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BACKGROUND

There is limited study of how simultaneous Spanish-English bilingualism affects phonological acquisition.

Liquid sounds (r and l) are articulatory complex and acquired late.

A Spanish-English bilingual child needs to learn 3 'r' sounds:

Spanish		English
/r/	/r/	/ɹ/
alveolar trill	alveolar tap	postalveolar approximant
"carro"	"carró"	"car"

Without a well established developmental norm in bilingual children, it is hard for speech-language pathologists (SLPs) to determine the presence of a speech delay in a bilingual child.

GOALS

1. Analyze liquid sounds in typically-developing Spanish-English bilingual children between ages 3-6, with control for phonetic environments. 2. Compare children's and parents' speech in each language to control for dialectical variation.

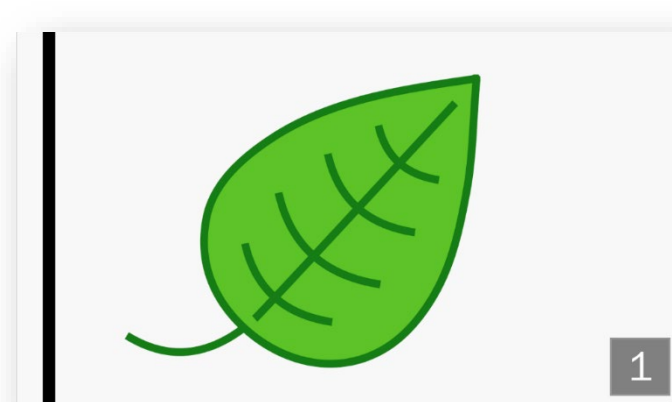
METHODS

Stimuli: 39 English and 31 Spanish words containing liquids. Phonetic environments are controlled across languages to allow better comparison.

SAMPLE ITEMS	English		Spanish		
	l	ɹ	l	r	r
				(tapped)	(trilled)
Word-initial	lif	ɹid	'libro	sound cannot occur in this context	'risa
Complex Onset	blu	bɹum	'blusa	'bruxa	sound cannot occur in this context
Word-final	bɛl	bɛɹ	pa'stel	ko'mer	sound cannot occur in this context
Before a consonant	kold	soɹd	sol'dado	ar'ðija	sound cannot occur in this context
Between vowels	gɹə'nolə	'dɹə	'ola	dok'tora	'gora

Elicitation: Both parent and child spoke the words in a picture-naming task.

This lets us compare child speech directly to their primary adult model (which may be accented).



Example slide: 'leaf'

Case study subject: 4-year old female bilingual whose parents speak Mexican Spanish. Mother estimates the child gets 60% English, 40% Spanish input.

SUMMARY

The child shows different error patterns in English and Spanish. She has difficulty with both Spanish 'r' sounds. She replaces Spanish flapped /r/ with /l/ or with English /ɹ/, but uses different strategies for Spanish trilled /r/. She switches 'r' and 'l' sounds in Spanish but not in English. She simplifies onset clusters in Spanish but not in English. She glides English coda /l/, but not Spanish /l/.

Spanish error patterns

Word-initial	Trilled /r/ replaced by stop+tap or fricative+tap /rana/ → drana, /risa/ → ðrisa	13/13
Complex Onset (Blend)	Flapped /r/ replaced by English /ɹ/; preceding consonant deleted /braso/ → ɹaso	2/17
Word-final	/l/ has quality between Spanish /l/ and English /ɹ/ /sol/ → soɹ	2/3
	Flapped /r/ replaced by /l/	11/14
	/komer/ → komeɹ	
Before a consonant	Flapped /r/ replaced by English /ɹ/ /tortuga/ → toɹtuga	8/11
Between vowels	Trilled /r/ replaced by stop+tap or fricative+tap /karo/ → kadro, kaðro	12/13
	Flapped /r/ shows variable substitutions or deletion /doktora/ → doktoɹ, doktoða; /karo/ → kadro /dinero/ → dineo	9/9

English error patterns

(all correct)	
(all correct)	
/l/ glides to [w] or is deleted /bol/ → bow /bal/ → ba (parent deletes it as well)	5/12
/l/ glides or deletes /kold/ → kowd; /salt/ → sad	4/8
/ɹ/ phonetically weakens /fɹɹk/ → fɹɹk with "½ ɹ"	2/7
(all correct)	

