

*Quierro comprar una guitarra:*  
Lexical encoding of /r/ vs. /rr/ by L2  
learners of Spanish

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Danielle Daidone  
Isabelle Darcy



INDIANA UNIVERSITY



# Introduction

- Spanish has two rhotics that contrast only in intervocalic position: tap /r/ & trill /rr/ (IPA: /r/ & /r/, respectively) (Hualde, 2005), e.g. *pero* ‘but’ vs. *perro* ‘dog’
- L1 American English speakers have difficulties with these sounds
  - In Rose (2010b), only 4 out of 21 learners differentiated the tap and trill environments natively in production
- Rose (2010a) however, found in an ABX task that discrimination of /r/-/rr/ was accurate across all learner levels (between 86.7% and 94.4%)
  - Listeners had more difficulty on /r/-/d/ (62.9%-82.5%)
- So the difficulty appears more articulatory than perceptual (Rose, 2010a; cf. Widdison; 1998; Hammond, 1999; Jimenez, 1987)



## Introduction

- However, this lack of differentiation is apparent even when articulation doesn't play a role:
  - Anecdotally, students make mistakes in orthography: e.g. *perro* for *pero*, *mirraba* for *miraba*, *caro* for *carro*
  - In Rose (2010b) 11 out of 21 learners did not differentiate the tap and trill environments in production at all
- Could this apparent articulation difficulty also hide/reflect a difficulty in representing /r/ vs. /rr/ in mental representations of words?



## L2 Lexical Encoding

- L2 learners have been shown to not accurately encode new contrasts in lexical representations (Pallier et al., 2001; Darcy et al, 2012; see talk later: Kojima & Darcy)
- If a lexical representation only encodes contrastive phonological information, then a new L2 distinction that is not recognized as a contrast by the learner's phonology will be neutralized in lexical representations (Hayes-Harb & Masuda, 2008)
- Both /r/ and /rr/ are most often assimilated to English /r/ in cross-linguistic mapping data by naïve listeners (Rose, 2010a)



## Research Question

- Is the /r/-/rr/ contrast in intervocalic position encoded in the lexical representations of L2 learners of Spanish?



## Method

- We examined both perception/categorization and lexical encoding in the same learners
- Tasks:
  - Language Background Questionnaire
  - Lexical Decision
  - ABX
  - Word Familiarity Questionnaire
    - No learners had to be excluded based on low familiarity with the words in the experiment



## Lexical Decision Task

- Participants had to decide whether the stimulus they heard was a real Spanish word or not
- Stimuli were created by exchanging trill /rr/ for tap /r/ or vice versa to create word-nonword (W-NW) pairs
  - Ex. *guerra* 'war', *guera*\*; *quiero* 'I want', *quierro*\*
- The same was done with /r/-/d/ and /rr/-/d/, as well as a control /p/-/f/ contrast
- In total, 10 W-NW pairs were created for each contrast, plus 24 W and 24 NW fillers
- 2 lists were created; each participant only heard either the word or the nonword of a W-NW pair = 128 stimuli + 10 practice
- Stimuli were recorded by 2 NSs of Spanish (1 male, 1 female)



## ABX Task

- Participants heard 3 sentences in a row, each containing a nonword; they had to decide whether the last nonword was the same as the 1<sup>st</sup> or the 2<sup>nd</sup> nonword

*Le digo nera al profe*

A

NS female voice 1

*Le digo nerra al profe*

B

NS female voice 2

*Le digo nera al profe*

X

NS male voice

- Test contrasts /r/-/rr/, /r/-/d/, /rr/-/d/; control contrast /p/-/f/:  
5 NW pairs per contrast x 4 repetitions = 60 test trials &  
20 control trials + 16 filler trials + 9 practice trials





