Positional Asymmetries and Licensing*

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1. "Licensing" constraints in Optimality Theory

There have been two major approaches to licensing in Optimality Theory. The first, shown roughly in (1), which we can call Positional Markedness, specifically refers to a particular position, naming marked structure which either must or cannot occur in that position. Negative positional markedness constraints such as License(labial) ban labial consonants from weak positions while positive Positional Markedness constraints such as License(complex segment) specifically relegate complex structures to strong positions.

(1) One approach to LICENSING: Context-specific *markedness* constraints

POSITIONAL MARKEDNESS:

e.g., License(labial): No labial consonants in coda position
License(complex segment): A complex segment is word initial

See for example Kiparsky 1994, Ito and Mester 1994, Lombardi 1995, Zoll 1996; Zoll in press, Steriade 1997 inter alia.

(2) shows the different kinds of primitive constraints in Optimality Theory, and you can see that Positional markedness constraints don't fit straightforwardly into this typology. They adopt the inherent relations, spelled out in (2c), of context-independent markedness, but restrict markedness violations to a particular position.

(2) How do positional markedness constraint fit into existing constraint typology?

- **KINDS OF CONSTRAINTS** (adapted from Smolensky 1995)

a. **Basic constraints**
Onset
NoCoda

b. **Parameterized constraints**:
Max(x)| x ∈ {feature, segment, syllable, foot…}
Align-X| X ∈ {left, right}

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c. **Context-independent markedness hierarchies**:
*[labial] » *[coronal]; *[voiced stop] » *[voiceless stop]

d. **Context-dependent markedness hierarchies**:
e.g., *Nuc/t»*Nuc/a; *Margin/a »*Margin/t

(3) **Positional markedness**: Requires constraint conjunction (Smolensky 1995)
Context-independent markedness restricted to a particular position:
e.g. a language may allow labial onsets but enforce *labial only in coda position

This restriction requires Smolensky-style conjunction, defined as in (4), of a markedness hierarchy with some kind of positional constraint.

(4) Local conjunction: Two constraints combine forces (Smolensky 1995)

"The local conjunction of C_1 and C_2 in domain *D*, C_1 & C_2, is violated when there is some domain of type D in which both C_1 and C_2 are violated."

Some current proposals utilizing constraint conjunction include Archangeli and Pulleyblank 1994, McCarthy 199x, Ito and Mester 1996, Alderete 1997, Smolensky 1997; cf. Crowhurst and Hewitt 1997 for a different notion of conjunction

(5) shows a conjunctive constraint that rules out labial consonants in coda position. The markedness constraint *Labial is conjoined with NoCoda. The resulting constraint will be violated only by a segment which is both [labial] AND in coda position. This amounts to the familiar markedness constraint "No coda labial". Onset labials do not violate this constraint and do not undergo neutralization.

(5) **[*LABIAL & NOCODA]** (after Smolensky 1995)

The constraint [*LABIAL & NOCODA] is violated when there is some segment that violates both *LABIAL *and* NOCODA

The tableau in (6) illustrates how conjunction derives positional markedness. The conjoined constraint rules out segments that are both marked AND in a weak position such as the coda, but has no effect on marked segments in stronger positions such as the onset. The candidate in (6a), with coda /m/, fatally violates the conjoined constraint. The optimal (6b), passes on this constraint because its

only labial consonant, /p/, is in the onset. It violates only the lower ranked *labial. IDENT(seg), ranked above *labial, prohibits the neutralization of onset labial consonants, so the labial-less (6c), in which the initial consonant has reduced to a /t/, also loses out.

(6) Conjoined constraint ⇔ Positional Markedness
A labial coda is the "worst of the worst"

- Hypothetical /pum-sa/ → pun.sa

	/pum-sa/	*LABIAL & NOCODA	IDENT(SEG)	NOCODA	*LABIAL
a.	pum.sa	*! (m)		* (m)	** (m, p)
b. ☞	pun.sa		* (n)	* (n)	* (p)
c.	tun.sa		** (t, n)		

- The high ranking conjoined constraint prohibits labial codas but is not violated by onset labials

⇒ **Is it possible to get these effects without resorting to constraint conjunction?**

It's important to ask whether conjunction between positional and markedness constraints is really necessary. As shown in (7), an alternative to licensing as Positional Markedness exists. This is Positional Faithfulness. Positional Identity constraints are context-specific faithfulness constraints. IDENT(onset) in (7), for example, demands that an onset be identical to its input correspondent, but is indifferent to correspondence relations in weak positions. This constraint allows codas to neutralize because no high-ranking faithfulness constraint specifically refers to codas. But it specifically protects onsets from alteration.

(7) Alternative: Positional Identity (henceforth PI)
Selkirk 1994, Alderete 1995, Jun 1995, Steriade 1995a, Beckman 1995, Beckman 1997, Casali 1996

- Licensing constraints are context specific *faithfulness* constraints
e.g., IDENT-onset 'an onset is identical to its input correspondent'

The tableau in (8) evaluates the same three candidates, this time using positional faithfulness. In the optimal (8b) the coda consonant has lost its labiality thereby reducing the number of violations of the context independent markedness constraint *labial. Under this account the unsuccessful competitor in

(8c) loses because high ranking positional faithfulness blocks neutralization in the onset. Whereas positional markedness directly prohibits marked structure in weak positions, here the context-independent markedness constraints like *LABIAL call for reduction everywhere. Positional faithfulness then proscribes neutralization in strong positions. In this particular example the two approaches are roughly equivalent.

(8)	/pum-sa/	IDENT(ONSET)	*LABIAL	IDENT(SEG)
a.	pum.sa		**! (p, m)	
b. ☞	pun.sa		*	* (n)
c.	tun.sa	*! (t)		** (t, n)

- The markedness constraint *Labial abhors all instances of the feature, but high ranking IDENT(Onset) forces labial to remain in onset position.

