Aspiration of /s/ in Spanish: An account of morpheme boundary processes

Leandro Bolaños
Yale University

1. Goals

To examine opaque data in Nicaraguan Spanish and to provide an analysis in a revised Stratal OT approach by taking co-articulatory effects into account.

Classical OT cannot account for:
Counterfeeding: "underapplication"
Deletion of final /s/ and [h] fails to cause spirantization of voiced stops: *las balas* ⇒[la balah] not [la βalah]
Counterbleeding: "overapplication"
Resyllabification fails to block process /s/ aspiration:
las alas ⇒ [lah alah]

2. Data

Transparent data:

Aspiration:
/s/ ⇒ [h] in syllable coda (Harris 1983, Hualde 1989, Morris 1998, Colina 2006, Wiltshire 2006):

este	[ehte]	'this'
aislar	[aihlar]	'isolate'
mas tarde	[mah tarde]	'later' (more late)
mas largo	[mah largo]	'longer' (more lon)

/s/ or [h] deletes before +v stop:

Las balas	[la balah]	'the bullets'

Spirantization of voiced stops after vowels:

No spirantization: utterance initial:

bala	[bala]	'bullet'
don	[don]	'gift'
gala	[gala]	'gala'

Spirantization: word initial and internal, post-vocalic:

lobo	[loβo]	'wolf'
lodo	[loðo]	'mud'
lago	[laɣo]	'lake'
la bala	[la βala]	'the bullet'
la di	[la ði]	'(I) gave it'
la gala	[la ɣala]	'the gala'

Opaque data:

Counterfeeding Opacity:
/s/ + voiced stop sequences: /s/ is deleted and the following voiced stop does not spirantize.

Word internal:

desde	[dede]	'since'
rasgo	[rago]	'trait'

Word Final:

las dos	[la doh]	'two o'clock'
mas grande	[ma grande]	'bigger' (more big)
las balas	[la balah]	'the bullets' -Pl

Counterbleeding Opacity:
/s/ ⇒ [h] when followed by vowel initial words or stems (Harris 1983, Hualde 1989, Colina 1997, Wiltshire 2006).

Environment (coda) for aspiration is lost: aspiration still occurs

las alas	[la.ha.lah]	'the wings'
los otros	[lo.ho.troh]	'the others'
mas alla	[ma.ha.ja]	'beyond'

3. Classical OT Account

OT can account for transparent data.

Constraints and tableaux for transparent aspiration of /s/ syllable finally.

*C/[+STRID]: Assign a violation per strident in coda

IDENT[STR]: Every corresponding segment in the input must be identical to its correspondent in the output for feature Strident

MAX: Do not delete

Aspirating dialect *C/[+STRID] >> IDENT[STR], MAX

/estos/	*C/[+STRID]	IDENT[STR]	MAX
a. estos	**!		
b. estoh	*!	*	
c. ehtos	*!	*	
d.☞ehtoh		**	
e. eto		**	*!*

Constraints and tableaux for transparent spirantization of voiced stops after vowels.

*Vd: Assign one violation for a voiced stop following a vowel

IDENT[CONT]: Assign one violation for a mismatch between feature Continuant between correspondent segments from input to output.

a. Word medial intervocalic /b/ *lobo* 'wolf'

/lobo/	*Vd	IDENT[CONT]
lobo	*!	
☞loβo		*!

b. Word Initial /b/ *bala* 'bullet'

/bala/	*Vd	IDENT[CONT]
☞bala		
βala		*!

c. Word initial intervocalic /b/ *la bala* 'the bullet'

/la bala/	*Vd	IDENT[CONT]
la bala	*!	
☞la βala		*!

Constraints necessary for deletion of /s/ before voiced stops and relevant tableaux.

AGREE: Assign a violation if two adjacent obstruents disagree in voicing

IDENT[VOICE]: Assign a violation for a change in voice between corresponding input and output segments

MAX: Do not delete

/desde/	AGREE	IDENT[VOICE]	*C/[+STR]	IDENT[STRID]	MAX
desde	*!		*		
dehde	*!			*	
dezde		*!	*		
☞dede				*	*

4. Problem

Constraints and rankings in Classical OT are unable to account for counterbleeding and counterfeeding opaque data.

