

Optimization of syllable contact in Old Spanish via the sporadic sound change metathesis

D. Eric Holt

University of South Carolina

0. Introduction.

In this article I treat the optimization of syllable contact in Old Spanish, particularly the "bad syllable contact" brought about by pre- or posttonic syncope in Late Spoken Latin or by the concatenation of morphemes. As may be observed from the data below, speakers of Old Spanish made use of many repair strategies — metathesis, dissimilation, palatalization, intrusive stop formation, deletion and strengthening — the effect of which was to improve the transition between syllables. Interestingly, a single etymon may yield multiple variants, each evidencing one of these phenomena, though in Modern Spanish only one of these has survived, either the form that shows metathesis (when morphologically simple), or the fully faithful variant with verb plus clitic forms.

(1.)¹ /dn/ (metathesis, palatalization, dissimilation)

- a. Lt. CAT(E)NATU > OSp. *cadnado*, *candado*, *cañado*, *calnado*. MSp. *candado*
- b. Lt. ANTENATU > OSp. *adnado*, *andado*, *andrado*, *alnado*, *anado*, *annado* (*antenado* and *entenado* are learned forms)
- c. Lt. LEGITIMU > **lidmo* > OSp. *leidimo*, *lindo*, MSp. *lindo*
- d. Lt. RETINA > **riedna* > Sp. *rienda*
- e. Lt. SEROTINU > OSp., dial. *serondo*, *seruendo*, *seruando*, *cerondo*, *cerando*, *zarando*, *seroño*

¹ In the case of the new Romance future and conditional verbal forms, forms that show intrusive stop formation (*pon(e)r + ha* > *pondrá*; *sal(i)r + ía* > *saldría*) are now standard, though there were competing forms (e.g., *ponrá*, *ponrrá*, *porá*, *terné*, *ternía*, *tería*; etc.). (There was also intrusive stop formation in nonverbal forms: HON(O)RA > OSp. *ondra*, HUM(E)RU > *hombro*, etc.) A proper treatment of this and other types of variation (palatalization, dissimilation, strengthening, loss, vocalization) lies beyond the scope of this article.

For discussion of intrusive stop formation, see Clements (1987), Holt (2000) and Martínez-Gil (2001), e.g.; for cases of metathesis of yod (the palatal glide of PRIMARIA > *primeira* > *primera*), see Pensado (1986). For abundant discussion of perceptually-motivated metathesis, see Blevins y Garrett (1998) and Hume (2001). For an OT treatment of vocalization of syllable-final consonants in the evolution from Latin to Hispano-Romance (e.g., ACTUS > *auto*, MULTU > *muíto*), see Holt (1999, 2000), which may be extendable to cases of secondary vocalization brought about by syncope: CAPITALE > *cabdal* > *caudal*; CUPIDITIA > *cobdicia* > *coudicia* (> *codicia*); CIVITATE > *cibdad* > *ciudad*; DEBITA > *debda* > *deuda*; RAPIDU > *rabdo* > *raudo*; etc.

Finally, there are primary Latin forms that undergo the same type of variation: *RETUNDU > OSp., dial. *redondo*, *rodendo*, *rodedno*, *torrendo*, *torredno*, MSp. *redondo*. The modern form reverts to the original stable syllable contact, but the Old Spanish form shows the same variation exhibited by those where syncope brought *dn* into contact.

(2.) /dl/ (metathesis, palatalization, dissimilation)

- a. Lt. SPATULA > OSp. *espadla*, *espalda*, *espalla*, MSp. *espalda*
- b. Lt. CAPITULU > OSp. *cabidlo*, *cabildo*, MSp. *cabildo*
- c. Lt. FOLIATILE > OSp. *hojalde*, *hojaldre*, MSp. *hojaldre*
- d. Lt. TITULO > OSp. *tidle*, *tilde*, MSp. *tilde* (Port. *til*, OCat. *títle*, Mallorquín *ti[λ]a*, Occitano *ti[λ]e*)
- e. Late Lt. ROTULARE > Astur., Arag. *roldar*, dial. *rollar*, *rondar*, OSp. *arrojar*, MSp. *arrojar*, *arrollar*

Verbal forms:

(3.) /d#n/ (metathesis)

- a. OSp. *dadnos* > (until the 17th c.) *dadnos*, *dandos*, MSp. *dadnos*
- b. OSp. *hazednos* > (until the 17th c.) *hazednos*, *hazendos*, MSp. *hacednos*

(4.) /d#l/ (metathesis)

- a. OSp. *dadlo* > OSp. (until the 17th c.) *dadlo*, *daldo*, MSp. *dadlo*
- b. OSp. *dezidlo* > OSp. (until the 17th c.) *dezidlo*, *dezildo*, MSp. *decidlo*
- c. OSp. *embiadlo* > OSp. (until the 17th c.) *embiadlo*, *embialdo*, MSp. *enviadlo*
- d. OSp. *fazedlo* > OSp. (until the 17th c.) *fazedlo*, *fazeldo*, MSp. *hacedlo*

(Data from various sources, among them, Menéndez-Pidal 1941, García de Diego 1970, Lloyd 1987, Penny 1991, Pountain 2001, Martínez-Gil 1991, 1994, 2001.)

Below I present an analysis couched in Optimality Theory (Prince and Smolensky 1993) that aims to account for the relationship between the various constraints that govern the phonological structure of Old Spanish, and whose interaction optimizes syllable structure when conditions of 'phonotactic distress' arise; that is, when there arise conditions of extreme markedness along the dimension of syllable contact. Further, while metathesis is variable, we will see that its occurrence is far from sporadic, as is that of other so-called 'sporadic' sound changes, which in fact obtain whenever the conditions for their occurrence prevail; further, the variation that existed can be modeled according to a partially-ordered OT grammar (Anttila and Cho 1998, Anttila 2002). Finally, we will see as well that further determining factors are morphological structure and faithfulness, and the external influence exerted by prescriptivist cultural institutions.