- PI is a parameterizable constraint:
  IDENT(x)| x ∈ {onset, stressed syllable, other strong position…}
- In this case PI and PM are equivalent

Despite the obvious attractions of Positional Identity, I am going to show, as outlined in (9), that with respect to licensing, it is not an adequate substitute for Positional Markedness. This gives us a strong argument for the necessity of conjunction between markedness and positional constraints. I'll present two cases for which Positional Markedness is absolutely essential.

The first problem concerns a set of phenomena that have never been considered with respect to Positional Identity: cases where marked structure arises through augmentation of an input. As sketched in (9a), Positional Identity constraints prohibit change in strong positions. While this correctly prevents reduction of underlying marked structure, it necessarily blocks augmentation in these contexts as well. Likewise, since no constraint refers specifically to weak positions, a Positional Identity analysis correctly allows neutralization in non-prominent contexts, but it also permits augmentation there for the same reason. In cases where augmentation results in marked structures, Positional Identity

therefore makes the erroneous prediction that while lexical marked structure will be limited to strong contexts, marked structure that arises due to augmentation of the input will be drawn to weak positions. A case study of long vowel distribution in Guugu Yimidhirr, an Australian language analyzed by Kager 1995, demonstrates the necessity of Positional Markedness constraints for licensing of both underlying and derived marked structures.

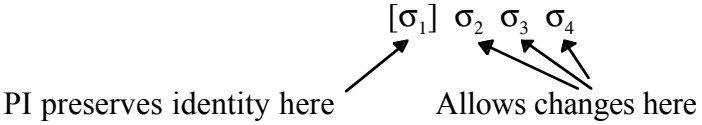
The second problem with Positional Identity, as noted in (9b), arises when cluster conditions are enforced by a variety of conflicting repair strategies. Beckman 1997 demonstrates that Positional Identity differs from Positional Markedness in its ability to determine directionality of assimilation in addition to restricting neutralization to weak positions. Yet this ostensible virtue is actually a pernicious limitation. By encapsulating the repair within the positional constraint, even indirectly, cases like Hamer in (9b)–where ill-formed clusters succumb to a variety of repair strategies including progressive assimilation, regressive assimilation and metathesis–are now out of reach. I'll go through these examples in detail in a few minutes, and demonstrate that such cases also require the explicit injunction of a Positional Markedness constraint.

Since positional markedness constraints are indispensable, we have evidence then for conjunction between markedness and positional constraints. In a sense this result is to be expected, since as Smolensky and McCarthy have argued, constraint conjunction is a natural consequence of the architecture of Optimality Theory.

(9) **Positional Identity DOES NOT SUBSUME POSITIONAL MARKEDNESS**

- Two problems with Positional Identity as a theory of licensing

a. PI predicts that *derived* marked structure will be drawn to weak positions



- *PI predicts therefore that derived marked structures should prefer to arise in weak positions*

b. PI does not subsume coda conditions when repairs don't uniformly neutralize marked structure

Hamer (South Omotic) Lydall 1976

a.	*Regressive Assimilation*	kʊm - sa	[kʊn. sʌ]	'cause to eat'
b.	*Progressive Assimilation*	om - na	[om. ma]	'bows'
c.	*Metathesis*	ep- sa	[es. pa]	'cause to cry'
d.	*Metathesis & Assimilation*	ʌtʌb- na	[ʌtʌm.ba]	'tongues'

(10) Outline

I. Derived Markedness: Guugu Yimidhirr
II. A variety of coda producing strategies: Hamer
III. Conclusion:

- Positional Faithfulness is not an adequate theory of licensing
- **Positional Markedness constraints are a necessary component of the grammar**
- Conjunction of markedness with positional constraints is unavoidable

2. Derived complexity: Guugu Yimidhirr

First let's look at the distribution of long vowels in Guugu Yimidhirr in (11). Kager shows that long vowels are allowed only in the first two syllables of a word. They may occur in the first syllable, the second syllable, or in both the first and second syllables. (11a), waaɽigan, for example, has an initial heavy syllable; in (11f),ḍamaaɽbina , the second syllable is heavy; and in (11i), muuluumul, both the first and second syllable contain a long vowel.

(11) Vowel length distribution in Guugu Yimidhirr (Kager, 1995: 8)

- Only the first two syllables support a contrast between light and heavy (CVV) syllables

	1st σ heavy	
a.	waaɽigan	'moon'
b.	waaḍa	'crow'
c.	guuɽumugu	'meat hawk'
	2nd σ heavy	
d.	dawaaɽ	'star'
e.	gambuugu	'head'
f.	ḍamaaɽbina	'magpie goose'
g.	buduunbina	'thunder'
	1st & 2nd σ heavy	
h.	buuɾaay	'water'
i.	muuluumul	'dove'
j.	daaɾaalŋan	'kangaroo'
k.	ɗiiɽaayŋguɽ	'old man'

The distributional restriction extends to derived length as well, as shown in (12). In Guugu Yimidhirr some suffixes, exemplified here by *-nda*, trigger vowel length on the final vowel of their base. So in (12a), the last syllable, which is also the second syllable of the word, lengthens to accommodate some prosodic requirement imposed by the suffix. (12b) shows that, as we might expect, lengthening does not take place if the syllable abutting the suffix is not one of the first two syllables of the word. The restriction on the distribution of long vowels holds therefore for both underlying and derived length.

