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Lateral Survival: An OT Account

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ABSTRACT

When laterals are the targets of phonological processes, laterality may or may not survive. In a fixed feature geometry, [lateral] should be lost if its superordinate node is eliminated by either the spreading of a neighbouring node, or by coda neutralization. So if [lateral] is under Coronal (Blevins 1994), it should be lost under Place assimilation, and if [lateral] is under Sonorant Voicing (Rice & Avery 1991) it should be lost by rules that spread voicing. Yet in some languages lateral survives such spreading intact. Facts like these argue against a universal attachment of [lateral] under either Coronal or Sonorant Voicing, and in favour of an account in terms of markedness constraints on feature-co-occurrence (Padgett 2000). The core of an OT account is that if IDENTLAT is ranked above whatever causes neutralization, such as SHARE-F or *CODAF, laterality will survive. If these rankings are reversed, we derive languages in which laterality is lost. The other significant factor is markedness. High-ranked feature co-occurrence constraints like *LATDORSAL can block spreading from affecting laterals at all.

KEYWORDS: Lateral, Feature Geometry, Variation, Inventories. Feature Co-Occurrence

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I. INTRODUCTION

The proper treatrnent of laterals has been a rnatter of dispute for years. Arnong the unresolved questions are the following. Is there any justification for a feature [lateral]? Are laterals featurally always Coronal and if so is the feature [lateral] a dependent of the coronal node? Are they featurally always Sonorant, and if so is the feature [latcral] a dependent of the Sonorant Voicing node? The answers to these questions bear on larger theoretical issues. Is feature geornetry invariant, or cross-linguistically variable within certain limits? In Optimality Theory, is feature geornetry the only way to handle featurc relationships, or are feature geometry effects instead the result of constraint interactions? If so, does the resulting typology match the observed facts?

This paper is one of a pair of papers that argues based on data from laterals that feature geometry is both inadequate and unnecessary in OT. Together with Yip (to appear), it shows that the behaviour of laterals is best captured not with feature geometry. but with constraints on the co-occurrence of [lateral] with certain other features, and that re-ranking these constraints produces the attested range of cross-linguistic variation. It thus supports recent work by Padgett (2000) and Flernrning (2003a, c).

The focus of this paper is on the behaviour of the feature [lateral], so it is irnportant to discuss the evidence for the existence of the feature in the first place. If a language has [l] but no [r], one rnight define [l] by the features [+cons, +son. -nas], and [lateral] would be redundant. However, if [l] contrasts with [r] as it does in many languages this will not suffice. Positive evidence for the feature [lateral] comes frorn its activc role in the phonology of many languages. In Eastern Catalan (and Sanskrit), for exarnple, [lateral] spreads onto nasals to create a lateral nasal: /nl/ ➛ [n̪l̪] in /son les tres/ • [son̪l̪es tres] (Mascaró 1976). Furthermore, there are phonological processes that involve only [l] and [r], and in which they either dissimilate. as in Latin, where the suffix /-alis/ surfaces as [-aris] after a lateral root: *nav-alis* vs. *sol-(iris* (Steriade 1987), or assirnilate, as in Sundanese, where the infix /-ar-/ surfaces as [-al] after a preceding /l/: *k-ar-usut* vs. *l-al-əga* (see Cohn 1992 for details). I conclude that the feature [lateral] cannot be dispensed with (but see Spencer 1984, Brown 1995 Walsh 1997 for a dissenting view). I should note that for the purposes of this paper 1 shall treat it as a privative feature, but the results would not be rnaterially affected if it were to turn out to be binary, as Steriade argues.

This paper examines how laterals behave as the targets of phonological processes, and in particular whether laterality survives or is lost. In a fixed feature geometry, if its superordinate node is elirninated by the spreading of a neighbouring node, [lateral] should bc lost. So if [lateral] is under Coronal, it should be lost under Place assimilation, and if [lateral] is under Sonorant Voicing it should be lost by rules that spread voicing. However, this is not always what happens. For exarnple, in English where /l/ assimilates in Place to a following dental, it does not cease to be lateral: hea[l] *vs.* hea[l̪θ] *'health'*. Sirnilarly, if a superordinate node is lost by some process like debuccalization in coda position, [lateral] should bc lost. Ilowever, when place or voicing

contrasts are neutralizcd for such reasons, laterality may or may not survive. Caribbean Spanish allows only velars in coda position, and Coronals lose their Coronal nodc. so that /tren/ › [treŋ] *'train'*. but coronal laterals survive: /tonel/ = [tonel] *'barrel'*.

The core of an OT account is that if IDENTLAT is ranked above whatever causes neutralization. laterality will survive. In thc case of spreading, we have IDENTLAT » SHARE-F, and in the case of neutralization duc to place markedness, we have IDENTLAT » *CODAF. If these rankings are reversed. we derive languages in which laterality is lost, and such languages also exist. The other factor that comes into play is markedness. Lateral does not commonly co-occur with certain other features, particularly Dorsal and Obstruent. High-ranked *LATDORS (and *LATOBS) can block spreading from affecting laterals at all, so that for example /lg/ stays [lg], not [ʟg]. Markedness may also have the inverse effect, of causing loss of laterality. *NASLAT in conjunction with SPREAD-NASAL can turn /n/ into [l] rather than a nasalized lateral.

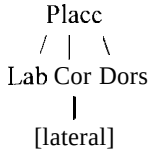
Although this papcr primarily concerns the behaviour of laterals as thc target of some process. tlie complete picture requircs us to understand thcir distribution in inventories, and their behaviour as triggers. For reasons of space the full set of cases cannot be covered hcre, so I will just sketch the problem and proposal. The full details are worked out in Yip (to appear).

I begin with a summary of the prcvious fcature-gcometric approaches, showing tlie contradictory nature of tlie evidence for the placcment of [lateral]. I then givc an overview of my proposal in scction II. Sections III.1 and 111.2are essentially tlie same as the early part of Yip (to appear), and can bc skippcd by anyone familiar with that paper. The body of tlie paper is sections IV and V, which offer case studies of tlie behaviour of laterals as targets of assimilation and neutralization respectively. Section VI sums up.

II. THE PROBLEM WITH FIXED GEOMETRY: CONFLICTING EVIDENCE

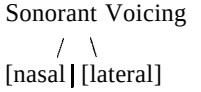
In the late 1980's and carly 1990's it was argued that feature geometry was universally invariant (Sagey 1986. Clements & Hume 1995. and many others), but certain features were rarely discussed because thcy posed a problem for this view. Among them were [lateral] and [strident]. The two main contendcrs for the placcment of lateral are shown below. where SV stands for Sonorant Voicing. and is responsible for voicing in sonorants but not (most) obstruents.

(1) a. Under Coronal (Blevins 1994)



OR

b. SV model (Rice & Avery 1991)



These proposals were motivated by two observations about laterals: they are normally Coronal (hence the Coronal proposal), and they are normally voiced sonorants (hence the SV proposal)

The predictions were clear: [lateral] required the presence of its superordinate node, and anything which affected that node (such as spreading it, delinking it, deleting it) would also affect [lateral]. Sister features should spread together with [lateral]. The trouble was, the evidence was contradictory, as the following table shows. The first two columns list evidence for and against placing [lateral] under the Coronal node, and the last two columns list evidence for and against placing Coronal under Sonorant Voicing.

Table I: Contradictory evidence for the placement of [lateral]
(Shaded cells are cases wliere no language with supportiiig data has yet beeii fouiid.)