1. Theoretical assumptions.

1.1 Syllable contact.

As early as Late Spoken ('Vulgar') Latin, we observe frequent loss of the pre- or posttonic vowel (e.g., SPECULUM NON SPECLUM, OCLUS NON OCLUS, from the Appendix Probi). When two consonants come into contact, they may form a licit cluster or sequence — either as a complex onset or distributed across the syllable boundary — with minimal, if any, changes necessary: perhaps only an adjustment of the syllable boundary (a.) or of the features of the syllable-final consonant (b.):

- (5.)a. /k.l/ → permitted complex onset cluster /kl/
 spé.cu.lum > *spec.lum > spe.clum (> *espejo*)
- b. /m.d/ → sequence permitted with assimilation of the nasal /n.d/
 có.mi.te > com.de > con.de
 lí.mi.te > lim.de > lin.de
 sé.mi.ta > sem.da > sen.da

But not all consonantal segments brought into contact by syncope could constitute a well-formed cluster, as we saw in (1)-(2). Upon observing the segments in contact, we see that sonority is the relevant factor. In the following section I offer an overview of this concept and of its relevance to the data at hand.

1.2 Sonority and its history.

The term "sonority" has long been appealed to in phonological explanations, but its precise definition has been the subject of considerable discussion.² As early as (1865) Whitney ranked sounds in terms of sonority or relative stricture. That such a ranking could be used to explain patterns of syllable structure is due to Sievers (1881) and subsequent work by others. For instance, Jespersen (1904) computes a scale of *perceptibility* that has eight degrees that correspond to the greater or lesser capacity to be heard. In increasing terms of perceptibility Jespersen proposed the following:

- (6.)
1. a) voiceless stops, b) voiceless fricatives
 2. voiced stops
 3. voiced fricatives
 4. a) voiced nasals, b) voiced laterals
 5. voiced *r*-sounds
 6. voiced high vowels
 7. voiced mid vowels
 8. voiced low vowels

Likewise, Saussure (1914) arrives at a similar classification based on degrees of *aperture*:

- (7.)
0. stops
 1. spirants
 2. nasals
 3. liquids
 4. closed vowels

² This discussion of the historical development of the term *sonority* draws partially from Clements (1990:284-287). Ohala (1990) also contains a discussion of sonority and its history, and in fact mentions work previous to Whitney's: de Brosches' (1765) three-element hierarchy of stops, liquids and glides, and vowels. Ohala espouses a definition of sonority based on acoustic properties which he claims avoids the supposed circularity of scales based on other properties.

5. semi-closed vowels
6. open vowels.

Grammont (1933) adds semivowels to Saussure's classification, ranking them between liquids and closed vowels.

An equivalent notion is that of *consonantal strength*, to which Foley (1977), Vennemann (1988) and others appeal. This term refers to a phonetic parameter of deviation from unimpeded (voiced) airflow (Vennemann 1988:8). Vennemann (p. 9) gives the following hierarchy, in descending order of consonantal strength:

- (8.) voiceless plosives
- voiced plosives
- voiceless fricatives
- voiced fricatives
- nasals
- lateral liquids (*l*-sounds)
- central liquids (*r*-sounds)
- high vowels
- mid vowels
- low vowels

More recently, Clements (1990) proposes a sonority scale that is based on the binary values of the major class features. Numeric values are arrived at by counting the number of positive specifications. Thus we have the following chart:

- (9.) *Sonority Scale*: (Obstruents, Nasals, Liquids, Glides, Vowels)

O	N	L	G	V	
-	-	-	-	+	[syllabic]
-	-	-	+	+	[vocoid]
-	-	+	+	+	[approximant]
-	+	+	+	+	[sonorant]
0	1	2	3	4	<i>sonority index</i>

Though phonologists disagree with the choice of [approximant] and [vocoid] as valid features for contributing to sonority, all sonority hierarchies do account for the ordering of segments listed above. The discussion here, however, is independent of the precise characterization of sonority, provided that the general ranking observed is maintained.

The idea that the peak of the syllable is the most sonorous while the edges are decreasingly sonorous is captured by the *Sonority Sequencing Principle* formulated in the work of Sievers and Jespersen:

- (10.) *Sonority Sequencing Principle*:

Between any member of a syllable and the syllable peak, only sounds of higher sonority rank are permitted (cited in Clements 1990:285).

Clements formulates the observation of the Sonority Sequencing Principle as in (11) and applies it to syllabification as in (12):

(11.) *Sonority Cycle:*

The rise and fall of sonority within the syllable. The preferred syllable type shows a sonority profile that rises maximally toward the peak and falls minimally towards the end.

(12.) *Core Syllabification:*

Associate each vowel to a syllable node; associate to that syllable node a preceding unsyllabified segment if it is lower in sonority than the nucleus (iterative).

Drawing on the data of occurring adjacent syllables, Hooper (1976) proposed a principle for Spanish that the sonority of a syllable-final consonant must exceed that of the following syllable-initial consonant (if there is one). Though this principle is not exceptionless across languages, it is a very strong recurring pattern, and has been dubbed the *Syllable Contact Law* (Murray and Vennemann 1983, Vennemann 1988):

(13.) *Syllable Contact Law:*

In any sequence $C_1 \ \$ \ C_2$, there is a preference for C_1 to exceed C_2 in sonority.

We will return to consider this important Law in the presentation of the optimality-theoretic approach advocated in section 2. With the implementation of these intuitions about sonority, syllable contact and optimality, we will better understand the causes that underlie the evolution and variation observed in the Old Spanish data.