(12) Restriction holds for derived length as well

- Some suffixes lengthen their base Kager (1995: 8)
  ***Lengthening* is blocked outside of first two syllables**

a.	/maŋal-nda/	ma.ŋ**aal**.nda	'clay'
b.	/wuluŋguɾ-nda/	wu.luŋ.**gu**ɾ.nda	'lightning, flame-ERG'
c.		(*wu.luŋ.**guuR**.nda)	

The diagnostics for strong positions, shown in (13), have been well-established in the literature referred to in (14), and chief among them is that prominent positions maintain more contrasts than weak positions do. Here, because a weight contrast is supported only in the first two syllables, Kager argues that the first two syllables constitute some kind of prominent domain.

(15) shows the two most obvious choices of domain type, but based on stress facts (in (16)) Kager concludes that the first two syllables constitute a word-internal prosodic word, or Head Prosodic Word. (17) spells out a rough positional markedness constraint which licenses heavy syllables only within the Head Prosodic Word. In each case illustrated here, syllables with long vowels are daughters of the binary Head Prosodic Word.

(13) The first two syllables are some kind of prominent domain

Major diagnostics for strong positions: First two syllables support weight contrast

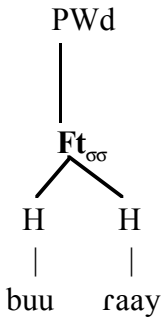
		Strong position	*Weak Position*
I.	*Contrast*	Supports more contrast	Supports less contrast
II.	*Reduction*	Resists reduction	Yields to reduction
III.	*Stress*	Attracts stress	Does not attract stress
IV.	*Tone*	Attracts H tone	Does not attract H tone
V.	*Harmony*	Commonly triggers harmony May resist assimilation	Usually target of harmony

(14) The idea of positional prominence has long played an important role in phonology.
The question at hand is its exact role in the grammar.

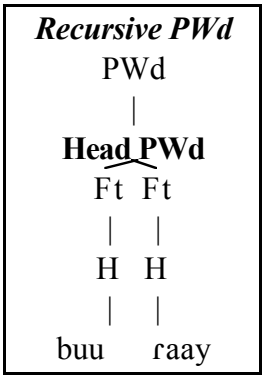
Trubetzkoy 1939/1969, Garde 1967, Hooper 1972; Hooper 1976, Vennemann 1972, Haiman 1972, Paulian 1975, Foley 1977, Brasington 1982, Cairns and Feinstein 1982, Goldsmith 1985, Ito 1986, Hyman 1987; Hyman 1989; Hyman 1990, Goldsmith 1990, Ito and Mester 1993, Bosch 1993, Mohanan 1993, Selkirk 1994, Dresher and Hulst 1995, Alderete 1995, Steriade 1995a; Steriade 1995b; Steriade 1997,Beckman 1995, Beckman 1997, Casali 1996, Zoll 1996; Zoll in press, inter alia

(15) Heavy syllables contrast only in some initial domain
Kager argues for a word internal head prosodic word

a. Quantity Insensitive Foot



b. Recursive PWd



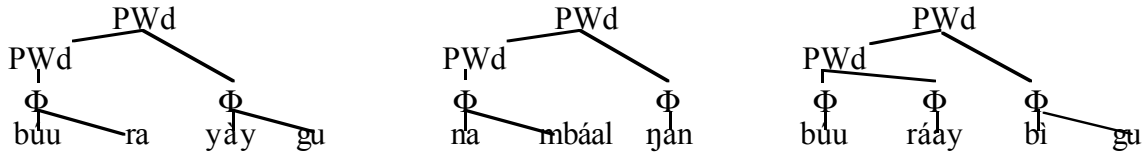
(16) GY stress pattern shows that feet are quantity sensitive (Kager, 1995:12)
Therefore the structure cannot be a quantity insensitive foot

a.	**#ĹL**	ná.mbal	'stone-ABS'
b.		máɾ.bu.gàn	'cave-ABS'
c.		dúɾ.gin.bì.gu	'Indian Head (place name)'
d.		máɾ.bu.gàn.bi.gù	'cave-LOC-EMPH (still in the cave)'
e.	**#HĹL**	gúu.gu	'language-ABS'
f		búu.ɾa.yày	'water-LOC (in the water)'
g.		búu.ɾa.yày.gu	'water-LOC-EMPH (still in the water)'
h.		ḍáa.ba.Nàl.Na.là	'ask-RED-IMP (keep asking!)'
i.	**#LH́**	ma.gúul	'branch-ABS'
j.		na.mbáal.Naŋ	'stone-ABL (from the stone)'
k.		ma.gíil.Nay.gù	'branch-PL-EMPH (just branches)'
l.	**#HH́**	búu.ɾáay	'water-ABS'
m.		búu.ɾáay.bì.gu	'water-LOC-EMPH (still in the water)

⇒ Therefore the licensing domain must be the Head Prosodic Word

(17) Licensing = A **Positional (un)markedness** constraint (after Kager 1995)

Heavy syllables (CVV) belong to the innermost prosodic word (a.k.a. the *Head PWd*)



2.1 Positional Markedness

(18) provides a more formal statement of weight distribution utilizing positional markedness. Positional markedness is expressed as a COINCIDE constraint that dictates that a heavy syllable should

belong to the Head Prosodic Word. Although I represent this as a simple constraint, keep in mind that it's actually the conjunction of the markedness constraint *LONG VOWEL with a positional constraint demanding the coincidence of all syllables with the head prosodic word. An additional constraint, IDENT(mora), which is a context-independent faithfulness constraint, favors identity of vowel length between input and output.

(18) Licensing as positional markedness

Positional (un)markedness:

- **COINCIDE** (heavy syllable, Head PWd) [1] 'a heavy syllable belongs to the Head PWd' Zoll 1996

  (i) $\forall x$(x is a heavy syllable $\rightarrow \exists y$(y=Head PWd $\wedge$ COINCIDE (x,y))
  (ii) Assess one mark for each value of x for which (i) is false

Faithfulness:

- **IDENT(μ)**[2] 'input length is preserved in the output'

  If α (an integer) weight bearing units dominate a segment in S1 then α weight bearing units dominate its correspondent in S2.

