

# Vowel Feature Licensing at a Distance: Evidence from Northern Spanish Language Varieties

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## 1. Introduction

The problem for locality presented by transparent segments in vowel harmony remains a central topic of debate. This paper brings to bear cases of transparency in metaphony patterns, focusing on varieties spoken in northwestern Spain. Emerging from the Romance literature, “metaphony” refers to height harmonies (usually raising harmonies) in which a stressed vowel assimilates to a post-tonic one. Data from the Asturian Lena Bable variety introduce the transparency issue. As discussed by Hualde (1989, 1998), Lena presents a phonological harmony in which a final high vowel, marking the masculine singular, triggers raising of nonhigh stressed vowels.<sup>1</sup> As shown in (1a), mid vowels raise to high, and low vowels raise to mid. Noteworthy for the locality question are the forms in (1b) with antepenultimate stress. Here the antepenult raises, but the intervening penult vowel is unaffected, i.e. it is transparent to height assimilation.

- (1) a. kordíru      ‘lamb’ (m sg)                      cf. kordéos      (m pl)  
      reúndu      ‘round’ (m sg count)                      cf. reóondo      (mass)  
      getu      ‘cat’ (m sg)                                      cf. gátos      (m pl)
- b. burwíbanu      ‘wild strawberry’ (m sg)      cf. burwébanos      (m pl)

Lena’s metaphony presents a challenge for theories of assimilation, because it is truly non-local. In particular, unstressed /a/ in (1b) is transparent despite its undergoing metaphonic raising in stressed syllables, which shows that it is capable of raising to [e]. Furthermore, /e/ is a permissible unstressed vowel quality in the language. This is evident not

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1. See Hualde (1998) for arguments that metaphony in Lena is a phonological process rather than an alternation induced purely by a morphological category.

only in pretonic position, e.g., in *reóndo* ‘round’ (mass) but also in post-tonic position, e.g., in Lower Lena’s feminine plural forms in [-es] (Hualde 1989:785, 802 fn. 12) (see also Dyck 1995).

In exploring this phenomenon, I concentrate on two related proposals. Working within Optimality Theory (Prince & Smolensky 1993), I argue that assimilation of a stressed vowel to an unstressed vowel quality is driven by a licensing constraint requiring that marked structure – in this case perceptually-difficult structure – be expressed in a strong position. In addition, I propose a Generalized Licensing constraint formulation. Under this, licensing is satisfied by a variety of configurations, including local assimilation through spreading to a strong position and assimilation at a distance through correspondence between strong and weak positions.

The organization is as follows. In §2, I present metaphonies differing in the (non)transparency of an unstressed penult, and I discuss the problem for locality. §3 introduces the generalized licensing proposal. In §4 I develop an analysis of the metaphony cases, and I address the issue of proximity in §5. In §6, I consider a metrical alternative, and §7 contains the conclusion.

## 2. Metaphony Patterns: Two Locality Behaviors

The issue under focus is that in words with antepenultimate stress, certain metaphony systems show height assimilation across a transparent, penult. In certain other systems, an intervening penult undergoes harmony.

The Cantabrian Tudanca Montañés variety shows a centralizing metaphony (Hualde 1989). Tudanca has five vowel phonemes /i e a o u/, as do the Asturian varieties discussed here. Word-final unstressed high vowels are regularly centralized in Tudanca. This is analyzed by Hualde as insertion of [-ATR] in this context. Metaphony in the language propagates [-ATR] to cause centralization of a preceding stressed vowel, as shown in (2a). In cases of antepenultimate stress, both the stressed vowel and the intervening penult vowel are centralized, as seen in (2b). Tudanca thus presents a metaphony in which an intervening unstressed vowel is affected.