1.3 Optimality.

Optimality Theory (Prince and Smolensky 1993) is a linguistic theory based on the interaction of violable constraints that encapsulate cross-linguistic observations or tendencies, and departs radically in this regard from previous generative rule-based approaches. One component of the grammar (dubbed EVAL) is responsible for the evaluation of the set of candidate output forms and determines which of the alternatives best satisfies the conflicting requirements of the grammar of the language, that is, which is the *optimal* (and actual) output form.

The constraints upon which I will rely in my analysis of the data under consideration are of two types: faithfulness constraints, which measure the correspondence between input and output forms; and markedness constraints, which penalize marked output structures:

(14.) **Faithfulness constraints** (McCarthy 1995; Kager 1999)³

MAXIMALITY (MAX): Input segments must have output correspondents.
(‘No deletion’)

LINEARITY: The output is consistent with the precedence structure of the input, and vice-versa. (‘The output should respect the linear order of the input’; ‘no metathesis’)

Markedness constraints

SYLLABLE CONTACT LAW (SYLLCON): Sonority should not rise across a syllable boundary.

(Hooper 1976, Murray and Vennemann 1983, Vennemann 1988, Landau 1997; in OT, Alderete 1996, Bat-El 1996, Davis and Shin 1999, Gouskova 2001, among others.)

MINIMAL DISTANCE IN SONORITY (MINDISTSON): There must be a minimum difference in sonority between members of a syllable onset.⁴

SONORITY SEQUENCING PRINCIPLE (SSP): (see (10))

ALIGN: The elements of a morpheme should not extend beyond the word boundary, and should remain at the proper edge.⁵

2. Metathesis.

Like many of the changes observed in (1)-(4), metathesis is usually considered a sporadic sound change because of its supposed irregularity and apparent lack of predictable application, and as such it has received mainly descriptive attention in the literature (see, for instance, Lloyd 1987, Penny 1991, Menéndez Pidal 1941 and, for a nonlinear account, Wanner 1989). However, as Hock (1985) and others have pointed out, metathesis usually serves some specific structural purpose, such as the elimination a universally disfavored sequence, or the establishment of a preferred syllable type. Wanner (1989) offers an insightful approach from within the generative paradigm of nonlinear phonology, but the analysis relies on several unmotivated stipulations and predates several important advances in linguistic theory. Finally, other authors recognize

³ Other faithfulness constraints, not relied upon here, are DEP and IDENT:

DEPENDENCY (DEP): Output segments must have input correspondents. (‘No epenthesis’)

IDENTITY (IDENT): Correspondent segments have identical values for feature [F]. (‘Do not change a feature’s specifications’)

⁴ The minimum sonority difference is a language-particular matter. See Harris (1983), and in OT, Gouskova (2001) for further discussion this constraint.

⁵ The present formulation of this constraint is somewhat vague. Any of three more specific constraints may be more apt: CRISP EDGE (Hume 1998, *inter alia*), which requires the alignment of morphological with syllabic boundaries; CONTIGUITY (Kager 1999:250, Gouskova 2001, *e.g.*), which requires that elements in a string in the input be so also in the output; or ANCHORING, which requires that an element at a designated periphery of the input should appear as likewise in the output (Kager 1999:251, *e.g.*). As it appears that any of these will suffice, I use the vague term ALIGN in the exposition.

the regularity with which metathesis, and other "sporadic" sound changes, occur (Dumenil 1987, Holt 1994, 2002, McCarthy 1995, Hume 1998, 2001).

2.1 A previous generative approach.

Wanner (1989:435) maintains that when certain similar segments are brought into contact, such as by syncope in the above examples, the resulting sequences can be unnatural. This "phonotactic distress" brings about the modification or transposition of the segments or one of their features, and various results and intermediate stages are possible, as we see above. These segmental reorderings are examples of attempts to preserve the phonetic content and improve the phonetic stream of speech. This essentially agrees with Ultan's (1978:367) characterization of metathesis as a process that tends to preserve segments or features that would otherwise be lost or changed by other processes.

Wanner (p. 437) says these cases of contiguous metathesis are actually "superimpositions of similar segments with ensuing resequencing, possibly producing an apparent segment transposition $/a > b/ \rightarrow \{a,b\} \rightarrow /b > a/$ ".⁶ We can see that the consonants that come into contact are similar in point of articulation, all being coronals. Two frequent solutions to the highly marked clusters are deletion and metathesis, both observed in the data above. According to the supersegment analysis, the common denominator in the above examples is that the contiguity has induced a stage of complex segments with multiple articulations acting as a single rooted segment with one feature having polar values,⁷ such as [nasality] for $/dn/ \rightarrow \{d,n\} \rightarrow /nd/$ or [lateral] for $/dl/ \rightarrow \{d,l\} \rightarrow /ld/$. The inherently unstable nature of these segments in Spanish (which does not have canonical complex articulations of this sort) leads to their simplification into stable sequences or coarticulated segments. The variability of the results is due to the various configurations allowed in the language.

The "supersegments" created above are the two segments combined into a complex articulation which share all the relevant features but manner of articulation. Such a superimposition is only possible, however, in restricted cases. Thus, in (2) and (4) the members of a supersegment like $\{d,l\}$ are identical except for the feature [lateral]. Wanner says that these cases are like contour segments (Sagey 1986) because the polar specifications are crucially ordered, but in accord with a stipulated unmarked order. Thus, the specifications $\{[-lateral] > [+lateral]\}$ are rearranged to $\{[+lateral] > [-lateral]\}$, yielding $/ld/$ after the supersegment $\{d,l\}$ is resegmentalized (e.g., *cabid'lo* > *cabildo*). Likewise, for nasality the unmarked order is $\{[+nasal] > [-nasal]\}$, and supersegment that results from the original $/dn/$, $\{d,n\}$, simplifies to $/nd/$ (e.g., *cad'nado* > *candado*).

