

---

# Effects of L2 proficiency in perception of native-like stimuli with embedded L2 vowels

---

Fernanda Barrientos  
University of Manchester

---

# Background: L2 Phonology

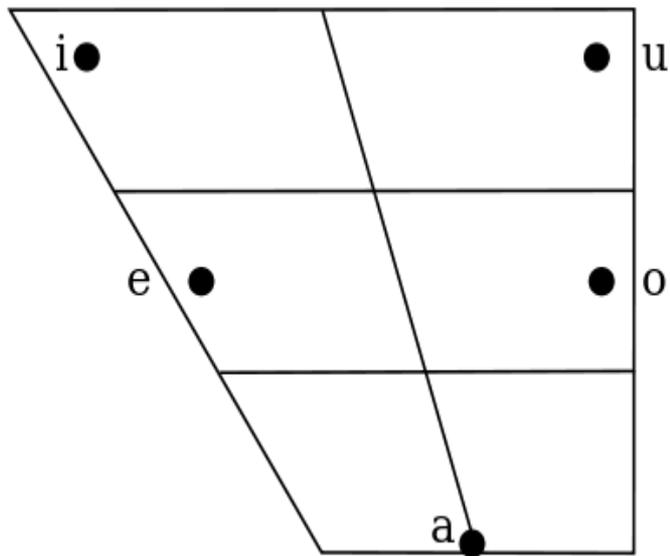
---

- Some L2 speakers' L1 inventory has fewer elements than the target language's.
  - Therefore, some L2 speakers need to acquire more categories in order to distinguish minimal pairs in L2 that are not present in L1.
    - “Ship” and “sheep” for L2 speakers of English whose L1 is Spanish (Spanish has no tense-lax contrast).
    - “Perceptual magnet effect” (Kuhl & Iverson, 1995): L1 sounds act as a prototypes, hence reducing the perceptual space between prototypical L1 and a similar L2 category.
  - These new L2 categories need to “share the room” with an L1 category, in perceptual terms.
    - Whenever this happens, will acquisition of L2 sound categories influence perception of L1 categories?
-

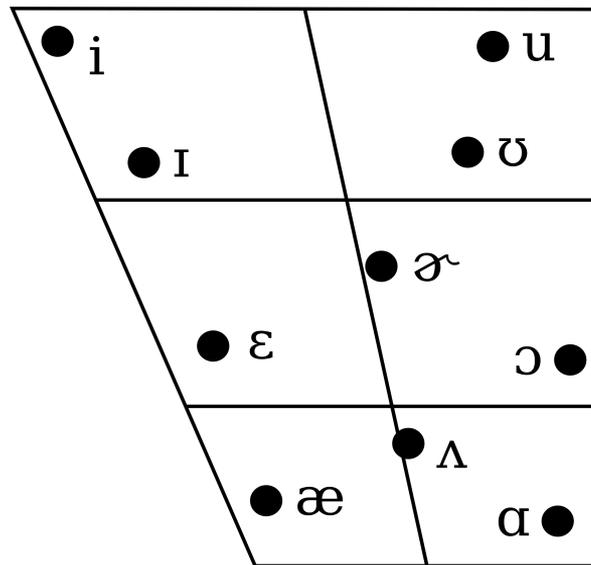
# Spanish vs. English vowel inventory

---

Spanish



English (GA)



# Categorical perception in L2

---

	<b>SLM (Flege, 1995)</b>	<b>PAM (Best, 1995)</b>	<b>Escudero (2005)</b>
Access	yes, but it decreases with age	yes, but it decreases with age	yes, no claims about influence of age
Learning mechanism	Same as L1	Same as L1	Change in cue-weighting
Representation of new L2 categories	Phonetic	Articulatory	Phonetic
L1/L2 relationship	Same perceptual space	Interlanguage perceptual space, but language-specific phones	Same perceptual space
Implications for L2-to-L1 influence	L2 affects L1 perception	L2 does not affect L1 perception	No claims

---

# Differences between L1/L2 contrasts

---

(Adapted from Eckman, Elreyes and Iverson, 2003)

	L2	L1	Spanish L1/English L2 example (vowels)
1	Sounds A and B are in contrastive distribution	contains neither A nor B	LOT and STRUT are not in Spanish
2		Contains A but not B	---
3		Contains both A and B as allophones of the same phoneme	Spanish contains FLEECE but not KIT(*), which is usually perceived as either /i/ or /e/