(2) a.	pínta	p <sup>í</sup> ntU	‘calf’ (f/m)
	thúrdos	θ <sup>ú</sup> rdU	‘left-handed’ (m pl/sg)
	óhos	o <sup>h</sup> U	‘eye’ (pl/sg)
	sekálo	sek <sup>á</sup> lU	‘to dry it’ (mass)/to dry him
	ahambráa	ahambr <sup>á</sup> U	‘hungry’ (f/m)
b.		antigw <sup>í</sup> s <sup>í</sup> mU	‘very old’
		k <sup>á</sup> r <sup>á</sup> bU	‘tawny owl’
		p <sup>ú</sup> lp <sup>í</sup> tU	‘pulpit’
		or <sup>é</sup> g <sup>á</sup> nU	‘oregano’

As already introduced in (1), Lena shows a different pattern, where an intervening unstressed vowel is transparent. The data in (3) offer fuller exemplification. The forms in (3a) show metaphonic raising of /e o/ to [i u],

respectively, and of /a/ to [e]. Of importance are the data in (3b), which illustrate transparency of a nonhigh penult in words with antepenultimate stress.<sup>2</sup> As seen in (3c), no change is engendered in an underlyingly high stressed vowel, and an unstressed high penult does not prevent metaphony.

(3) a.	féa	fīu	‘ugly’ (f sg count/m sg count)
	ésta	ísti	‘this’ (f sg/m sg)
	tónta	túntu	‘stupid’ (f sg count/m sg count)
	tsamárga	tsamérġu	‘muddy lake’ (f sg/m sg)
b.	trwébanos	trwībanu	‘beehive’ (m pl/m sg)
	kándanos	kéndanu	‘dry branch’ (m pl/m sg)
	pářara	péřaru	‘bird’ (f sg/m sg)
c.	kúbos	kūbu	‘pail’ (m pl/m sg)
	silikótikos	silikútiku	‘suffering from silicosis’ (mpl/msg)

Metaphony in the neighboring Nalón Valley (Asturias region) also shows transparency (Hualde 1998). Like Lena, Nalón Valley metaphony involves raising. Stressed mid vowels become high in metaphonic contexts, as shown in (4a), and stressed low vowels raise to [ɔ] (rather than Lena’s [e]), as in (4b). In cases of antepenultimate stress, a penultimate vowel is unaffected by metaphony. Both low and mid vowels occur in the unstressed penult context, as illustrated in (4c).<sup>3</sup>

(4) a.	górdos	gúrdu	‘fat’ (m pl/m sg) <sup>4</sup>	
	kordéros	kordīru	‘lamb’ (m pl/m sg)	
b.	(Spanish, <i>gato</i> )	gótū	‘cat’ (m sg)	cf. Lena, gétu
	(Spanish, <i>blanco</i> )	blónku	‘white’ (m sg count)	cf. Lena, blénku
c.	mátola	mótolu	‘I kill her/him’	
	pářaros	péřaru	‘bird’ (m pl/m sg)	

The Lena and Nalón metaphonies raise a locality issue. The raising of a nonhigh stressed vowel across an unaffected nonhigh vowel in the penult is non-local. In recent years several researchers have argued that featural or gestural spreading carries only between segments that are articulatorily

2. Hualde was unable to find words in Lena with antepenultimate stress and a penultimate mid vowel (1989:802, fn. 16). He observes that words of this form are rare outside learned vocabulary. However, the Nalón Valley variety in (4), which also exhibits transparency, shows that mid vowels can occur in this context.

3. Hualde (1998) does not give examples of transparency with a stressed antepenult that has raised to high.

4. The masc. pl. ending in the Nalón Valley variety is produced as *-os* ~ *-us*. As Hualde points out, production of /o/ in this suffix appears to be moving towards [u], but without effect in metaphonic patterns (1998:103).

adjacent (e.g., Gafos 1996, Walker 1998, Ní Chiosáin & Padgett 2001; note also Flemming 1995). As discussed in that work, this view corresponds with representing each instance of a feature or gesture as continuous and unitary, building on certain insights of gesture modeling in Articulatory Phonology (Browman & Goldstein 1986 et seq.). Ní Chiosáin & Padgett (2001) obtain this result through a locality statement, adapted in (5), which constrains Gen. Under this statement, a feature occurrence F (“featural event”) that is associated to (“overlaps”) more than one segment is prevented from skipping an intervening segment.