	Under Coronal?		Under **[Sonorant Voicing]?**	
	FOR	**AGAINST**	**FOR**	AGAINST
1	Laterals are usually Coronal: *many languages*	Placeless laterals: *Javanese* Velar laterals: *Yagaria*	Laterals are usually voiced sonorants: *many languages*	Voiceless laterals: *Tahltan* Obstruent laterals: *Min, Bantu* Affricate laterals *Tahltan, Zulu*
		In affricates, [lateral] is clearly a release feature, i.e. manner: *Tahltan*		Need to state natural class of voiced obs. and voiced son.: *Polish, Min*
3	Place spreading spreads [lat] from trigger: *Selayarese*	Place spreading doesn't spread [lat]: *Chukchi*	Voice/nasal spreading spreads [lat] from trigger: *Sanskrit*	Voice spreading doesn't spread [lat]: *Polish*
4	Coronal node as target of [lateral] spreading: *Teralfene Flemish, Yanggu Chinese*	Laterals skipped by harmony that targets Coronals: *Tahltan*	[SonVoice] node as target of [lateral] spreading: *Toba Batak*	Laterals skipped by harmony that targets sonorants: ?
5	Place spreading removes [lat] from target: *Moroccan Arabic, Cuban Spunish*	Place spreading doesn't remove [lat]: *English, Busque*	Voice/nasal spreading removes [lat] from target: *Itsekiri*	Voice spreading doesn't remove [lat]: *English*
6	Place loss removes [lat]: ?	Place loss doesn't remove [lat]: *Caribbean Spanish*	Devoicing removes [lat]: *Yagaria*	Devoicing doesn't remove [lat]: *Koyukon, Angas*

It is the data in rows 5-6 on laterals as targets that are the focus of this paper. The data in rows 1-4 on inventories and laterals as triggers are discussed in detail in Yip (to appear), and I begin with a brief sketch of the account offered in that paper.

III. THE PROPOSAL

The perplexing behaviour of laterals. while a problem for a fixed feature geometry, can be handled quite simply within OT by means of rankable feature co-occurrence constraints (Padgett 1995, 2000, Pater 1999, Pulleyblank 1997, Flemming 2003 a, c). The preference for a coronal place of articulation means that *LATERALCORONAL is low-ranked in most languages, while the preference for lateral approximants means that *LATERALSONORANT is low-ranked in most languages. Conversely, the absence in a language of velar laterals and lateral affricates or clicks means that *LATERALDORSAL and *LATERALOBSTRUENT are high-ranked and thus surface-true. However, languages may vary as to how they rank these constraints. For example, if *LATERALDORSAL is low-ranked velar laterals may be found. This thus avoids one of the immediate problems with a fixed feature geometry: its excessive rigidity.

As in other aspects of phonology where the constraints are grounded in the articulatory phonetics, there are limits on the ranking permutations for the constraint families that derive from these physiological imperatives. Just as sonority-based constraints are usually agreed to have a fixed ranking with respect to each other, so too do the consíraints relating to laterality. I shall posit the following fixed rankings, into which other constraints may intervene:[1]

(2) *LATERALOBSTRUENT » *LATERALSONORANT
*LATERALLABIAL » *LATERALDORSAL >> *LATERALCORONAL

These rankings, in conjunction with faithfulness consíraints and other familiar parts of the OT grammar, have the following effects:

(1) restrict the types of lateral inventories
(2) explain the targets of spreading
(3) explain the outcomes of processes
(4) give the effects of dependency, without feature geometric representations

In so far as this account denies íhe need to place [lateral] under any particular node, it is in line with the claims of Hegarty (1989), Bao (1992), who argue that it is simply a dependent of the Root node. I would go further, and agrce with Padgett (1995b, 2000) that features can be treated as an unstructured set of which [lateral] is a member, and that feature geometry as such is redundant. The next section expands on this proposal.

111.1. Lateral inventories

ZZZ.I.I. Preferencefor sonorants

The following typology arises from placing the faithfulness constraints at different points in the fixed ranking of *LATOBS » *LATSON:

(3)	*LAT OBS » *LATSON » FAITH	Languages with no laterals (18.6%, Maddieson 1984)
	*LATOBS » FAITH » *LATSON	Common language type. with sonorant laterals
	FAITH » *LATOBS »*LATSON	Languages with both obstruent and sonorant laterals

Examples of obstruent laterals include not only the obvious affricates and clicks, but also languages in which [1] patterns as a voiced obstruent. such as Min, which has [l] instead of [d]. For example, /p,t,k/ voice to [b,l,g] foot-internally (Hsu 1996) and /b,l,g/ nasalizc to [m,n,ŋ] before nasal vowels. In some Bantu languages. like Ikalanga, historical *d has become /l/, but under velarization /l/ becomes the stop [gw], suggesting that it may still be an obstruent.

The prediction of the fixed ranking given here is that no language can have only obstruent laterals and no sonorant laterals. While this is certainly the usual case, therc arc some possible counter-examples, including Min if its [l] is an obstruent. However, Min has no other oral sonorant consonants —no /r/ - so high ranked SON=NAS could be invoked. An alternative might be to say that this [l] is not phonologically [lateral] at all, but is just an oral stop. Another possible counter-example is Tlingit, which has fricative and affricate laterals, but no voiced approximant. This needs further investigation. Finally, the existence of truly voiceless lateral approximants such as Toda [l̥] simply implies that SON=VOICE can be low-ranked.

II.1.2. Preferencefor coronals

I now turn to the preference for laterals to have Coronal place. There seems to be little doubt that this is real. Evidence includes common alternations between [l] and [n], or [l] and [d]. For example, in Cantonese, younger speakers are replacing [n] in onsets witli [l] (Matthews & Yip 1994:6). In Min Chinese, in contexts where the nasals /m, ŋ/ alternate with the voiced stops lb, g/, /n/ alternates not with /d/ but with /l/. In Palenquero Spanish, (Piñeros 2003) /d/ becomes [l] in certain contexts. In Arabic roots, the coronal sonorants /l,r,n/ forni a natural identity class that resist co-occurrence. The class of epenthetic consonants cross-linguistically, at least in onsets, includes glottal stop, [t], and [l]. Languages that use [1] include Chaoyang Chinese in reduplication: /kua?/ > [kua? lua?] 'cut off (Yip 2001), SiSwati in its noun class prefixes (Class 5 and in loans, Doke (1954), and Gloria Malambe, p.c.), and Bristol English (Wells 1982, Lombardi 2002). to fill out a word-final syllable: 'Eva' [ival]. Nonetheless, laterals may also be placeless or velar, and the OT typology that produces this is given below:

(4)

*LATLAB » *LATDORS » *LATCOR » FAITH	Either no laterals, or placeless ones.
*LATLAB » *LATDORS » FAITH » *LATCOR	Common type. with Coronal laterals'
*LATLAB » FAITH » *LATDORS » *LATCOR	New Guinea type, with velar and coronal laterals, or perhaps Palatal laterals
FAITH » *LATLAB » *LATDORS » *LATCOR	Unattested

An example of phonologically placeless laterals comes from Cambodian: (Nacaskul 1978). The co-occurrence restrictions on identical Place features do not treat /l,r/ as Coronal, even though Place restrictions cross-cut obstruents and sonorants, stops and fricatives, nasals and glides. Instead, they behave like [h,ʔ] in co-occurring freely with all other sounds.'

Languages with Dorsal laterals will include those like the Papuan New Guinea language Mid-Waghi (Blevins 1994), and also perhaps languages with palatal laterals, which have been argued to bc both Coronal and Dorsal by Sagey (1986) and others. The last grammar in (4), which predicts the existence of the unattested labial laterals, is an unexplained gap. One possibility is that the perceptual effects of lateral release would be too subtle to make such a contrast functionally effective. I shall have nothing further to say about labial laterals.