Finally, the original clusters $/dl/$ and $/dn/$ are predicted to be possible, though marginal according to universal tendencies. In fact, in Spanish this restoration is only completely successful intramorphemically and postlexically (e.g. with clitics: *lo(s)*, *la(s)*,

⁶ As for the data in (1) and (3), Hock (1985:533) cites an additional piece of evidence given by Szemerényi (1950) that he says would also favor a metathesized outcome: at least for initial stop + homorganic nasal, the widespread avoidance of this cluster may be perceptual in nature; before a nasal stop, a homorganic oral stop appears not to be sufficiently differentiated for easy auditory discrimination. See also Hume (2001:8).

⁷ Andersen (1972) calls this 'diphthongization.'

*le(s); nos*⁸), and it is a functional choice to mark at what level such tendencies are to be most strongly followed.

In sum, according to the supersegment approach, a supersegment is created, but then resegmentalized according to an unmarked, but stipulated order of polar specifications, giving the appearance of strict metathesis. The question is, "Why should this be so?" The current approach offers an alternative that motivates many of the preceding stipulations, particularly that in these sequences, [+nasal] > [-nasal] and [+lateral] > [-lateral] are the unmarked orders for these features. While this correctly predicts the Modern Spanish outcomes in most cases (except those with clitics, which did in fact show variation in Old Spanish), without motivation it is essentially a circular restatement of the facts to say that they are the most "natural". The current approach does not rely either on these features being binary, as most phonologists now believe that neither [nasal] nor [lateral] is bivalent (Steriade 1995), and some deny the existence of [lateral] at all (Walsh Dickey 1997). In the next section we will see the theoretical implementation of metathesis and other sporadic sound changes as a way to improve the stream of speech, understood here as the optimization of syllable contact, which in turn results from the interaction of faithfulness and phonotactic markedness constraints.

2.2 An optimality-theoretic analysis.

It is certainly the case that when a lateral or nasal segment comes into contact with another segment that is not, the unmarked order between them is [+lateral] > [-lateral] and [+nasal] > [-nasal], respectively;⁹ however, instead of stipulating this, it should be understood as a result of the Syllable Contact Law; more specifically, of the interaction of this constraint with faithfulness. Below we see how various alterations of the syncopated form are evaluated according to the constraint hierarchy of Old Spanish. For metathesis to obtain, the faithfulness constraint LINEARITY must be dominated by the markedness constraint SYLLCON. (I assume that syncope resulted from some higher-ranked constraint, not included here. See Hartkemeyer 2000 and Lleó 2001 for two OT approaches to Old Spanish vowel loss.)

⁸ One might wonder whether an alternation like *dadme* ~ *damde/dande* could exist, since all nasals are presumably of the same sonority class, and /m/ might therefore be expected to metathesis as easily as /n/. To the best of my knowledge, there are no such forms in the written record. It appears that the elements that may potentially undergo metathesis must both be coronal; the different points of articulation of /d/ and /m/ presumably remain perceptually distinct and therefore these segments are immune from reordering. That is, metathesis would yield no appreciable gain in perceptibility.

⁹ There are exceptional cases of *tl*: Mexican Spanish allows onset /t.l-/ (e.g., *Tlaloc*, the Aztec deity of rain and fertility; *Tenochtitlán*, the Aztec capital), and general Spanish allows /t.l/ in a handful of words (e.g., *atlas*, *Atlántico*, *atleta*).

Tableau 1: Word-internal metathesis

(i) /dn/ > /nd/ (SYLLCON >> LINEARITY)

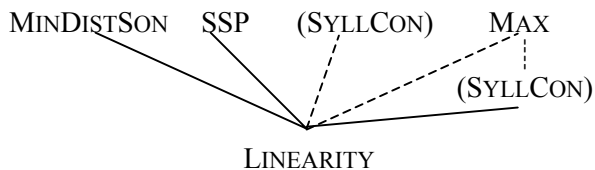
cad'nado	MINDISTSON	SSP	MAX	SYLLCON	LINEARITY
a. cad.na.do				*!	
b. can.da.do 7					*
c. ca.na.do			*!		
d. ca.nda.do	*(!) ¹⁰	*(!)			*
e. ca.dna.do	*!				

(All data in (1) would be treated this way.)

(ii) /dl/ > /ld/ (SYLLCON >> LINEARITY)

cabid'lo	MINDISTSON	SSP	MAX	SYLLCON	LINEARITY
a. ca.bid.lo				*!	
b. ca.bil.do 7					*
c. ca.bi.lo			*!		
d. ca.bi.dlo	*!				
e. ca.bi.llo	*(!)	*(!)			*

(All data in (2) would be treated this way.)

(iii) Ranking relationships for (i) and (ii):¹¹

¹⁰ For these violations I indicate fatality by putting the exclamation mark in parenthesis because as these constraints appear to be unranked with respect to each other (more specifically, that either ranking order will result in the same candidate being optimal), and the violation of either will prove fatal. Since MINDISTSON does not specify the order of the segments in the complex coda, just that there be sufficient sonority distance between them, [dn] and [nd] (and [dl] and [ld] in the second tableau) violate this constraint equally.

¹¹ The ranking relationship MAX >> SYLLCON is somewhat of a simplification, and would appear to reflect at least one demotion from the initial state, since it is an instance of F >> M. (This is shown in the graphic by placing SYLLCON in parenthesis, and in the tableaux by separating it from MAX with the nearly solid line.) With an absolute initial ranking of M >> F, SYLLCON would dominate MAX, and we would predict deletion (hypothetical *ca(d)nado*, *cabi(d)lo*, *da(d)me*, *deci(d)lo*), at least in child speech. As there are no documents, to the best of my knowledge, that record either child or adult speech with these forms, the issue of initial state vs. demotion to reach MAX >> SYLLCON remains unresolved here. (The dashed line here and below indicates that after reranking, the constraint still dominates the bottom constraint. The dotted line below indicates that after reranking, the constraint no longer dominates the bottom constraint; that is, that dominance relationship has dissolved.)

