

Difficulty lexically encoding Spanish rhotics: L1 phonological grammar or variability in the input?

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Introduction

- Spanish has two rhotics that contrast only in intervocalic position: tap /r/ & trill /r/, e.g. *pero* 'but' vs. *perro* 'dog' (Hualde, 2005)
- American English has a single rhotic phoneme which is realized most often as a voiced alveolar approximant [ɹ] (Ladefoged & Johnson, 2011)
- English speakers have difficulties with the Spanish rhotics

Low canonical trill production by L2 learners

| Learner group | Trill [r] |
|--|-----------|
| 1st-3rd semester | 5-13% |
| 4th-5th semester | 0-27% |
| 8 th semester | 2-20% |
| Advanced majors/minors | 26.6% |
| Doctoral/Advanced non-native instructors/faculty | 59-83% |

The tap is often one of the most frequent realizations of the trill for learners

Lack of tap-trill contrast

- This lack of differentiation is apparent even when articulation difficulty doesn't play a role:
- Daidone and Darcy (2014) found that while learners were quite accurate at the tap-trill contrast in a perception task, they did not distinguish these rhotics in lexical representations

L2 lexical encoding of tap and trill

- Daidone and Darcy (2014) tested L2 learners on words and non-words created by switching the rhotic
- trill for tap, e.g. *señora* [sejora] and **señorra* [sejora]
- tap for trill, e.g. *correcto* [korekto] and **corecto* [korekto]

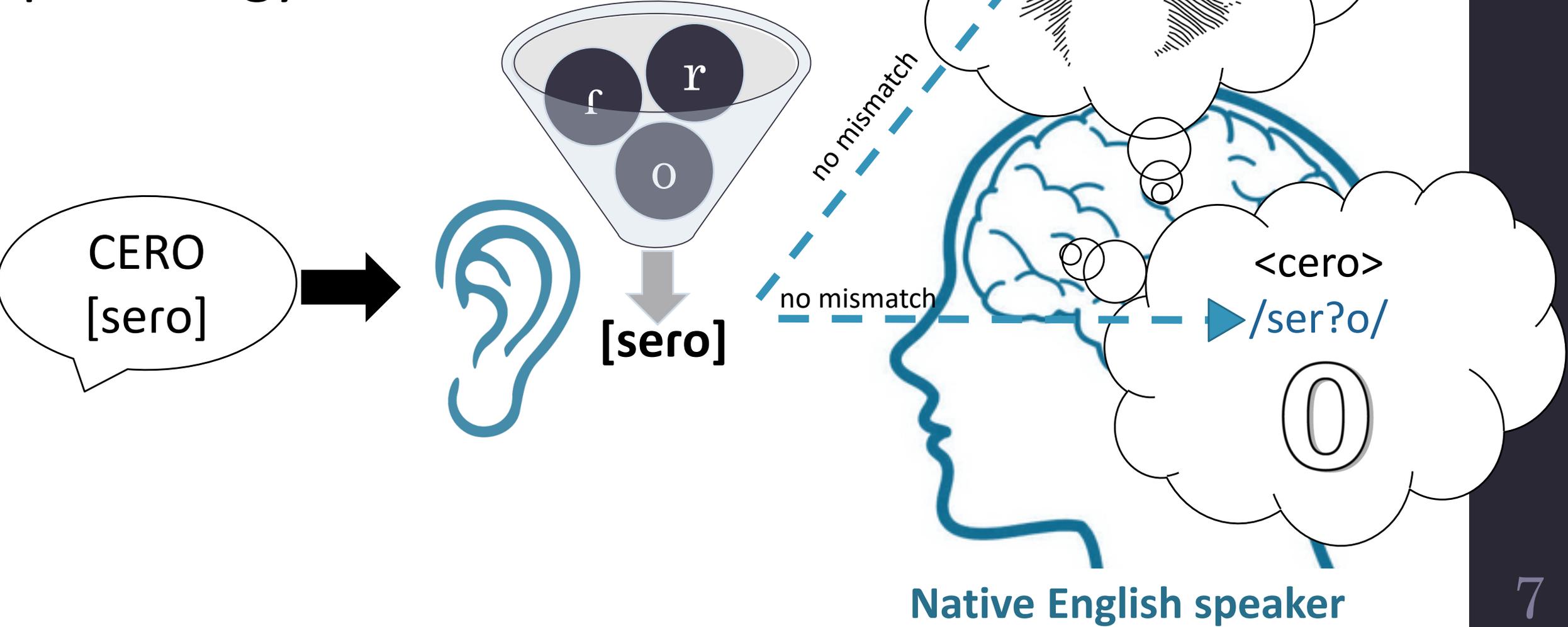
| | Mean Accuracy | |
|--------------|---------------|----------|
| Group | Word | Non-Word |
| Intermediate | 81% | 23% |
| Advanced | 93% | 28% |
| NS | 96% | 72% |