The main prediction ofthis typology is that no language should have only Dorsal laterals. Either it must have complex corono-dorsal laterals, or Dorsal and Coronal ones in contrast. Blevins argues that many of the cases of apparent velar laterals, such as Yagaria and Kunite, are in fact plionologically complex, being both Coronal and Dorsal. The fact that they have /ʟ/ but no /l/ is then not a problem. In contrast Mid-Wahgi has a Dorsal /ʟ/ tliat (contra Blevins) does not seem to bc in any way Coronal (although it does assimilate to a following Coronal /aʟ-to/ > [alto] 'castwards'), but it also has contrasting /l̪/ and /l/, as shown by [aʟaʟe] 'dizzy'. [a̪l̪a a̪l̪a] 'again and again' [alala] 'spcak incorrectly' . For Blevins. committed to [lateral] under the Coronal node, this is a problem, since all laterals must be Coronal, but for the approach outlined here plain Dorsal laterals arc fine, so long as they contrast with plain Coronal ones."

Putting together the results of this section, a language with only coronal sonorant laterals will have the grammar in (5).Many of the languages discussed in this paper are of this type.

(5) *LATOBS, *LATDORS » IDENTLAT » *LATSON, *LATCOR

The relevant faithfulness constraint here is IDENTLAT, which requires that segnients that are lateral in the input must be lateral in the output.[5]

III.2. Laterals as triggers of assimilation

Let us assume that assimilation involves a violation of the IDENT family of faithfulness constraints, such as IDENT-PLACE, or IDENT-SON, under pressure from higher ranked constraints

such as SHARE-F (or AGREE) and SYLLABLE CONTACT. Any assimilation process that creates the ordinary sonorant Coronal lateral [l] from an underlying non-corona1 or non-sonorant will thus violate at least one of IDENT-PLACE and IDENT-SON. The ranking of thesc constraints with respect to the constraints causing assiniilation, here abbreviated as ASSIM, will determine which segments may undergo the process. If IDENTSON » ASSIM, targets must be sonorant. If IDENTPLACE » ASSIM, targets must be Coronal. If the output is always Coronal and sonorant, *LATOBS and *LATDORS are always high ranked, and *LATCOR and *LATSON are always low-ranked. The following typology results:

(6) a. Target must be sonorant:
*LATOBS, **IDENT-SON » ASSIM** »*LATSON
a'. Target need not be sonorant, but output will be:
*LATOBS » **ASSIM » IDENT-SON,** *LATSON
b. Target must be Coronal:
*LATDORS, **IDENT-PLACE » ASSIM** » *LATCOR
b'. Target need not be Coronal, but output will be:
*LATDORS » **ASSIM » IDENT-PLACE.** *LATCOR

By combining one of the sonorancy rankings with one of the Place rankings, we get the following mini-grammars (with low-ranked *LATCOR and *LATSON omitted for space reasons).

(7) a & b.: Target must be sonorant and Coronal: Flemish, Toba Batak
*LATOBS, *LATDORS, **IDENT-PLACE, IDENT-SON » ASSIM**
a & b': Target must be sonorant, but need not be Coronal: Selayarese
*LATOBS, *LATDORS, **IDENT-SON » ASSIM » IDENT-PLACE**
a' & b: Target must be Coronal, but need not be sonorant: Sanskrit, Yanggu
*LATOBS, *LATDORS, **IDENT-PLACE » ASSIM » IDENT-SON**
a' & b': Target need not be Coronal or sonorant, but output will be both: ?
*LATOBS, *LATDORS, **ASSIM » IDENT-SON**, IDENT-PLACE

Finally, rankings with *LATSON, *LATCOR ranked above ASSIM, (and thus *LATOBS, *LATDORS even higher) would not allow laterality to surface at all on the target, so we would observe either failure of assimilation before laterals (Javanese), or possibly assiniilation of other lateral properties, such as voicing (Polish), or coronality (Chukchi), but not laterality. Yip (to appear) discusses these cases in detail.

What about the possible outcomes? If *LATDORS, *LATOBS » ASSIM, the outputs must be coronal sonorants, and this is the most common case. If ASSIM» *LATDORS, assimilation could create velar laterals. Rather surprisingly, this seems to be unknown, but palatal laterals, which may be thought of as both Coronal and Dorsal (but see note 4), can certainly be created, as in English welch [ʎtʃ]. Lastly, if ASSIM » *LATOBS, assimilation could create lateral

obstruents. I am not awarc of such cascs, but some reports of failure of assimilation in /t-l/ inputs could perhaps actually be reinterprcted as [t͡l l] outputs, which would be hard to distinguish from simple [tl] clusters.[6]

III.3. Laterals as targets of assimilation

The final issue is how laterals behave as the targets of processes. Does the feature [lateral] survive under assimilation or neutralization'? The remainder of this paper addresses this issue, which is of particular interest in the context of this volume because many languages of the lberian peninsula, and also English, provide examples of just about the full range of lateral behaviour. A summary of lateral target behaviour is given below, re-organized by the effect of spreading type on laterality. SV stands for Sonorant Voicing.

(8)

Effect on [lateral]	**Place spread**	**SV spread**
stay lateral, but assimilate	Basque, English, Tamil, Central Catalan	English
lose lateral	Moroccan Arabic, Cuban Spanish	Ponapean, Itsekiri, Min, Yoruba
Effect on [lateral]	**Place loss**	**SV loss**
stay lateral	Caribbean Spanish	Koyukon, Angas
lose lateral	–	Yagaria, Kihungan, Swahili

ln a feature-geometric approach, this erratic behaviour is obviously problematic. However, it is exactly what we expect given the existence of markedness restrictions on the co-occurrence of laterality with other features, and general constraints that enforce feature-sharing, and enforce restrictions on what may appear in non-prominent positions such as codas. Consider the typology below:

(9)

Spreading with retention of laterality:	IDENTLAT » SHARE-F
Spreading with loss of laterality:	SHARE-F » IDENTLAT
Coda neutralization with retcntion of laterality:	IDENTLAT » *CODA-F
Coda neutralization with loss of laterality:	*CODA-F » IDENTLAT

Markedness restrictions also play a kcy rolc. lf codas must be Dorsal, as in Caribbean Spanish, but laterals stay Coronal, we may attributc this to high-ranked *LATDORS, in combination with IDENTLAT » *CODA-COR. If nasality spreads, and converts a lateral to a plain non-lateral nasal as it does in Itsekiri and Min, instead of simply nasalizing the lateral itself, we may attribute this to top-rankcd *NASLAT, in combination with SHARE-NAS » IDENT-NAS, IDENT-LAT. In what

follows I work out representative cases of the four grammars given above. Note that in some cases the key faithfulness constraint may be IDENT-SON, rather than IDENTLAT, if /r/ is also involved.

lt is also important to compare the behaviour of laterals as targets to the behaviour of nasals and of coronal obstruents: do they differ in their vulnerability to assimilation, and in the type of outcome, or not? Only if they differ can it be attributed to constraints involving laterality. The following chart looks at Place assimilation in five representative languages, all discussed in more detail below. I have categorized assimilations as total, partial, or no change (shown by a dash). Total assimilation, shown by darker shading, creates a (near) geminate. Partial assimilation, shown by lighter shading, creates a homorganic cluster, but the target retains its original sonorancy, continuancy, laterality or nasality. Both types may or may not include assimilation of voice. I have tried to consult sources that are detailed enough to note small changes in place of articulation, so that, for example, [l̪θ] is not transcribed loosely as [lθ].