## Participants

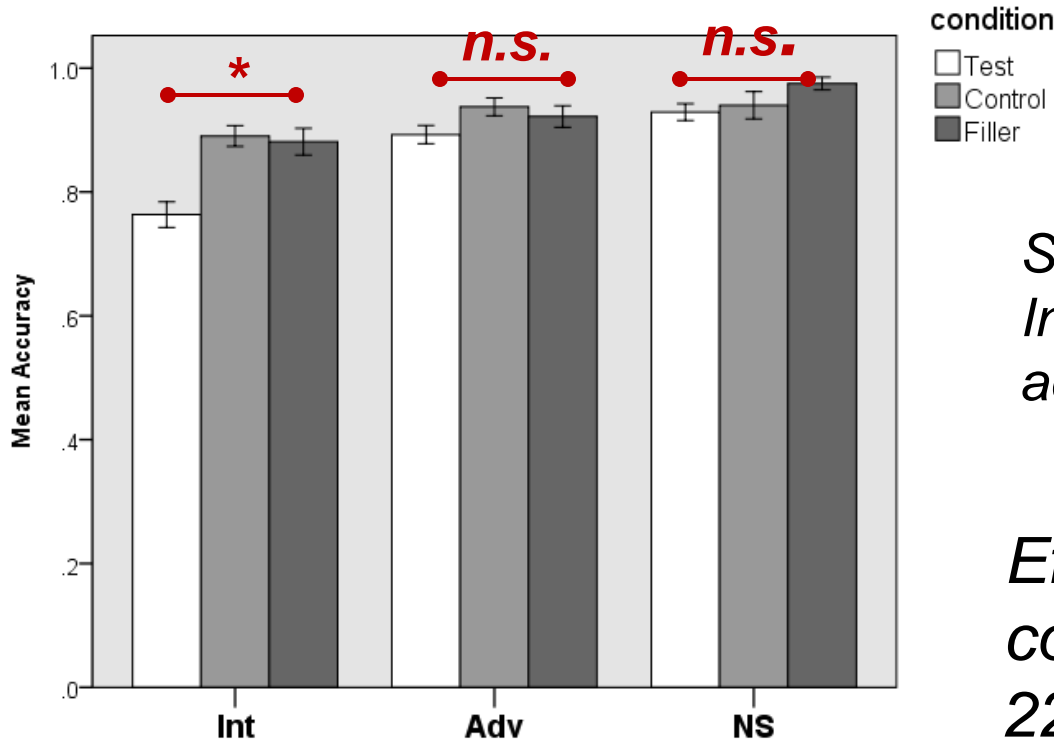
- Intermediate speakers: enrolled in a 5<sup>th</sup> semester Spanish class
- Advanced speakers: mostly graduate students in Hispanic Linguistics or Literatures, some undergraduates in higher level classes
- Native Spanish speakers