In (i), the first candidate is the most faithful of all, as it maintains the linear order of the input, but it violates the Syllable Contact Law — /d/ is less sonorous than the /n/ that follows it. Candidate (b.) maintains all original segments, and the inversion of the segments in contact satisfies SYLLCON, though at the expense of LINEARITY; as this is the lowest-ranked relevant constraint, though, this candidate is selected as the optimal one. (c.) also satisfies SYLLCON and maintains the linear order, but at the expense of deleting a segment, prohibited by the ranking position of MAX. Candidates (d.) and (e.) eliminate the bad syllable contact by forming a complex onset, but in (d.) this results in a violation of the SONORITY SEQUENCING PRINCIPLE, as sonority does not rise continuously from the syllable margin to its peak; and in (e.) there is insufficient distance in sonority between the members of the onset, a violation of MINDISTSON.¹² (The same explanation applies to the data in (ii), with metathesis of /dl/ → /ld/, with the commentary reversed for candidates (d.) and (e.)) The new metathesized output forms that fully respect SYLLCON are subsequently lexicalized via Lexicon Optimization (Prince and Smolensky 1993, Inkelas 1994), and future input/output mappings of the optimal forms will be more harmonic, as there will be no violations of the faithfulness constraint LINEARITY.

However, there must be more to the complete explanation of metathesis, since for the forms with clitics (as in (3)-(4)), there was variation in Old Spanish among fully faithful and metathesized forms; further, this variation is no longer allowed, with morpheme boundaries respected. That is, morphological factors are at play as well. What appears to be the case is that it is important to respect the integrity of the component morphemes despite the bad syllable contact that the concatenation brings into existence. This results in faithful forms like *dadnos y decidlo*.

The relevant constraint here comes from the family of ALIGNMENT constraints (McCarthy and Prince 1993), which regulates the alignment of the edges of grammatical and prosodic categories. In this case, the segments of each morpheme should remain within their own domain, and at the proper edges. Presumably this helps with parsing and serves as a useful processing strategy (see, e.g., Russell 1997:120), as it allows the learner/parser to more reliably determine word boundaries in the continuous phonetic stream of speech by identifying syllable or prosodic structure with morphological structure.

I assume that Alignment constraints are akin to Markedness constraints, and that the initial ranking is M >> F (on the latter, Smolensky 1996, McCarthy 2002:80, and most other OT work). This accounts for the fact that a child's production lags behind her comprehension with respect to adult forms, with productions relatively unmarked relative

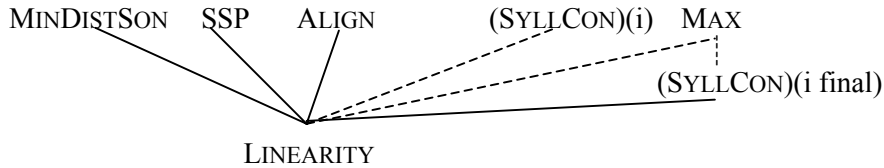
¹² These data do not permit the establishment of a ranking relationship between the first two constraints, hence the dashed line separating them.

For candidates (d.) and (e.), one might want to posit the effects of the constraint *COMPLEX ('No complex syllable margins'; e.g., Prince and Smolensky 1993, Hume 1998, Gouskova 2001); however, there are indeed licit syllable-initial and syllable-final clusters in Spanish: *ptk, bdg, f + l, r* (except *dl* and *tl*); *-bs, -ks, -ns, -ls, -rs*, word-internally, though rare; and *-bs, -ks, -ps* word-finally, though also rare. (Recall that /tl/ is abundant in Mexican Spanish, though, which is due to Aztec influence.) See Harris (1983). In fact, *COMPLEX must be ranked below LINEARITY; otherwise a word like /*abril*/ would always become **ar.bil*, rather than *a.bril*.

to adult speech; further, a learner will only rerank the constraints from her initial state upon hearing positive evidence whose production requires such a move.¹³

The relationship between this constraint and the others discussed so far is the following:

(15.) Ranking relationships for all constraints:



This is a partially-ordered constraint hierarchy, under which, we will see, each evaluation by the system will reflect a random total ranking of ALIGN, MAX and SYLLCON upon each input/output mapping (Anttila and Cho 1998, Anttila 2002). With the relationship between these constraints "in flux", variation will result if different candidates are favored under one of the possible permutations in ranking. This indeed is the case:

(16.) Serious output candidates for input /decid + lo/:¹⁴

- | | |
|-----------------|---------------------------|
| a. de.cid.] [lo | violates SYLLCON |
| b. de.cil.] [do | violates ALIGN, LINEARITY |
| c. de.ci.] [lo | violates ALIGN, MAX |

Constraint rankings obtained from free permutation of unranked constraints (3 x 2 x 1 possibilities for three constraints):

- | | | |
|---|-------------|----------------|
| i. (ALIGN >> MAX >> SYLLCON) >> LINEARITY | favors (a.) | fully faithful |
| ii. (ALIGN >> SYLLCON >> MAX) >> LINEARITY | favors (a.) | fully faithful |
| iii. (MAX >> ALIGN >> SYLLCON) >> LINEARITY | favors (a.) | fully faithful |
| iv. (MAX >> SYLLCON >> ALIGN) >> LINEARITY | favors (b.) | metathesis |
| v. (SYLLCON >> MAX >> ALIGN) >> LINEARITY | favors (b.) | metathesis |
| vi. (SYLLCON >> ALIGN >> MAX) >> LINEARITY | favors (b.) | metathesis |

The following tableaux illustrate these rankings; in effect, variation results from a speaker implementing one or another of these total rankings from among the pool of logical possibilities schematized above.