- (5) Let F be a featural event. For all segments,  $\alpha$ ,  $\beta$ ,  $\gamma$ , if  $\alpha$  precedes  $\beta$ ,  $\beta$  precedes  $\gamma$ ,  $\alpha$  overlaps F and  $\gamma$  overlaps F, then  $\beta$  overlaps F.

In keeping with this view, it has been proposed that certain so-called “transparent” segments do not involve an articulatory interruption but rather are cases of (mis)perceived transparency (see locality work above). Under these circumstances, segments that the listener perceives as transparent to an assimilation actually undergo it but without perceptible consequences. However, the imperceptibility explanation is not available for metaphony like that in Lena or Nalón. This is because nonhigh vowel raising is perceptible elsewhere in the system. Moreover, even in unstressed syllables, (most of) the expected raised qualities are attested and perceptible.

To summarize, metaphony in the patterns under study involves a stressed vowel assimilating in some height feature(s) to a vowel that is high, word-final and suffixal. Under antepenultimate stress, metaphony in Tudanca causes assimilation in both the stressed antepenult and unstressed penult. On the other hand, in Lena and the Nalón Valley, metaphony affects the stressed antepenult but leaves an intervening penult unaffected. This transparency presents a locality issue that must be addressed in the theory.

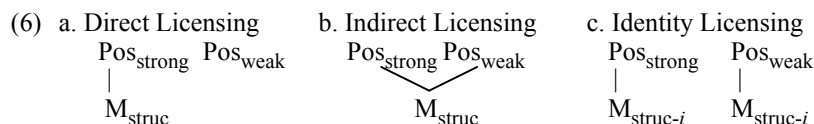
### 3. Licensing of Marked Structure

I turn next to a two-fold positional licensing proposal. One claim is that metaphony is driven by a licensing constraint. I argue that high unstressed vowels are perceptually-marked, i.e. they have relatively poor perceptibility. In order to improve this difficulty, their height features are licensed by (also) being expressed in a prosodically-strong site. Another part of the proposal is that various configurations achieve licensing. One of these involves correspondence between phonological elements (i.e. segments or autosegments) in licensor and licensee, which can achieve assimilation at a distance.

I focus first on formalizing the positional licensing constraint. The literature has identified a range of phenomena involving features that are attributable to licensing expressed in terms of positional markedness (e.g., Steriade 1995, Zoll 1996, Majors 1998, Crosswhite 1999, Walker 2001, to appear). These include assimilation of features in a weak position to ones in

a strong position, and vice versa, attraction of floating features to a strong position, migration of features from a weak position to a strong one, and loss of marked structure in a weak position. What unites these phenomena is that they accomplish the expression of marked structure in a strong position and/or its loss in a weak position.<sup>5</sup>

I suggest that licensing patterns are achieved by the configurations in (6). Each involves association of marked structure ( $M_{\text{struc}}$ ) with a strong position ( $\text{Pos}_{\text{strong}}$ ). A fourth configuration, not shown here, deletes  $M_{\text{struc}}$  from a weak position ( $\text{Pos}_{\text{weak}}$ ). The direct/indirect licensing terminology for configurations in (6a-b) follows Steriade (1995). In direct licensing,  $M_{\text{struc}}$  is associated solely with  $\text{Pos}_{\text{strong}}$ . In indirect licensing,  $M_{\text{struc}}$  is associated to both  $\text{Pos}_{\text{strong}}$  and  $\text{Pos}_{\text{weak}}$ . New here is identity licensing, in (16c). In this configuration,  $M_{\text{struc}}$  in  $\text{Pos}_{\text{weak}}$  has a correspondent in  $\text{Pos}_{\text{strong}}$  (as indicated by subscripted indices).<sup>6</sup>



The aim is to bring these configurations together as possible outcomes of a general licensing constraint. In order to accomplish this, I introduce the notion of chains, in (7), under which an element (e.g., feature, tone, segment) and all its correspondents in a representation form an object.

(7) Chain:

Let  $X$  be an element belonging to a given representation  $R$ . Then  $X$ 's chain is composed of  $X$  and all its correspondent elements within  $R$ .

