

The effects of language transfer during Spanish language development

A study on word-external phonological processes

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Hispanic Linguistics Symposium, 2021 October 8, 2021

INTRODUCTION

BACKGROUND

Understanding language transfer
Repairing empty onsets in Spanish and English

RESEARCH QUESTIONS

METHODOLOGY

Participants
Questionnaire
Production task

DATA ANALYSIS

Categorical coding

Results

DISCUSSION

THE BILINGUAL POPULATION

Heritage speakers: are early bilinguals for whom their first language is a minority language in the society and who eventually become dominant in the majority language (Benmamoun, Montrul, & Polinsky, 2013; Polinsky & Scontras, 2020; Valdés, 2014).

- ▶ **Input reduction during childhood** is believed to be at the center of the shift in language dominance (Flores & Barbosa, 2012; Montrul, 2013; Montrul & Bowles, 2009)
- ▶ But, very few studies have conducted cross-sectional studies to validate this claim.

CHILD BILINGUAL PHONOLOGY

- ▶ A child's two grammars interact during language development (i.e., acceleration, deceleration, transfer). (Paradis & Genesee, 1996)
 - ▶ Acceleration: Faster acquisition of linguistic property in language A due to exposure to language B (Keffala, Barlow, & Rose, 2018; Lleó, Kuchenbrandt, Kehoe, & Trujillo, 2003)
 - ▶ Deceleration: Slower acquisition of linguistic property in language A due to exposure to language B (Fabiano-Smith & Barlow, 2010; Kehoe, 2002)
 - ▶ Transfer: Incorporation of linguistic property of language B in language A (Fabiano-Smith & Barlow, 2010; Lleó, 2018; Meziane & MacLeod, 2021; Paradis, 2001)
- ▶ Transfer continues to be present up until the child grammars mature (adulthood) (Lleó, 2016).

FACTORS CONTRIBUTING TO LANGUAGE TRANSFER

Factors contributing to language transfer in bilingual phonology:

- ▶ **Language use and dominance** (Amengual, 2018; Rao, 2014; Shea, 2019)
- ▶ **Cultural sensitivity and study abroad** (Ronquest, 2012)
- ▶ **Language mode** (Amengual, 2018; Khattab, 2003)
- ▶ **Code-switching** (Bullock, 2006; Elias et al., 2017)
- ▶ **Cognate status** (Amengual, 2012; Shelton et al. 2017)

UNDERSTANDING LANGUAGE TRANSFER

- ▶ Language transfer reflects the bilinguals' mixed representations of their two grammars (i.e., it is influenced by individual characteristics: language input / output, language dominance, proficiency, cultural sensitivity).
- ▶ Language transfer reflects processing costs in bilingual language production (i.e., it is influenced by language mode, code-switching, cognate status).

MAIN OBJECTIVES

- ▶ Examine the age factor in heritage bilingualism.
- ▶ Examine how exposure to and use of the heritage language influences heritage language production of /C#V/ sequences across age periods.

WORD-EXTERNAL REPAIRS OF EMPTY ONSETS

Cross-linguistically, **CV Onset and Nucleus** is the preferred syllable type. Syllables with empty onsets (V or VC) are dispreferred. (Blevins, 1995; Jakobson, 1968)

WORD-EXTERNAL REPAIRS OF EMPTY ONSETS

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ONSET: syllables should have an onset.

SPANISH RESYLLABIFICATION

Resyllabification

- ▶ The coda consonant in the C#V sequences becomes an onset. [e.l.o.xo] becomes [e.lo.xo] ‘the eye’
(Colina, 1997; Harris, 1983; Hualde, 2014).

ojo

ENGLISH GLOTTAL STOP INSERTION

Glottal stop insertion

[an.onion] becomes [an.ʔonion] in prosodically prominent positions

(Davidson & Erker, 2014; Dilley, Shattuck-Hufnagel, & Ostendorf, 1996; Garellek, 2014; Pak, 2014, 2016; Scarpace, 2017; Scobbie & Pouplier, 2010)

onion

TRANSFER OF WORD-EXTERNAL PROCESSES

Majority-to-heritage language will result in high rates of glottal phonation in stressed /C#V/ sequences in Spanish.