# ABX RESULTS



# Overall Accuracy Data



Int n=21  
Adv n=20  
NS n=10

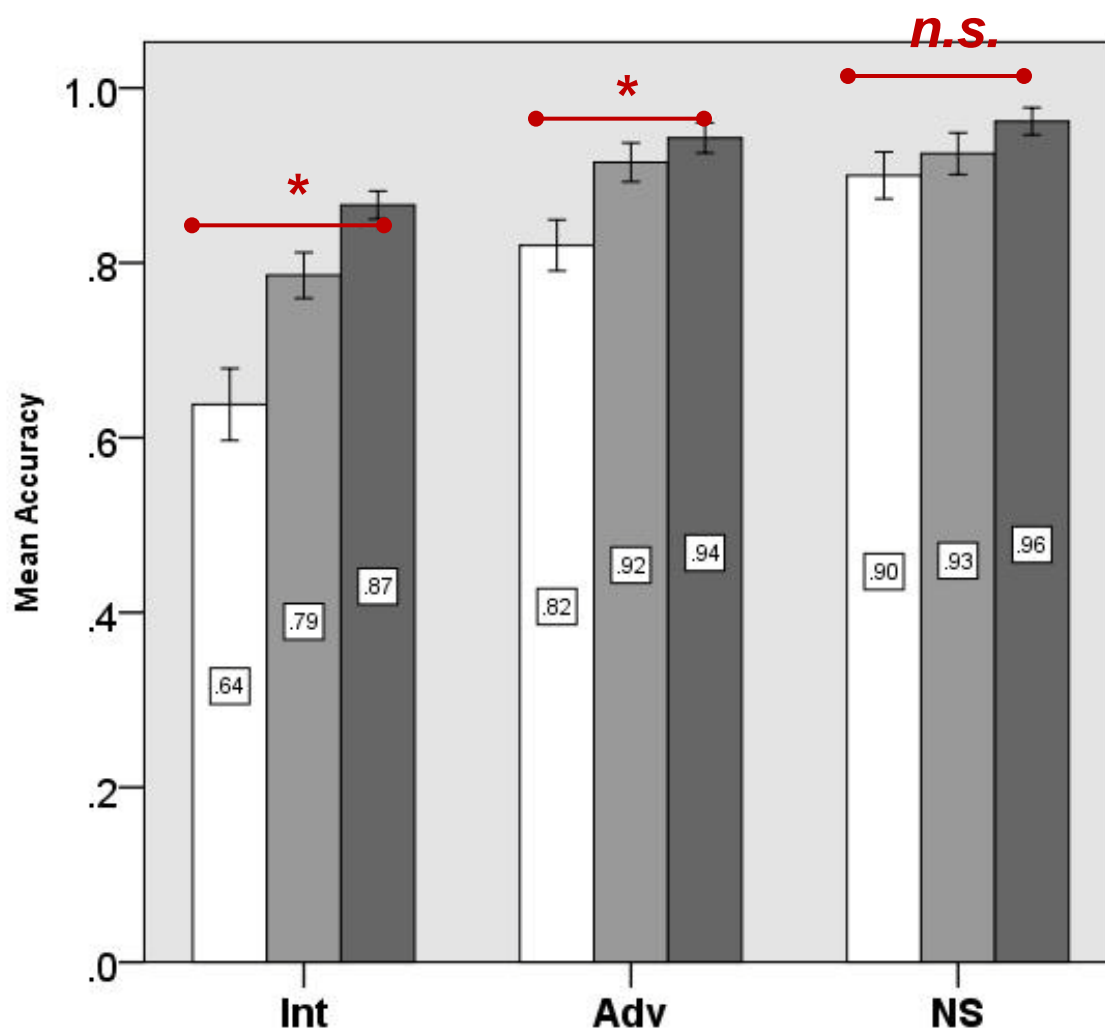
*Significant effect of condition for Intermediates only: Less accurate on Test*

*Effect of Group on the condition "Test":  $F(2, 84.8) = 22.6, p < .001$*

*→ Look at **Test Condition** in more detail*



# Test Condition



contrast

- r - d
- r - rr
- rr - d

Main effect of “Group”  
( $F(2,48) = 24.6, p < .001$ ).

Mainly due to the  
Intermediates. Overall, the  
Advanced learners **do not**  
**differ** from the native  
speakers ( $p > .6$ )

Effect of “contrast”  
significant only for  
Intermediates and  
Advanced



# Summary

- One contrast (/r-d/) is most difficult:
  - /r-d/ is the least accurate: *Mean accuracy* { *Intermediate: 64%*  
*Advanced: 82%*  
*Natives: 90%*
  - /r-rr/ is not too difficult to perceive: *Mean accuracy* { *Intermediate: 79%*  
*Advanced: 92%*  
*Natives: 93%*
  - /rr-d/ is least difficult: *Mean accuracy* { *Intermediate: 87%*  
*Advanced: 94%*  
*Natives: 96%*
- There is no significant difference in accuracy between /r-rr/ and /rr-d/ but /r-d/ is significantly LESS accurate than both other contrasts



## Summary

- Intermediates are less accurate on Test condition
- Native speakers show no significant difference in accuracy among the three contrasts
- Both Intermediates and Advanced are less accurate on /r-d/
- Overall, Advanced learners are not different from Native speakers