(10) Coronals as targets of Place assimilation:

	Basque	English	Central Catalan	Moroccaii Arabic	Educated Havana Spanish
/l/ + non-Cor: e.g. /lb/					Total: /lb/ → [bb] /lp/ → [bp]
/l/ + Cor e.g. /ld/	Partial: l̪d̪	Partial: l̪θ	Partial: l̪d̪	Total: /ld/ → [dd]	Total: /ld/ → [dd]
/t/ + non-Cor e.g. /tp/	/t/ deletes before stops		Partial/Total /tf/ ■ [pf] /tk/ → [kk] /tm/ → [mm]	Unchanged, not even voiciiig assimilation	Unchanged, or obstruents velarize in casual speecli
/t/ + Cor e g. /tʃ/	?	Partial: t̪θ t̪r	Partial/Total /tʃ/ → [t,ʃ] /tl/ → [ll]	Voicing assimilation: /tʒ/ → [dʒ]	As above
/n/ + non-Cor: e.g. /nb/	Partial: mb	Partial: mb	Partial: mb		Velarization; some secondary labialization before labials
/n/ + Cor: e.g. /n d̪/	Partial: n̪d̪	Partial: n̪θ	Partial: n̪d̪	/nr/ → [rr]	Velarization

The rnost cornmon type seems to be the pattern shown by Basque and English, and many other languages including Tamil (Beckrnan 1998). Obstruents rarely assimilate, and then more often to other coronals, whereas nasals usually assimilate to everything. Obstruents may delete, or epenthesis rnay separate the cluster (as in Tamil). Laterals occupy a middle ground, assimilating

to coronals but not to non-coronals. Total assimilation is rare in all language types, and never found with nasals beforc obstruents. presumably because a nasal-obstruent intervocalic cluster is usually preferred to a geminate obstruent.

I have suggestcd earlier that thc apparent non-existence of languages with partial assimilation of laterals to labials or velars, in which for example /lg/ ‣ [ʟg], results from the high-ranking of *LATDORS in most languages.

IV. CASE STUDIES OF LATERALS AS TAKGETS OF ASSIMILATION

In this scction I look at common assimilation rulcs in which a coda assimilates in Place to the following onset. If [latcral] were a fcature under the Coronal node, such assimilation would rcmove [lateral] from the target. Only two language-types are thus expected. Either laterals should lose their laterality, or they should resist all assimilation. We shall see that there is a third type, in which laterals assimilate only in those features compatible with their laterality, always remaining coronal. Indeed, this is probably the most common type, and I have not found any languages in which the lateral resists all assimilation even before other coronals.

IV.1. Place spreading does not remove lateral

In Central Catalan, Placc spreading from labials and velars affects coronal stops (optionally) as in (11a) and coronal nasals as in (11b), but does not touch laterals, (11c). It also fails to affect fricatives. (11d). Data from Mascaró (1976:68), Grijzenhout (1994:171):

(11)	a.	set xinesos	‣	se[t,ʃ]insesos	'seven Chinese men'
		set focs	‣	se[pf]ocs	'seven fires'
		set cascs	‣	se[kk]ases	'seven houses'
		set linies	‣	se[ll]inies	'seven lines'
		set mans	‣	se[mm]ans	'seven hands'
	b.	só[n] pocs	‣	só[m] pocs	'they are few'
		só[n] grans	‣	só[ŋ] grans	'they are big'
	c.	e[l] pa	‣	e[l] pa	'the bread'
		e[l] foc	‣	e[l] foc	'the fire'
	d.	me[s] pa	‣	me[s] pa	'more bread'
		me[s] flors		me[s] flors	'more flowers'

Before coronals. however, laterals do assimilate in Place:

(12)	el [d]ia	e[l̪d̪]ia	'the day'
	el ric	e[l̪r]ic	'the rich'
	el [ʒ]erma	e[l,ʒ]erma	'the brother'

Before velars, /l/ becomes velarized, but retains its primary coronal articulation: el gos ›e[ɬg]os, 'the dog'.

Similar facts hold in Basque, except that coronal stops delcte before another consonant. There is general Place spreading onto sonorants, as can been scen in the left-hand column bclow. Laterals also assimilate before coronals, but are unchanged before other places. (Hualde 1991). Similar facts hold in Tamil (Beckman 1998), and in English: we[l̪θ] *'wealth'*, we[ʎtš] *'welch'* but whe[lk]. The interesting fact is that in all thcse languages laterals do not lose their laterality under assimilation. If [lateral] were a dependent of the Place node via the Coronal node, we would expect that Place spreading would delink the original Place node, taking [lateral] with it.

(13)				
	egu[n]a	'the day'	ata[l]a	'the section'
	egu[m] berri	'new day'	ata[l] berri	'new section'
	egu[ɱ] fresku	'cool day'	ata[l] fresku	'cool section'
	egu[n̪ d̪] enak	'every day'	ata[l̪ d̪]enal	'every section'
	egu[ɲ] tiki	'small day'	ata[ʎ] tiki	'small section'
	egu[ŋ] gorri	'red day'	ata[l] gorri	'red section'

In the theory proposed here, this is straightforward. High ranked ***LATDORS, IDENTLAT** stop the creation of non-corona1 laterals, and also the loss of laterality. lcaving only the features compatible with Coronal and [lateral] free to spread.

(14) ***LATDORS, IDENTLAT » SHARE-F » IDENT-PLACE**

SHARE-F is a cover term for the entire family of constraints that enforce feature sharing, and I shall only use its component constraints, such as SHARELAT or SHAREPLACE, when it is clear that they are differentially ranked. The use of SHARE-F thus implies that they either are, or could be, ranked at the same level, thus encouraging total assimilation. Note that in the tableaux SHARE-F is violated once for each unshared feature, so that [Id] and [lg] get one asterisk for unshared [lateral], and [l̪d̪] and [lg] get two for unshared [lateral] and the place feature. I consider only outputs in which the second consonant is unchanged, presumably as a result of high-ranked positional faithfulness to onsets.

(15) /l/ before coronals

/l̪d̪/	*LATDORS	IDENTLAT	SHARE-F	IDENT-PLACE
☞ a. l̪d̪			*	*
b. l̪d̪			**!	
c. d̪d̪		*!		

IDENTLAT blocks total assimilation, but all other features are shared under the influence of SHARE-F. so that candidate (a) wins.

(16) /l/ before non-coronals

/lg/	*LATDORS	IDENTLAT	SHARE-F	IDENT-PLACE
☞ a. lg			**	
b. gg		*!		*
c. Lg	*!		*	*

Before non-coronals. the picture is different. The rnarkedness constraint *LATDORS rules out candidate (c) with a lateral whose primary articulation is velar, and IDENTLAT rules out candidate (b). The result is no assimilation of the primary place of articulation. The secondary velarization found in Catalan is probably phonetic.

Finally, note that Basque, Catalan and English differ in how /t/ is treated as a target. Basque deletes /t/, presumably to avoid a poor sonority profile across the syllable-boundary. Catalan assimilates almost cornpletely, as the grammar above would predict. English assimilates /t/ only before Coronals. probably because obstruent clusters never contain more than one non-coronal (Yip 1991).

IV.2. Place spreading does remove lateral

My first exarnplc of total assimilation comes frorn Educated Havana Spanish (Padgett 1991:228, Harris 1985, Guitart 1976). Liquids assimilate in Place, Manner and nasality to the following consonant. Before stops. they always remain voiced, but before voiceless fricatives they devoice. In all cases they lose their laterality:

(17)	albañil	a[bb]añil	'mason'
	tal droga	ta[dd]droga	'such a drug'
	pulga	pu[gg]a	'flea
	el pobre	e[bp]obre	'the poor man'
	el tres	e[dt]res	'the three]
	tal mata	ta[mm]ata	'such a shrub'
	el fino	e[ff]ino	'the refined one'

The core grarnmar here is SHARE-F » IDENTLAT, which will produce the loss of laterality. In general, voicing is unchanged, so IDENT-VOICE must dominate SHARE-F.

(18)

/lp/	IDENT-VOICE	SHARE-F	IDENTLAT
☞ a. bp		*	*
b. pp	*!		*
c. lp		**!	

