Form Priming Across Dialects: L1 and L2 Effects

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ABSTRACT

Research shows that cross-dialect lexical recognition can be asymmetrical, favouring non-dominant dialect speakers and prejudicing dominant-dialect speakers [10]. We ask if non-dominant dialect speakers exhibit similar perceptual effects when exposed to modified L2 input that aligns with their particular L1 dialect. The dialect feature examined is Spanish coda [-s]-aspiration. Participants were from Bogotá (non-[-s]-aspirating) and Barranquilla ([-s]-aspirating), Colombia. Participants carried out an auditory form-priming task with lexical decision. Critical Spanish trials consisted of word-pairs matched across dialects (*basta* 'enough' [ba<u>h</u>ta]-[ba<u>h</u>ta]) or unmatched ([ba<u>h</u>ta]-[ba<u>s</u>ta]). In the English version, critical trials included similar items, modified to reflect the s-aspiration pattern of Barranquilla Spanish ('display' [dɪ<u>h</u>pleɪ]-[dɪ<u>s</u>pleɪ]), also in matched or unmatched pairs. Results show that speakers of [-s]-aspirating dialects were equally fast at recognizing native-dialect targets and non-native dialect targets. English form-priming results followed a similar pattern, with the modulating effect of English proficiency, as measured by a standardized vocabulary test.

Keywords: second-language acquisition, phonology, dialects, speech perception

1. INTRODUCTION

Listeners are exposed to massive amounts of variability in the speech stream. And yet for the most part, extensive experience with a particular language allows native listeners to recognize and extract the regularities that exist in the speech input and make sense out of the acoustic chaos. This same experience that makes us expert native language listeners can hinder speech processing in a second language. Indeed, extensive previous linguistic experience can bias the processing of all subsequent linguistic input, influencing expectations regarding how 'language works'. Such expectations are driven by L1 experience and do not necessarily coincide with the actual L2 structures to be acquired. This effect of previous experience is commonly known as 'transfer'. Transfer can be either positive or negative, depending upon whether it facilitates or impedes the acquisition of second language structure. In its essence, transfer can be conceptualized as a logical response to second language acquisition: previous experience guides what learners expect from future experience with similar stimuli (see [8] for similar argumentation).

In this study, we examine how the processing of L2 words is affected by a specific type of L1 experience, that of a particular L1 dialect. We predict that when exposed to L2 input that conforms to specific L1 dialect features, L2 listeners will demonstrate characteristics typical of more proficient listeners, due to the close alignment between previous experience, expected and current input. To investigate this, we use auditory form-priming with lexical decision to test whether Spanish speakers listening to dialects of their native language exhibit the same dialect asymmetry effects found for English [10] and furthermore, to see if these asymmetrical effects carry over to L2 input.

The dialect feature examined was coda [-s]-aspiration in Colombian Spanish. The phenomenon of [-s]-aspiration is one of the most extensively studied sociolinguistic variables of Spanish. The lenition of coda /s/ to [h] or ø affects approximately half of the Spanish-speaking world [2][4]. While the contexts for [-s]-aspiration found across dialects can be characterized as a continuum, all dialects that aspirate do so when [-s] occurs in word-internal coda position, before an onset consonant [7].

Participants were from Bogotá (non-[-s]-aspirating dialect) and Barranquilla ([-s]-aspirating dialect). Work by File-Muriel [5] shows that in the Barranquilla dialect, [-s]-aspiration is most common in men's speech and in words of high frequency and greater length (over two syllables). Highland Colombian Spanish dialects such as those spoken in the region of Bogotá are conservative dialects and retention of [-s] in pre-consonantal position occurs almost without exception. Based upon results from [10], we hypothesize that speakers of the non-dominant [-s]-aspirating dialect will be equally proficient at processing input from their own dialect and the dominant dialect. We also predict that this processing advantage will carry over to L2 input. Specifically, non-dominant [-s]-aspirating dialect speakers will transfer their previous experience with aspirated coda [-s] to the processing of English modified forms (e.g., 'display' [dɪ<u>h</u>pleɪ]-[dɪ<u>s</u>pleɪ]).

Thus, Barranquilla listeners will recognize English forms that have been modified to reflect their dialect-specific feature more quickly and accurately than the Bogotá listeners, who have experience with different dialect input.