The statement in (8) formulates a generalized licensing constraint (extending work by Zoll 1996, Majors 1998, Crosswhite 1999, Walker, to appear). The strength of the constraint's requirement depends on its quantification. The existential constraint statement in (8a) requires that for any occurrence of a given type of marked structure in a representation, there must be some member of its chain that belongs to a given type of strong position. The universal statement imposes the stronger requirement that every member in the marked structure's chain belong to a strong position.

5. On the basis for linguistic positional privilege, see the aforementioned work on licensing and also Beckman (1998) and Smith (2002). Other applications of positional markedness include Ringen & Vago (1998) and Alber (2001), among others; and note Goldsmith (1990).

6. On the notion of correspondence, see McCarthy & Prince (1995). Precursors using correspondence for assimilation at a distance include Walker (2000), Hansson (2001), Krämer (2001), Rose (in press) and Rose & Walker (in press). Note also Bakovic (2000) and Zuraw (2000).

## (8) Generalized Licensing:

Let  $M_{\text{struc}}$  be a given type of marked structure,  $\text{Pos}_{\text{strong}}$  a given type of strong position, and  $R$  a phonological representation.

- a.  $\exists M_{\text{struc}}/\text{Pos}_{\text{strong}}$ : For any instance of  $M_{\text{struc}}$  in  $R$ , some member of its chain belongs to a  $\text{Pos}_{\text{strong}}$  in  $R$ .
- b.  $\forall M_{\text{struc}}/\text{Pos}_{\text{strong}}$ : For any instance of  $M_{\text{struc}}$  in  $R$ , every member of its chain belongs to a  $\text{Pos}_{\text{strong}}$  in  $R$ .

As will be demonstrated in §4, the existential constraint statement is capable of enforcing indirect and identity licensing. Notice that the nature of the outcome, such as correspondence or spreading, is not stipulated in the constraint. This will fall out of the language's constraint ranking. While the existential version of the constraint is also satisfied by direct licensing, it is not strict enough to regularly enforce it. Cases of strictly direct licensing, are enforceable by the universal constraint statement. This work deals with patterns involving indirect and identity licensing. Phenomena involving direct licensing have been established elsewhere (e.g., Steriade 1995, Zoll 1996, Crosswhite 1999, Walker 2001). Licensing constraints are also capable of driving deletion of  $M_{\text{struc}}$  or change to less marked structure.

In the case of perceptually-marked structure pertaining to features, Walker (to appear) suggests that it can be singled out by satisfying one or more of the following restrictions: (i) a feature,  $F$ , occurs in a segment that is inherently perceptually difficult (possibly because  $F$ 's perceptibility itself is weak), (ii)  $F$  belongs to a prosodically-weak position, or (iii)  $F$  occurs in a perceptually-difficult feature combination. (See also Kaun 1995.) Height features that propagate in metaphony show perceptual disadvantage on two fronts. First they occur in a segment with inherent perceptual difficulty. High vowels have a lower amplitude and shorter duration than lower vowels. Second, they belong to a prosodically-weak position. Unstressed vowels tend to have a lower amplitude and shorter duration than their stressed counterparts. In addition they tend to lack a salient pitch contour.

The licensing constraint which I propose drives metaphony is given in (9). The  $M_{\text{struc}}$  is height features in a high vowel and the  $\text{Pos}_{\text{strong}}$  is a stressed syllable.<sup>7</sup> The constraint requires that height features in a [+high] vowel have some association within a chain to a stressed syllable. For expositional convenience I use (9) as a cover constraint for individual licensing constraints pertaining to the features [high], [low] and [ATR]. In the interests of uniformity of analysis across Romance varieties, I assume that the licensing constraints for all height features are ranked at the same place in a given hierarchy, but this is not crucial.

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7. A larger issue is which types of  $\text{Pos}_{\text{strong}}$  are suitable to license a given type of  $M_{\text{struc}}$ . This work finds that stressed syllables license perceptually-marked structure, but positions applicable to other kinds of marked structure await further research.

- (9)  $\exists(\text{height})\text{-in-}V_{[+\text{high}]}/\acute{\sigma}$       Henceforth  $\exists\text{LICENSE}(\text{height})/\acute{\sigma}$   
 For any instance of [high], [low] or [ATR] in a high vowel in a word,  
 some member of that feature's chain belongs to a stressed syllable.