L2 learners accepted a token with either rhotic as a word over 70% of the time

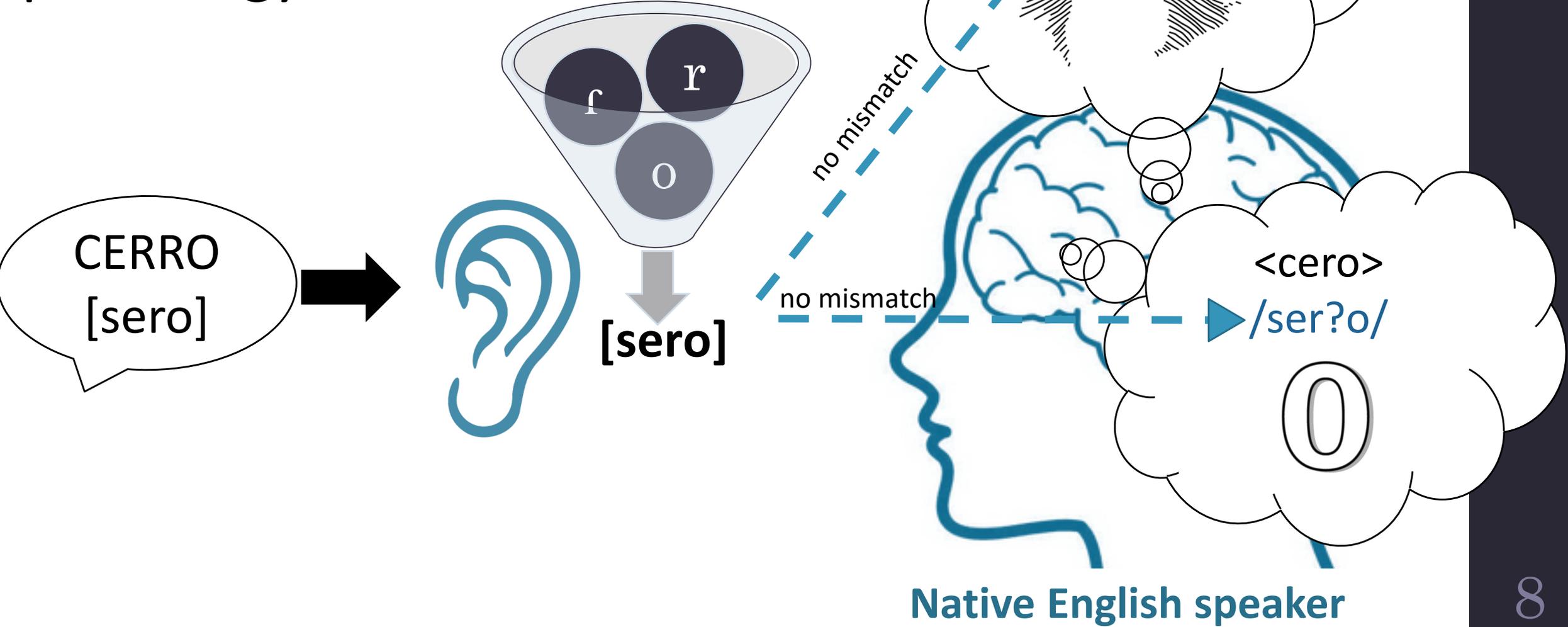
L2 lexical encoding: Role of the L1 phonological grammar