The degree to which L1 dialect differences may affect processing of L2 modified forms is also predicted to depend upon experience with the L2. In particular, at the earliest stages of L2 acquisition, listeners will necessarily draw more heavily upon L1 experience and expectations regarding linguistic form [9]. As experience increases, these effects are predicted to diminish. To test this hypothesis, listeners also carried out an English vocabulary test [3] and the results were subjected to a correlational analysis with the reaction time scores.

2. METHOD

2.1. Participants

Participants were 36 native speakers of the [-s]-aspirating Barranquilla dialect and 32 native speakers of the non-[s]-aspirating variety from Bogotá. None had spent more than three continuous weeks abroad in an English-speaking country and all had completed at least two years of university-level English classes. Participants were paid $20.00 for their time. Participants who scored more than two standard deviations below the norm on the vocabulary tests were eliminated. This left 31 Barranquilla speakers and 30 Bogotá speakers.

Following [10], we also screened participants for their production of [-s]-aspiration by means of a monologue task in which they had to talk about an event that caused a particular emotional effect on them. Participants from Barranquilla demonstrated differing degrees of [-s]-aspiration in the [sC] context but all aspirated at least 65% of the time in the expected [sC] contexts.

2.2. Stimuli

Forty lexical items were included in each experiment with word-internal coda [-sC] structure. Due to vocabulary restrictions, we included a combination of nouns and verbs. Half had 's'-aspiration and half did not. Forty control items were selected, with the same [-sC] structure (thirty nouns, ten verbs), half aspirated and half not. Forty pseudowords were also created by switching out the final vowel of highly frequent words to form a nonword (e.g., *mes**a*** 'table' → *mes**u***). The pseudowords were always targets, and half the primes for the pseudowords were aspirated and half were not. Two lists were created such that all words served as prime and target (other than the pseudowords) once each. The list of trials is presented in Table 1:

Table 1. Experiment Conditions

CONDITION	SPANISH		ENGLISH	
	Prime - Target		*Prime - Target*	
[-s]-aspiration Related	fui[h]te 'went'	fui[h]te	ma[h]ter 'master'	ma[h]ter
Unrelated	ha[s]ta 'until'	ha[h]ta	di[s]play 'display'	di[s]play
non-aspiration Related	mue[s]tra 'sample'	tra[s]te 'dish'	exi[s]t 'exist'	exi[s]t
Unrelated	fra[h]co 'bottle'	di[s]co 'disk'	we[h]tern 'western'	di[s]trict 'district'
fillers	casa 'house'	árbol 'tree'	table	pencil

2.2.1. Spanish
The Spanish stimuli were recorded by two female speakers of the Bogotá dialect, one female speaker from Cartagena (the same Caribbean dialect region) and one from Barranquilla. Stimuli were recorded in a soundproof booth using a Marantz PM 670 solid state recorder and a Sennheiser e835 microphone. Speakers read each word in the carrier phrase *Yo digo X una vez* at a comfortable pace. The Cartagena/Barranquilla speakers were informed as to the purpose of the study and encouraged to read the words using their native dialect. The aspirated [-s] segments varied between 74ms and 182ms, with an average length of 109ms. A native Bogotá speaker and native Barranquilla speaker selected the most naturally-sounding tokens for inclusion.

Figure 1. [-s]-aspiration in Barranquilla dialect *mi organismo* 'my organism'

[mi̯organi	[h]	mo
mi organismo		
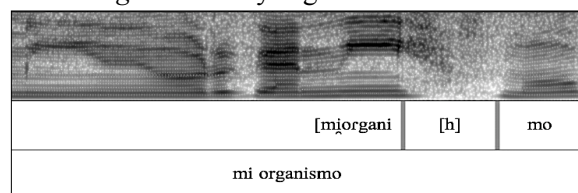
2.2.1. English
The English stimuli were also taken from the NIM database and exhibited the same [-sC] word-internal structure. The word lists were recorded by four female native Midwest L1 English speakers. Two speakers had had previous phonetic training and spoke Spanish. These two speakers were asked to read the list of English words with [-s]-aspiration as though they corresponded to a Spanish Caribbean dialect. The lists were read three times and the best token (as judged by the author and a linguist colleague) were selected for inclusion. The length of aspiration for the English tokens was between 79-172ms. The average length was 119ms.