In the metaphonies under study, I posit that licensing is further restricted to word-final suffix vowels, as (sole) carriers of a morphological distinction, e.g., masc. sg. (after Majors 1998; cf. Rose, in press). In the exemplification below, metaphony thus operates over final vowel triggers only.

#### 4. Analysis: Metaphony in varieties of Northwestern Spain

Let us now proceed to the analysis of the metaphony cases. Focusing first on Lena, recall the principal facts: a high suffix vowel raises stressed mid /e o/ to [i u], respectively, and low /a/ to [e] (see (1a), (3a)). Under antepenultimate stress, raising operates across an unaffected nonhigh penult (e.g., /paʃaru/ → [péʃaru] 'bird' (m. sg.), (see (1b), (3b)).

Because metaphony causes raising alternations in a stressed syllable, the licensing constraint that drives metaphony,  $\exists\text{LICENSE}(\text{height})/\acute{\sigma}$ , must dominate the faithfulness constraints that control identity for height. The cover constraint  $\text{IDENT-IO}(\text{height})$  is used here to generalize across the  $\text{IDENT}$  constraints for [high], [low] and [ATR]. The ranking is illustrated in (10). For simplicity, the height specifications of the final high vowel are collapsed under the general term (height). Candidate (10c) is ruled out because it violates the licensing constraint. In this form the high vowel's height features do not have a member of their chain that belongs to the stressed syllable; they are contained solely in the final unstressed vowel. Candidates (10a) and (10b) both obey licensing. The output in (10a) is optimal, because it spreads its height features only as far as the stressed syllable. By spreading to the pretonic syllable also, (10b) incurs a faithfulness violation not motivated by licensing, which is fatal.<sup>8</sup>

(10) Penultimate stress:  $\exists\text{LICENSE}(\text{height})/\acute{\sigma} \gg \text{IDENT-IO}(\text{height})$

/korderu/	$\exists\text{LICENSE}(\text{height})/\acute{\sigma}$	$\text{IDENT-IO}(\text{height})$
a. kordíru ↓ (height)		*
b. kurdíru ↓ (height)		**!
c. kordéru   (height)	*!	

8. Although the representations in (10a-b) show linking of features between vowels, I assume that these features also carry through the intervening consonants, obeying strict locality (Ní Chiosáin & Padgett 2001).



here violate the licensing constraint once with respect to [+high], because /a/ raises to mid rather than high. There will be a constraint dominating licensing that permits stepwise raising only. See Kirchner (1996) for an approach based on local conjunction. The winning candidate in (13a) shows identity licensing for [-low] and [+ATR]. This violates INTEGRITY once for each feature and gives a neutral penult. (For simplicity, figures collapse correspondence indexing for [low] and [ATR] on each segment.) The indirect licensing form in (13b) obeys INTEGRITY, but its raising of the penult incurs fatal violations with respect to higher-ranked IDENT(height).

(13) Transparent penult: IDENT-IO(height) >> INTEGRITY-IO

/paʃaru/ (+lo,-ATR) <sub>1</sub> (-lo,+ATR) <sub>2</sub>	∃LICENSE(height)/ó	IDENT-IO (height)	INTEGRITY-IO
a. péʃaru (-lo,+ATR) <sub>2</sub> (-lo,+ATR) <sub>2</sub>	*(+high)	**	**
b. péʃeru ↓ (-lo,+ATR) <sub>2</sub>	*(+high)	***!*	

Returning to the form in (10), we can now examine why an indirect licensing candidate, with spreading, is favored over identity licensing in cases of penultimate stress, where licensing operates in adjacent syllables. The indirect and identity licensing candidates would both be pronounced as [kordíru]. Considered in relation to the constraint hierarchy in (13), both forms will obey licensing and violate identity for height once (for raising in the stressed syllable). The output with indirect licensing is optimal (see (10a)), because it will minimize violations of INTEGRITY, by avoiding the multiple correspondence necessitated by identity licensing.