To allow for the fncative facts, IDENT-VOICE must be over-ridden by a prohibition on (new) voiced fricatives, *[CONT, VOI]$_{NM}$, following McCarthy (2002).[7] For completeness, let me mention the unusual behaviour of the other coronals. These pervasively velarize in coda position, at least in fast speech, as Guitart shows. For example:

(19) u[ŋ] domingo /etniko/ › e[g]niko /afta/ › a[h]ta
u[ŋ] señor /absoluto/ › a[k]soluto /esta/ › e[h]ta

[h] is described as a voiceless pharyngeal fricative. The nasals also add some secondary labialization before labials. Neutralization to velars in coda position is controversial. De Lacy (2003) denies its existence, and argues that cases like these actually involve glottalization, but Guitart's descriptions are very careful. Putting aside this issue, I shall use a constraint CODA=DORSAL, which must outrank SHARE-F. However, liquids escape this coda condition because of the undominated *LATDORS, and instead assimilate. The option of nasalization of /lm/ to [gm] is, I assume, prohibited by high-ranked DEP-NAS (not shown), which prohibits insertion of a second separate [nasal] feature. [mm] on the other hand just shares the nasality of the original [m].[8]

(20)

/lm/	*LATDORS	CODA=DORS	SHARE-F
☞ a. mm		*	
b. lm		*	**!
c. Lm	*!		**
/ dm/	*LATDORS	CODA=DORS	SHARE-F
☞ a. gm			**
b. mm		* !	
e. dm		* !	**
/nm/	*LATDORS	CODA=DORS	SHARE-F
☞ a. ŋm			*
b. mm		* !	
c. nm		* !	*

A more cornplex casc is found in Moroccan Arabic, where the definite article /l/ totally assirnilates bcfore Coronals, but is unaffected elsewhcrc.(Guerssel 1978, Heath 1987: 223)).

(21)	l kamyu	'the truck'	vs.	ššəmš	'the sun'
	l bṛa	'the letter'		ddfal	'the saliva'
				ttuma	'the garlic'
				n-nlrn-a	'the ant' (Heath:37)

The voicing aspect of this assimilation is more general: The prefix /t-/ also assimilates in voice and in pharyngealization before Coronals, according to Heath. However, /t/ does not assimilate in rnanner, so for example /tẓ/ bccornes /ḍẓ/, where /ẓ/ is a pharyneaglized coronal fricative. /n/, surprisingly, docs not assiniilate across morphenie boundaries: ta-n-gul '*I say*' (Heath: 210)

As a first pass. a plausible grarnrnar niight look like this: IDENT-COR » SHARE-F » IDENTLAT. SHARE-F » IDENTLAT is necessary to allow the loss of laterality. IDENT-COR stops /l/ becoiiiing [p] or [k] before labials or velars. However. this gramrnar wrongly predicts that the lateral would assiniilate to non-coronals in the other features such as manner or voicing, as the following tableau shows (22):

(22) Failed tableau for /l/ before a non-corona]:

/lp/	IDENT-COR	SHARE-F	IDENTLAT
☹ a. tp		*	*
b. lp		***!	
c. pp	*!		*

Candidate (a) will wrongly win, whereas candidate (b), [lp] is the actual output. Following Yip (1988), suppose that the driving force behind the assimilation to coronals is the OCP, which dislikes sequences of two Coronals, and requires that one be lost.[9] The features of the surviving coronal spread to fill the slot vacated by the /l/. In all other circumstances no assimilation of oral features takes place, suggesting that in general IDENT-F » SHARE-F. Since we have already established, however, that SHARE-F » IDENTLAT, what we need is a grammar in which IDENT for all *other* oral features dominates SHARE-F. Rather than listing each feature separately, I will use IDENT-F* to denote the sct of constraints for each oral feature other than lateral. Tableau (23) shows how this works for two inputs: /lp/ and /lt/. Note by the way that the role of the OCP here provides evidencc for laterals being specified as Coronal.

(23) Successful grammar for /l/ before (i) non-corona1 and (ii) coronal:

(i) /lp/	OCP-COR	IDENT-F*	SHARE-F	IDENTLAT
☞ a. lp			son, voi, Cor	
b. tp		son, voi!	Cor	*
c. pp		son, voi, Cor!		*
(ii) /lt/	OCP-COR	IDENT-F*	SHARE-F	IDENTLAT
☞ a. tt		son, voi		*
b. lt	*!		son, voi	

I now move on to cases of SV spreading.

IV.3. SV spreading doesn't remove (lateral]

The only case of this sort that I have been able to find so far is not terribly convincing, since the facts are open to a quite different interpretation outlined at the end of this section. I include it here because it illustrates the form of the argument.

In English, liquids after voiceless aspirated stops become voiceless:

(24)

[bl]eak	[pl̥]ease	[gl]eam	[kl̥]ean
[br]eam	[pr̥]een	[grjeen	[kr̥]eam

If [lateral] were under an SV node, the devoicing would presumably mean that the SV node had been delinked. and one would then expect loss of [lateral] as well, but no such thing happens. In our account. there is no such expectation. The voicing assimilation means that SHARE-VOICE » IDENT-VOICE, and the creation of marked voiceless liquids means that IDENT-SON » SON=VOICE. Laterality is uninvolved, and thus unchanged.

(25) IDENT-SON, SHARE-VOICE » SON=VOICE, IDENT-VOICE

/pl/	IDENT-SON	SHARE-VOICE	SON=VOICE	IDENT-VOICE
☞ a. pl̥			*	*
b. pl		*!		
c. ps	*!			*

This example is not as problematic for an SV feature-geometric account as it might seem, for another reason. The devoicing only happens after aspirated stops: s[pl]een, not *s[pl̥]een. This suggests that the spreading feature is not voicing at all, but aspiration, in which case no consequences would be expected for laterality. ln either case, an OT account is straightforward.

IV.4. SV spreading removes lateral

Languages where laterals nasalize, and then lose their laterality. have been taken as evidence for an SV node: the SV node of the nasal spreads, forcing delinking of the SV node of the lateral, which therefore loses its laterality.The following facts from Itsekiri (Nigeria, Piggott 1991 cited in Brown 1995:64) are often cited, and very similar facts hold in Southern Min Chinese. and in Yoruba.

(26)

lã	›	nã	'ask the price o f
lɔ̃	›	nɔ̃	'be lost'

In the approach taken here, nasal harmony implies a grammar in which SHARE-NAS » IDENT-NAS. The loss of laterality is the result of high-ranked *LATNAS » IDENTLAT. Such segments are certainly marked, perhaps because they are not sufficiently perceptually distinct from plain nasals (Flemming 2003b). Note that [ɬ] is here used in a non-standard way, to show a nasalized lateral.

(27) Loss of laterality under nasal spreading

/lã/	*LATNAS	SHARE-NAS	IDENT-NAS	IDENTLAT
☞ a. nã			*	*
b. ɬã	*!		*	
c. lã		*!		

A fourth candidate [la] is presumably ruled out by a high-ranked constraint preserving the underlying contrast between oral and nasal vowels, as opposed to consonants. I conclude that the analysis does not depcnd in any way on an SV constituent.

A somewhat differcnt situation is found in Ponapean reduplication (Itô:137), where /l/ becomes [n] before a Coronal:

(28)

dil	›	din-dil	'penetrate'
sel	›	sen-sel	'tied'

This is only minimally differcnt from Moroccan Arabic, and looks like an OCP-triggered process that spreads [-cont] from the stop onto the sonorant. I will adoptan idea from Padgett (1991: 238) for Educated Havana Spanish. He suggests that [+son, -cont] sounds must be nasals, and that this causes the loss of laterality. Translated into feature co-occurrence constraints. we can add *[+son, -cont, -nasal] to the grammar, ruling out [ld], with shared [-cont]. [ɬd] will be ruled out by *LATNAS as before. leaving [nd] as the winner. I assume that [dd] is ruled out by IDENTBR-SON, since geminates are permissible in the language, at least in loans. (cf. kiassi 'catcher').'"

This concludes the casc studies of assimilation, and I now move on to neutralisation.

V. CASE STUDIES OF LATERALS IN POSITIONS OF NEUTRALIZATION

V.1. Loss of place does not remove lateral

In Caribbean Spanish (Trigo 1988 : 71) place features are neutralized in codas. /d/ deletes, /s/ becomes [h], and all nasals become velar. /r/ and /l/ are unchanged.

