How early should we teach pronunciation?

Sound category formation in beginner and intermediate learners

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Explicit instruction of pronunciation/phonetics seems to have a positive impact on second language (L2) learner’s production of the L2 sounds.

We explore whether explicit phonetics instruction affects beginner and intermediate learners differently:
- Examining the acquisition of Spanish voiceless stops by learners with L1 American English
- Taking into account the hypothesis that sound category formation might go through a learning plateau
- Considering different phonological contexts
- Keeping in mind pedagogical implications
Growing interest in SLA of phonology/phonetics:
  • Including the impact of phonetics instruction on learner’s production and perception of L2

Focusing on L2 Spanish by L1 English learners, phonetics instruction has been shown to help improve the acquisition of many L2 sounds (e.g. Elliott 1995, Gonzalez-Bueno 1997, Lord 2005, Gonzalez Lopez and Counselman 2012, Camus Oyarzun 2016; but see Kissling 2013):
  • Degree of impact might depend on the type of sound.
There is some evidence suggesting that phonetics instruction benefits different levels of L2 proficiency (Lee et al. 2014)

- It is still \textit{unclear whether this type of instruction benefits beginners and intermediate/advanced learners similarly} (Camus-Oyarzún 2016)
- Addressing this would allow us to evaluate curriculum content for different levels.
Effect of phonetics instruction could be different depending on the proficiency level:

- Sound category formation, which seems to speed up with instruction, might go through a “learning plateau” (Flege 1988, Munro & Derwing 2008).

Hypothesis:

- Beginners, starting to create their L2 sound categories, might present a more malleable system and exhibit greater improvements from phonetics instruction;
- More advanced learners, whose L2 categories are more formed, might show more resistance to improvement due to instruction.
SPANISH & ENGLISH VOICELESS STOPS

- American English:
  - /p t k/ are aspirated in stressed position, esp. word-initial positions, when not part of a complex onset.
  - /t/ is usually produced as a flap in unstressed positions.

- Spanish:
  - /p t k/ are always unaspirated voiceless stops

- VOT is the acoustic measure used to capture differences in aspiration for voiceless stops - from Amengual (2012):
  - In Spanish, VOT range for [p t k] is 0-20 ms
  - In English, VOT range for [pʰ tʰ kʰ] is 30-120 ms.
Some studies have explored the impact of phonetics instruction on VOT:

- González López & Counselman (2012) found that novice learners that received instruction improved VOT production of /p t k/, contrary to learners who didn’t receive instruction.
- Camus-Oyarzun (2016) found that instruction improved learners’ VOT for three different proficiency levels:
  - There seemed to be no apparent differences for the overall data across levels
  - But the study didn’t explore potential differences in certain contexts vs. others.
Are there differences in the impact of explicit phonetics instructions on the production of Spanish voiceless stops /p t k/ by L1 English learners depending on the proficiency level?
Methodology
Data was collected as part of *See your Speech*, an OSU project that combines research and teaching:

- Data comes from a module presented to college students.

*See your Speech* module:

- Using a web-based interface, students record themselves reading word lists in Spanish and in English:
  - At the beginning and at the end of the semester (T1 & T2)
- Pedagogical component:
  - Instant and in-class feedback is provided to students
  - This determines the unique nature of our data
Module includes 71 Spanish words presented to participants one by one:

- Words target a variety of Spanish sounds
- /p t k/ appear in different contexts:
  - Word-initial and medial position:
    - Examples: champú, comida
  - Stressed and unstressed syllables:
    - Examples: pito, pitó
Record your voice

You have completed the English word list. We now have seven short word lists in Spanish. As before, please read the words that appear below.

Please don’t do anything else or change windows on your computer during the recording. When you are ready to continue, click the BEGIN button below.

campo
PARTICIPANTS

- **Group I (N=10):**
  - College students in third-semester Spanish language course that includes explicit phonetic instruction
  - 5 females; 5 males

- **Group II (N=27):**
  - Spanish majors and minors taking an upper-level Spanish pronunciation course.
  - 13 females; 11 males

- **All participants:**
  - L1 = American English
  - Started learning Spanish after 12 years
• In Spanish Language Course:
  • Three phonetic topics were covered:
    ▪ Vowels, voiceless and voiced stops
    ▪ Basic description of phonetic differences in English and Spanish
    ▪ Practice exercises

• In Spanish Pronunciation Course:
  • Semester-long course on Spanish pronunciation:
    ▪ All Spanish sounds were discussed
    ▪ Phonetic terms were introduced
    ▪ Practice exercises
Each token of /p t k/ was:

- Categorized by its type of production (tap, voiceless stops, approximant, etc.)
- Measured for VOT

Fig. 1 Examples of VOT measurement for /p/ and /t/ in the word *pato*
Number of tokens: Group I: 1,139 & Group II: 3,476

Linear regression on all VOT data to test effect of:
  • Group (G1, G2)
  • Timepoint (T1; T2)
  • Interaction between timepoint and group

Linear regression on VOT data by Group to test effect of:
  • Timepoint (T1; T2)
  • Place of articulation (/p/ vs. /t/ vs. /k/)
  • Stress (stressed vs. unstressed)
  • Word position (initial vs. medial)
  • Interaction between timepoint and the other factors