RESEARCH QUESTIONS

1. Do Spanish HS produce a greater rate of glottal phonation than Spanish speakers in Mexico?
 - ▶ Yes, influence from English into Spanish will result in the production of /C#V/ sequences with greater rates of glottalization than those found in Spanish speakers in Mexico.

RESEARCH QUESTIONS

2. Does age moderate the difference in the rate of glottal phonation between HS and MexS?

- ▶ Yes, child HS = child MexS / adult HS > adult MexS, the shift in language dominance occurs in late childhood
- ▶ Yes, child HS > child MexS / adult HS = adult MexS, language transfer arises during childhood & adults have more robust grammars OR better processing /inhibitory skills.
- ▶ No, child HS > child MexS / adult HS > adult MexS, language transfer arises during childhood & adult grammars are not more permeable to language transfer than child grammars.

RESEARCH QUESTIONS

3. Does amount of language use and exposure affect the rate of glottal phonation in heritage speakers?

- ▶ Yes, heritage speakers who are exposed to the language and use it more would often demonstrate fewer cases of glottal phonation.
- ▶ No, language interaction arises in heritage speakers' grammars regardless of the amount of language use and exposure.

BACKGROUND QUESTIONNAIRE

Input

- ▶ Percentage of Spanish heard at school
- ▶ Percentage of Spanish heard at home (caregiver 1, caregiver 2, younger siblings [if any], older siblings [if any])
- ▶ Weighted by time spent with each speaker and in each environment

Output

- ▶ Percentage of Spanish spoken at home (caregiver 1, caregiver 2, younger siblings [if any], older siblings [if any])
- ▶ Weighted by time spent with each speaker

PARTICIPANTS

Spanish speakers from Mexico (MexS)

- ▶ MexS adults: 20 participants (14F, 6M) from Central Mexico with no exposure to other languages (other than some English).
- ▶ MexS children: 44 child Mexican speakers (19F, 1 M) from Central Mexico with no exposure to other languages (other than English).

MexS	N (Ages)	Spanish input	Spanish output
younger child MexS	N = 21 (5;1 to 8 years)	86.98% (SD = 0.08)	92.58% (SD = 0.07)
older child MexS	N = 23 (8 to 11;8 years)	91.52% (SD = 10.28%)	97.93% (SD = 4.47%)
adult MexS	N = 20 M = 20.87, SD = 1.99	87.50% (SD = 8.10%)	92.82% (SD = 7.15%)