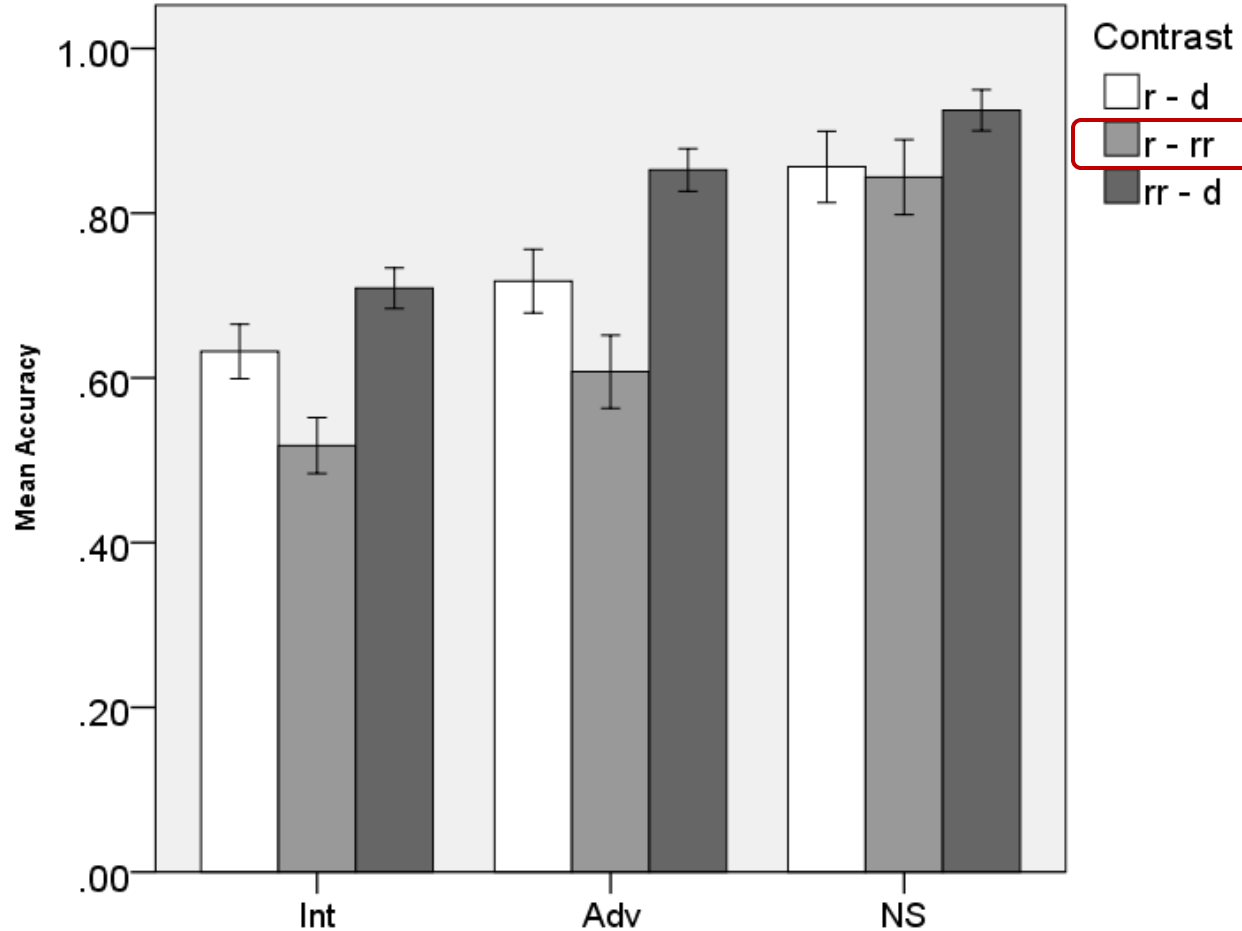
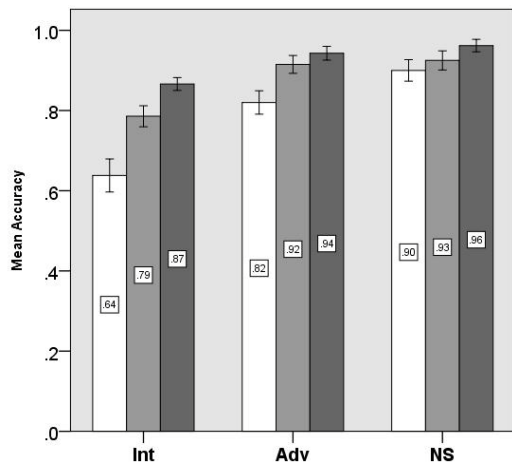
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# LEXICAL DECISION RESULTS