¹³ This is argued by Tesar and Smolenksy (2000) to occur via the Recursive Constraint Demotion algorithm, RCD.

¹⁴ I omit from consideration those candidates that would violate the syllable-internal structural markedness constraints MINDISTSON and SSP, as these appear to be undominated in Spanish.

In these examples and below, the brackets delimit the relevant morphological borders.

Tableaux 2: Metathesis or faithfulness across a morpheme boundary

(i) /d + l/ > /dl/ ((ALIGN >> SYLLCON) >> LINEARITY) (common to rankings i., ii., iii.)

decid + lo	ALIGN	MAX	SYLLCON	LINEARITY
a. de.cid.]lo 7			*	
b. de.ci[l.d]o	*!			*
c. de.ci.]lo	*! ¹⁵	*		

(ii) /d + l/ > /dl/ ((SYLLCON >> ALIGN) >> LINEARITY) (common to rankings iv., v., vi.)

decid + lo	SYLLCON	MAX	ALIGN	LINEARITY
a. de.cid.]lo	*!			
b. de.ci[l.d]o 7			*	*
c. de.ci.]lo		*!	*	

Thus, with random distribution of total rankings, we expect fully faithful forms like *decidlo* and *dadnos* 50% of the time, and metathesized forms like *decildo* and *dandos* the other 50% of the time. While precise figures are not available, metathesized forms appear abundantly in the written record of Old Spanish. It should be noted here that ALIGN plays no role in the evaluation of the data treated in Tableau 1, since there we are dealing with a single morpheme (*cad'nado* → *candado*) and edges/peripheries are respected, so purely phonotactic constraints alone will be at issue. Additionally, free ranking of MAX and SYLLCON, provided both dominate LINEARITY, will still yield metathesis.¹⁶

Further favoring the metathesized forms across words are those cases with word-internal syncope, those many cases of bad syllable contact free from morphological influences that allow the effects of the SYLLABLE CONTACT LAW to be observed, as in Tableau 1 above, where there is no variation and metathesis obtains. Surely important as well in this regard are two processes of grammaticalization (Hopper and Traugott 1993) that were underway: that of the Latin demonstratives that yielded the atonic pronouns and articles of Old Spanish, which showed ambivalent grammatical status and wavering prosodic independence. Likewise, during Old Spanish, the future and conditional forms were undergoing a process of grammaticalization whereby the "endings" (*e*, *as*, *a*, *emos*, *eis*, *an*; *ia*, *ias*, *ia*, *iamos*, *iais*, *ian*, which derive from the present tense of the auxiliary verb HABERE 'to have' and the imperfect tense of either HABERE or IRE 'to go') are being fused with the infinitive (*comer* + *he* > *comeré*) and becoming desinences. At this time, the process is still unsettled, as evidenced by the ample citations of future and conditional forms with these atonic pronouns where the clitic appears between the infinitive and the emerging "endings": e.g., *amar lo é* ~ *lo amaré* (Lloyd 1987:311), *ferlo ia* (Penny 1991:205-6), and *excusarse ía* (Gracián, *Criticón*, from the Golden Age, cited in Lapesa

¹⁵ The elision of /d/ is disfavored by ALIGN, if taken as ANCHOR, as /d/ is at the right periphery in the input but is not in the output, being absent.

¹⁶ An additional option might be the crucial nonranking of these constraints; under this scenario, where no total ranking is established prior to evaluation, metathesized candidate (i.b.) above is actually eliminated by its violation of LINEARITY; likewise, (ii.b.) would no longer be optimal, with the faithful candidate preferred. This would eliminate metathesis, contrary to the observed written record of the period. For this reason, as well as for theoretical reasons of computation/implementation, I therefore reject this possibility.

1986:392). Further, there is a strong tendency towards enclisis of atonic pronouns, as attestations such as *dixol* (~ *dixo le*), *díot* (~ *dio te*), *un colpel dio* (~ *un golpe le dio*) and *quem* (~ *que me*) show (data principally from Martínez-Gil 2001).

These factors suggest that in speakers' minds there was confusion as to the morphological analysis of the clitic pronouns. This plausibly would hinder the definitive ranking of ALIGN with regard to the other constraints, leading to the partial ranking of ALIGN vis-à-vis other constraints; as discussed and modelled above, this would yield the variation observed.¹⁷

During the period of variation speakers would demonstrate this partially-ordered grammar, and further variation would be supported by individual speakers settling on one or another of the rankings (i.-vi.) above; beginning in the 17th century, however, and for speakers of Modern Spanish, the grammar must have ALIGN above SYLLCON, as there is no longer metathesis between words. The founding of the Real Academia Española de la Lengua (1713/1714), whose focus was (and is) to maintain the purity of the language (its motto is 'Limpia, fija y da esplendor'),¹⁸ surely played a decisive role. This impulse toward purity would quite likely have disfavored the generation of metathesized forms, as the "purity" of each component morpheme would be compromised. I suggest that this led to the definitive ranking of ALIGN above SYLLCON, as it preserves the contiguity of the individual morphological forms when they come into contact. (Presumably, there was more *esplendor* in improved syllable contact within words; once these words were optimized via metathesis, they would be lexicalized, with no way to reconstruct their Latin form. On the other hand, morphological concatenation is productive, and results in syllable contact anew upon each utterance, and so is available to conscious awareness and is susceptible to the prescriptivism of not overlapping or interleaving of segments of component morphemes.)

