



Volume 7

Issue 1 *Proceedings of the 24th Annual Penn
Linguistics Colloquium*

Article 2

1-1-2000

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1 Abstract

I have two goals in this paper. One is to deconstruct the account of nasal place neutralization processes in Spanish given by Harris (1984a,b), and to demonstrate that the typological predictions that it appears to make are falsified by neutralization patterns in languages other than Spanish. The spirit (if not the letter) of Harris' account is at the heart of a great deal of work on the autosegmental analysis of neutralization, and I follow Lombardi (1999) in the abandonment of this approach in favor of a typologically more accurate one involving Optimality Theoretic constraint interaction. My second goal is to provide a novel account of the distinct results of final nasal neutralization in different varieties of Spanish, one that satisfactorily explains the observed variation via the interaction of independently motivated constraints.

2 Theoretical Implications of Spanish Nasal Phonology

It is commonly recognized that all varieties of Spanish have three nasal phonemes, referring to the fact that the widest range of place of articulation contrasts available in a single position is the three-way contrast that holds at the beginning of words and intervocalically; i.e., in syllable onset position (the fact that word-initial \tilde{n} is relatively rare is ignored here). This three-way contrast is exemplified by the data in (1), taken from Harris (1984a:67).

(1)		<i>bilabial</i>	<i>alveolar</i>	<i>palatal</i>
	<i>word-initial</i>	<u>m</u> ata	<u>n</u> ata	<u>ɲ</u> ata
	<i>intervocalic</i>	ca <u>m</u> a	ca <u>n</u> a	ca <u>ɲ</u> a

There are four more non-contrastive but phonetically distinct nasal consonants in Spanish due to a process of pre-consonantal nasal place assimilation, as shown in (2) (again, examples are from Harris 1984a:67).

* I thank Jim Harris and Ricardo Bermúdez-Otero for extensive and valuable comments on an earlier version of this paper; I believe (hope?) that their input has resulted in some improvement. Needless to say, any remaining errors of fact and interpretation are mine to keep. Thanks also to the PLC-24 editors for their patience.

(2)	<i>bilabial</i>	<i>labiodental</i>	<i>dental</i>	<i>alveolar</i>	<i>alveopalatal</i>	<i>velar</i>
	campo	amfora	manto	manso	mancho	manco
	[mp]	[mf]	[nt]	[ns]	[nč]	[ŋk]

The three-way contrast among bilabial *m*, alveolar *n* and palatal *ɲ* is said to be *neutralized* pre-consonantly in favor of a nasal with the same place of articulation as the following consonant. The three-way contrast is also neutralized word-finally, leaving only alveolar *n* in standard varieties of Spanish and velar *ŋ* in some non-standard varieties as shown by the examples in (3).¹

(3)	a. <i>Standard</i>		b. <i>Non-standard</i>	
	e[n] Chile	si[n] dinero	e[ŋ] Chile	si[ŋ] dinero
	ta[n] frío	co[n] leche	ta[ŋ] frío	co[ŋ] leche
	u[n] elefante	allí está[n]	u[ŋ] elefante	allí está[ŋ]

The pre-consonantal nasals in (2) and the word-final nasals in (3) can of course be uniformly referred to as nasals *in the syllable rhyme*, as established by Harris (1983).² Since the place of articulation of both types of nasal in the rhyme is predictable, Harris (1984a,b) proposes that both of these processes of neutralization are fundamentally related to each other by a single process of *nasal place neutralization*, stated in (4).

(4) Nasal place neutralization (adapted from Harris 1984a:77)

[+nas]		/	_____
	→	*	
[PA]		[PA]	R

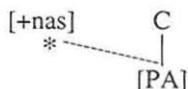
This rule removes the place of a nasal in the syllable rhyme. Those nasals in a syllable rhyme that happen to be pre-consonantal are subsequently supplied with the place of articulation of the following consonant by

¹ Harris (1984a:68) explicitly provides only the non-standard data in (3b); the data in (3a) are extrapolated from his subsequent analysis of the standard varieties. Harris refers to the non-standard varieties as “velarizing” and to the standard varieties as “non-velarizing.” I do not adopt this terminology for reasons made clear in section 4.

² At least, prior to resyllabification across certain morphosyntactic boundaries, on which see Harris 1983 (among many others) as well as section 4 of this paper.