# Lexical Decision Global Accuracy by contrast

**ABX:**

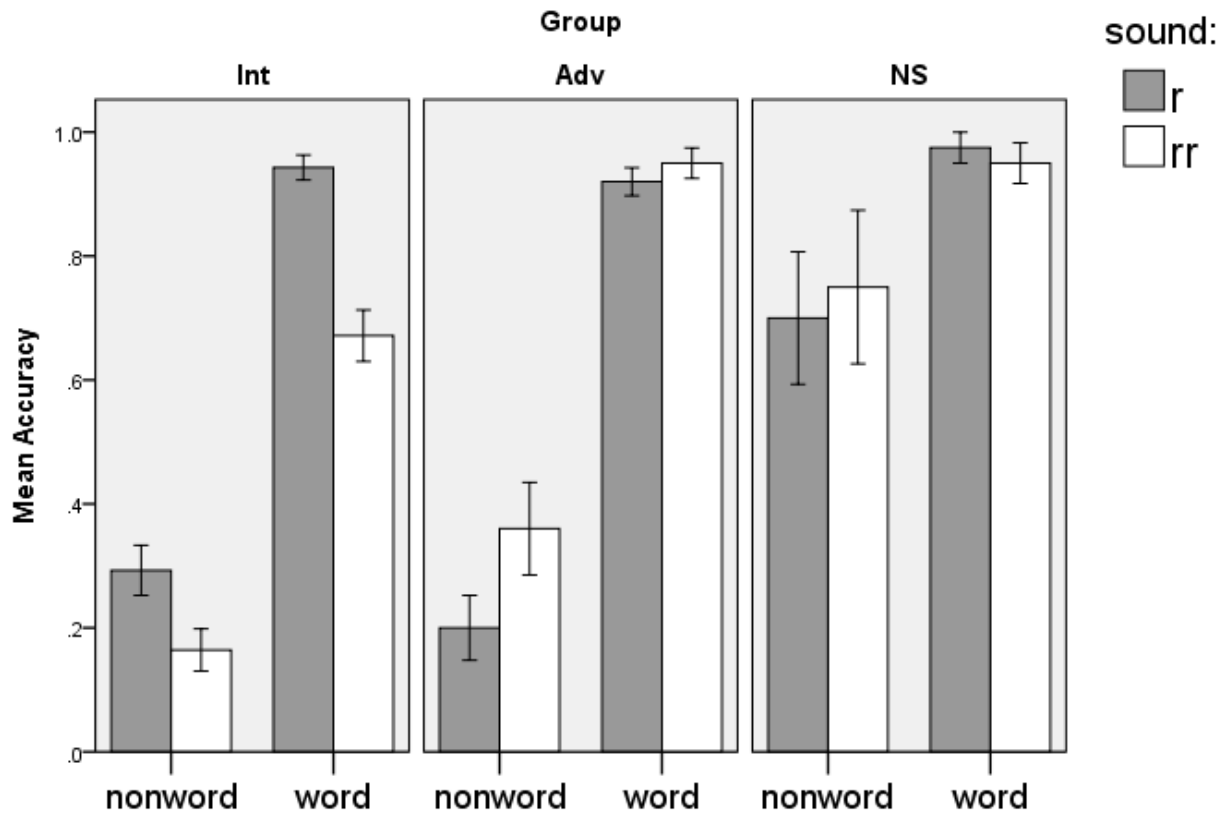






# Accuracy for /r-rr/

Overall Accuracy	/r/	/rr/
Intermediate	.62	.42
Advanced	.56	.65
NS	.84	.85



**Adv vs. Int :  $p < .044$**   
**Adv vs. NS:  $p < .001$**   
**Int vs. NS:  $p < .001$**



## Discussion

- Is the /r/-/rr/ contrast in intervocalic position encoded in the lexical representations of L2 learners of Spanish?
- This contrast appears to be unstable, if encoded at all
- Could this apparent articulation difficulty also hide/reflect a difficulty in representing /r/ vs. /rr/ in mental representations of words?
- Yes, our data suggests that this difficulty originates in the way words are encoded



## Implications

- Categorical discrimination ability does not directly relate to how these contrasts will be lexically encoded
- If learners can perceive a difference, even in a demanding ABX task, what prevents them from maintaining this distinction at the lexical level?



# Thank you!

- Danielle Daidone [ddaidone@indiana.edu](mailto:ddaidone@indiana.edu)
- Isabelle Darcy [idarcy@indiana.edu](mailto:idarcy@indiana.edu)



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