- L2 learners have been shown to not accurately encode novel L2 contrasts in lexical representations (e.g., Pallier et al., 2001; Darcy, Daidone, & Kojima, 2013; Darcy & Thomas, 2019)
- 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 (e.g., Hayes-Harb & Masuda, 2008)
- Both tap and trill are most often assimilated to English /ɹ/ in cross-linguistic mapping data by naïve listeners (Rose, 2012)
- = L2 learners have underspecified or fuzzy lexical representations due to the L1 phonology (e.g., Cook, Pandža, Lancaster, & Gor, 2016; Darcy, Daidone, & Kojima, 2013, Hayes-Harb & Masuda, 2008)

Underspecified or fuzzy lexical representations due to the L1 phonology



Underspecified or fuzzy lexical representations due to the L1 phonology



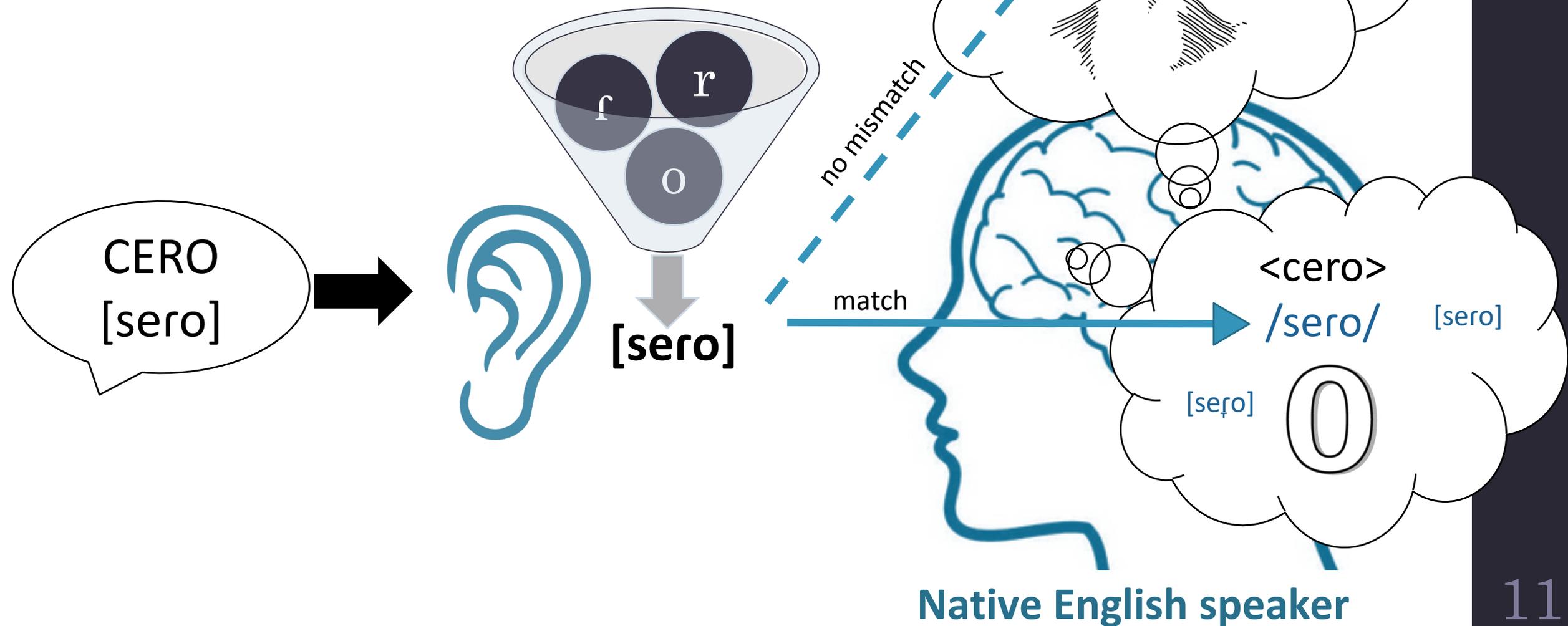
...But what about variability in the input?