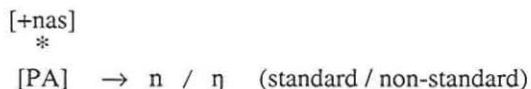
the *nasal place assimilation* rule in (5), spreading the place of articulation of a post-nasal consonant leftward to the nasal, already made placeless by (4).³

- (5) Nasal place assimilation (adapted from Harris 1984a:77)



Those nasals in the syllable rhyme that happen to be in word-final position undergo the *nasal place default* rule in (6) below, which simply supplies any nasals in the syllable rhyme left over by the application of (5) with a default place of articulation (alveolar or velar, depending on the variety).

- (6) Nasal place default (adapted from Harris 1984a:77)



By this account, two descriptive generalizations have been analytically extracted from these two otherwise unrelatable processes of neutralization: (i) both affect nasal place, and (ii) both occur in the syllable rhyme. This abstraction of neutralization from assimilation and default has become a commonplace in autosegmental analysis, under the guise of underspecification. The rule in (4) is equivalent in relevant respects to the statement “nasals in the rhyme are unspecified for place of articulation,” and the rules in (5) and (6) are similarly equivalent to the feature-filling rules necessary to complete such an analysis. But this formalized generalization appears to make a non-trivial typological prediction: if assimilation and default are always dependent on generalized neutralization, then they should never be found independently of each other. This prediction is falsified in at least one direction by the facts of Diola Fogany (Sapir 1965, Itô 1986), which has pre-consonantal nasal place assimilation but no process of word-final nasal place default. As the following examples show, the final nasal of a reduplicated verb surfaces place-assimilated in pre-consonantal position but place-contrastively (i.e., not neutralized) in word-final position.⁴

³ The predictability of the place of articulation of *both* nasals in nasal-nasal clusters is not addressed here; see Harris 1984ab for discussion and related analysis.

⁴ The same seems to be true in Ponapean (Rehg & Sohl 1981, Itô 1986).

(7) Diola Fogny reduplication

- a. /ni-gam-gam/ → [ni.gam.gam] 'I judge'
 b. /na-tiŋ-tiŋ/ → [na.tin.tiŋ] 'he cut through'
 c. /ku-boñ-boñ/ → [ku.bom.boñ] 'they sent'

The rule in (4), then, is only a true generalization about Spanish (and languages like it). One must then ask what the theoretical point of making such a generalization is, if it does not—and is not expected to—hold more generally.⁵ Typologically, it appears to make exactly the wrong prediction.

3 The General Independence of Assimilation and Default

Lombardi (1999) finds a parallel in terms of voicing to the situation just outlined. As shown in (8), word-final devoicing (that is, voicing default) and pre-consonantal voicing assimilation co-occur, as in Polish (8a), about as often as they do not, as in Yiddish (8b)—which has only assimilation—and German (8c)—which has only (necessarily syllable-final) devoicing.

(8) Voicing “neutralization” (adapted from Lombardi 1999)

- a. Polish: pre-consonantal assimilation and word-final devoicing
 i. /klub/ → [klup] 'club'
 ii. /żab-ka/ → [ʒap.ka] 'frog (dim.)'
 iii. /pros-ba/ → [proʒ.ba] 'request (n.)'
 b. Yiddish: pre-consonantal assimilation and word-final contrast
 i. [vog] ~ [vok.ʃol] 'weight ~ scale'
 ii. [bak] ~ [bag.beyn] 'cheek ~ cheekbone'
 c. German: syllable-final devoicing
 i. Sar[k] ~ Sär[g]e 'coffin (sg. ~ pl.)'
 ii. ja[g]en ~ ja[k.d]en 'to hunt ~ hunts'

Lombardi's analysis of the complete voicing neutralization typology thus involves assimilation-specific agreement constraints, general marked-

⁵ I should note that Harris' motivation—made clear in Harris 1984b:162 but not in Harris 1984a—is empirical: assimilation and default share the same class of exceptions in Spanish, a fact captured by the abstraction of neutralization.

ness constraints, and both positional and non-positional faithfulness constraints.⁶ The tableau in (9) is a mock example of the analysis of Polish.⁷

(9) Lombardi's analysis of Polish

Input:	/apgab/	AGREE (voi)	ONS- ID(voi)	*[+voi]	ID(voi)
a.	ap.gab	*!		**	
b.	ap.gap	*!		*	*
c.	ab.gab			***!	*
d.	ab.gap			**	**
e.	ap.kap		*!		**
f.	ap.kab		*!	*	*

The input has a voiceless + voiced obstruent cluster and a word-final voiced obstruent. Any faithful rendering of the obstruent cluster, as in (a) and (b), runs afoul of AGREE(voi), which is undominated. Any attempt to remedy this disagreement by devoicing the released pre-vocalic member of the cluster, as in (e) and (f), violates the equally undominated ONS-ID(voi), a position-specific faithfulness constraint targeting this better-cued member of the cluster. The decision in Polish comes down to (c) and (d), both with assimilation of the lesser-cued member, and a general markedness constraint against voiced obstruents, *[+voi], rules in favor of the one of these candidates that also has a devoiced word-final obstruent.

