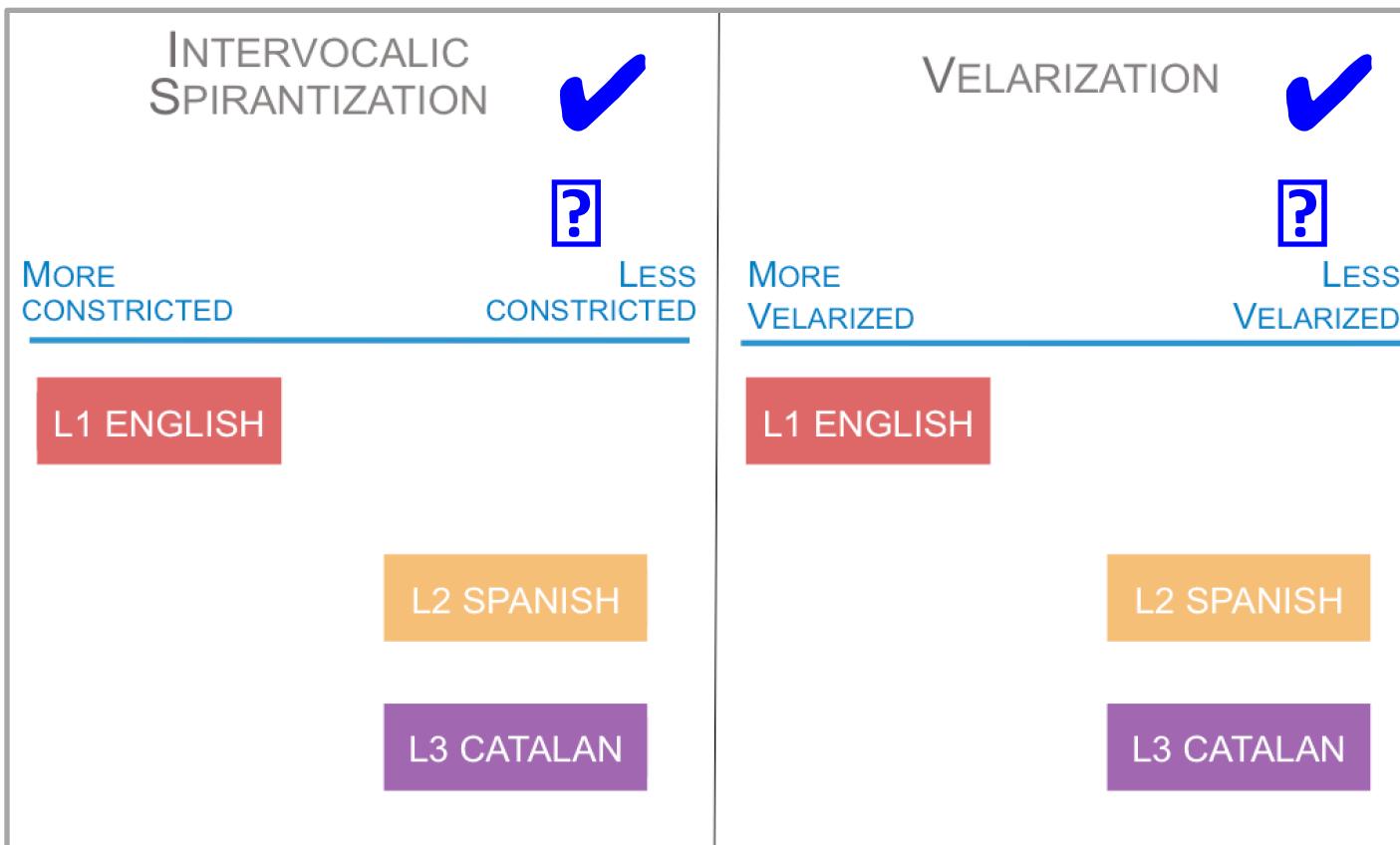
# HYPOTHESIS 1: SENSITIVITY TO SIMILARITY

- L3 Catalan production patterns fit with “Sensitivity to Similarity” hypothesis for Spirantization, but not for Velarization



## HYPOTHESIS 2: L2 → L3 INFLUENCE

- Strong evidence for L2 → L3 transfer as the primary mechanism of cross-linguistic influence at the initial stage of L3 Catalan acquisition



# CONCLUSION

- 1) Strong evidence for L2 Status Factor from the very beginning of L3 acquisition.
  - Robust to the effect of time during early stages of acquisition
- 2) Patterns of cross-linguistic influence into the L3 do not seem to be affected by structural similarity between sound pairs across languages.
  - Effect of structural similarity overridden by L2 Status Factor
- 3) Models of adult phonological acquisition (e.g., Best & Tyler, 2007; Flege, 1995) may need to consider L2-L3 interaction effects of the type we have documented here.