- Trill /r/ is variable in native-speaker production (e.g., Díaz-Campos, 2008; Hammond, 1999, Widdison, 1998; Willis, 2006)
 - Velar variants in Puerto Rico (Lipski, 1990)
 - Pre-breathy voiced variants in Dominican Republic (Willis, 2006, 2007)
 - A range of variants from fricatives to approximants in Argentina (Colantoni, 2006)
 - An assibilated variant throughout Latin America (e.g., Bradley, 1999, 2006)
 - A tap realization in various dialects (e.g., Díaz-Campos, 2008; Willis, 2006)
 - Can be distinguished by duration from tap in tap context (e.g., Willis & Bradley, 2008)
 - Learners are not sensitive to this duration difference (Melero García & Cisneros, 2018)

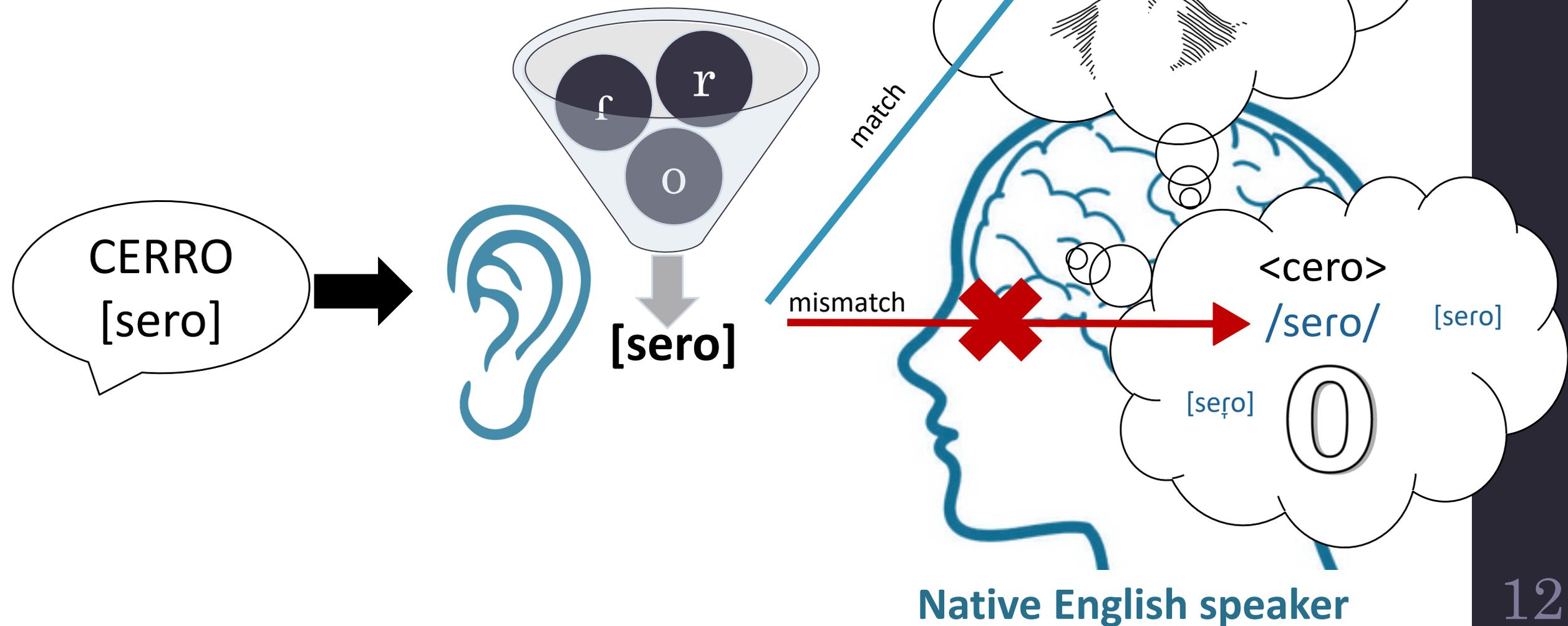
L2 lexical encoding: Role of variability in the input