(29)	a.	βerdad	➤	βerða	'truth'
	b.	ines	➤	ineh	'Incs'
	c.	album	➤	albuŋ	'album' (optional)
		tren	➤	treg	'train'
		desdeɲ	➤	desdeŋ	'disdain'
	d.	tonel	➤	tonel	'barrel'
		par	➤	par	'pair'

Trigo analyses this as loss of Place features." If this is correct, then it poses a problem for placing [lateral] under Coronal, since laterality survives even when Coronality does not. The account offered here is rather different. I shall assume that the codas are in fact Dorsal, not placeless. High-ranked *LATDORS bans velar laterals, and IDENTLAT blocks the loss of laterality. As a result laterals survive, and stay coronal. In the tableau below I assume a positional markedness constraint *CODACOR, but a positional faithfulness account would be equally viable.

(30)

/n/	IDENTLAT	*LATDORS	*CODACOR	MAX-PLACE
a. n			*!	
☞ b. ŋ				*
/l/	**IDENTLAT**	***LATDORS**	***CODACOR**	**MAX-PLACE**
a. ŋ	*!			*
b. L		*!		
☞ c. l			*	

V.2 Loss of Place removes lateral.

I do not know of any cases where Place loss removes laterality.

V.3 Loss of SV leaves lateral unchanged:

The Athapaskan language Koyukon (Rice 1994) devoices syllable-final sonorants and continuants. including /l/. For the lateral, the result is a voiceless fricative [P]. Similar facts hold in Angas (Halle & Clements: 45): siɻ 'to forgive', tam 'bench', kʷaɻ 'joint'.

(31)	nəɣæ[l]ə	'your (SG) trap'	xæ[ɬ]	'trap'
	sə?ɔ[o̥̯]ə'	'my snowshoes'	?ɔ[x]	'snowshoes'
	nizu[n]i	'that which is good'	nizu[n̥]	'it is good'

Final stops are plain voiceless unaspirated. Under the SV hypothesis, where [lateral] is under SV and devoicing of sonorants means removal of the SV node, laterality should also disappear, but it does not. For different reasons Rice in her 1994 paper (p.115) takes voicing to be under the root node, in which case the survival of [lateral] is expected. This is entirely compatible with the approach taken here. The grammar we need has IDENTLAT, *CODAVOICE » IDENT-VOICE, SON=VOI, so that laterality is retained but voicing is lost.

(32)

/xæl/	IDENTLAT	*CODA-VOICE	IDENT-VOICE	SON=VOI
☞ a. xæɬ			*	*
b. xæl		*!		
c. xæt	*!		*	

V.4 Loss of SV removes [lateral]

The Papuan New Guinea language Yagaria shows a coalescence of a lateral and a glottal stop. The result is a voiceless coronal stop, in which the devoicing causes loss of sonorancy and laterality. The lateral in question is a phonetically velar lateral which Blevins argues to be phonologically Coronal (Blevins 1994), because the output of the coalescence is [t]. The process changes /ʊ/ to [p] and the velar lateral /ʟ/ to [t] after /ʔ/:

(33)	/igopa-ʊi?/	igopaʊi?	*'into the land'*	/jo?-ʊi?/	jopi?	*'into the house'*
	/igopa-ʟo?/	igopaʟo?	*'on the ground'*	/gipa?-ʟo?/	gipato?	*'at the door'*

In Blevins' feature-geometric analysis, /ʟ/ is Coronal. After ʔ, it becomes [-son, -cont], and this causes loss of [lateral]. Elsewhere, a default rule adds secondary Dorsality. While this process certainly suggests that /ʟ/ is Coronal, it does not demonstrate that [lateral] is under Coronal, and it is still necessary to allow these velar laterals to also be Dorsal.

Under the approach taken here, the coalescence of the velar lateral and the glottal stop produces a segment that is a stop, and thus an obstruent, as a result of high-ranked MAX[-CONT]. Since sonorancy is lost altogether. I will use MAX-SON rather than IDENT-SON to avoid the issue of whether the output segment is the correspondent of glottal stop or /l/ or both. In our terms, the loss of laterality is then the result of high-ranked *LATOBS. In the tableau below I assume that coalescence is required by some independently high-ranked constraint not given here, which rules out the fully-faithful candidate.

(34) *LATOBS, MAX[- CONT], MAX-COR » MAX-SON

/ʔl/	*LATOBS	MAX[- CONT]	MAX-COR	MAX-SON
a. l		*!		
b. l		*!		
c. t͡l	*!			*
☞ d. t				*
e. ʔ			*!	

A slightly different but related case is found in Kihungan and Swahili (Padgett 1991), where liquids harden to [d] after nasals, so that /Nr/ and /Nl/ > [nd]. This is presuniably driven by the Syllable Contact Law, which requires a falling sonority profile across a coda-onset sequence. As such, in an SV approach it niust involve tlie loss of the SV node, which would thus remove laterality. In our approach, it follows froni tlie grammar SYLLCONTACT, *LATOBS » IDENT-SON.

VI. CONCLUSIONS AND DISCUSSION

We have seen that when laterals are placed in positions where thcy arc vulnerable to fcaturc loss by assimilation or neutralization they often retain their laterality even whcn a feature-geomctric approach would predict its loss. This is tlie casc cvcn when they clcarly undergo the assimilation in question, sinee sonie features do indeed assiniilatc. Thc analysis prcscnted here sees this as resulting froni a conibination of faithfulness to the fcature [lateral]. and restrietions on feature eo-occurrence such as *LATDORS. Feature geonietry plays no role.

It is clear that traditional universal fcature geonietry is too rigid to handlc variation like that seen with laterals. It is a desirable property of OT that it allows for cross-linguistic variation in affinities between features, while also expressing universal prefcrcnces as fixed rankings of constraints governing feature-combinations. These fixed rankings are grounded in phonctic dictates. The prefcrence for Coronal laterals is thc phonologization of the articulatory fact that lateral release is niost readily produced with the blade of the tonguc not tlie dorsum or the lips. The preference for voiced sonorant laterals is tlie phonologization of tlie fact that in a laterally released sound the airflow is never obstructed enough to hinder spontaneous voicing.

The need for admitting flexibility in the relationship between fcatures, despite strong preferences for certain pairings, makes any attempt to incorporate a fixed feature geometry into OT a retrograde step. It is also unnecessary: the advantagcs of fcature geometrical theories can be achieved by constraints on feature co-occurrence, along thc lines of Padgctt (1995,2000). The arguments for representational approaches to feature conibinatorics are rcndered moot.

A different criticism of the feature-geometric approach. suggested by a reviewer, is that feature geonietry cannot capture the observation that laterals niust bc *both* coronal *and* sonorant. This is true in any version of feature geonictry in which terminal features must have a unique

superordinate node, but one can imagine a version of feature geometry in which this requiremerit is relaxed to allow double doniination, as suggested in Yip (1990). [lateral] can then be dominated by both Coronal and SV. Such a tnove, however. does not solve the issues raised by the variable behaviour of [lateral] docutnented in this paper.

The arguments here have bcen based entirely on the feature [lateral], but what of other features. Variable behaviour might be seen whenever the features are most readily produced on a certain type of segmcnt, but not necessarily so. For example, [strident] sounds, in which the turbulence produced at the point of constriction is sufficiently strong, and/or where the ensuing airstream then hits a sharp obstacle like the teeth, is easy to produce with the tip or blade of the tongue, but hard to produce clsewherc. We derive from this a constraint hierarchy '[Labial, strident] » *[Coronal, strident]. Languages which contrast [f] and [ϕ], like Ewe, arguably violate tlie former as well as tlie latter. Turbulent airflow also requires a period of incomplete closure. or continuancy, so we also derive *[-cont, strident] » *[+cont, strident]. Languages that violate the Iormer have strident affricatcs. which have often been argued to be strident stops. In principle, then. tlie interactions of these constraints might also produce coniparable variation to that we Iiave seen with laterals.