The tableau in (19) shows how these two constraints together preserve lexical vowel length in the first two syllables. (19a), with underlying long vowels retained, is optimal. Since neither of the heavy syllables violates COINCIDE, any reduction of underlying length, as in (19b) and (19c), results in a fatal violation of IDENT(mora).

(19) *muuluu*mul: Heavy syllables are licensed in the head PWd

	Candidates	COINCIDE (σ_{μ}, Head PWd)	IDENT(μ)	
a. ☞	$_{PWd}$[muuluu]mul			
b.	$_{PWd}$[muluu]mul		*!	input *muu* shortened in output
c.	$_{PWd}$[muulu]mul		*!	input *luu* shortened in output

[1] Kager derives licensing from a Weight to Stress Principle that states that "heavy syllables have maximal prominence" (p. 13). This WSP expands upon the original constraint proposed by Prince 1990. Here, to have "maximal prominence" means that a syllable belongs to the head of the word, in this case the first two syllables, which comprise the head of the prosodic word. In other words, Kager's WSP amounts to a constraint which calls for coincidence of a heavy syllable with the head prosodic word. The COINCIDE constraint therefore is just a restatement in current terms of Kager's original insight.

[2] Urbanczyk calls the constraint TRANSFER. [Urbanczyk 1995: 512]

(20) shows how this ranking prohibits the surfacing of long vowels outside the Head Prosodic Word. From the hypothetical underlying form with a long vowel in the third syllable, the perfectly faithful (20a) fatally violates the high ranking positional markedness constraint. Candidate (20b) is optimal, despite the difference in vowel length between input and output, since by shortening the vowel of the third syllable, positional markedness violations are avoided.

(20) Elsewhere, heavy syllables will be shortened

Hypothetical /mulubuulu/ → [mulubulu]:

	Candidates	COINCIDE (σ_H, Head PWd)	IDENT(μ)	
a.	$_{PWd}$[mulu]*buu*lu	*!		*buu* does not coincide with Head PWd
b. ☞	$_{PWd}$[mulu]***bu***lu		*	input *buu* shortened in output

- COINCIDE » IDENT(μ) because long vowels outside of the Head PWd must shorten

Restrictions on derived length also follow from Positional Markedness. First, some constraint must cause vowel lengthening when the suffix -nda attaches to a disyllabic base. (21) presents an alignment constraint that fulfills this function, although most likely a more complete analysis would find global prosodic considerations at work. This constraint requires that the suffix *-nda* attach itself to a heavy syllable.

(21) Restrictions on derived length also follow from Positional Markedness

- Affix places a prosodic constraint on its base
  (see Rosenthall 1995, Kager 1996 inter alia for affixes that impose prosodic requirements on their bases; see McCarthy and Prince 1993 for alignment constraints in morpheme subcategorization)

- **ALIGN (-nda, L, heavy σ, right)** 'The suffix -nda is affixed to a heavy syllable'

As shown by the tableau in (22), COINCIDE crucially outranks Align(nda). For the trisyllabic base, wuluŋgur-, COINCIDE penalizes lengthening, in (22b), because the derived long vowel would fall outside the Head Prosodic Word. Since the prosodic requirement of the suffix is less compelling than the need to obey considerations of positional markedness, (22a), with no additional vowel length, is optimal.

(22) Positional markedness constraint blocks derivation of long vowels in weak position

	/wuluŋguɾ-nda/	COINCIDE(σ_H,Hd PWd)	ALIGN(nda)	IDENT(μ)
a. ☞	PWd [wu.luŋ].**gu**ɾ.nda		*	
b.	PWd [wu.luŋ].**guu**ɾ.nda	*! (*guuR)		*

- COINCIDE » Align(nda) since winner fails to satisfy the prosodic requirements of affix
- Violations of Align(nda) must be categorical to prevent lengthening further to the left

Finally, the tableau in (23) demonstrates that positional markedness will not block lengthening within the head prosodic word. The lengthened (23b) best satisfies the hierarchy because it manages to meet the length requirements of the suffix without violating the positional markedness constraint.

(23) Derived length is legal in the head PWd

	/maŋal-nda/	COINCIDE(σ_H,Hd PWd)	ALIGN(nda)	IDENT(μ)
a.	PWd [ma.ŋ**al**].nda		*!	
b. ☞	PWd [ma.ŋ**aal**].nda			*

- ALIGN(nda) » IDENT(μ) since lengthening does take place

The positional markedness account of Guugu Yimidhirr is summarized in (24). COINCIDE restricts heavy syllables to the Head Prosodic Word regardless of their source. Furthermore, as it places no specific faithfulness restrictions on the Head Prosodic Word, it allows vowel lengthening to occur there to satisfy the needs of an affix.

(24) Sum: Positional Markedness Hierarchy for Guugu Yimidhirr:
Restricts heavy syllables, derived and lexical, to the Head Prosodic Word

COINCIDE(σ_H,Hd Pwd) » ALIGN(nda) » IDENT(μ)

2.2 Comparison with Positional Faithfulness

Now let's compare positional markedness with a positional identity account. (25) lays out the major differences between the two approaches. Both utilize markedness and faithfulness constraints, but differ in the kind of positional statements they use. In a positional markedness account,

faithfulness is context-independent. Positional faithfulness may restrict Identity statements to a particular context, but markedness constraints are context-independent.

(25) The differences:

	Markedness	**Faithfulness**
Positional Markedness	positional	context-independent
Positional Faithfulness	context-independent	positional

The positional faithfulness account for Guugu Yimidhirr is outlined in (26). IDENT(Head Prosodic Word) preserves identity between elements in the first two syllables of the word and their output correspondents. The context-independent *LONG VOWEL condemns long vowels wherever they are found.