- Learners may be exposed to this variability, particularly advanced learners with more language experience outside the classroom
 - Can this explain the behavior of learners in Daidone and Darcy (2014)?
- Melero García and Cisneros (2018) found that learners were 89% accurate in identifying stimuli with canonical realizations of the trill as the correct word
 - e.g., hear *carro* [karo] and choose between <caro> and <carro>
- = accurate lexical representations, but willing to accept a tap as a possible pronunciation of the trill due to variation in the input

Accurate lexical representations
but broadly accepting for trill
due to variability in the input



Accurate lexical representations
but broadly accepting for trill
due to variability in the input



Research Question

- Are L2 learners' apparent difficulties with lexically encoding Spanish rhotics due to their L1 phonological grammar or to variation in the input?
- If lexical representations are fuzzy or underspecified due to the L1 phonological grammar...
 - Learners should accept either rhotic as a possible realization
 - Learners should have difficulty choosing the canonical form of a word
- If lexical representations are accurate, but broadly accepting for trill due to variability in the input...
 - Learners should accept the tap for trill but not trill for tap, e.g. accept *corecto* but not *señorra*
 - Learners should not have difficulty choosing the canonical form of a word

Participants

- 24 intermediate English-speaking learners of Spanish
 - undergrads in 5th semester or higher
- 12 advanced English-speaking learners of Spanish
 - grad students or a postdoc teaching Spanish
- 7 native Spanish speakers
 - from a variety of countries, all speak English as an L2

Tasks

- Hearing screening
- Lexical decision task
- Oddity task
- Forced choice lexical decision task
- Serial non-word recognition task
- Flanker task
- Retrieval-induced inhibition task
- X_Lex vocabulary test
- Language background questionnaire

Tasks

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Lexical Decision Task

Participants hear a stimulus, then indicate if it is a real word of Spanish or not



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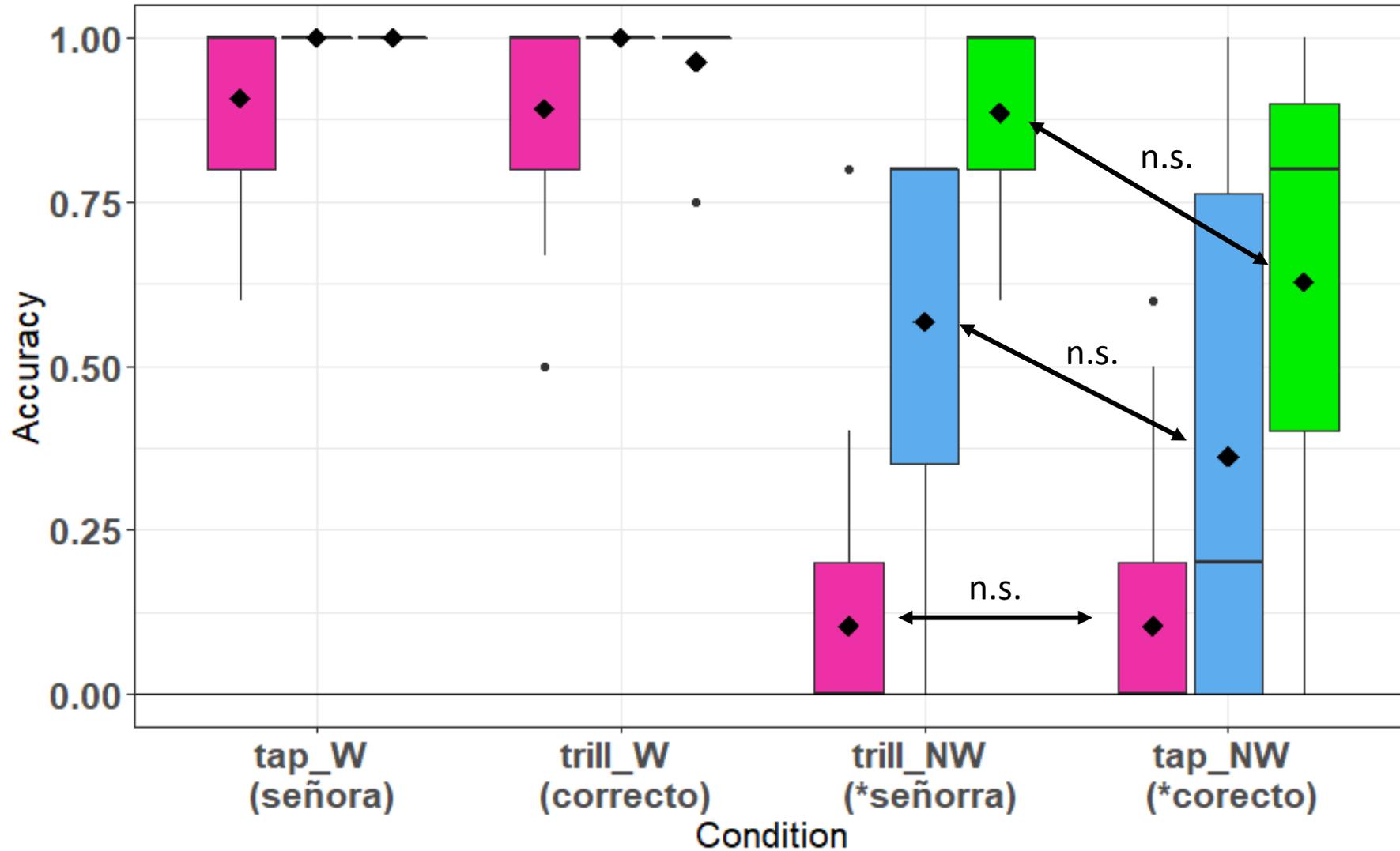
Forced-Choice Lexical Decision Task