The result is that multiple correspondence is recruited in cases where the licenser is located at a distance, producing the identity licensing configuration. This satisfies the licensing constraint and obeys locality, while minimizing violations of IDENT. On the other hand, when the trigger and target are in adjacent syllables, indirect licensing is preferred in order to avoid INTEGRITY violations. Thus, both the identity and indirect licensing configurations occur in Lena metaphony, with the choice of configuration emerging as an outcome of the constraint ranking.

In the essentials, the Nalón Valley pattern of metaphony will be subject to analysis along similar lines as that for Lena. For reasons of space, it will not be elaborated here.<sup>11</sup>

Turning to Tudanca metaphony, recall that it shows a centralizing height harmony which not only affects stressed syllables, but also an

11. The raising of /a/ to non-phonemic [ɔ] in Nalón metaphony might be an effect of contrast preservation (see Lubowicz 2003). This awaits further investigation.

intervening penult in words with antepenultimate stress (e.g., [pÚlpItU] ‘pulpit’, see (2)). Since centralized vowels are posited to be [-ATR], it is IDENT-IO(ATR) that is dominated by the licensing constraint in this variety. This ranking is necessary for there to be metaphony alternations in the language. Unlike Lena, Tudanca metaphony presents solely indirect licensing configurations – licensing is consistently accomplished by feature spreading. This difference is achieved by ranking INTEGRITY over IDENT, the reverse of that in Lena. The dominating status of INTEGRITY blocks the availability of the identity licensing configuration and forces the feature that undergoes licensing to carry through a continuous string of syllables. The ranking is illustrated in (14). Both candidates considered here satisfy licensing for [-ATR].<sup>12</sup> The indirect licensing output in (14a) obeys INTEGRITY at the cost of lower-ranked IDENT-IO(ATR). This wins over the identity licensing form in (14b), which minimizes violations of IDENT but incurs a violation of higher-ranked INTEGRITY.

(14) Affected penult:  $\exists$ LICENSE(height)/ó, INTEGRITY >> IDENT-IO(ATR)

/pulpitu/	$\exists$ LICENSE(height)/ó	INTEGRITY-IO	IDENT-IO(ATR)
a. pÚlpItU [-ATR] <sub>I</sub>			**
b. pÚlpitU [-ATR] <sub>I</sub> [-ATR] <sub>I</sub>		*!	*

To summarize, this account involves claims about the nature of the constraint that drives metaphony and the configurations that satisfy it. I have proposed that metaphony in Lena, the Nalón Valley and Tudanca is driven by a licensing requirement for height features in perceptually-marked, unstressed high vowels (Walker, to appear, argues this is also true of other Romance varieties). The licensing constraint is obeyed provided that for each height feature in question, some member of its chain is associated with a stressed position. Among its candidate outputs, Gen gives representations that accomplish licensing by cross-segmental linkage and by correspondence. The Lena pattern, which shows a transparent unstressed penult, is produced by ranking identity constraints for height over INTEGRITY. The reverse ranking of INTEGRITY and IDENT(ATR) yields the Tudanca pattern, with an unstressed penult that undergoes metaphony.

## 5. Proximity

In incorporating identity licensing among the configurations that satisfy licensing, it is important to consider crosslinguistic predictions. I address

12. In (14), insertion of [-ATR] is assumed on the final vowel (after Hualde 1989). This is enforced by a constraint which is not of focal interest for present purposes.

here the issue of forms that contain more than one potential licensor for a given type of marked structure. I suggest that a scale of proximity constraints which restricts the distance between corresponding elements ensures selection of the closest licensor in identity licensing.

Proximity constraints have been applied to correspondence by Rose (in press) and Rose & Walker (in press) (see references therein on other work on proximity conditions). The general version of the constraint that I assume is given in (15) (cf. Suzuki 1998), where “X” is spelled out in terms of phonological units. The ranking in (16) expands this using the proximity hierarchy that Suzuki (1998) crosses with an OCP constraint. Whether this particular scale of intervening material is appropriate for the PROXIMITY-X hierarchy remains to be explored. However, Suzuki’s scale is sufficient to demonstrate the point of closest licensor selection.

(15) PROXIMITY-X

Corresponding elements in an output are separated by no more than X.