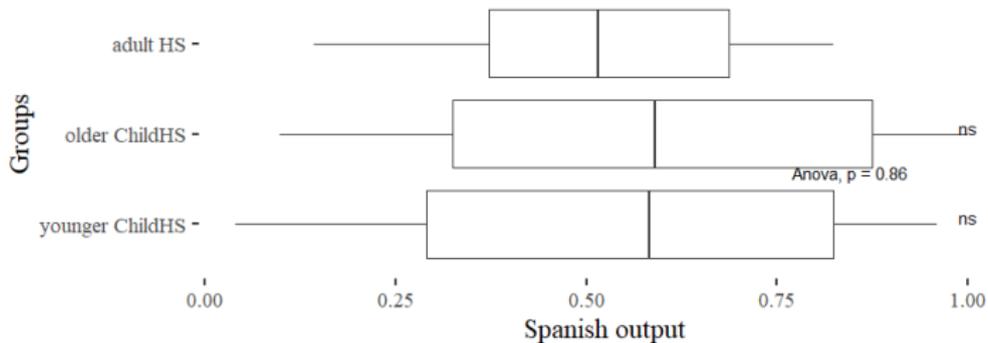
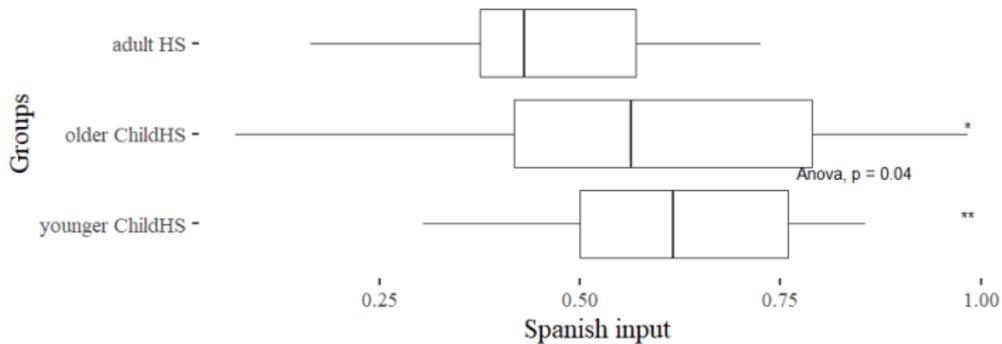
PARTICIPANTS

Spanish heritage speakers

- ▶ **Adult HS:** 21 US-born participants of Mexican descent (15 F, 5 M). Exposed to Spanish since birth and to English before the age of 5 ($M = 3.3$ years, $SD = 1.59$ years).
- ▶ **Child HS:** 44 participants (23 F, 21 M) with at least one caregiver that immigrated from Mexico. Except for 4 participants, all the child HS were born in the US. The mean age of arrival in the US of the 4 child HS was 22 months ($SD = 11$ months). Exposed to Spanish since birth. The mean age of exposure to English was 1.52 years ($SD = 1.49$ years).

HS	N (Ages)	Spanish input	Spanish output
younger child HS	N = 19 (5;2 to 8 years)	61.62% ($SD = 15.98\%$)	54.86% ($SD = 31.42\%$)
older child HS	N = 25 (8;2 to 11;1 years)	57.95% ($SD = 22.04\%$)	52.64% ($SD = 28.71\%$)
adult HS	N = 21 (18;11 to 26;7)	47.47% ($SD = 14.22\%$)	48.47% ($SD = 14.14\%$)