Further pairwise comparisons to check sig. interactions

Speaker and word are included as random factors in regression analyses
Results
Types of realizations of /p t k/ by timepoint and group:
- Virtually same realization for both levels: voiceless stops
- Note some approximants for Group II

<table>
<thead>
<tr>
<th></th>
<th>Group I</th>
<th></th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
<td>T2</td>
<td></td>
</tr>
<tr>
<td>fricative</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>tap</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>voiced stop</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>voiceless stop</td>
<td>544</td>
<td>585</td>
<td></td>
</tr>
<tr>
<td>approximant</td>
<td>2</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>deletion</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>tap</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>voiced stop</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>voiceless stops</td>
<td>1740</td>
<td>1718</td>
<td></td>
</tr>
</tbody>
</table>

Following VOT analyses are based only on voiceless stops.
Results for all the data

- Linear regression on all the data:
  - Effect of Timepoint: T1 > T2
  - No effect of Group
  - No significant interaction bt. Timepoint & Group

![Graph showing VOT average by Timepoint and Group](image)

**Fig. 1** VOT average by Timepoint and Group

<table>
<thead>
<tr>
<th>Group</th>
<th>T1</th>
<th>T2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>35.19 (20.07)</td>
<td>29.66 (17.79)</td>
</tr>
<tr>
<td>Group 2</td>
<td>34.30 (22.41)</td>
<td>30.17 (18.49)</td>
</tr>
</tbody>
</table>

**Table 1** Average and SD VOT by Timepoint and Group
All fixed factors are significant:
- Effect of timepoint: T1 > T2
- Effect of place of articulation: k > t > p
- Effect of stress: stressed > unstressed
- Effect of word position: initial > medial

**Fig. 2** Group I: VOT average by Timepoint and POA

**Fig. 3** Group I: VOT average by Timepoint and Stress
Significant interaction bt. timepoint & word position:
- The change in VOT for initial position is greater than in medial position:
  - both word positions present significant change.

Fig. 4 Group I: VOT average by Timepoint and Word position
All fixed factors are significant:
- Effect of timepoint: T1 > T2
- Effect of place of articulation: k > t > p
- Effect of stress: stressed > unstressed
- Effect of word position: initial > medial
RESULTS FOR GROUP II

- Significant interaction between timepoint & place of articulation and timepoint & stress:
  - No change in VOT for /k/.
  - No change in VOT for unstressed contexts

**Fig. 5** Group II: VOT average by Timepoint and POA

**Fig. 6** Group II: VOT average by Timepoint and Stress
- 5 participants: longer T1 > T2
- 2 participants: T1 = T2
- 3 participants: shorter T1 < T2
  - All participants with T1 > T2 start with VOT above 30ms
  - Other participants start with values around 30 or lower:
    - All participants that “needed” to improve their VOT did and lower their VOT durations to the 30 ms. mark.
- 13 participants: longer T1 > T2
  - 2 participants that T1>T2 stay well above 30 ms.
- 8 participants: shorter T1 < T2
- 6 participants: T1 = T2
  - 2 participants stay well above 30ms.
- Not all participants improve their VOT to 30 ms. mark.

Fig. 8 Group II: VOT average per participant by Timepoint
Discussion
**DISCUSSION**

- **All learners** present a decrease in VOT duration in T2 vs. T1:
  - Learners present more variability in T1 (see SD in Table 1).
  - Both groups present longer VOT averages than native Spanish speakers but shorter than for English (see ranges from Amengual 2012; Zampini 2014).

<table>
<thead>
<tr>
<th></th>
<th>T1 (SD)</th>
<th>T2 (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group I</strong></td>
<td>35.19 (20.07)</td>
<td>29.66 (17.79)</td>
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</table>

*Table 1* Average and *SD* VOT by Timepoint and Group
Beginners present a more dramatic change in T2 vs. T1 (Fig. 9):
• But no stat. significant difference between groups.

VOT differences based on POA, stress and word location:
• Significant for both groups in the expected directions.

Fig. 9 VOT average by Timepoint and group
Interactions between timepoint and other factors reveal differences between groups:
- Beginners decrease their VOTs in T2 across the board.
- Intermediates present a more limited decrease:
  - No change for /k/ or for unstressed positions

Analysis of individual productions show that all beginners show shorter VOT in T2:
- This is not the case for all intermediate learners.
1. Results suggest that explicit instruction of phonetics/pronunciation has greater impact on beginners’ than on intermediate learners’ sound production.

   • This is evidence supporting our hypothesis on differences in degree of category formation:
     ▪ Beginners are prone to greater changes due to instruction because their sound categories are less solid and more malleable than more advanced learners’.

2. Our study presents initial support for a Spanish curriculum that includes explicit phonetics instruction as early as possible.
Next Steps/Future Research

- Add more data to the beginner group.
- Compare across proficiency levels the impact of phonetics instruction on other sounds (e.g. voiced stops and vowels).
- Analyze delayed effects of instruction across levels.
- Explore the role of production variability in L2 acquisition and how instruction impacts it.


Thank you!
¡Muchas gracias!

Learn more about our project at
Our Voices/Nuestras Voces:
https://u.osu.edu/ourvoices