Figure 2. English modified stimuli

[sʌ	pekt]
suspect	
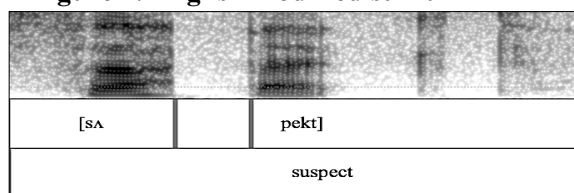
2.3. Method

All tasks were carried out in one language and then the other, counterbalanced across participants. Stimuli were presented using Superlab 5.0 experimental software. Participants were presented with the pairs of words and asked to make a lexical decision on the second item in each pair. A trial consisted of a centring '+' on the computer screen, accompanied by an auditory prime. Following a 500ms ISI, the auditory target was presented. Between trials, there was a 1500ms pause. Participants registered their response ('real word' vs. 'nonword') at the offset of the target. Accuracy and reaction times were recorded. Following the computer tasks, participants completed the Expressive and Receptive One-Word Picture Vocabulary Test [3] and the monologue task in which they had to tell a personal anecdote.

3. RESULTS

Difference scores for mean raw RT values for each of the four critical conditions, along with error rates, are presented in Table 2:

Table 2. Reaction time and error rates

	SPANISH	ENGLISH
[-s]-aspiration		
Related		
Bogotá	998.6 (1.88%)	1309.1 (2.7%)
Barranquilla	835.7 (.91%	1159.7 (1.95%)
Difference	*162 (.87%)*	*149 (.75%)*
Unrelated		
Bogotá	1302.1 (2.01%	1423 (3.1%)
Barranquilla	1130.1 (1.77%)	1306.7 (2.3%)
Difference	*172.1 (.24%)*	*116.3 (.8%)*
non-aspiration		
Related		
Bogotá	760 (.7%)	1099.9 (2.9%)
Barranquilla	768 (.79%)	1176.4 (3.3%)
Difference	*-8 (-.09)*	*76.5 (-.4%)*
Unrelated		
Bogotá	1207.1 (1.9%)	1499 (3%)
Barranquilla	1033 (.9%)	1344.7 (3.2%)
Difference	*173.6 (.09%)*	*155 (-.2%)*

As Figure 3 below shows, the only condition where the Barranquilla listeners were slower than the Bogotá speakers was the Related non-aspiration condition.

Figure 3: Difference scores: Bogotá-Barranquilla
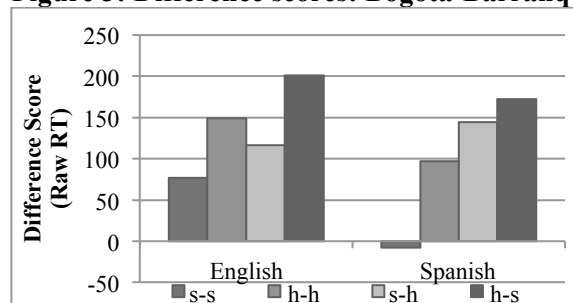
In order to test the effects of different conditions across the different Spanish dialect groups, we carried out a linear mixed model analysis using R 2.15.2 and the *lme4* package, Version 0.999999–0 [1]. Separate models were run for Spanish and English. The dependent variable was log-transformed reaction time and the fixed effects were dialect group and experiment condition. The random effects were participant and item. Only correct responses were included in the analysis. For reasons of space, we only discuss the related and unrelated trials and report only effects and interactions with t-values greater than 2.

3.1. Spanish

For the Spanish model, the Bogotá listeners were slower overall (β=0.04, S.E. = 0.01, t=4.3) than the Barranquilla listeners. For both groups, the Unrelated condition was also slower overall. (β=0.09, S.E.=0.03, t=3.33). There was an interaction between group, aspiration and Related condition, where the Bogotá listeners were slower than Barranquilla listeners (β=0.078, S.E.=0.023, t=3.32) on the [-s]-aspiration targets when the prime-target aspiration was Unrelated (β =0.082, S.E.=0.031, t=5.01).

3.2. English

The English results aligned very closely with those from Spanish. Again the Bogotá listeners were slower overall (β=0.04, S.E.=0.009, t=4.89) and the Unrelated condition was slower overall than the Related condition. There was also an interaction for group and condition, where the Bogotá listeners were slower on the Unrelated trials than the Barranquilla listeners (β=0.11, S.E.=0.038, t=3.76). Finally, a three-way interaction between group, aspiration and Related condition emerged. The Bogotá listeners were slower than the Barranquilla listeners on the [-s]-aspiration targets when the

prime-target was Unrelated (β =0.052, S.E.=0.041, t=3.81).