Substituting place of articulation for voicing, the analysis of Spanish turns out to be formally identical to the analysis of Polish.⁸ The input now has an alveolar nasal + velar stop cluster and a word-final bilabial nasal. A faithful rendition of the cluster, as in (a) and (b), fatally violates AGREE(PA). Assimilating the pre-vocalic stop to the nasal, as in (e) and (f), fatally violates ONS-ID(PA). The decision thus boils down to (c) and (d), both with assimilation of the lesser-cued nasal, and a general markedness constraint

⁶ See Baković 1999, 2000 on the use of agreement constraints with respect to vowel harmony features. On positional faithfulness, see Beckman 1998 (and references therein).

⁷ I use nonce inputs like /apgab/ to establish some consistency across tableaux.

⁸ Only the standard, alveolar-nasal-final varieties of Spanish in (3a) are analyzed here; see section 4 below for the analysis of the non-standard varieties of Spanish in (3b).

against non-coronals, *-COR, chooses the one of these candidates that also has a coronal (that is, alveolar) word-final nasal.⁹

(10) Lombardi-style analysis of (standard varieties of) Spanish

Input:	/angam/	AGREE (PA)	ONS- ID(PA)	*-COR	ID(PA)
a.	an.gab	* !		**	
b.	aN.gan	* !		*	*
c.	aN.gam			*** !	*
d.	an.gan			**	**
e.	an.kan		* !		**
f.	an.kam		* !	*	*

Returning to voicing: in Yiddish, the constraint ranking is as in Polish except that the markedness constraint *[+voi] is at the very bottom of the hierarchy. Crucially, it is ranked below ID(voi), the general faithfulness constraint against changing any values of the voicing feature. The decision flips to candidate (c), which has assimilation but no word-final devoicing.

(11) Lombardi's analysis of Yiddish

Input:	/apgab/	AGREE (voi)	ONS- ID(voi)	ID(voi)	*[+voi]
a.	ap.gab	* !			**
b.	ap.gap	* !		*	*
c.	ab.gab			*	***
d.	ab.gap			** !	**
e.	ap.kap		* !	**	
f.	ap.kab		* !	*	*

This is precisely the pattern found in Diola Fogy and Ponapean:

⁹ *-COR represents a set of constraints against non-coronal (labial, dorsal, etc.) place: see Harris 1984a:79, Prince & Smolensky 1993, and subsequent work in OT.

(12) Lombardi-style analysis of Diola Fogny / Ponapean

Input:	/angam/	AGREE (PA)	ONS- ID(PA)	ID(PA)	*-COR
a.	an.gab	* !			**
b.	aN.gan	* !		*	*
c.	³³ aN.gam			*	***
d.	aN.gan			** !	**
e.	an.kan		* !	**	
f.	an.kam		* !	*	*

Finally, the ranking for German is like the one for Polish, except that AGREE(voi) is dominated by both ONS-ID(voi) and *[+voi]. This ranking means that the unassimilated candidates in (a) and (b) are up for grabs, with the decision between them falling to *[+voi], which chooses (b), the candidate with syllable-final (that is, non-pre-vocalic) devoicing. (I leave the verification of this analysis to the reader in the interests of space.)

Of course, this analysis predicts the existence of a language with a place of articulation pattern parallel to German syllable-final devoicing. Such a language would have only coronal nasals in all syllable-final positions, including pre-consonantal—there would be no assimilation, only default.¹⁰ I do not at present know of any such language (though see the discussion surrounding (14) below), but the striking similarity between the neutralization patterns of place and voicing seems to inevitably lead to this prediction.

4 Nasal “Velarization”

Recall from the data in (3) that some (standard) varieties of Spanish have a word-final alveolar nasal *n*, as analyzed in (10), while other (non-standard) varieties are claimed to have a word-final velar nasal, *ŋ*. Given the foregoing analysis, an obvious question arises: how does the velar nasal make it past the clutches of markedness (i.e., *-COR) in these non-standard varieties while the alveolar nasal does not? The answer to this question that I propose is that the velar nasal in fact does not survive, in any variety. Following

¹⁰ Since *-COR is really a composite of *LAB, *DOR, etc. (see fn. 9), then it is more accurate to say that such a language would have no assimilation and some *limited set* of nasal place contrasts syllable-finally (as compared to its syllable-initial contrasts).

much other work, I maintain that coronal is the least-marked place of articulation, and as such a language with only a final velar nasal is impossible.