(16) PROXIMITY-Seg >> PROXIMITY-μ >> PROXIMITY-μμ >>

PROXIMITY-σσ >> ... >> PROXIMITY-∞

PROXIMITY constraints must be dominated to produce identity licensing at a distance. Nevertheless, they will act to favor licensing by the closest available strong position. The tableau in (17) demonstrates with a schematic form. There is a constraint requiring that a feature [F] be licensed by a stressed syllable, and this dominates the PROXIMITY constraint hierarchy, of which a subset is shown in the tableau. Let us assume that IDENT-IO(F) outranks INTEGRITY to promote identity licensing over indirect licensing. The candidates considered here are stressed on the first and third syllable, and [F] originates on the final syllable.

(17) Closest licensor:  $\exists$ LICENSE(F)/σ >> PROXIMITY-X constraints

/σσσσσ/   [F] <sub>1</sub>	$\exists$ LICENSE(F)/σ	PROXIMITY -Seg	PROXIMITY -σσ	PROXIMITY -∞
a. σσσσσ     [F] <sub>1</sub> [F] <sub>1</sub>		*		
b. σσσσσ     [F] <sub>1</sub> [F] <sub>1</sub>		*	*!	
c. σσσσσ   [F] <sub>1</sub>	*!			

In (17), candidate (c) loses because it violates licensing. Candidate (17a) shows identity licensing by the third syllable, which violates PROXIMITY-Seg. Identity licensing is also seen in (17b), but by the first syllable. This violates both PROXIMITY-Seg and PROXIMITY-σσ, rendering



## 7. Conclusion

This study of metaphony bears on issues of locality and the constraints that drive assimilation. It examined cases of non-local assimilation, for which transparency does not look to be a consequence of imperceptible participation. These harmonies show a positional markedness licensing distribution, wherein perceptually-marked structure requires licensing by association to a strong position. The generalized licensing approach proposed here incorporates the notion of structural chains. By virtue of this adjustment, it accommodates three licensing configurations, direct, indirect and identity licensing, plus deletion and feature change. It was shown that under this approach, the long-distance identity licensing and syllable-adjacent indirect licensing representations can occur together in the same pattern. Hence, feature copy, representing two distinct gestural entities, occurs only in structures showing transparency. This is made available by the constraint's formulation, which does not stipulate whether licensing be accomplished by correspondence or spreading. The choice of licensing configuration is thus an epiphenomenon of constraint ranking.

This study represents only a beginning in exploring patterns of distance identity licensing. Further investigation is needed on which kinds of features and segments participate in distance licensing effects and if limits exist on the distance at which licensing can occur. Also to be explored further is the conditions that favor identity licensing over indirect licensing. In the metaphonies examined here, avoidance of IDENT-IO(F) violations drives identity licensing when the licensor is in a non-adjacent syllable. It is predicted that identity licensing could also arise in some language under the ranking,  $\exists M_{\text{struc}}/Pos_{\text{strong}} \gg *M \gg INTEGRITY$ , where  $*M$  is a markedness constraint that blocks an intervening segment from undergoing assimilation. It is conceivable that this ranking is applicable to certain other patterns of vowel harmony involving transparency. Examining these issues will inevitably lead to further empirical discovery and theoretical refinement.

## References

- Alber, Birgit. 2001. Maximizing first positions. In C. Féry, A. D. Green & R. van de Vijver, eds., *Proceedings of HILP 5. Linguistics in Potsdam*, Vol. 12, pp. 1-19.
- Bakovic, Eric. 2000. *Harmony, Dominance and Control*. PhD dissertation, Rutgers University.
- Beckman, Jill. 1998. *Positional Faithfulness*. PhD dissertation, University of Massachusetts, Amherst.
- Browman, Catherine & Louis Goldstein. 1986. Towards an articulatory phonology. *Phonology Yearbook* 3, 219-52.
- Crosswhite, Katherine. 1999. *Vowel Reduction in Optimality Theory*. PhD dissertation, UCLA.
- Dyck, Carrie. 1995. *Constraining the Phonology-Phonetics Interface with Exemplification from Spanish and Italian Dialects*. PhD dissertation, University of Toronto.