(\*) FLEECE exists in Spanish only in terms of openness and frontness (not duration)

# Types of L2 category acquisition

---

- One to one: move boundary, keep category (English and French schwa)
  - Two+ to one: remove boundary and merge categories (English FLEECE and KIT to Spanish /i/)
  - One to two+: create boundary and categories (Spanish /i/ to English FLEECE and KIT)
-

# L1-L2 interactions in perception

---

- Iverson and Evans (2007): perception of nonnative vowels differ according to the native language system
  - Categorization into native-like categories: do L2 speakers create new categories or they just map L2 sounds onto L1 categories?
  - Effects of L2 proficiency in perceiving L2 vowels in embedded L1-like stimuli: how do L2 speakers categorise L2 sounds that fall on the boundary of 2+ L1 categories, when the phonological context is L1-like?
    - Language mode, language selection, and priming effects on perception
-

# L2-to-L1 effects in perception

---

Some of the few attempts to research the issue:

- Van Wijnendaele & Brysbaert (2002): phonological priming effect in word recognition.
  - Lev-Ari & Peperkamp (2013): Low inhibitory skill allows L2-like perception in L1: boundary shift in L1 categories to L2-like values.
  - Lopez-Prego & Jongman (2014): “Language mode” proves boundary movement in L1 categories.
-

# Research question

---

The following work aims to gather evidence regarding the effects of L2 proficiency in native language speech perception, and more specifically, when speakers are confronted to the task of categorizing a nonnative vowel sound that falls between two native categories in the perceptual space, in a native-like phonological context.

---

# Method

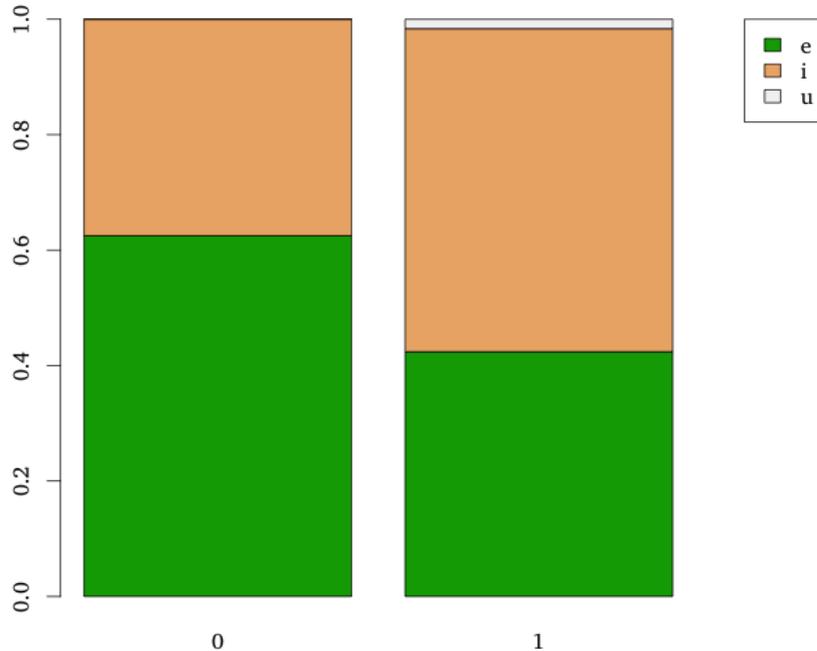
---

- ❑ Subjects: 42 native speakers of Spanish with different levels of proficiency in English
  - ❑ Stimuli: 8 CVC nonwords with admissible onsets and codas in Spanish, and lax English vowel in the middle: C\_C (vowels used were KIT, STRUT, FOOT, TRAP and DRESS).
  - ❑ Modality: online (Limesurvey).
  - ❑ Task: categorize the vowel in the CVC stimulus into the 5 Spanish categories.
  - ❑ Total number of stimuli: 40
-