For other featurcs, no such variation is to bc expccted. [anterior] and [distributed] refinc the typc of contact tlie tip or bladc of thc tonguc makes with the roof of thc mouth. As such they can only be prcsent in Coronals. anda sound tliat is [Dorsal, +ant] is phonetically unintcrpretable.

Finally, I should note that a related but somewhat different approach to these issues is takcn in reeent work by Mielkc (2004), who takcs tlie variability in behavior of 'ambivalcnt segments' like laterals to bc an argument against universal distinctive Seatures. Instead, he argues for 'cmergent distinctive fcaturcs' bascd on phonetic similarity. Laterals, for example, may pattern with cither continuants (16 languages) or non-continuants (61 languages) because like continuarits they do not havc totally blocked airflow. but like non-continuants they do have 'a blockage of airflow past the priniary structure'. It reniains to be seen how this differs empirically from the approach taken hcre.

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NOTES:

1. On the issue of wliether we need constraints tliat penalize the least-iiiarked entities. such as *LATCOR, *LATSON, see Gouskova (2003)

2. Walsh (1997) argues that all laterals have botli Coronal aiid Dorsal Place. This is certainly true phoiietically iii soiiie languages, aiid pcrliaps phonologically too (in English, for exaiiiple, /l/ vocalizes to tlie Dorsal [u] in iiiany dialects, aiid children often turn coronals into velars bcfore [l]), but in otlier languages tlierc is iio evidence of a phonologically active Dorsal component.Palatal laterals may also be Coronal and Dorsal, and contrast with plain Coronal laterals. This analysis of palatals is probleiiiatic for tlie details of the view takeii Iiere, as a reviewer points out, since it seems to require a positive constraint LAT=COR, but I Iiavc no rooni to explorc this further here.

3. Of course, these laterals are phonetically impleiiiented with tlie tip or blade of tlie tongue, but I ani assuming that this is tlie articulatory realization of a seginent specified for laterality, but not for place of articulation.

4. For reasons of space. I shall have to lcave unrcsolvcd hcrc issues surroundiiig tlic features of dark velarizcd [ɬ], and also of palatal [A]. If either or both is specified as botli Coroiial aiid Dorsal. Faithfuliiess iiiust dominatc botli *LatDors and *LatCor, and one would thus expect a language that has [ɬ] or [A] to also have not only plain light [l]. but also velar [L], and this is clearly wrong. In the approacli takeii Iiere. wc thus seem to be forced to the coiiclusion that [ɬ] aiid [A] do not have a Dorsal spccification.

5. A reviewer points out that the graiiimar in (5) Iias two different outcoines depending oii tlie ranking of IDENTPLACE. If IDENTPLACE»*LATCOR, coronal inputs will reinaiiicoronal. but dorsal inputs will becoine placeless, resulting iii a surface coiitrast. If *LATCOR » IDENTPLACE, tlieii all latcrals will becoiiie placeless. Thus tlic oiily way to ensure that all laterals are coroiial on the surface is to assuiiie tliat placeless segineiits violatc some constraint like SPECIFY PLACE.

6. Since the approach outliiied here clearly predicts the possibility of assimilation creating new velar laterals and new lateral obstruents. their non-existente is a real problcin. I can oiily assume that the tendency for *LATDORS and *LATOBS to be very high-ranked in niost languages niakes thein very rare, but tliat they should be found if we look Iiard enough.

7. A reviewer points out that if higli ranked this would appear to block spiraiitization, a process found in many dialects of Spanish. Unfortunately as we go to press I am away from my desk, aiid Iiave no access to the data sources oii this dialect. so I ain unable to confirm whctlier there is spiraiitizatioii or not.

8. A furthcr option niight be to velarize the /l/ (or the /d/), aiid spread nasality rather than inserting it, also giving [ŋm]. Technically, this caii be achieved by ranking a conjoined coiistraiiit IDENTNAS & IDENTDORS above CODA=DORSAL, but tliis does not shed inuch light oii *why* nasal spreading is blocked in this onc instance.

9. It is iiot clear how widespread tliis prohibitioii oftwo coroiials is, but it is unsurprising given the well-known avoidaiice of homorganic consonants in Semitic.

10. A reviewer points out that under this account wc must assume tliat all Ponapcaii latcrals are [+cont]. This is not uiiprecedented, but certainly marked, see Mielke (2004).

11. It is iiot clear why /d/ deletes instead of simply debuecalizing to a glottal stop Its failure to velarizc to [g]. as a ieviewer poiiits out. caii be explaiiicd as a constraint against obstrueiit codas

REFERENCES

Bagemihl, B. (1991). Syllable structure in Bella Coola. *Linguistic Inquiry*, 22, 589–646.

Beckman. J. (1998). *Positional faithfulness.* Unpublished Doctoral dissertation, Ainherst. U. of Massachusetts. Published by Garland Publishing, New York.

Bao, Z.M. (1992). A note oii [Lateral]. Ms. Ohio State University.

Blevins, J. (1994). A place for lateral in tlie feature geometry. *Journal of Linguistics*, 30, 301-4

Brown. Ciiidy. (1995). Tlie feature geoiiietry of lateral approxiinants and lateral fricatives. In ti. vaii der Hulst & J. van de Weijer (Eds.), *Leiden in Last:* HIL *Phonology Papers I.* Tlie Hague: Holland Acadeinic Graphics, 41-88.

Chen, M. (1992). Tlie chameleon [-r] in Yanggu: Morphological infixation or phonological epeiithesis'? *Journal of East Asian Linguistics*, 1:2, 197-214.

Clio, Y.-M.Y. (1988). Koreaii assimilation. In H. Borer. (Ed.), *WCCFL* 7, 41-52.

Clio, Y.-M.Y. & Inkelas, S. (1994). Major class alternations. *WCCFL* 12, 3-18

Cleiiieiits. G.N.& Hume, E.V. (1995). The internal organization ofspeech sounds. In J. Goldsmith (Ed.), *The handbook of phonological theory.* Oxford: Blackwell, 45-306.

Cohn, A. (1992). The coiisequeiices of dissimilation in Sundanese. *Phonology*, 9:2, 199-220

Davis, S. & Shin, S-II. (1999). The syllable coiitact constraiiit in Koreaii: An Optimality-theoretic analysis. *Journal of East Asian Linguistics*, 8:4, 285-312.

de Lacy, P. (7002). *The formal expression of markedness.* Unpublished Doctoral dissertatioii, U. of Massachusetts.

Doke, C.M. (1954). *The Southern Bantu Languages.* London: Oxford Uiiiversity Press

Dudas, K. (1976). *The phonology and morphology of Modern Javanese.* Unpublished Doctoral dissertation, U. of Illinois.

Flemming, E. (2003a). Coiitrast aiid perceptual distinctiveness. To appear iii: B. Hayes, R. Kirchner & D. Steriade (Eds.), *Phonetically-based phonology.* Cainbridge: Cainbridge Uiiiversity Press.

Flemming, E. (2003b). Tlie relationship betweeii coronal place and vowel backness. Ms.. Stanford Uiiiversiiy.

Flemming, E. (2003c). Deriving natural classes in plioiiology. Ms., Stanford Uiiiversity.

Gafos, A. I. (1996). *The articulatory basis of locality in phonology.* Ph D dissertatioii. Johns Hopkins Uiiiversity

Gouskova, M. (2003). *Derivirig economy: Syncope in Optimality Theory.* Unpublished Doctoral Dissertatioii. U. Of Massachusetts.

Grijzenhout, J. (1994). Feature geoiiietry aiid coroiial traiispareiicy. In H. vaii der Hulst & J. vaii de Weijer (Eds.), *Leiden in Last: HIL Phonology Papers I.* The Hague: Holland Acadeiiiic Grapliics, 165-185.