(26) Constraints

Positional *faithfulness*:

- **IDENT-HEAD PWD (μ)** "A syllable in the head prosodic word is identical to its input correspondent with respect to weight"

Markedness:

- ***LONG VOWEL** "No long vowels" (after Rosenthall 1994: 42))

With these constraints, ranked as in (27), heavy syllables survive in the Head Prosodic Word because the high ranking IDENT(Head Prosodic Word) prohibits vowel shortening in the first two syllables of a word. Candidates (27b) and (27c) are less marked with respect to vowel length, since they contain fewer long vowels, but (27a) is optimal because the prominent syllables have not suffered neutralization.

(27) *muuluu*mul: Heavy syllables survive in the head PWd

	Candidates	**IDENT-HD PWD (μ)**	***LONG VOWEL**	**IDENT- (μ)**
a. ☞	$_{PWd}$[muuluu]mul		**	
b.	$_{PWd}$[**mu**luu]mul	*! (mu)	*	*
c.	$_{PWd}$[muu**lu**]mul	*! (lu)	*	*

- IDENT HdPwd » *LONG VOWEL since long vowels do survive in the first two syllables

As shown in (28), because the Positional Identity constraint says nothing about the less prominent syllables outside the Head Prosodic Word, *LONG VOWEL will compel shortening of long vowels in the third (or a subsequent) syllable. Change in a weak syllable violates only the lowest ranked general Identity constraint, so *LONG VOWEL can be satisfied in this position.

(28) Input heavy syllables will be shortened outside the head PWd

Hypothetical /mulubuulu/ → [mulubulu]:

	Candidates	**IDENT-HD PWD (μ)**	***LONG VOWEL**	**IDENT- (μ)**
a.	$_{PWd}$[mulu]*buu*lu		*!	
b. ☞	$_{PWd}$[mulu]***bu***lu			*

- *LONG VOWEL » IDENT (μ) since long vowels shorten outside the Head PWd

Turning now to the case of suffix-induced vowel lengthening in (29), it must be the case that ALIGN outranks positional faithfulness, since lengthening occurs in the optimal (29b) despite the resulting Positional Identity violation. (29a), while perfectly faithful to its input, loses out because lengthening has not taken place.

(29) High ranking prosodic requirement forces weight change in Head PWd

	/maŋal-nda/	ALIGN(nda)	IDENT-HDPWD (μ)	*LONG VOWEL	IDENT- (μ)
a.	$_{PWd}$ [ma.ŋ**al**].nda	*!			
b. ☞	$_{PWd}$ [ma.ŋ**aal**].nda		*	*	*

Finally we come to the problem with Positional Identity in (30). Faithfulness in strong positions cannot block derived length in weak positions. The hierarchy wrongly selects (30b) with vowel lengthening outside of the head prosodic word, because no constraint specifically bans vowel length in a weak position. Positional Identity entails that if a strong position can be altered, weak ones must be mutable as well.

(30) PI predicts that if strong positions can be altered weak ones can also be changed

∴ Faithfulness in strong positions cannot block derived length in weak positions

✗ indicates an ill-formed candidate wrongly selected by the proposed ranking

	/wuluŋguɾ-nda/	ALIGN(nda)	IDENT-HDPWD (μ)	*LONG VOWEL	IDENT- (μ)
a.	PWd [wu.luŋ].**gu**ɾ.nda	*!			
b. ✗	PWd [wu.luŋ].**guu**ɾ.nda			*	*

- The only ranking of Align(nda) which can block lengthening outside the Head Pwd is below IDENT(μ), but this will lose the phonotactic condition by incorrectly permitting lexical long vowels to surface in any position.

This aspect of the problem with Positional Identity as a theory of licensing is summarized in (31). Positional Identity cares only about preserving input/output correspondence in strong positions. Therefore it does not block marked structure in weak positions that wasn't present lexically. As a result, it wrongly predicts that *derived marked structures preferably arise in weak positions*. Without positional markedness there is no way to limit derived marked structure to exclusively strong positions. We need Positional Markedness constraints to block derived markedness in weak positions.

The next section provides a second argument for positional markedness. I'll show that Positional Markedness constraints are necessary to motivate conflicting strategies of cluster resolution as well.

(31) Outline of the problem for Positional Faithfulness

- PI cares only about preserving input/output correspondence in strong positions
- Therefore it can't block marked structure in weak positions that was not present lexically
- Therefore it predicts that *derived marked structures preferably arise in weak positions*

∴ Positional Markedness constraints are necessary to block derived markedness in weak positions

- For other cases that raise the same issue see Zoll in press

3. Multiple strategies: Hamer

⇒ Positional Markedness constraints are necessary to motivate conflicting strategies of cluster resolution

3.1 Data and generalizations

The distribution of long vowels in Guugu Yimidhirr represents a kind of derived markedness that has so far not been dealt with in the literature on positional faithfulness, and clearly shows that there is more at stake in licensing than just neutralization of potential lexical contrasts. Now I'll present cluster resolution in Hamer, a South Omotic language spoken in Ethiopia. This is a case with coda phonotactics nearly identical to more typical cases for which positional faithfulness has been invoked. By looking in detail at the kinds of repairs which maintain the phonotactics however, we'll see again that positional markedness is crucially involved.

Hamer is an important litmus test for positional faithfulness. (32) lays out the Hamer consonant cluster conditions. In clusters, the first consonant is limited to either a coronal consonant or to a nasal that is homo-organic with a following consonant. The phonotactics are identical to cases for which Positional Identity appears to subsume Positional Markedness, such as initial syllables in Tamil, but differs in the kinds of strategies that maintain the phonotactic generalizations.