# Results

---

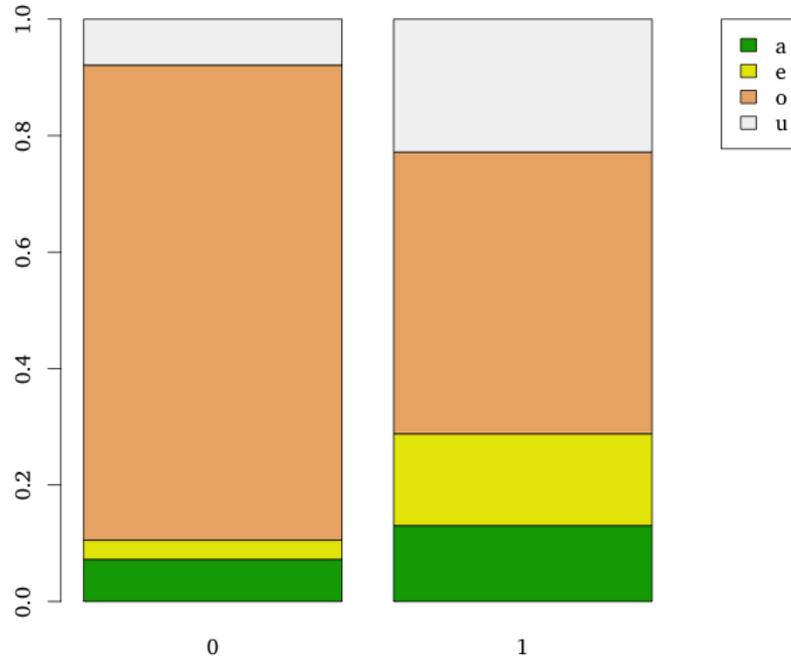
Categorizations of KIT according to language proficiency



- ❑ Mapping of KIT onto /e/ seems to be default in early stages of L2 learning, and decreases as proficiency rises. (GLM and Chi-square critical values  $<0.001$ ).
- ❑ More proficiency leads to more categorizations of KIT onto /i/.

# Results

Categorizations of STRUT according to language proficiency

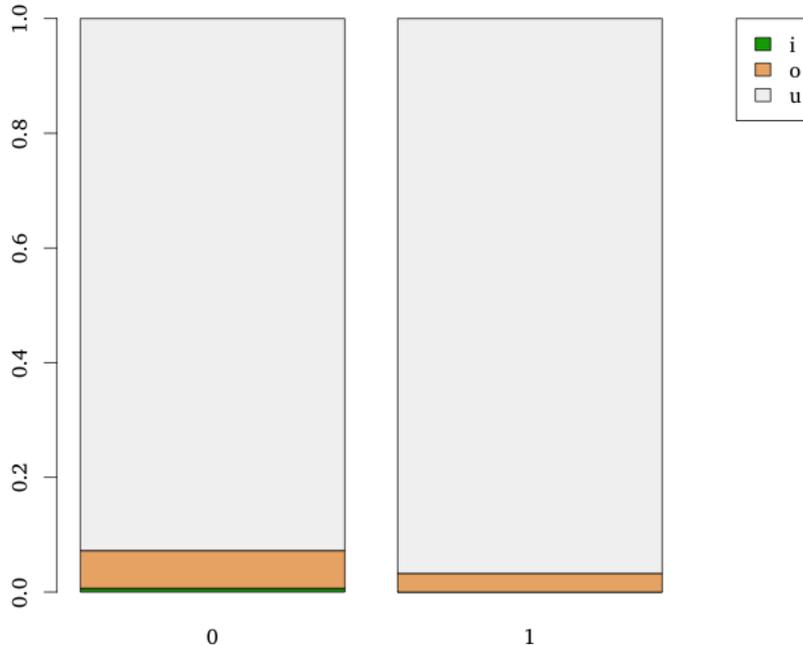


- ❑ Mapping of STRUT into /o/ seems to be default in early stages of L2 learning, and decreases as proficiency rises.
- ❑ GLM gives highly significant values for changes in /e/, /o/, and /u/ ( $<0.001$ ) and significant for /a/ ( $<0.01$ )
- ❑ More proficiency leads to a more evenly distribution of the mappings.