3. Summary and conclusions.

Upon examining the data and analyzing their behavior, then, we see that metathesis is not a random, sporadic or unexpected phenomenon. Quite the contrary, its application is

¹⁷ Perhaps similar are Modern Spanish nonstandard forms like *desen* for *dense* 'give each other' or *cállesen* for *cállense* 'quiet yourselves'; however, syllable contact or other markedness may not be at issue, as /-ns-/ occurs in the derivational suffix *-ense*, as in *canadiense*, *forense*, etc. There seems to be alignment-related interplay between verbal 3p.pl. *-n* and the clitic *se*. I leave the issue unresolved here.

The interplay of other constraints with these presumably will account for other variant forms like *cañado* (< dn), *espalla* and *arrollar* (< dl), with palatalization; *calnado* and *alnado* (< dn), with dissimilation; OSp./MPtg. *porrá/porá* (< nr), with loss; and others. Additional constraints likely to be involved are IDENT, since features are changed, and those militating against coalescence, since single (palatal) segments sometimes result. I leave this unformalized in the present work, as I do also the treatment of the intrusive stop formation observed in the future and conditional forms (*pondré*, *pondría*; *saldré*, *saldría*). For one OT account of these, see Martínez-Gil (2001); for an approach that relies on feature geometry and the nature of contact between nasals or liquids with rhotics, and the general imperative of assimilation between nasals and liquids with following segments, see Holt (2000).

¹⁸ "Su propósito fue el de 'fijar las voces y vocablos de la lengua castellana en su mayor propiedad, elegancia y pureza'. Se representó tal finalidad con un emblema formado por un crisol al fuego con la leyenda *Limpia, fija y da esplendor*, obediente al propósito enunciado de combatir cuanto alterara la elegancia y pureza del idioma, y de fijarlo en el estado de plenitud alcanzado en el siglo XVI." (RAE)

regular given the right circumstances — those that result in marked phonotactics brought about by syncope — and it serves to optimize syllable structure via satisfaction of the SYLLABLE CONTACT LAW in the face of faithfulness violations, as well as of Alignment violations in the case of cliticized forms, whose morphological and prosodic status was in flux during a process of grammaticalization.

The observed variation was argued to be the result of two situations: intra-speaker variation, with a grammar that contained partially ordered constraints, upon whose strict domination in a totally ranked hierarchy upon a given evaluation of the input/output mapping, one or another form emerged as optimal; the other, cross-speaker variation as to which competing totally-ranked grammar is adopted as the norm. External factors — the establishment of the influential prescriptivist institution the Real Academia Española — eventually impacted the variationist grammar and eliminated the productively metathesized forms, while cases of morphologically simple metathesis are lexically optimized.

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References

- Alderete, John (1996). Winnebago accent and Dorsey's Law. In *University of Massachusetts Occasional Papers 18: Papers in Optimality Theory*, Jill N. Beckman, Laura Walsh Dickey and Suzanne Urbanczyk (eds.). GLSA. 21-51.
- Anttila, Arto (2002). Variation and phonological theory. In *The Handbook of Language Variation and Change*, J.K. Chambers, Peter Trudgill, and Natalie Schilling-Estes (eds.). Malden, MA and Oxford, UK: Blackwell. 206-243.
- and Yung-mee Yu Cho (1998). Variation and change in Optimality Theory. *Lingua* 104.31-56.
- Bat-El, Outi (1996). Selecting the best of the worst: the grammar of Hebrew blends. *Phonology* 13.283-328.
- Blevins, Juliette and Andrew Garrett (1998). The origins of consonant-vowel metathesis. *Language* 74.508-556.
- Clements, G. Nick (1987). Phonological feature representation and the description of intrusive stops. In *CLS 23: Papers from the Parasession on Autosegmental and Metrical Phonology*, A. Bosch et al. (eds.). Chicago: Chicago Linguistics Society. 29-50.

- (1990). The role of the sonority cycle in core syllabification. In *Papers in Laboratory Phonology 1: Between the Grammar and the Physics of Speech*, John Kingston and Mary Beckman (eds.). New York: CUP. 283-333.
- Davis, Stuart and Seung-Hoon Shin (1999). The syllable contact constraint in Korean: An Optimality-Theoretic analysis. *Journal of East Asian Languages* 8.285-312.
- Dumenil, Annie P (1987). A rule-account of metathesis in Gascon. *Lingvisticae Investigationes* XI.81-113.
- Foley, James (1977). *Foundations of Phonological Theory*. New York: Cambridge University Press.
- García de Diego, Vicente (1970). *Gramática histórica española*. 3rd ed. Madrid: Gredos.
- Gouskova, Maria (2001). Falling sonority onsets, loanwords, and Syllable Contact. In *CLS 37: Papers from the 37th Annual Regional Meeting of the Chicago Linguistic Society*. Chicago: Chicago Linguistics Society.
- Grammont, Maurice (1933). *Traité de Phonétique*. 4th ed. Paris: Librairie Delegrave.
- Harris, James (1983). *Syllable Structure and Stress in Spanish*. MIT Press.
- Hartkemeyer, Dale (2000). An OT approach to atonic vowel loss patterns in Old French and Old Spanish. In *New Approaches to Old Problems: Issues in Romance Historical Linguistics. Selected Papers from the LSRL XXIX Parasession*, Steven N. Dworkin and Dieter Wanner (eds.). Amsterdam/Philadelphia: John Benjamins. (Current Issues in Linguistic Theory, 210). 65-84.
- Hock, Hans Heinrich (1985). Regular metathesis. *Linguistics* 23: 529-546.
- Holt, D. Eric (1994). The sonority cycle, the demisyllable and Old Spanish metathesis. Presented at *The 24th Linguistic Symposium on Romance Languages*. USC & UCLA.
- (1999). The moraic status of consonants from Latin to Hispano-Romance: The case of obstruents. In *Advances in Hispanic Linguistics: Papers from the Second Hispanic Linguistics Symposium*, Javier Gutiérrez-Rexach and Fernando Martínez-Gil (eds.). Somerville, MA: Cascadilla Press. 166-181.
- (2000). The articulator group and liquid geometry: Implications for Spanish phonology present and past. In *Romance Phonology and Variation*, Caroline Wiltshire and Joaquim Camps (eds.). Philadelphia and Amsterdam: John Benjamins. To appear.
- (2002). Sobre los cambios fónicos esporádicos que optimizan el contacto silábico en el español antiguo: El caso de la metátesis. Presented at the XIII Congreso de la Asociación de Lingüística y Filología de América Latina (ALFAL), Universidad de Costa Rica, February 18-23, 2002. To appear in the proceedings.
- Hooper, Joan Bybee (1976). *An Introduction to Natural Generative Phonology*. New York: Academic Press.
- Hopper, Paul J. and Elizabeth Closs Traugott (1993). *Grammaticalization*. Cambridge University Press.
- Hume, Elizabeth (1998). Metathesis in phonological theory: The case of Leti. *Lingua* 104.147-186.
- (2001). Metathesis: Formal and functional considerations. In *Surface Syllable Structure and Segment Sequencing*, Elizabeth Hume, Norval Smith and Jeroen van de Weijer (eds.). HIL Occasional Papers. Leiden, NL: HIL. 1-25.
- Inkelas, Sharon (1994). The consequences of optimization for underspecification. *NELS 24* and Rutgers Optimality Archive (<<http://roa.rutgers.edu>>).