Participants hear two stimuli, then indicate which is the real Spanish word



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Lexical Decision Task - Results



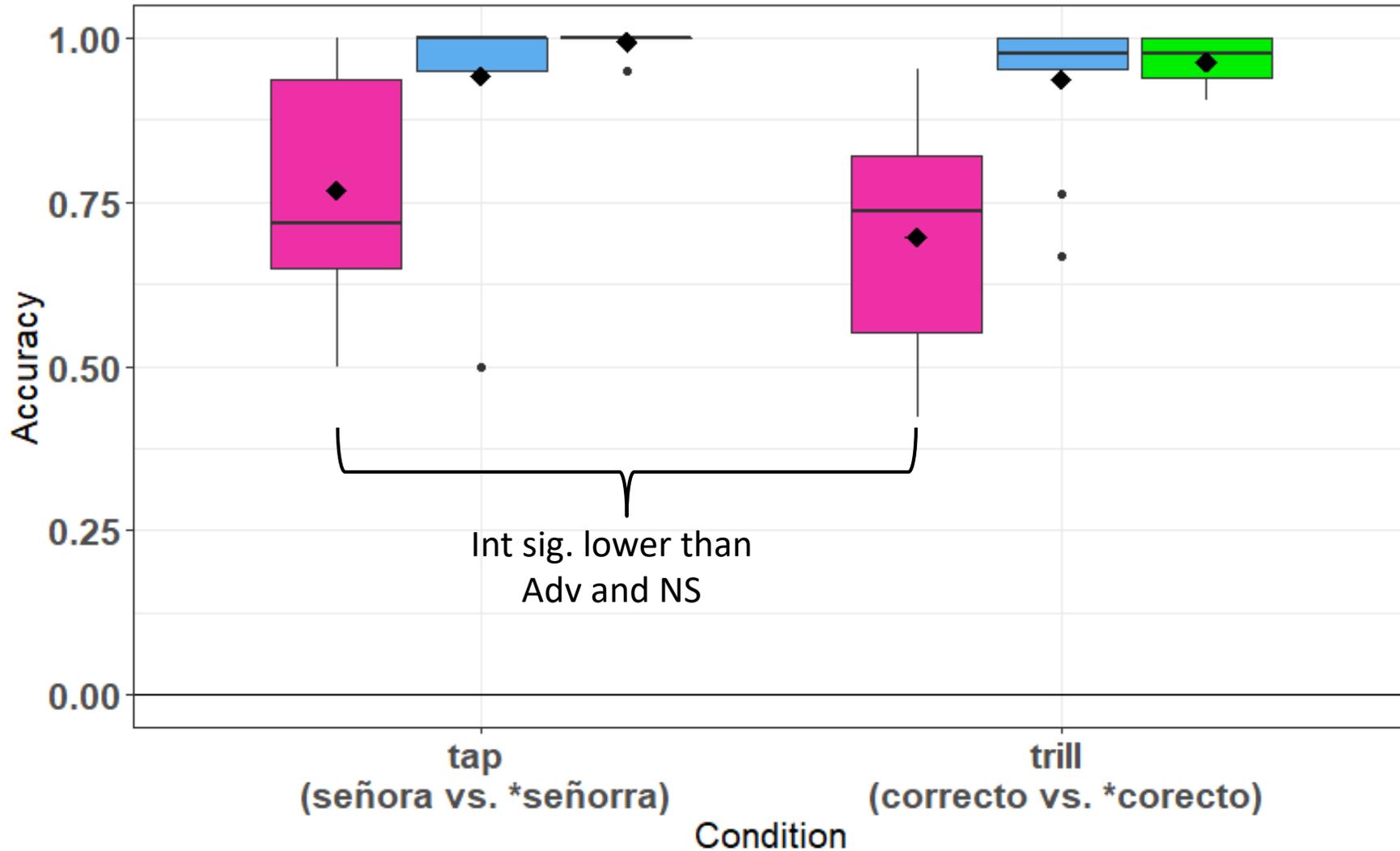
Predictions reminder:
 No asymmetry = L1 phonology
 Asymmetry (tap for trill) = Input

