# EFFECTS OF DIALECT EXPOSURE ON THE PROCESSING OF ARGENTINE REGIONAL PHONES BY ENGLISH-SPEAKING L2 LEARNERS OF SPANISH

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## ABSTRACT

Previous research shows that regional phonetic variation may impede comprehension for both native and L2 listeners, but that experience with regional varieties can lead to changes in the perception of dialectal sounds. This study investigates how exposure to a novel dialect of the target language through a 4-week study abroad immersion experience in Buenos Aires affected the processing of Argentine phonetic variants by English-speaking L2 learners of Spanish. Learners completed a lexical decision task in the first and fourth weeks abroad, which presented Spanish stimuli with Argentine assibilated palatal and aspirated-/s/ variants. Initially, learners were less accurate in recognizing known Spanish words articulated with the Argentine assibilated palatal, and also had slower recognition reaction times for both the assibilated palatal and aspirated-/s/. By the end of four weeks, effects of the assibilated palatal on lexical decision accuracy and processing speed disappeared; however, effects of the aspirated-/s/ on processing speed persisted.

**Keywords**: L2 speech perception, regional variation, Spanish, study abroad, lexical decision

## 1. INTRODUCTION

The objective of the current study is to examine how regional phonetic variation in the speech signal affects L2 speech processing, and how exposure to a regional dialect of the target language may mediate such effects over time.

### 1.1. Effects of dialectal speech on perception and comprehension

Previous research shows that dialectal speech affects comprehension and intelligibility for both native and L2 listeners [e.g., 3, 8, 12, 22], with greater comprehension of some regional or social varieties over others. However, in the case of L2 learning, such dialectal effects have been found to diminish when explicit instruction and awareness drawing to dialectal variants of the target language is provided [20] or learners are exposed to dialectal speech through an immersion or study abroad experience [18, 21].

Dialectal phonetic variants have also been shown to affect performance on perception tasks for both native and nonnative listeners. Several studies document evidence of differences in how regional sounds are identified and processed by native speakers according to the linguistic experiences of the listener, such as the variants produced in one's own speech [7, 22] or the region in which one was raised [6, 2]. A growing body of studies have begun to test how L2 learners categorize and discriminate dialectal sounds in the L2, and these have shown that the learners' perceptual patterns can change according to the varieties exposed to in a study abroad program [1, 4, 5, 19], or via dialectal social contacts [19]. It is still unclear, however, how dialectal speech affects speech processing in a L2, such as in terms of lexical retrieval or processing time, and how such processing effects may or may not change with learner experience with dialectal speech.

### 1.2. Argentine Spanish phonetic features

Two sociophonetic features characteristic of Buenos Aires Argentine Spanish were targeted in the current study: the assibilated pre-palatal [ʃ] and aspiration [h] of syllable-final /s/.

In many of the varieties and pedagogical models of Spanish that L2 learners are commonly exposed to in the US learning context (for example, Mexican or Castilian varieties), the phonemic category corresponding to orthographic 'y' and 'll' and that category corresponding to orthographic 's' (as well as 'c' before 'e' or 'i' and 'z' in non-Peninsular varieties) are realized as a palatal fricative [ʝ], or as an alveolar fricative sibilant [s], respectively [17]. However, in the River Plate region, including Argentina and Uruguay, 'y' and 'll' are realized as a voiceless or voiced assibilated pre-palatal fricative [ʃ ʒ], with the voiceless variant the preferred form amongst the recent generations in the capital region [17], as in *playa* 'beach' [ˈpla-ʃa]. This variant is specific primarily to the River Plate region, and US-based L2 learners of Spanish may have limited exposure to speakers who use these phones. The second feature, lenition of syllable-final /s/, is

likewise characteristic of Argentine Spanish, but also occurs in the speech of Spanish speakers of many other varieties, including Caribbean and coastal varieties [13] and is variable in nature, subject to social and stylistic factors such as speaker gender or speech style [15]. In Buenos Aires, the most frequently produced lenited form is the aspirated glottal fricative [h] (as in *costa* 'coast' [ˈkoh-ta]), although speakers variably produce the full sibilant [s] and elided forms Ø as well [17], depending on stylistic and sociolinguistic factors.

### 1.3. Research questions

The current study is guided by the following research questions:

1. What are the effects of Argentine phonetic variants on L2 speech processing, in terms of lexical retrieval and processing time?
2. Does dialect exposure through an immersion experience mediate these effects, and if so, in what ways and to what extent?

## 2. METHODS

### 2.1. Participants

Twenty-two English-speaking second language learners of Spanish from various regions of the United States participated in the study during a short-term summer study abroad program in Buenos Aires, Argentina. The learners, aged 19-21, were third- and fourth-year North American undergraduate students enrolled in Spanish language, literature and history courses taught by local Argentine instructors and taken with other international students. They also participated in homestays with Argentine families. The majority of the participants self-rated their Spanish language proficiency as high intermediate or advanced. While most of the learners had prior travel or study experiences in other Spanish-speaking regions and contact with speakers of a variety of other Spanish dialects (primarily in and from Spain, Mexico, Central America, and Spanish-speaking Caribbean countries), the learners had very little to no prior exposure to Argentine Spanish. Only 4 reported previous contact with speakers of Argentine Spanish, and none had previously traveled to Argentina.