(32) Possible C_1 in Hamer (South Omotic) C_1C_2 clusters Lydall 1976

- coronal consonant : {t, s, l, r, n, š} observed
- nasal homo-organic to a following consonant

(33) Hamer is an important test case for positional faithfulness

- The phonotactics are identical to cases for which PI appears to subsume PM
  e.g. in Tamil initial σ codas may be coronal, geminate, or place-linked sonorants (Beckman 1997:100 drawing on Christdas 1988)
- The variety of repair strategies forces retention of Positional Markedness

Because of the short time I have today I'll just concentrate on the distribution of labial consonants. (34) gives some examples of words with labials. They occur syllable initially, as in (34a-f), as coda nasals homorganic to a following stop, as in (34h-j), or word-finally as in (34k-l).

(34) Case study: distribution of labial consonants

- Onset labials

a.	bula	'draw out'	403
b.	ɗʌbɪ	'culprit	403
c.	paya ne	'is it good?'	405
d.	epa	'cry'	403
e.	mitca	'man of Miša clan'	404
f.	kʊmʌ	'ate'	405
g.	ɓulas	'jump'	403

- Coda labial nasals homorganic with following C

h.	omma	'bowls'	404
i.	pimbada	'was afraid had existed'	411
j.	nokombar	'water hole in use'	411

- Word final labials

k.	kʊmʌb	'eaten'	403
l.	senindam	'stone ACC"	400

Sometimes at root affix boundaries, clusters arise that are not consistent with Hamer's phonotactics. As shown in (35) Hamer resorts to metathesis and assimilation to repair ill-formed clusters. The [mn] cluster in (35c), [om-na], is bad because the labial coda is not homorganic with the following consonant. In this case progressive assimilation gives rise to a geminate [mm]. The [ms] cluster in (35f), kumsa, is resolved with regressive assimilation which changes the coda labial into a homorganic coronal. Finally, in (35g), /ep-sa/, the ill-formed /ps/ cluster is resolved through metathesis. The resulting cluster has a coronal coda consonant and is well-formed.

(35) Ill-formed clusters at morpheme boundaries undergo a variety of repairs

	na= particular plural				
a.	kara- na	[karana]		‘Kara people’	408
b.	nu- na	[nuna]		‘fires’	409
c.	om - na	[om. ma]	mn > mm	‘bows’	404
d.	ʌtʌb- na	[ʌtʌm.ba]	bn > mb	‘tongues’	404
	sa = causative				
e.	ʌl-sa	[ʌl.sʌ]		‘cause to ward off’	417
f.	kʊm - sa	[kʊn. sʌ]	ms > ns	‘cause to eat’	404
g.	ep- sa	[es. pa]	ps > sp	‘cause to cry’	404

(36) outlines the basic generalizations of cluster resolution. Assimilation is the first choice for cluster repair, but nasals are the only possible targets. Looking at (36a), with two nasals, either is a possible target. Since Place spreads progressively here, the default direction for spreading must be left to right. In (36d), assimilation also yields an appropriate cluster, but here spreading is from right to left. It has to be, since the only nasal is on the left. This form also shows that assimilation is favored over metathesis as a strategy. In this case metathesis would also result in a well-formed cluster, since /s/ is a legitimate coda consonant, but assimilation is optimal.

As shown in (36e-i)), when neither consonant is a nasal clusters are repaired by metathesis. In (36e), *espa*, the labial [p] is not a well-formed coda. Metathesis removes it from coda position, replacing it with the less marked coronal /s/. Metathesis is forced in these cases because obstruents are not possible targets of assimilation.

Finally, (36j-l) show the most striking strategy. When the *second* member of an ill-formed cluster is a nasal, metathesis takes place followed by assimilation. So in (36j) for example, ʌtʌb-na, the [bn] cluster comes out as [mb]. As shown in (37), speaking derivationally, the nasal and obstruent first switch places, then the nasal takes on the place features of the obstruent. This pattern is not an

uncommon one in Ethiopian languages and has also been discussed recently by Hume [and the references therein].

(36) Cluster resolution generalizations:

* Strategy depends on whether there is a nasal consonant and where that nasal is.
* Only nasals can be targets of assimilation

- When C1 is a nasal, assimilation repairs illicit sequences

Spread place left to right, when possible (a), else right to left (d)
Assimilation is favored over metathesis as a strategy (d)

a.	**LR**	om - na	[om. ma]	'bows'	*onna (RL)
b.	**LR**	k'ʊl-na	[k'ʊl.la]	'goats'	
c.	**LR**	ar-na	[ar.ra]	'Aris'	
d.	**RL**	kʊm - sa	[kʊn. sʌ]	'cause to eat'	*kus.ma (metathesis)

- If neither C is a nasal, clusters are repaired via metathesis

e.	**ps > sp**	ep- sa	[es. pa]	'cause to cry'
f.	**bs > sp**	wob-sa	[wos.pa]	'make bent'
g.	**ks > sk**	ʊk-sa	[ʊs.kʌ]	'cause to spear'
h.	**št > tc**	miš-ta	[mit.ca]	'man of Mis&a clan'
i.	**dn > nd**	ɓʌd-na	[ɓan.da]	'foods'

- If C2 is a nasal: metathesis PLUS assimilation
  (Hume 1997 discusses other cases with a similar repair strategy)

j.	**bn > mb**	ʌtʌb-na	[ʌtʌm.ba]	'tongues'
k.	**cn > nc**	rac-na	[ran.ca]	'men of Rac clan'
l.	**qn > ŋq**	dɪq-na	[dɪŋ.qa]	'milk cows'

(37) Derivation of ʌtʌm.ba (36j)

	ʌtʌb- na
Metathesis	ʌtʌn.ba
Assimilation	ʌtʌm.ba

This case is an important one because descriptively the cluster restrictions are identical to those which constitute foundational arguments for positional faithfulness versus positional markedness. The challenge for any analysis of this data is to be able to account for the variety of ways that clusters get resolved to meet the phonotactic conditions: in this case we have to account for the bi-directional options for assimilation along with metathesis. I'll show that this is completely straightforward using positional markedness but impossible to do without it.