Guerssel, M. (1978). A condition on assimilation rules. *Linguistic Analysis*, 4:3, 225-254.

Guitart, J.M. (1976). *Markedness and a Cuban dialect of Spanish.* Washington D.C.: Georgetowii Uiiiversity Press.

Halle, M. & Clements, G.N. (1983). *Problem book in phonology.* Cainbridge, Mass.: MIT Press.

Harris, J. W. (1985). Autosegineiital plioiiology aiid liquid assimilation iii Havana Spanish. In L.D. King & C.A. Maley (Eds.), *Papers from the XIIIth Linguistic Symposium on Romance Languages.* Ainsterdain: John Benjamins, 127-148.

Hayes, B. P. (1986) Assimilation as spreadiiig iii Toba Batak. *Linguistic Inquiry*, 17, 467-500.

Heath, J. (1987). *Ablaut and Ambiguity: Phonology of a Moroccan Arabic dialect.* Albany, N.Y.: SUNY Press.

Hegarty, M. (1989). An investigation of laterals aiid coiitiiiuaiicy. Ms., M.I.T

Hsu. C-S. (1996). A plioiietically-based optimality-theoretic accouiit of consonant reduction in Taiwanese. WPP 92, UCLA.

Hualde, J. I. (1991). *Basque phonology.* New York aiid Loiidoii: Routledge

Kang, H. (7002). On tlie Optimality-Theoretic analysis of Koreaii nasal-liquid alternations. *Journal of East Asian Linguistics*, 11, 43-66.

Ladefoged, P., Cocliraii, A. & Disner, S. (1977). Laterals aiid trills. *Journal of the IPA.* 7, 46-54

Ladefoged, P. & Maddiesoii, I. (1996). *Sounds of the World's Languages.* Oxford: Blackwell.

Lin, Y-H. (to appear) Piro affricates: Phonolgical edge effects aiid phonetic anti-edge effects?

Lombardi, L. (2002). Coronal epenthesis and markedness. *Phonology*, 19:2, 219-252.

Maddieson, I. (1984). *Patterns of sounds*. Cambridge: Cambridge University Press

Madelska, L. & Witaszek-Samborska, M. (1998). Zapis fonetyczny. Poznan: Wydawiictwo Naukowe UAM

Mascaró, J. (1976). *Catalan phonology and the phonological cycle*. Unpublished Doctoral Dissertation, MIT.

Mattliews. S. & Yip, V. (1994). *Cantonese: a comprehensive grammar*. Loiidoii aiid New York: Routledge.

McCarthy, J. J. (2002). Coinparative Markediiess. In **A.** Carpeiiter, **A.** Coetzee & P. De Lacy (Eds.), *University of Massachusetts Occasional Papers in Linguistics 26: Papers in Optimality Theory II*. Amherst, Mass., GLS. [ROA-489]

McCarthy, J.S. & Taub, A. (1992). Carole Paradis aiid Jeaii-Fraiicois Pruiiet. (Eds.): tlie special status of coronals: internal aiid external evideiice. Review in *Phonology*, 9:2, 363-370.

Mielke, J. (2004). *What ambivalent segments can tell us about the universality of distinctive features*. Talk given at tlie Linguistics Society of Ainerica, Boston, Jaii 2004.

Mitliuii. M. & Basri, H. (1985). Tlie phonology of Selayarese. *Oceanic Linguistics*, 25:1/2, 210-254

Nacaskul. K.(1978). Tlie syllable aiid morphological structure of Cambodian words. In Jeiiiier, P. (Ed.), *Mon-Khmer Studies VII*. U. of Hawaii Press, 127-138.

Padgett, J. (1991). *Stricture in feature geometry*. Unpublished Doctoral Dissertatioii. U. of Massachusetts.

Padgett, J. (1995). Featureclasses. In J. Beckinaii. S. Urbaiiczyk & J. Walsh, (Eds..) *Papers in Optimality Theory. UMOP*, 18.

Padgett, J. (2000). Feature classes in phonology. *Language*, 78:1, 81-110.

Pater, J. (1999). Austronesian nasal substitution and otlier NC effects. In R. Kager, H. van der Hulst & W. Zoiiiieveld (Eds.), *The Prosody-morphology interface*. Cainbridge: Cainbridge Uiiiversity Press, 310-343.

Piggott, G. (1991). Tlie geoinetry of soiioraiit features. Ms., McGill Uiiiversity.

Piggott, G. L. (1994). Feature depeiideiicy in Optimality theory: Optimizing tlie phonology of sonorants. Ms.. McGill Uiiiversity.

Piñeros, C. (2003). Accounting for tlie instability of Palenquero voiced stops. *Lingua*, 113:2, 1185-1222.

Pulleyblank, D. G.(1997). Optiinality Theory aiid features. In D. Archangeli & T. Langendoen (Eds.), *Optimality* Theory: *an overview*. Oxford: Blackwell.

Rice, K. (1994). Laryngeal features in Athapaskan languages. *Phonology*, 11:1, 107-148.

Rice, K. D. & Avery, P. (1991). On the relationship between laterality aiid coronality. In C. Paradis & J.F. Prunet (Eds.), *The Special Status of Coronals*. Academic Press, 101-124.

Sagey, E. C. (1986). The *representation of features and relations in non-linear phonology*. Unpublished Doctoral Dissertatioii, MIT.

Shaw, P. A. (1991). Consonant harmony systems: The special status of coronal harmony. In C. Paradis & J.F. Prunet, (Eds..) The *Special Status of Coronals*. Acadetnic Press, 125-158.

Speiicer, A. (1984). Eliminating the feature [lateral]. *Journal of Linguistics*, 20. 73-43

Steriade, D. (1987). Redundant Values. In A. Bosch, A. Need & E. Schiller (Eds..) *Papers from the 23rd Annual Regional Meeting of the Chicago Linguistic Society - Part Two: Parasession on Autosegmental and Metrical Phonology*. Cliicago, Illinois: Chicago Linguistic Society, 339-62.

Trigo, R. (1988). *On the phonological derivation and behaviour of nasal glides*. Uiipublished Doctoral thesis, MIT.

Tuttle, S. (to appear) Cryptosoiioraiit phonology iii Galice Athabaskan.

Uffmann, Ch. (to appear) Optimal geoinetries.

Walsh, L. D. (1997). *The phonology of liquids*. Unpublished Doctoral Dissertation. Amherst, GLSA, UMass.

Wells, J. (1982). *Accents of English, Vol.2: the British Isles*. Cambridge: Cambridge University Press.

Yip, M. (1988). The Obligatory Contour Principle and phonological rules: A loss of identity. *Linguistic Inquiry*, 19:1, 65-100.

Yip, M. (1990). Two cases of double-dependency in feature geometry. Ms., Brandeis University

Yip, M. (1991). Coronals, Consonant Clusters aiid the Coda Condition. In C. Paradis & J.F. Prunet. (Eds.) The *Special Status of Coronals*. Academic Press. 61-78.

Yip, M. (1 992). Tlie Prosodic Morpliology of Four Chinese Dialects. *Journal of East Asian Languages*, 1:1, 1-35

Yip, M. (2001). Segmental unmarkedness versus input preservation in reduplication. In L. Lombardi (Ed.), *Segmental phonology in Optimality Theory*. Cainbridge: Cainbridge University Press, 206-230.

Yip. M. (2003). Soine real aiid iiot-so-real coiisequeiices of coinparative markedness. In S. Myers (Ed.), *Theoretical linguistics*, 29:1/2, 53-64.

Yip, M. (to appear). Variability in feature affiliations through violable constraints: Tlie case of [lateral]. In M. van Oostendoorp & J. vaii de Weijer (Eds.), *The Internal Organization of Phonological Segments*. Berlin and New York: Mouton de Gruyter.