Specifically, I follow Trigo (1988) in claiming that the so-called “velar” nasal reported in these non-standard varieties is a debuccalized (placeless) nasal (represented here as [N]), which looks and sounds velar due to the articulatorily and perceptually sympathetic relation between velum lowering and linguo-velar contact.¹¹ Under this view, nasal “velarization” can be analyzed not as a way to satisfy *segmental* markedness but rather as a way to satisfy *syllabic* markedness; to wit, a coda condition against nasal place, which I will refer to here as NASCODACOND. This unfaithful debuccalization mapping violates none other than ID(PA) again, as shown in (13).

(13) Nasal “velarization” as debuccalization

Input: /pan/	NASCODACOND	ID(PA)
a. pan	*!	
b. paN		*

I assume that NASCODACOND is not a “licensing condition” and thus that pre-consonantal nasal assimilation actually violates this constraint (cf. Bermúdez-Otero 1999:85). Under the ranking in (14a) below, word-final nasals are debuccalized and pre-consonantal nasals are assimilated; under the ranking in (14b), all coda nasals are predicted to debuccalize. These patterns are both attested in Spanish (Terrell 1975, López Morales 1980).¹²

- (14) a. AGREE(PA) » NASCODACOND » ID(PA)
 b. NASCODACOND » {AGREE(PA), ID(PA)}

In a morphologically complex word in Spanish, a stem-final consonant syllabifies as the onset of the syllable headed by the following suffix-initial vowel. Nasal “velarization” does not overapply in this context:

- (15) a. /pan/ → [paN] ‘bread’
 b. /pan + es/ → [pa.nes] ‘breads’ (*[pa.Nes])

¹¹ Trigo (1988) proposes that at least some reportedly velar nasals are placeless nasal *glides*. This analysis is unattractive in the case of Spanish, since final glides strongly attract final stress in this language (Harris 1983) and final nasals do not, even in the varieties in question. (I thank Rolf Noyer for discussion of this issue.)

¹² I thank R. Bermúdez-Otero for bringing these facts and sources to my attention.

I assume that a placeless consonant makes a poor onset, because the syllabic markedness constraint ONSET demands that syllables begin with consonantal features (in particular, consonantal place; Itô & Mester 1999). The non-overapplication of debuccalization can thus be attributed to the rank of ONSET above faithfulness between stem and affixed forms. (An affixed form is related not only to its underlying representation, a relation governed by input-output (IO-) faithfulness constraints, but also to its stem of affixation, as governed by stem-affixed form (SA-) faithfulness constraints.¹³) Since stem-faithfulness (16a) violates ONSET, onsetfulness (16b) wins.

(16) Generation of the plural of the stem [paN] ‘bread’

Input: /pan + es _N /	ONSET	SA-ID(PA)	IO-ID(PA)
a. pa.Nes	*!		*
b. ^{es} pa.nes		*	

But a nasal before the plural suffix in Spanish is *always* alveolar,¹⁴ even if it is underlyingly non-alveolar (at least arguably; cf. Harris 1999). For instance, the root meaning ‘disdain’ in Spanish is both nominal and verbal; when affixed with a verbal suffix like the second person singular subjunctive *-es* in (17a), the final nasal in this form reveals itself to be palatal \tilde{n} . When given a null nominal suffix, as in (17b), this nasal is (predictably) debuccalized in the varieties in question (and “alveolarized” in the others). Under plural suffixation, however, the nasal surfaces neither as palatal nor as debuccalized but rather as alveolar, regardless of variety, as shown in (17c).

- (17) a. /desdeñ - es_V/ → [des^z.ðe.ñes] ‘that you (sg.) disdain’
 b. /desdeñ - ø_N/ → [des^z.ðẽ] ‘disdain (n.)’
 c. /desdeñ + es_N/ → [des^z.ðe.nes] ‘disdains (n.)’

The analysis presented thus far works correctly if the final nasal in question is underlyingly alveolar *n*, but apparently not for this example of an underlying palatal \tilde{n} , as shown in (18) below. The competition includes not only the stem-faithful fusion candidate in (a) and the “alveolarization” candidate in (b), but also the input-faithful candidate in (c) with a palatal \tilde{n} . As shown in the tableau, this latter candidate is incorrectly predicted to be op-

¹³ This is Benua’s (1997) Transderivational Correspondence Theory, but I refer to her “output-output” faithfulness constraints as “stem-affixed form” faithfulness constraints in an effort to clarify their function (see also Baković 2000).