3.2 Analysis

The analysis begins in (38). Any account of these facts must include a high ranking constraint that prohibits the targeting of obstruents in assimilation, formalized here as IDENT(obstruent). Likewise, labial clusters are not resolved with consonant deletion, indicating that MAX(seg) is also undominated. Since these constraints are never violated in optimal forms, I will not include candidates with non-faithful obstruents or deleted segments in the following tableaux.

(38) Two unviolated constraints

- Obstruents are never possible targets of assimilation in Hamer

  IDENT(obstruent) 'an obstruent is featurally identical to its input correspondent'

  This high ranking constraint is consistent with the hierarchy proposed in [Jun 1995:125
  Preserve continuant place » Preserve stop place » Preserve nasal place (see also Mohanan 1993)

- Segments are not deleted in resolution of bad clusters

  MAX(segment) 'a segment in the input has a correspondent in the output'

First let's try to account for Hamer without invoking Positional Markedness. In (39), following Beckman 1997, we can account for predominantly left to right spreading with a positional identity constraint that favors faithfulness to root features. Since this constraint preserves root features over suffix features, it will penalize right to left, or regressive, spreading since that will obliterate root

specifications. This constraint dominates the markedness constraints which disfavor labial and coronal place. Following the assumptions of Prince & Smolensky 1993, based on earlier underspecification literature, these two markedness constraints have a fixed inherent ranking, since coronals are less marked than labials.

(39) Analysis relying on positional faithfulness alone

Positional *faithfulness*: Beckman 1997: Chapter 4

- **IDENT(ROOT)**
  'Every segment of the root is featurally identical to its input correspondent'

  This constraint favors root features over suffix features in assimilation, i.e. left-to-right spreading
  om-na → [omma], *onna

Markedness:

- *labial » *coronal (universal ranking (Prince & Smolensky 1993))

  ***labial** "No labial features"
  ***coronal** "No coronal features"

The tableau in (40) establishes that positional faithfulness must outrank the markedness constraint. In this case the optimal candidate in (40b) preserves the root's labial feature even though labial is more marked. Under this analysis the reason we get assimilation is that the markedness constraints are better satisfied with fewer overall features. The unassimilated (40c) violates both *labial and *coronal, whereas the optimal candidate in (40b) only violates *labial. For this to work it is crucial to assume that shared place literally means a shared feature, so both (40b) and (40c) violate *labial only once.

(40) Progressive Assimilation: om-na → omma

Ranking: IDENT(root) » *labial » *coronal
Rationale: Root's labial feature is preserved when possible

	o**m - n**a	IDENT(root)	*Labial	*Coronal
a.	o**n.n**a	*!		*
b. ☞	o**m.m**a		*	
c.	o**m.n**a		*	*!

- Assimilation motivated by the desire to minimize violations of markedness constraints

- *feature violations count instances of the feature, assume geminates share single feature

With IDENT(root) progressive assimilation follows automatically, but the problem with this analysis is that it wrongly predicts that when progressive assimilation is impossible no other repair strategy will kick in. In (41) the second consonant is an obstruent and as such cannot be targeted in assimilation. The necessarily high ranking IDENT(root) forces preservation of root features at all costs, favoring the unassimilated (41a). In this case it blocks regressive spreading in (41b) because that would wipe out the root's labial feature. But in fact (41b), with regressive assimilation, is the actual output.

(41) Regressive assimilation:

- PI wrongly predicts regressive assimilation to be impossible here since it forces non-identity of root nasal

	/kum-sa/	IDENT(root)	*Labial	*Coronal
a. ✗	kum.sa		*	*
b.	kun.sa	*!		

- **kumfa* blocked by high ranking IDENT(obstruent)
- **kuma*, **kusa* blocked by high ranking MAX(seg)

⇨ **What motivates regressive assimilation?**

Likewise, as shown in (42), the positional faithfulness account cannot alone motivate metathesis. Here again assimilation in both directions is blocked, since obstruents can't be targets of assimilation. Both candidates are equivalent with respect to markedness. Linearity, ranked anywhere, should favor the non-metathesized candidate (42a), since nothing in a purely positional faithfulness account necessitates metathesis.

(42) Metathesis:

- PI analysis wrongly predicts that metathesis will not occur since it does not lead to better satisfaction of the markedness constraints

	/ep_1-s_2a/	*labial	*coronal	Linearity
a. ✗	$ep_1.s_2$a	*	*	
b.	$es_2.p_1$a	*	*	*!

- No higher ranking constraint can force violations of linearity
- **eppa*, **essa* blocked by high ranking IDENT(obstruent)
- **epa*, **esa* blocked by high ranking MAX(seg)

⇨**What motivates metathesis?**

There must be some constraint that forces assimilation in (41) and metathesis in (42). What the ill-formed candidates in (41) and (42) share is a coda labial consonant. Therefore the most obvious choice for this constraint is the positional markedness constraint, repeated here in (43), which specifically penalizes preconsonantal labials.[3] This is roughly the same as NoCoda&*labial, but following Steriade's convincing critique of coda conditions I adopt instead the formal statement of the environment in (43). Keep in mind though that this remains the conjunction of a positional with a markedness constraint.

(43) What's missing here is a constraint that identifies illicit clusters

- Positional markedness is required

***[labial]/__C** (after Steriade 1997, Hume 1997) 'No preconsonantal [labial]'

The tableau in (44) shows that when the positional markedness constraint outranks faithfulness, progressive assimilation will be preferred to leaving the cluster as it stands. The winning candidate in (44b) satisfies positional markedness, but in doing so suffers an IDENT(root) violation. This is

[3] Whether or not it would be preferable to invoke Syllable Contact (after Vennemann) as a distinct Positional Markedness constraint here remains to be seen. (Cho and Davis, p.c.)

preferable to the loser in (44a), which would preserve the root's labial feature, but at the cost of an illicit consonant cluster.