Group
 Intermediate (pink)
 Advanced (blue)
 NS (green)

Int: L1 phonology
 Adv: Input?

Note: A word was excluded if unknown by a participant

Forced Choice Lexical Decision Task - Results



Predictions reminder:
Low accuracy = L1 phonology
High accuracy = Input

Group
Intermediate
Advanced
NS

Int: L1 phonology
Adv: Input

Note: A word was excluded if unknown by a participant

Discussion

- Intermediate learners appear to have fuzzy lexical representations for words with Spanish rhotics
 - accepted non-words with the other rhotic
 - could not identify the canonical pronunciation of words with rhotics
- Results are less clear for advanced learners
 - accepted non-words with the other rhotic, although there was a numerical tendency toward a tap for trill asymmetry
 - could identify the canonical pronunciation of words with rhotics
- Explanation varies by learner?

Individual differences

L1 phonological grammar

- Acceptance of either rhotic in LD
 - 50% accuracy or below on both tap and trill non-words
- Not accurate in FCLD
 - below 80% accuracy

Intermediate: 12/24
Advanced: 1/12
NS: 0/7

High accuracy (80% or above) across both tasks:
Intermediate: 0/24
Advanced: 3/12
NS: 4/7

Variability in the input

- Tap for trill asymmetry in LD
 - 50% accuracy or below for tap non-words (e.g., **corecto*)
 - 80% accuracy or higher for trill non-words (e.g., **señorra*)
- Accurate in FCLD
 - 80% accuracy or higher

Intermediate: 1/24
Advanced: 3/12
NS: 2/7

High accuracy (80% or above) on FCLD but low on non-words in LD (50% or below):
Intermediate: 5/24
Advanced: 2/12
NS: 0/7

Discussion

- Most intermediate learners appear to have fuzzy(ish) lexical representations words with for Spanish rhotics
 - half chose either rhotic across tasks
 - some could choose the canonical realization, but accepted either rhotic → making decision based on knowledge of orthography?
- Results more mixed for advanced learners
 - one chose either rhotic across tasks
 - some could choose the canonical realization, but accepted either rhotic → making decision based on knowledge of orthography?
 - others appear to be influenced by variability in the input
 - some chose only the canonical realization across tasks

Discussion

- Results also mixed for native speakers
 - some chose only the canonical realization across tasks
 - others accepted tap for trill but not trill for tap
 - one NS said she chose 'word' even if they sounded wrong because someone might say that
- Advanced learners behaved more like native speakers
 - more native-like lexical encoding with more language experience

Future Directions

- Look at more individual differences
- Look at the correlation with perception ability
- See if their knowledge of orthography plays a role
- Examine their input experiences, e.g. study abroad

Thank you!

- Questions?
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