PARTICIPANTS

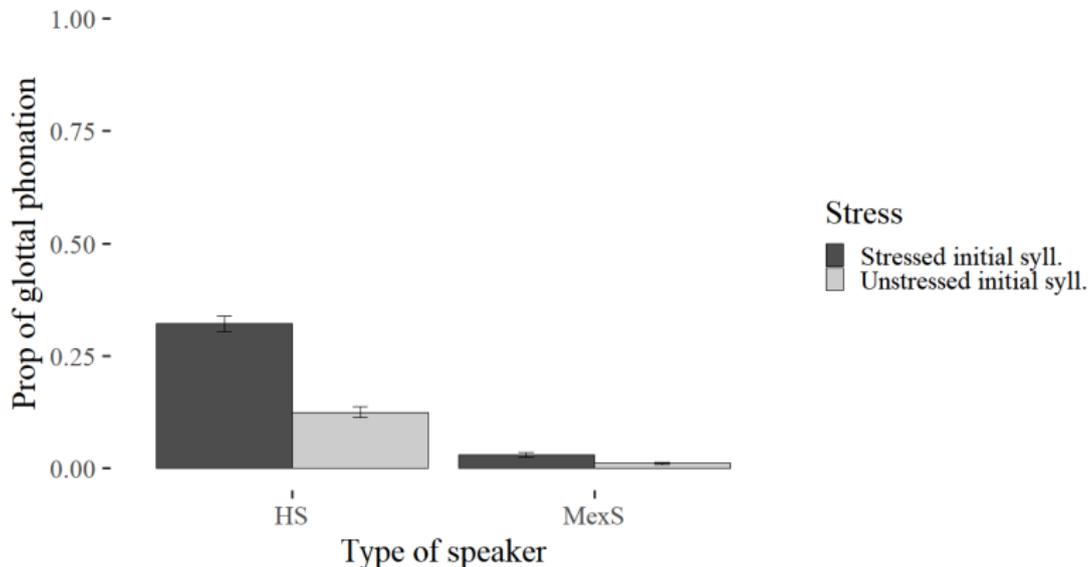


STATISTICAL MODEL

- ▶ 3162 were submitted to analysis (142 tokens removed)
- ▶ A mixed effects logistic regression
 - ▶ Fixed effects:
 - ▶ Type of speaker (i.e., HS, MexSs)
 - ▶ Primary stress (i.e., yes, no)
 - ▶ Age (younger CH, older CH, adults)
 - ▶ Random effects:
 - ▶ Random intercept for participant
 - ▶ Random intercept for word
 - ▶ Random intercept for consonant (i.e., /n/, /l/, /s/)

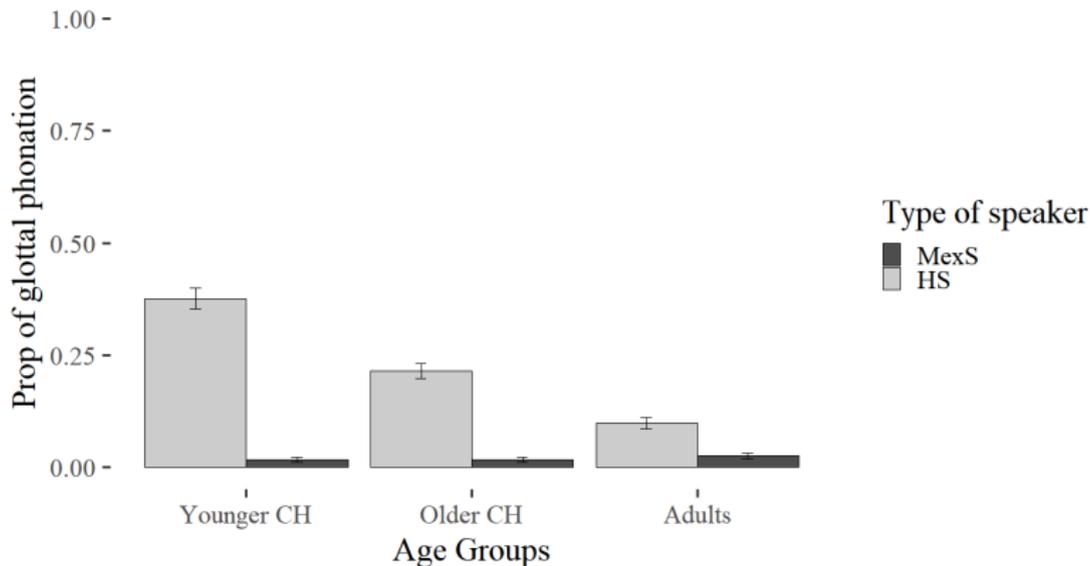
RESULTS

- ▶ Vowel-initial words with initial primary stress are glottalized more often than vowel-initial words with unstressed initial syllables ($p < 0.001$), and only in the HS' group (Interaction: $p = 0.01$)



RESULTS

- ▶ younger child HS > younger child MexSs ($p < 0.0002$)
- ▶ older child HS > older child MexSs ($p < 0.001$)
- ▶ adult HS = adult MexSs ($p = 0.56$)