**THANK YOU**

## REFERENCES

- Antoniou, M., Best, C.T., Tyler, M.D., & Kroos, C. (2011). Inter-language interference in VOT production by L2-dominant bilinguals: Asymmetries in phonetic code-switching. *Journal of Phonetics*, 39, p. 558-570.
- Best, C.T., & Tyler, M.D. (2007). Nonnative and second-language speech perception: Commonalities and complementarities. In O. Bohn, & M.J. Munro (Eds.), *Language experience in second language speech learning: In honor of James Emil Flege* (pp. 13-34). Amsterdam: John Benjamins.
- Cabrelli Amaro, J. (2012). L3 Phonology. In J. Cabrelli Amaro, J. Rothman and S. Flynn (Eds.), *Third Language Acquisition in Adulthood* (pp. 33-60). Amsterdam: John Benjamins.
- Cenoz, J. (2001). The additive effect of bilingualism on third language acquisition: A review. *International Journal of Bilingualism*, 7, 71-87.
- De Angelis, G. (2007). *Third or Additional Language Acquisition*. Clevedon: Multilingual Matters.
- Grosjean, F. (1982). *Life with two languages: An introduction to bilingualism*. Cambridge: Harvard University Press.
- Flege, J.E. (1995). Second language speech learning: Theory, findings, and problems. In W. Strange (Ed.), *Speech perception and linguistic experience: Issues in cross-language research* (pp. 233-277). Baltimore: York Press.

# REFERENCES

- Gut, U. (2010). Cross-linguistic influence in L3 phonological acquisition. *International Journal of Multilingualism*, 7, 19-38.
- Harper, S. (2016). Phonological Influence in Third Language Acquisition: L2 Spanish Effects on the Production of L3 Portuguese Voiced Stops. Poster presented at LabPhon 15, Ithaca, New York, July 2016.
- Llama, R., Cardoso, W., and Collins, L. (2010). The influence of language distance and language status on the acquisition of L3 phonology. *International Journal of Multilingualism* 7(1): 39-57.
- Tremblay, M. (2007). L2 influence on L3 pronunciation: Native-like VOT in the L3 Japanese of English-French bilinguals. Paper presented at the L3 Phonology Satellite Workshop of ICPHS XVI, Freiburg, Germany.
- Williams, S., and Hammarberg, B. (1998). Language switches in L3 production: implications for a polyglot speaking model. *Applied Linguistics*, 19(3), 295-333.
- Wrembel, M. (2011). Cross-linguistic influence in third language acquisition of voice onset time. In L. Wai-Sum and E. Zee (Eds.), *Proceedings of the 17<sup>th</sup> International Congress of Phonetic Sciences ICPHS, 17-21 August, Hong Kong* (pp. 2157-2160). Hong Kong: City University of Hong Kong.
- Wrembel, M. (2012). Foreign accentedness in third language acquisition. In J. Cabrelli Amaro, J. Rothman and S. Flynn (Eds.), *Third Language Acquisition in Adulthood* (pp. 281-309). Amsterdam: John Benjamins.

# APPENDIX A: QUESTIONNAIRE

<b>Question</b>	<b>1=very similar; 7=very different</b>
1. Overall, rate how similar you think the <u>Catalan</u> and <u>English</u> languages are.	5.22
2. Rate how similar you think <u>Catalan</u> and <u>English</u> are in terms of pronunciation.	5.5
3. Overall, rate how similar you think the <u>Catalan</u> and <u>Spanish</u> languages are.	2.94
4. Rate how similar you think <u>Catalan</u> and <u>Spanish</u> are in terms of pronunciation.	4.16

# APPENDIX B: QUESTIONNAIRE

Question	1=similar; 3=different
1. Rate how similar the pronunciation of <b>I</b> (not II) is in <u>English</u> & <u>Catalan</u>	1.61
2. Rate how similar the pronunciation of <b>b</b> is in <u>English</u> & <u>Catalan</u>	1.94
3. Rate how similar the pronunciation of <b>I</b> (not II) is in <u>Spanish</u> & <u>Catalan</u>	1.17
4. Rate how similar the pronunciation of <b>b</b> is in <u>Spanish</u> & <u>Catalan</u>	1.41