### 2.2. Stimuli and procedure

Participants completed a lexical decision task (LDT) within the first week of arrival in Buenos Aires, and again after the fourth week of their program. They heard common disyllabic Spanish words as well as invented words that followed Spanish phonotactic patterns, and responded as quickly as possible as to whether the item heard was an existing Spanish word or not. Following the LDT, subjects completed a Vocabulary Familiarity Task to ensure familiarity with all of the real word task items, as well as a Language Background Questionnaire.

A total of 189 items were presented in the LDT, balanced across nonwords ($n$ = 99) and real words ($n$ = 90). All target and distractor stimuli were produced by a female, university-educated speaker from Buenos Aires living in the U.S., with target items articulated with either those variants learners were previously most exposed to in the North American L2 classroom – the palatal fricative [ʝ] and sibilant [s] –, or with the Argentine regional phones – the assibilated palatal [ʃ] and aspiration [h] (see Table 1).

| Feature | Real word | Nonword |
|---|---|---|
| dis-tractor | *leche* 'milk' ($n$ = 40) | *dalpa* ($n$ = 59) |
| [s] variant | *tri[s]te* 'sad' ($n$ = 13) | *ga[s]po* ($n$ = 10) |
| [h] variant | *chi[h]te* 'gossip' ($n$ = 13) | *bi[h]ca* ($n$ = 10) |
| [ʝ] variant | *toa[ʝ]a* 'towel' ($n$ = 12) | *dre[ʝ]o* ($n$ = 10) |
| [ʃ] variant | *pla[ʃ]a* 'beach' ($n$ = 12) | *me[ʃ]o* ($n$ = 10) |

**Table 1**: Examples of the LDT Spanish stimuli.

### 2.3. Analysis

Lexical judgments and RTs were recorded. Judgments were coded as correct if the participant accurately accepted a Spanish real word or accurately rejected a nonword. Any lexical items not marked as known in the Vocabulary Familiarity Task were excluded from the analysis as were data that exceeded three *SD*'s in either direction from an individual's mean RT. Lexical judgment accuracies (0-100%) of the real word stimuli data were then calculated for each participant according to feature and test time by dividing the number of correct judgments by the total number of judgments for each feature at each test time. Mixed model analyses were then conducted for both the variants of Spanish 's', 'ce/ci', and 'z' (here-on referred to as the 'S context') and for the variants of Spanish 'y' and 'll' (the 'Y context'), with word judgment accuracies and reaction times set as dependent variables, phonetic feature and test time as fixed effects, and subject as a random effect.

## 3. RESULTS

### 3.1. Lexical decision accuracies

Mean recognition accuracies of the Spanish real word stimuli according to phonetic feature and test time are presented in Table 2. Table 3 shows the results of the mixed models run for each of the two contexts.

| Context | Variant | Pretest | Posttest |
|---|---|---|---|
| S | [s] | .94 (.077) | .95 (.069) |
| | [h] | .93 (.098) | .91 (.110) |
| Y | [ʝ] | .95 (.084) | .94 (.096) |
| | [ʃ] | .89 (.097) | .96 (.074) |

**Table 2**: Mean LDT accuracy rates for acceptance of real word stimuli by test time and variant (*SD*).

There were no significant main effects nor interactions for feature or test time in the statistical model for the S context, which indicated that the regional [h] variant had no effect on the learners' abilities to accurately identify known Spanish lexical items, even at the beginning of the study abroad program (during week 1).

However, the mixed model for the Y context revealed a different picture: an interaction between feature and test time, approaching significance. First, Bonferroni posthoc comparisons showed that at time 1, learners were significantly worse at recognizing words realized with Argentine [ʃ] (89%) than those articulated with the previously familiar [ʝ] variant (95%) ($p$ = .036). By time 2, however, this difference disappeared (i.e., was no longer significant; $p$ = .575). Moreover, within category comparisons further showed that learners became significantly more accurate in identifying known Spanish words with the [ʃ] variant at time 2 (96%) when compared to time 1 (89%) ($p$ = .020). No such differences were found for lexical recognition accuracies of the [ʝ] variant across time ($p$ = .747).

| Context | Effect | *F (df)* | *p* |
|---|---|---|---|
| S | feature | 2.012 (1, 84) | .160 |
| | test time | .795 (1, 84) | .795 |
| | feature*time | .271 (1, 84) | .604 |
| Y | feature | 1.232 (1, 84) | .270 |
| | test time | 2.095 (1, 84) | .151 |
| | feature*time | 3.632 (1, 84) | .060(*) |

**Table 3**: Results of mixed models for LDT accuracy.

### 3.2. Reaction time latencies

Table 4 presents the RT latencies for the identification of the Spanish real word items across feature and time. Results of the mixed models for RTs for each of the two contexts are also shown below in Table 5.

| Context | Variant | Pretest | Posttest |
|---|---|---|---|
| S | [s] | 1.33 (.199) | 1.28 (.191) |
| | [h] | 1.43 (.193) | 1.38 (.217) |
| Y | [ʝ] | 1.32 (.155) | 1.26 (.158) |
| | [ʃ] | 1.54 (.306) | 1.32 (.165) |

**Table 4**: Mean RTs in seconds by test time and variant (*SD*).

For the S context, a significant main effect of phonetic feature was found for learner RTs. The learners were significantly slower overall in making lexical judgments when the words were articulated with the regional aspirated [h] variant ($M$ = 1.40 sec., $SD$ = .205) than with the sibilant [s] variant ($M$ = 1.30 sec., $SD$ = .194) ($p$ = .021). This effect was constant across test times.