- Jespersen, Otto (1904). *Lehrbüch der Phonetik*. Leipzig: B. G. Teubner.
- Kager, René (1999). *Optimality Theory*. Cambridge University Press.
- Landau, Idan (1997). Weight-by-Cycle. *MIT Working Papers in Linguistics* 30.183-208.
- Lapesa, Rafael (1986). *Historia de la lengua española*. Madrid: Gredos.
- Lleó, Conxita (2001). Some interactions between word structure, foot structure and syllable structure in the history of the Spanish language. Ms. Earlier version presented at the 45th Annual Conference of the International Linguistics Association (ILA), April 7-8, 2000, Georgetown University, Washington, D.C.
- Lloyd, Paul M. (1987). *From Latin to Spanish*. (*Memoirs*, 73). Philadelphia: American Philosophical Society.
- Martínez-Gil, Fernando (1991). Feature hierarchy, syllable structure and Old Spanish intrusive consonants. Paper presented at the 21st Linguistic Symposium on Romance Languages. University of California, Santa Barbara.
- (1994). Ambisyllabicity, sonority and underspecification in the historical emergence of Spanish lenition. Presented at *The 24th Linguistic Symposium on Romance Languages*. USC & UCLA.
- (2001). Consonantal intrusion in heterosyllabic consonant-liquid clusters in Old Spanish and Old French: An Optimality Theoretical Account. To appear in the selected proceedings of LSRL 31.
- McCarthy, John (1995). Extensions of faithfulness: Rotuman revisited. Rutgers Optimality Archive. <<http://roa.rutgers.edu>>.
- (2002). *A Thematic Guide to Optimality Theory*. Research Surveys in Linguistics. Cambridge University Press.
- and Alan Prince (1993). Generalized Alignment. In *Yearbook of Morphology*, Geert Booij and Jaap van Marle (eds.). Dordrecht: Kluwer. 79-153.
- Menéndez Pidal, Ramón (1941). *Manual de gramática histórica española*. 6th ed. Madrid: Espasa Calpe.
- Murray, Robert W. and Theo Vennemann (1983). Sound change and syllable structure [: Problems] in Germanic phonology. *Language* 59.514-528.
- Penny, Ralph (1991). *A History of the Spanish Language*. New York: CUP.
- Pensado, Carmen (1986). *Comha, ravha*, y otras grafías similares en portugués medieval. *Verba: Anuario Galego de Filoloxia* 13.329-340.
- Prince, Alan and Paul Smolensky (1993). *Optimality Theory: Constraint Interaction in Generative Grammar*. To appear, MIT Press.
- Pountain, Christopher J. (2001). *A History of the Spanish Language through Texts*. London: Routledge.
- Real Academia Española (2002). La Real Academia Española, Breve historia, Origen y fines. <<http://www.rae.es>>.
- Russell, Kevin (1997). Optimality Theory and morphology. *Optimality Theory: An Overview*. Basil Blackwell.
- de Saussure, Ferdinand (1916). *Cours de linguistique générale*. Paris: Payot.
- Sievers, Eduard (1881). *Grundzüge der Phonetik*. Leipzig: Breitkopf and Hartel.
- Smolensky, Paul (1996). On the comprehension/production dilemma in child language. *Linguistic Inquiry* 27.720-731.
- Tesar, Bruce and Paul Smolensky (2000). *Learnability in Optimality Theory*. Cambridge, MA: MIT Press.

- Ultan, Russell (1978). A typological view of metathesis. In *Universals of Human Language*, vol. 2: *Phonology*, Joseph H. Greenberg (ed.). Stanford: Stanford University Press. 367-402.
- Vennemann, Theo (1988). *Preference Laws for Syllable Structure and the Explanation of Sound Change (With Special Reference to German, Germanic, Italian, and Latin)*. Berlin: Mouton de Gruyter.
- Walsh Dickey, Laura (1997). *The Phonology of Liquids*. Ph.D. dissertation, University of Massachusetts, Amherst.
- Wanner, Dieter (1989). On metathesis in diachrony. In *CLS 25: Papers from the 25th Annual Regional Meeting of the Chicago Linguistic Society, Part One: The General Session*, Caroline Wiltshire, R. Eraczyk and B. Music (eds.). Chicago: Chicago Linguistics Society. 434-450.

Correspondence address:

D. Eric Holt
Department of Languages, Literatures, and Cultures, and
Linguistics Program
University of South Carolina
Columbia, SC 29208
holt@sc.edu