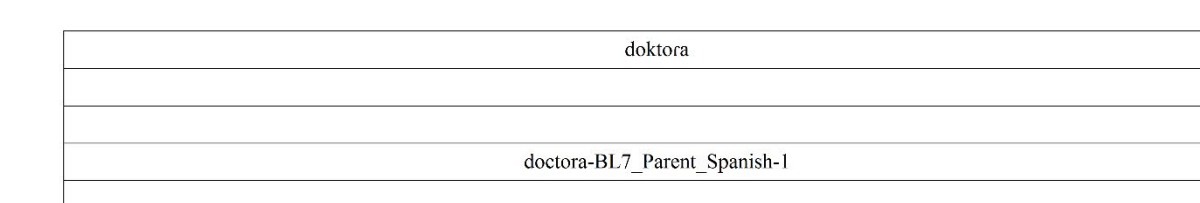
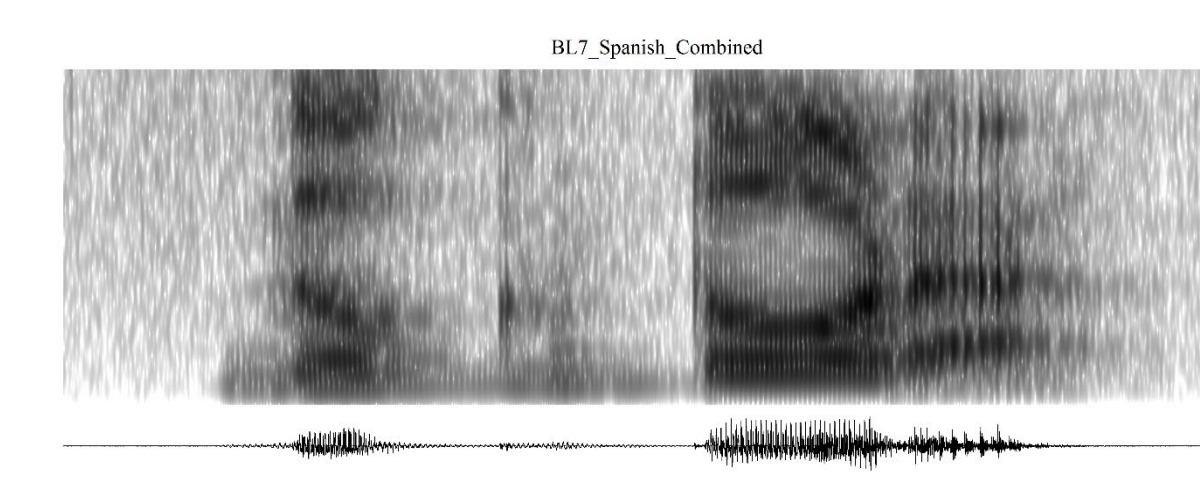
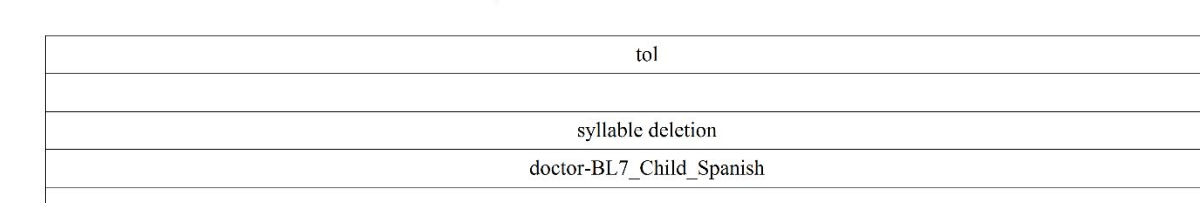
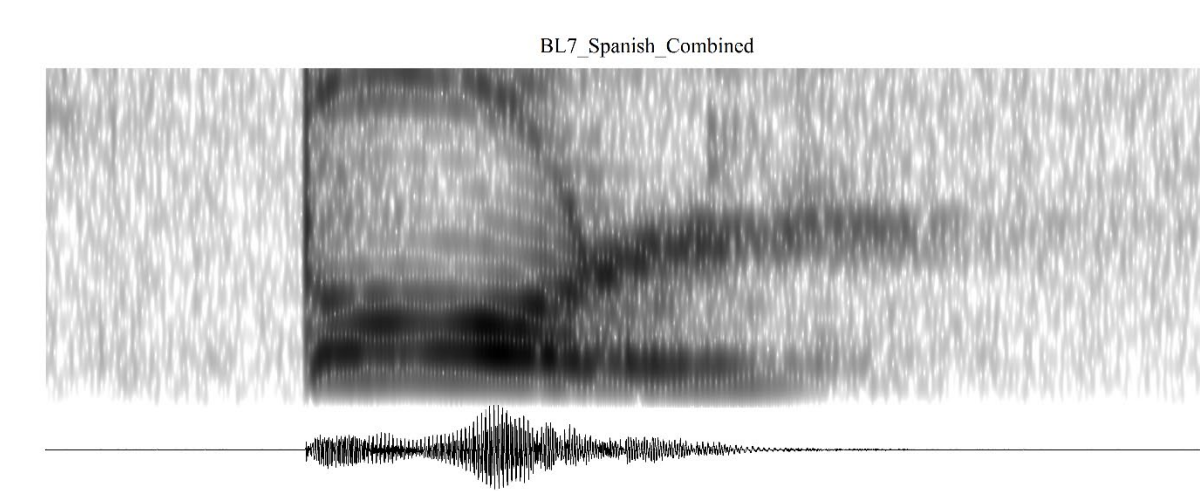
SAMPLE SPECTROGRAMS

We plan to conduct acoustic analysis to pick up more subtle differences.

Top: child production of /doktora/ as [toɹ].

Bottom: parent production of /doktora/

The formant movements in the liquid are different for adult and child. The child's speech lacks the sharp intensity dip and rise seen with the parent's flap.



IMPLICATIONS AND FUTURE WORK

1. Effective evaluation of a bilingual child must take into account both languages, as well as the nature of the input the child hears. What might seem like 'disordered' pronunciation in one language may be transfer of sounds from the other language, or may be modeled (accurately!) on accented parental speech.
2. SLPs should consider the impact of phonetic environment, language interference and the influence of dialectical variation on liquid sound production during the assessment.
3. This has been a case study of one child, out of 9 we have recorded. We plan to eventually compare 10 typically-developing Spanish-English bilingual and 10 English monolingual children between ages 3-6.

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