¹⁴ Modulo the exceptions noted by Harris (1984b); see fn. 5.

timal due to the actual optimal candidate's failure on input-output faithfulness (this desired candidate is indicated with a skull-and-crossbones).

- (18) Generation of the plural of the stem [des^z.deN] 'disdain'

Input: /desdeñ+es _N /	ONSET	SA-ID(PA)	IO-ID(PA)
a. des ^z .ðe.Nes	*!		*
b. ð des ^z .ðe.nes		*	*!
c. es des ^z .ðe.ñes		*	

Something must block the appearance of the marked palatal nasal, or in fact any other nasal besides the unmarked alveolar, in this morphological context. It cannot simply be markedness (that is, *-COR, assuming that palatals have at least a secondary dorsal component), because we already know that this constraint is ranked below ONS-ID(PA)—as a quick look back at the Spanish tableau in (10) will verify—and this is a nasal in a syllable onset (meaning it is released and pre-vocalic; i.e., well-cued).¹⁵

I propose that the responsible constraint is a Local Conjunction of markedness and faithfulness constraints, following work by Smolensky (1993, 1995, 1997), Lubowicz (1998), and myself (Baković 1999, 2000). The specific constraint is defined in (19); essentially, it is a constraint that penalizes segments that are *both* stem-unfaithful *and* non-coronal.

- (19) *-COR &_l SA-ID(PA)

Segments in an affixed form should not be *simultaneously* non-coronal *and* unfaithful to their correspondents in the stem.

The theory of Local Conjunction as originally laid out by Smolensky states that a Local Conjunction universally dominates both of its conjuncts, and so the constraint in (19) outranks its stem-affixed form faithfulness conjunct SA-ID(PA) with no additional stipulation. This automatically achieves the desired result, as shown by the tableau in (20). Again, the three candidates are the stem-faithful one in (a), the alveolar one in (b), and the input-faithful one in (c). The alveolar candidate in (b) wins because it avoids violations of both ONSET and *-COR &_l SA-ID(PA).

¹⁵ The lack of true velar nasals syllable-initially in Spanish must be due to a specific constraint against initial *N* (McCarthy & Prince 1995) ranked above ONS-ID(PA).

- (20) Generation of the plural of the stem [des
- ^z
- .deN] ‘disdain’

Input: /desdeñ+es _N /	ONSET	*-COR & _I SA-ID(PA)	SA- ID(PA)	IO- ID(PA)
a. des ^z .ðe.Nes	*!			*
b. [Ⓢ] des ^z .ðe.nes			*	*
c. des ^z .ðe.ñes		*!	*	

In the standard (that is, “alveolarizing”) varieties, it is simply *-COR rather than NASCODACOND that causes the word-final default to alveolar *n*, a result which is simply carried over stem-faithfully in the plural form, as shown below (following in essential respects my analysis in Baković 1998).

- (21) Nasal alveolarization

Input: /desdeñ/	ONS-ID(PA)	*-COR	IO-ID(PA)
a. des ^z .ðeñ		*!	
b. [Ⓢ] des ^z .ðen			*

- (22) Generation of the plural of the stem [des
- ^z
- .den] ‘disdain’

Input: /desdeñ+es _N /	SA-ID(PA)	ONS-ID(PA)	*-COR
a. des ^z .ðeñes	*!		*
b. [Ⓢ] des ^z .ðenes		*	

The difference between standard and non-standard varieties of Spanish in terms of the neutralization of final nasals thus lies in the type of markedness constraint responsible for the neutralization: a segmental one (*-COR) in standard varieties and syllabic ones (NASCODACOND, ONSET) in non-standard varieties.

In sum, the proposed analysis capitalizes on the segmental and syllabic markedness constraints *-COR, NASCODACOND, and ONSET and their expected conflicting interactions—through strict domination as well as Local Conjunction—with equally well-established input-output and stem-affixed form faithfulness constraints. In particular, the independently motivated assumption that a Local Conjunction universally dominates its conjuncts satisfactorily explains the observed three-way alternation among palatal *ñ*, de-buccalized *N*, and alveolar *n* in non-standard varieties of Spanish.

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{ ROA = Rutgers Optimality Archive, <http://ruccs.rutgers.edu/roa.html> }

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