# Results

---

Categorizations of FOOT according to language proficiency

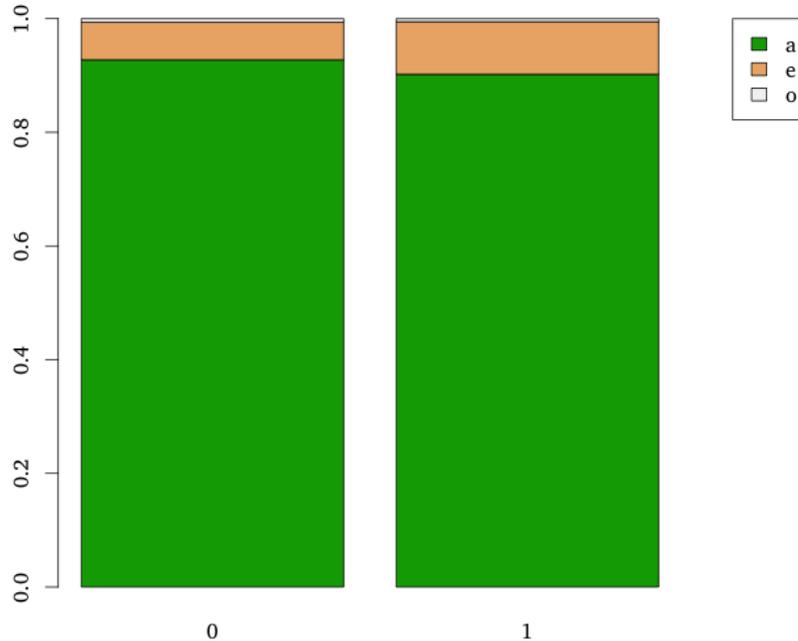


- ❑ Mapping of FOOT onto Spanish categories doesn't show any significant difference as proficiency increases.
- ❑ X-squared = 3.2736, df = 2, p-value = 0.1946

# Results

---

Categorizations of TRAP according to language proficiency

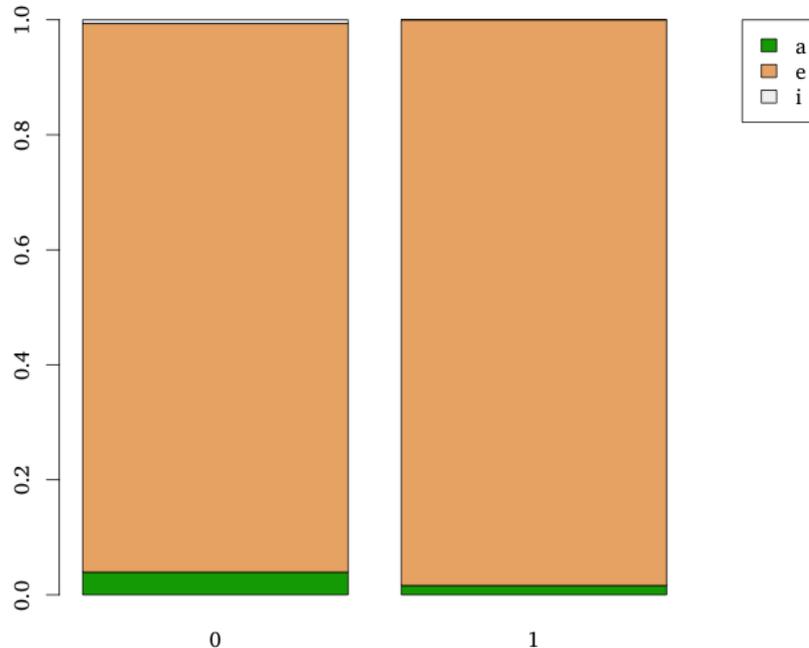


- ❑ Mapping of HAD into /a/ doesn't show any significant difference as proficiency increases.
- ❑ X-squared = 0.8104, df = 2, p-value = 0.6669