3.3. Offline vocabulary measure

To test the hypothesis that language proficiency modulates the strength of expectations in terms of L2 input, participants completed a vocabulary test in English. Because the Bogotá participants were uniformly slower on the Unrelated trials, we took only the vocabulary scores of the Barranquilla listeners and correlated them with Log10 reaction times for the Unrelated targets.

Figure 4. Correlation between RT and Vocabulary scores on Unrelated trials
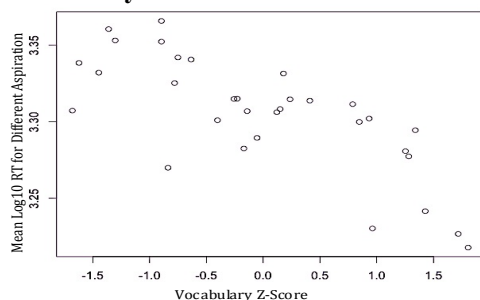
The analysis revealed a negative correlation between reaction time and vocabulary z-scores (r=-0.56, t=6.23, p=0.012, 0.95C.I. =-0.87, -0.42).

4. DISCUSSION

These results support the hypothesis that L2 listeners transfer L1 expectations when processing L2 input [8]. Barranquilla listeners were more proficient at processing L2 English input that shared a feature of their L1 dialect. This study also extended the results of [10] to Spanish by showing that non-dominant dialect speakers also demonstrate greater flexibility when processing both dialects than do listeners of the dominant dialect. One question that arises, however, is whether Barranquilla listeners are in fact *expecting* to hear the modified forms in English or if their advantage lies solely in their greater perceptual flexibility, as shown by the asymmetrical processing advantage in the L1. We argue that since the processing advantage only accrues to listeners with lower English vocabulary knowledge, it most likely reflects L1 expectations. Once experience with the target language increases, these expectations are attenuated. If it were merely a question of flexibility, language proficiency would not play such a strong role, since flexibility is actually an advantage in comparative terms and would not necessarily disappear with greater experience. Another important question is whether the Barranquilla listeners are actively predicting the [-s]-aspirated forms or merely integrating these targets faster because they do not cause the same perceptual disruption as the same forms do for the Bogotá listeners. We argue that this is not the case, since the Barranquilla listeners are actually *faster* at lexical decisions when the target matches their dominant dialect pattern, in both Spanish and English. Given this, we propose that Barranquilla listeners have a processing advantage that comes from their L1 dialect that drives their expectations regarding the nature of the input. The [-s]-aspirated forms do not exist in English and are thus expected to interrupt processing, as occurs with Barranquilla listeners of higher English proficiency.

While the notion of transfer is not new in the field of second language acquisition, conceiving of transfer in terms of learner expectations represents a departure from more traditional accounts, in particular as in terms of its origins and potential effects.

5. REFERENCES

[1] Bates, D. M., Maechler, M., & Bolker, B. (2008). Package 'lme4' [Documentation file, online].

[2] Brown, E., Torres Cacoullos, R. (2003). Spanish /s/: A different story from beginning (initial) to end (final). In *Proceedings from the 31st LSRL,* ed. R. Nunez- Cedeno, L. López, and R. Cameron, 21–38. Amsterdam: John Benjamins.

[3] Brownell, R. (Ed.). (2012). *Expressive One-Word Picture Vocabulary Test manual* (3rd ed.). Novato, CA: Academic Therapy Publications.

[4] Chappell, W. (2014). Reanalysis and Hypercorrection Among Extreme /s/ Reducers. Selected Papers from NWAV 42, Vol.20.

[5] File-Muriel, R.J. (2007). The role of Lexical Frequency and Phonetic Context in the Weakening of Syllable-final Lexical /s/ in the Spanish of Barranquilla, Colombia. PhD Dissertation, Indiana University

[6] Guasch, M., Boada, R., Ferré, P., & Sánchez-Casas, R. (2013). NIM: A Web-based Swiss army knife to select stimuli for psycholinguistic studies. *Behavior research methods*, *45*(3), 765-771.

[7] Lipski, J. (1994). *Latin American Spanish*. London: Longman.

[8] Pajak, B. (2012). Inductive inference in non-native speech processing and learning.PhD dissertation, University of California, San Diego.

[9] Pierrehumbert, J. (2002). Word-specific phonetics. *Laboratory phonology*, *7*, 101-139.

[10] Sumner, M., & Samuel, A. G. (2009). The role of experience in the processing of cross-dialectal variation. *Journal of Memory and Language*, *60*, 487-501.