- Flemming, Edward. 1995. Vowels undergo consonant harmony. Paper presented at the Trilateral Phonology Weekend 5, University of California, Berkeley.
- Gafos, Adamantios. 1996. *The Articulatory Basis of Locality in Phonology*. PhD dissertation, Johns Hopkins University.
- Goldsmith, John A. 1990. *Autosegmental and Metrical Phonology*. Blackwell.
- Hansson, Gunnar. 2001. *Theoretical & Typological Issues in Consonant Harmony*. PhD dissertation, University of California, Berkeley.
- Hualde, José Ignacio. 1989. Autosegmental and metrical spreading in the vowel-harmony systems of northwestern Spain. *Linguistics* 27, 773-805.
- Hualde, José Ignacio. 1998. Asturian and Cantabrian metaphony. *Rivista di Linguistica* 10, 99-108.
- Kaun, Abigail. 1995. *The Typology of Rounding Harmony: An Optimality Theoretic Approach*. PhD dissertation, UCLA.
- Kirchner, Robert. 1996. Synchronic chain shifts in Optimality Theory. *LI* 27, 341-9.
- Krämer, Martin. 2001. *Vowel Harmony & Correspondence Theory*. PhD dissertation, Heinrich-Heine-Universität.
- Lombardi, Linda. 2001. Why Place and Voice are different: Constraint-specific alternations in Optimality Theory. In L. Lombardi, ed., *Segmental Phonology in Optimality Theory*, pp. 13-45. Cambridge University Press.
- Lubowicz, Anna. 2003. *Contrast Preservation in Phonological Mappings*. PhD dissertation, University of Massachusetts, Amherst.
- Majors, Tivoli. 1998. *Stress-Dependent Harmony*. PhD dissertation, University of Texas, Austin.
- McCarthy John & Alan Prince. 1995. Faithfulness and reduplicative identity. In J. Beckman, L. Walsh Dickey & S. Urbanczyk, eds., *UMOP* 18, pp. 249-384.
- Ní Chiosáin, Máire & Jaye Padgett. 2001. Markedness, segment realization and locality in spreading. In L. Lombardi, ed., *Segmental Phonology in Optimality Theory*, pp. 118-56. Cambridge University Press.
- Prince, Alan & Paul Smolensky. 1993. *Optimality Theory: Constraint Interaction in Generative Grammar*. Ms., Rutgers University and University of Colorado, Boulder. [Corrected version, 2002, ROA 538-0802.] To appear, Blackwell.
- Ringen, Catherine O. & Robert M. Vago. 1998. Hungarian vowel harmony in Optimality Theory. *Phonology* 15, 393-416.
- Rose, Sharon. In press. Long-distance vowel-consonant agreement in Harari. *Journal of African Languages and Linguistics*.
- Rose, Sharon & Rachel Walker. In press. A typology of consonant agreement as correspondence. *Language*.
- Smith, Jennifer. 2002. *Phonological Augmentation in Prominent Positions*. PhD dissertation, University of Massachusetts, Amherst.
- Steriade, Donca. 1995. Underspecification and markedness. In J. Goldsmith, ed., *The Handbook of Phonological Theory*, pp. 114-74. Blackwell.
- Suzuki, Keiichiro. 1998. *A Typological Investigation of Dissimilation*. PhD dissertation, University of Arizona.
- Walker, Rachel. 1998. *Nasalization, Neutral Segments, and Opacity Effects*. PhD dissertation, University of California, Santa Cruz.
- Walker, Rachel. 2000. Long-distance consonantal identity effects. *WCCFL* 19, 532-45.
- Walker, Rachel. 2001. Positional markedness in vowel harmony. In C. Féry, A. D. Green & R. van de Vijver, eds., *Proceedings of HILP 5. Linguistics in Potsdam*, Vol. 12, pp. 212-32.
- Walker, Rachel. To appear. Weak triggers in vowel harmony. *NLLT*.
- Zoll, Cheryl. 1996. *Parsing Below the Segment in a Constraint-Based Framework*. PhD dissertation, University of California, Berkeley.
- Zuraw, Kie. 2000. *Patterned Exceptions in Phonology*. PhD dissertation, UCLA.