# Results

---

Categorizations of DRESS according to language proficiency

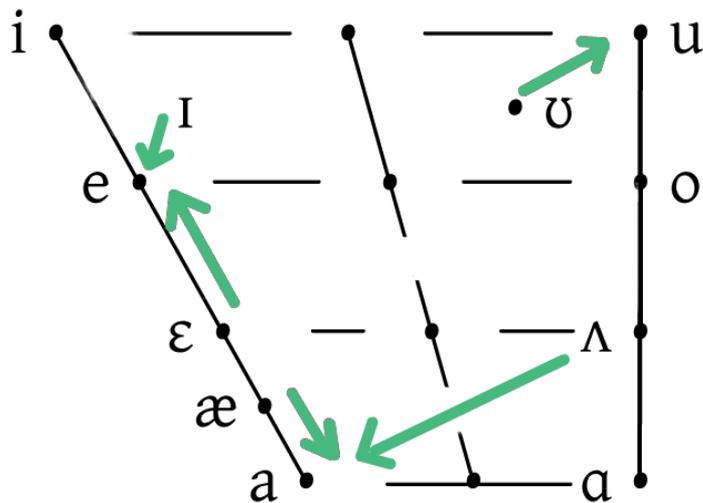


- ❑ Mapping of DRESS into /e/ doesn't show any significant difference as proficiency increases.
- ❑ X-squared = 2.9546, df = 2, p-value = 0.2282

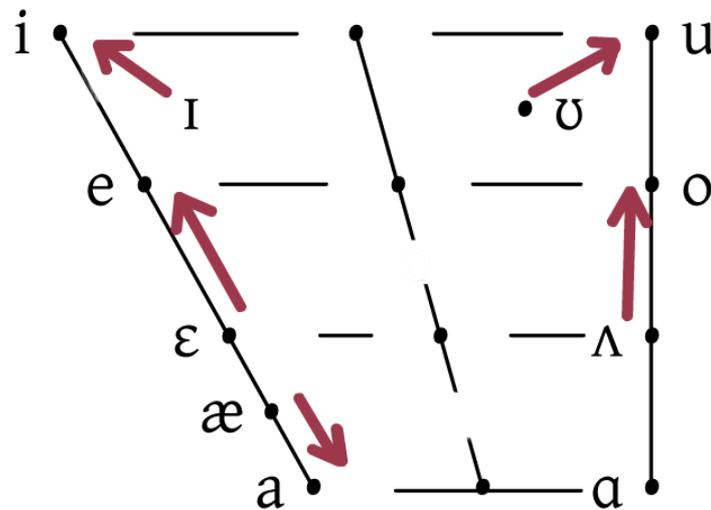
# L2-to-L1 mapping at different stages

---

Less proficient



More proficient



# Discussion

---

- Effects of one-to-one perceptual assimilation over L1 boundaries
    - HAD and DRESS: /a/ and /e/. They have no closer contenders in the perceptual space (too far from other L1 categories).
    - Priming effect of native-like phonological context enhances this effect.
    - No need to rearrange.
      - Effect of proficiency over L1 boundaries: none
-

# Discussion

---

- Effects of one-to-two L2 perceptual assimilation over L1 boundaries
    - The /u/ perceptual space has to be shared by FOOT and GOOSE
      - But why does /u/ win for FOOT, and not /o/, in both cases?
      - Effect of proficiency on L1 boundaries: none
-

# Discussion

---

- Effects of one-to-two L2 perceptual assimilation over L1 boundaries
    - KIT falls in the boundary for /i/ and /e/.
      - However, /i/ is taken by FLEECE too
      - While less proficient L2 speakers prefer /e/, more proficient speakers prefer /i/.
      - Proficient L2 speakers show preference for closeness
    - Effect of proficiency on L1 boundaries: yes, boundary moves towards /e/ (downwards), thus shrinking the /e/ room and increasing /i/'s.
-

# Discussion

---

- One- to-two+
    - STRUT falls in the middle of the perceptual space for L1 vowels
      - However, open and back vowels have overall preference over closed and front ones on both proficiency levels.
        - Perceptual magnet effect: STRUT values are closer to the back and open L1 categories.
      - While /a/ wins over the other L1 categories in less proficient speakers, /o/ wins in more proficient ones.
      - Effect of proficiency on L1 boundaries: yes. Boundary moves towards /a/
-

# Summary

---

- Categorization of L2 sounds into L1 categories changes as proficiency increases
    - Boundary movement of L1 categories
  - Perceptual magnet effect is more powerful (i.e. even in advanced speakers) when no further L1 categories can dispute an L2 sound
  - Assimilation effects must take the whole L2-to-L1 mappings into account.
  - Proficient L2 speakers tend to map towards closeness and have a maximum of two L2 categories mapped onto an L1 category.
-