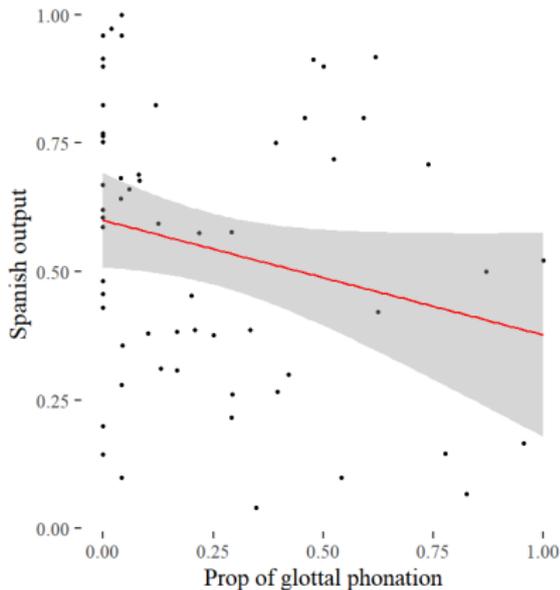
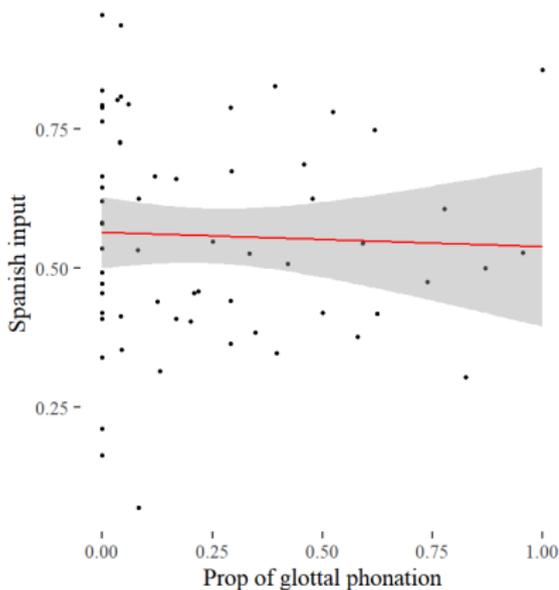


STATISTICAL MODEL

- ▶ Subset of HS (N = 1542)
- ▶ A mixed effects logistic regression
 - ▶ Fixed effects:
 - ▶ Primary stress (i.e., yes, no)
 - ▶ Age (younger CH, older CH, adults)
 - ▶ Amount of Spanish input / amount of Spanish output
 - ▶ Random effects:
 - ▶ Random intercept for participant
 - ▶ Random intercept for word
 - ▶ Random intercept for consonant (i.e., /n/, /l/, /s/)

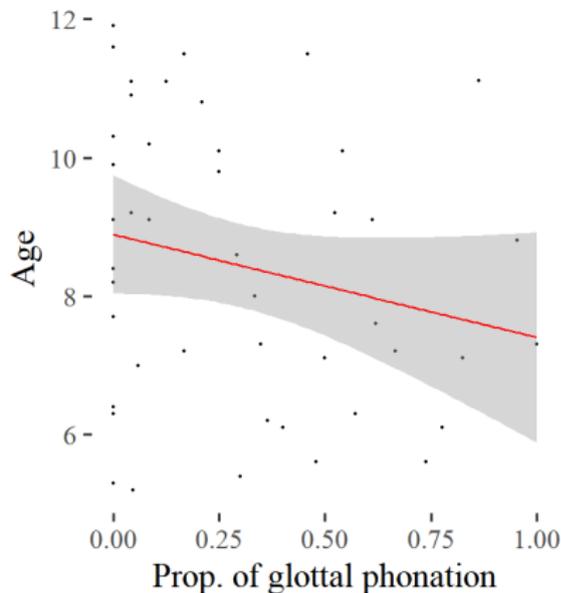
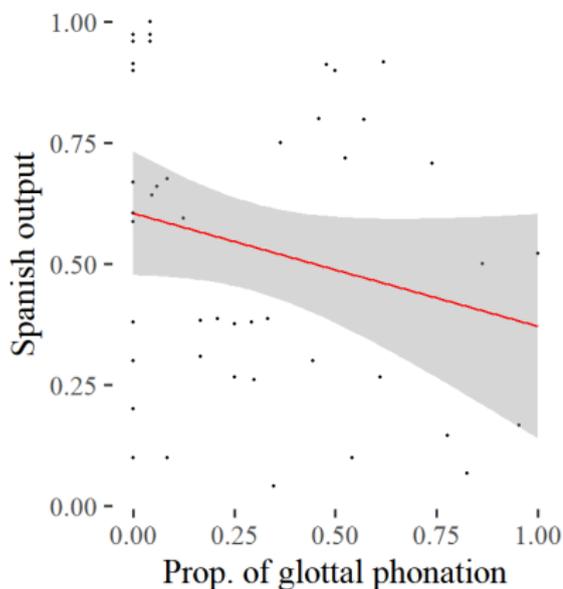
RESULTS