(44) ***[labial]/__C** » Linearity gives rise to metathesis

	/ep-sa/	***[labial]/__C**	Linearity	*labial	*coronal
a.	ep. sa	*!		*	*
b. ☞	es.pa		*	*	*

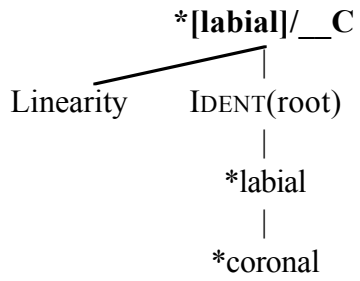
The ranking of the positional markedness constraint above IDENT(root) also forces regressive assimilation at the expense of root features when the only nasal consonant in a cluster belongs to a root. In (45) the faithful [kum-sa] is ruled out by positional markedness. The optimal candidate violates IDENT(root) since the nasal, part of the root, is now not identical to its input correspondent, but this is forced by the high ranking cluster condition.

(45) ***[labial]/__C** » IDENT(root) can force regressive assimilation

	/kum-sa/	***[labial]/__C**	IDENT(root)	*labial	*coronal
a.	kum.sa	*!		*	*
b. ☞	kun.sa		*		*

So far we have established the partial ranking in (46), where the positional markedness constraint outranks IDENT(root) as well as Linearity, thereby allowing both metathesis, and root altering regressive assimilation.

(46) Partial Ranking:



As shown in (47), the fact that we get assimilation from [kum-sa], in (47a), rather than metathesis (in (47b)) entails that LINEARITY must outrank IDENT(root). Candidate 47b, kus-ma, is then ruled out by a fatal linearity violation.

(47) More ranking: **Linearity** » IDENT(root)
Rationale: IDENTity destroying assimilation of root nasal preferred to metathesis

	/kum-sa/	**Linearity**	IDENT(root)	*labial	*coronal
a. ☞	kun. sa		*		*
b.	kus.ma	*!		*	*

Because the positional markedness constraint does not itself prefer any particular kind of repair, this analysis is consistent with progressive assimilation as well, as shown in (48). Unassimilated [om-na] in (48a) fatally violates the high ranking positional markedness constraint. Here then we see the effect of IDENT(Root). (48c), with its coronal nasal geminate, results in a less marked cluster. But it loses out to omma in (48d), which manages to satisfy the positional markedness constraint and IDENT(Root) by preserving the root nasal's labial feature.

(48) ***[labial]/__C** » IDENT(root) allows progressive assimilation as well

	/om-na/	***[labial]/__C**	Linearity	IDENT(root)	*labial	*coronal
a.	om.na	*!			*	*
b.	on.ma		*!		*	*
c.	on.na			*!		*
d. ☞	om.ma				*	

This example also shows how Positional Markedness violations must be assessed here. Crucially, (48d) satisfies the high ranking constraint, so this constraint must penalize only labial *features* which are released into a consonant. In geminate mm, the labial feature itself is released into a vowel and hence satisfies the constraint.

(49) Ranking:

***[labial]/__C**
|
Linearity
|
IDENT(root)
|
*labial
|
*coronal

An analysis that includes positional markedness, with an additional constraint that bans obstruents from pre-consonantal position (50) (Hume 1997 after Steriade 1997), correctly derives the cases where we get both metathesis and assimilation. This constraint must rank above LINEARITY, since it disfavors obstruent-consonant sequences even when the consonants share place features (51b), thereby optimizing metathesis of the nasal and obstruent consonants (51d). The fact that the actual output contains a labial cluster is due to the IDENT(root) constraint, which penalizes the loss of the root labial (51c).

(50) ***[-son]/__C** 'An obstruent does not occur before another consonant'

(51) Assimilation with metathesis

	/ʌtʌb- na /	*[labial]/__C	*[-son]/__C	Linearity	IDENT(root)	*labial	*coronal
a.	ʌtʌb.na	*!	*			*	*
b.	ʌtʌb.ma		*!			*	*
c.	ʌtʌn.da			*	*!	*	*
d. ☞	ʌtʌm.ba			*		*	
e.	ʌtʌn.ba			*		*	*!

To summarize the Hamer problem, then, I showed that an analysis that relies exclusively on positional faithfulness cannot account for the variety of strategies that the language employs to satisfy phonotactic considerations. Positional Identity therefore does not subsume Positional Markedness in

accounting for coda neutralization. Positional Markedness constraints remain a crucial component of any grammar.

The question remains as to whether both positional faithfulness and positional markedness are necessary. I have shown that Positional Markedness constraints are indispensable, but in the analysis of Hamer above I continued to rely on Root Identity constraints to determine the directionality of assimilation. In addition, Beckman 1997 and Casali 1996 present a variety of interesting arguments for Positional Identity which go beyond scope of this paper. What I have shown, summarized in (57), is that while Positional Identity does some of the work required for licensing, it does not fully subsume Positional Markedness. Positional Markedness constraints are indispensable. Insofar as we need Positional Markedness, then, we have compelling evidence for the conjunction of markedness and positional constraints, given current assumptions. Although conjunction increases the power of the theory, the necessity of conjoined positional markedness constraints demonstrates that this power is surely warranted.

(52) Conclusion:

- Positional Faithfulness is not an adequate theory of licensing
- **Positional Markedness constraints are a necessary component of the grammar**
- Conjunction of markedness with positional constraints is unavoidable assuming context independent markedness hierarchies

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