The statistical model for the Y context found significant main effects of both phonetic feature and test time, and a significant interaction between the two. Bonferroni posthoc comparisons revealed that only at time 1 did the L2 learners make lexical decisions significantly slower in the presence of the Argentine [ʃ] variant (1.54 sec.) as opposed to the previously familiar [ʝ] variant (1.32 sec.) ($p$ < .001). By time 2, there was no significant difference in processing speed between the two variants ($p$ = .378). Furthermore, the posthoc analyses of the within category comparisons showed no change from time 1 to time 2 in the response speed for the identification of the [ʝ] items ($p$ = .359), while they revealed a significant increase in processing speed (i.e., faster RTs) for the identification of the [ʃ] items from time 1 (1.54 sec.) to time 2 (1.32 sec.) ($p$ < .001).

| Context | Effect | *F (df)* | *p* |
|---|---|---|---|
| S | feature | 5.517 (1, 84) | .021* |
| | test time | 1.343 (1, 84) | .250 |
| | feature*time | .010 (1, 84) | .919 |
| Y | feature | 9.559 (1, 84) | .003** |
| | test time | 9.983 (1, 84) | .002** |
| | feature*time | 3.382 (1, 84) | .069(*) |

**Table 5**: Results of mixed models for RTs.

## 4. DISCUSION AND CONCLUSIONS

This study examined how previously unfamiliar regional dialectal variation affects processing of speech for second language learners, and how exposure through a month-long study abroad immersion experience in the target dialectal region may mediate such effects of dialectal phonetic variation on L2 speech processing.

Prior to extensive exposure to Argentine Spanish (during week one of arrival to Buenos Aires), the L2 learners' abilities to accurately comprehend and retrieve known Spanish words were impeded by the presence of one of the dialectal phones, of the assibilated pre-palatal fricative [ʃ]. The presence of the [ʃ] phone also resulted in greater processing costs in terms of longer processing times to make lexical decisions. The second regional feature studied, aspiration of syllable-final /s/, did not similarly impede lexical retrieval (lexical judgments), but [h] did likewise result in longer processing times for the learners in making lexical decisions at week one.

Interestingly, after only four weeks living and studying in Argentina, the processing effects of the Argentine [ʃ] variant observed initially on lexical retrieval and processing speed completely disappeared: that is, after one month, learners were equally accurate and equally fast at identifying known Spanish words realized with the Argentine dialectal [ʃ] phone as with the previously familiar [j] variant. This was not the case, however, for the dialectal lenited [h] phone, which, still at week four, continued to cause slowed processing as compared to the processing of the previously familiar (and more acoustically robust) full sibilant form [s].

A possible explanation for the disparity observed across the two regional variants is the role of perceptual saliency of the two phones, which, in turn influences attention, which then influences the encoding and representing of new episodic instances into the L2 mental lexicon upon exposure to the dialectal forms. Under an Exemplar Model approach [9, 11], listeners are understood to encode acoustically detailed and socially and lexically indexed information from the speech signal in cognitive representations of speech [11, 16]. Speech is then recognized by comparisons with these stored exemplars [11]. Pierrehumbert [16] stresses, however, that in order for exposure be "effective" in the encoding and storing of this detailed information, cognitive factors such as attention and memory are also at play. That is, those episodic events that are more attended to are more likely to be remembered [16]. As [ʃ] is a distinctive (phonemic) feature in the L1, English (albeit associated with a different phonetic category), this phone should be particularly perceptually salient to this learner group, and thus – while it may be more disruptive in speech processing upon initial exposure (time one) – this saliency also allows for greater awareness and drawing of attention to the form during exposure, eventually allowing for greater effects for the encoding and remembering of episodic instances of the new variant stored with lexical information over time. On the other hand, as shown previously in [19], Spanish syllable-final aspiration [h] is often 'ignored' by English-speaking learners of Spanish, interpreted as part of the preceding vowel. As such, the presence of this phone may be less disruptive in terms of impeding lexical recognition (recognition accuracies). However, the learners are more likely to have less awareness and less attention drawn to the syllable-final [h] phone, and this could result in less "effective exposure" and less opportunities for changes to the cognitive system even after a month of exposure. This could explain the effects of dialectal [h] on processing speed persisting into time two. Future research is needed to further explore the role of attention and awareness – for example testing effects of explicit instruction of and awareness drawing toward dialectal phones – in the processing of dialectal forms in the L2.

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