- ▶ Amount of Spanish output significantly affects rate of glottal phonation ($p = 0.03$)
- ▶ No sig. effect of amount of Spanish input ($p = 0.13$)



RESULTS

- ▶ With only the group of children, output showed a sig. effect ($p = 0.04$), but age (continuous) did not turn out to be significant ($p = 0.16$).



DISCUSSION

1. Do child and adult HS produce a greater rate of glottal phonation than child and adult Spanish speakers in Mexico?

- ▶ Child HS > Child MexS
- ▶ Adult HS = Adult MexS
- ▶ **Majority-to-heritage language transfer** in word-external phonological processes, an understudied area in heritage language phonology.

DISCUSSION

2. Does age moderate the difference in the rate of glottal phonation between HS and MexS?

- ▶ Yes, there was an interaction between age and type of speaker.
 - ▶ Younger child HS > Younger child MexS
 - ▶ Older child HS > Older child HS
 - ▶ Adult HS = Adult MexS

It is unlikely that adult heritage language transfer only occurs after late childhood (as argued in heritage bilingualism). Instead, language transfer is present already during childhood.

- ▶ Adult grammars are less permeable to language transfer and may have better processing/inhibitory skills during HL production.

DISCUSSION

3. Does amount of language exposure and use affect the rate of glottal phonation in heritage speakers?

- ▶ Spanish output, but not Spanish input, predicted the rate of glottal phonation.
- ▶ "Using a language (i.e. output) forces the learner to process the language in a way that only hearing it (i.e. input) does not" (Bohman, Bedore, Peña, Mendez-Perez, & Gillam, 2010, p.339).
- ▶ Although HS have an advantage over L2 speakers for having **heard** the HS during childhood (Au, Knightly, Jun, & Oh, 2002), it is not enough to just hear the heritage language.

DISCUSSION

3. Does amount of language exposure (input, output) affect the rate of glottal phonation in Spanish heritage speakers?

- ▶ Despite some studies suggesting that HL use has an effect beyond childhood (Kupisch et al., 2014; Lloyd-Smith et al., 2020; Oh Au, 2005; Yeni-Komshian et al., 2000), my research shows that language use in the heritage language plays a greater role as the heritage grammars are still maturing (during childhood).
- ▶ The effect of Spanish output is stronger than the effect of age during childhood. That is, the amount of output in the heritage language overrides potential effects of language maturation during childhood.

DISCUSSION

- ▶ Language transfer is not static, but rather mediated by the maturation of the bilinguals' grammars (children vs. adults), and the amount of output in the heritage language.
- ▶ **Gradient Symbolic Computation:** (Goldrick et al., 2016; Smolensky & Goldrick)
GSC is a grammar-based formalism that posits that discrete phonological structure can be associated with activation scores (continuous structure)
- ▶ Coactivation of the two languages is present during language evaluation. Each language is active to a degree.
 - ▶ During language maturation, children learn how to inhibit (not activate) the irrelevant language.
 - ▶ Output in the heritage language is necessary to balance the activation of the two languages.