*C/[+str] targets surface coda: /s/ in las no longer in coda

/las alas/	*C/[+STRID]	IDENT[STR]	MAX
a. la.s a.las	*!		
b.☞la.s a.lah		*	
c. ☹la.h a.lah		**!	

*Vd targets voi stops after vowels on the surface: counterfeeding opacity.

/las balas/	Agree	IDENT[VOICE]	*C/[+STR]	IDENT[STRID]	MAX	*Vd	IDENT[CONT]
a. las balas	*!		**	**			
b. lah balah	*!						
c. laz balah		*!	*	*			
d.☹ la balah					*	*!	
e.💣 la βalah					*		*
f. lah βalah	*!						**

5. Stratal OT and OT-CC

Counterbleeding: example /beses ai/ 'times there'

a. Stem: /bes/ 'time'

/bes/	IDENT[STR]	*C/[+strid]
☞bes		*
beh	*!	

b. Word: /bes+es/ 'times' PL

/bes+es/	*C/[+STRID]	IDENT[STR]
a. be.ses	*!	
b.☞be.seh		*
c. beh.eh		**!

c. Phrase: /beseh + ai/ 'times there'

/beseha i/	*C/[+STRID]	IDENT[STR]
a. be.se.sa.i		*!
b.☞be.se.ha.i		
c. be.he.ha.i		*!

Counterfeeding: example /las/ + /balas/ 'the bullets'

a. Word: /la-s/ 'the' and /bal-as/ 'bullets'

/la-s/	*C/Strid	IDENT[STR]	Max	*Vd	IDENT[CONT]
las	*				
☞lah		*			
/bal-as/	*C/Strid	IDENT[STR]	Max	*Vd	IDENT[CONT]
balas	*				
βalas	*				*!
☞balah		*			
βalah		*			*!

b. Phrase: /lah + balah/

/lah balah/	Agree	IDENT[VOICE]	*C/[+STR]	IDENT[STRID]	MAX	*Vd	IDENT[CONT]
a. las balas	*!		**	**			
b. lah balah	*!						
c. laz balah		*!	*	*			
d.☹ la balah					*		
e.☞ la βalah					*	*!	
f. lah βalah	*!						**

Stratal OT:
Proposed to account for opacity (Kiparsky 2000, 2008; Bermudez-Otero to appear).
Up to 3 levels of grammar, stem, word, phrase.
Constraint re-rankings at levels capture opacity

Tableaux at left show that Stratal OT works for counterbleeding: /s/ aspirates at word level, input to phrase level

Problem for counterfeeding, same problem as before

Both spirantization and /s/ deletion apply at phrase level

OT-CC is OT with candidate chains,(McCarthy 2007) is also inadequate.
Counterbleeding opacity fails - only valid chains at right.
No resyllabification and aspiration possible in OT-CC

Valid chains:

a. Initial form: /las.a.las/ (word boundary syllabification)
<las.a.las, lah.a.lah> Valid chain, no resyllabification

b. Initial form: /la.sa.las/ (ONSET satisfying syllabification)
<la.sa.las, la.sa.lah> Valid chain, only aspiration on final /s/.

6. Solution

Stratal OT needs to take co-articulation into account.
Introduction of a second level (P2) as in Kaisse (1985), ranking constraints dealing with co-articulatory phenomena (Agree) higher than in the phrasal level
e.g., the Postlexical P2 level encompasses phenomena like [h] deletion which occur in fast/casual speech.

Phrase and P2 levels

/lah balah/	IDENT[VOICE]	*C/[+STR]	IDENT[STRID]	MAX	Agree	*Vd	IDENT[CONT]
a. las balas		*!*	**		*		
b.☞lah balah					*		
c. laz balah	*!		*				
d. la balah				*!		*	
e. la βalah				*!			*
f. lah βalah					*		*!*

Spirantization of voiced stops occurs at Phrase Level

/lah balah/	Agree	IDENT[VOICE]	*C/[+STR]	IDENT[STRID]	MAX	IDENT[CONT]	*Vd
a. las balas	*!		**	**			
b. lah balah	*!						
c. laz balah		*!	*	*			
d.☞la balah					*		*
e. la βalah					*	*	
f. lah βalah	*!					**	

Loss of [h] occurs at Postlexical P2 level

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