NEXT STEPS AND LIMITATIONS

- ▶ What process do bilinguals employ to "learn to inhibit" the irrelevant language? Can be formalized in the grammar? (Developing the model)
- ▶ What is the type of input that bilinguals receive? Is the end state that of the adult bilinguals' grammars, or do they also transfer glottal phonation when compared to the input that they receive? (Data from first generation speakers)
- ▶ Is the decrease of glottal phonation parallel to that of English? In other words, are children during young childhood still learning to produce ambisyllabic consonants? (Data from English)

THANKS

- ▶ Ji Young Kim & Victoria Mateu
- ▶ The members of the UCLA Spanish and Portuguese Research Methods Group
- ▶ Research team: Melissa Medoza, Aljeandro Romo, Maricela Estrada, Karina Eutimio, Ashley Cobian, Maria Cruz Gutierrez.

Funded by:

NSF 20-538 Linguistics Program - Doctoral Dissertation Research Improvement Grant



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APPENDIX

- ▶ But, can high rates of glottal phonation in stressed syllables /C#V/ be due to language maturation (i.e., deceleration)? Is it possible that bilinguals are still learning the process of resyllabification?
 - ▶ It is unlikely that they are learning to coordinate gestures (consonant-to-vowel), because they can do it in unstressed syllables.
 - ▶ It is possible that they are learning that resyllabification applies across stress conditions, instead.
 - ▶ But, so far, there is no attested stage in which monolingual glottalize more sig. more in stressed than in unstressed syllables.

THE PHONOLOGICAL MODEL

/ el árbol/	ONSET W= 6	ALIGN -L W = 0	DEP- ? W = 6	H	p
a. ω σ e l ω σ σ a r β o l	1			6	0.002
b. ω σ e ω σ σ l a r β o l		1		0	0.99
c. ω σ e l ω σ σ ? a r β o l			1	6	0.002

Table 1: Basic tableau for *el árbol* in Spanish

THE PHONOLOGICAL MODEL

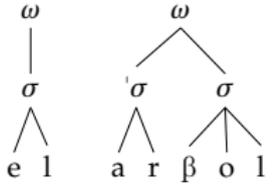
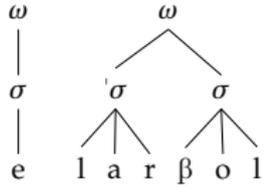
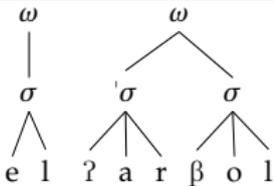
/ el árbol/	ONSET W= 6	ALIGN -L W = 2	DEP- ? W = 3	H	p
a. 	1			6	0.01
b. 		1		2	0.72
c. 			1	3	0.26

Table 2: Basic tableau for *el árbol* in Spanish

THE PHONOLOGICAL MODEL

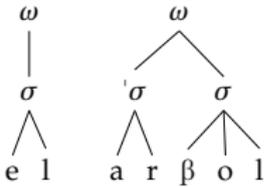
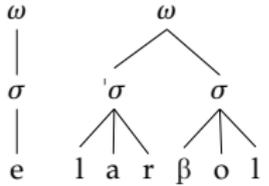
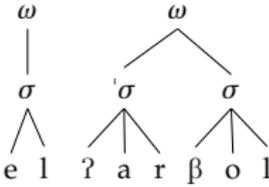
/ el arbol /	ONSET Sp 0.5: 3 En 0.5: 3	ALIGN -L Sp 0.5: 0 En 0.5: 2	DEP- ? Sp 0.5: 3 En 0.5: 0.5	H	p
a. 	1			6	0.06
b. 		1		2	0.80
c. 			1	3.5	0.17

Table 3: Based on Goldrick et al (2016)