The Sentani Variation

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In discussing stress and accent patterns in natural language, *default patterns* are a useful point of reference. Default patterns rely only on the most basic considerations of constituency and directionality to determine how prominences are distributed. They are unaffected, for example, by differences in syllable weight, the placement of morphological boundaries, or the locations of inherent prominences. In other words, they are the patterns that emerge in morphologically simple forms containing only light syllables without underlying accents.

In this paper we focus on the default pattern of Sentani (Elenbaas 1999), a Papuan language spoken in the Indonesian province of Irian Jaya. (A distinct dialect of Sentani was described with a different pattern in Cowen 1965. This paper focuses exclusively on the dialect described by Elenbaas.) Sentani's default pattern is similar to many of the other attested binary default patterns in that it exhibits limited departures from perfect binary alternation. However, where departures in other attested binary default patterns might constitute either clash configurations (adjacent prominent positions) or lapse configurations (adjacent non-prominent positions), Sentani is unique in deploying both clash and lapse and in deploying them in very similar circumstances.

Sentani locates primary stress on the penult. In forms with four or fewer syllables, as in (1a-c), Sentani locates secondary stresses on every even-numbered syllable from the left preceding the penult. The result in four-syllable forms, as in (1c), is a clash involving the stresses on the penultimate and antepenultimate syllables. In forms with more than four syllables, as in (1d-f), Sentani locates secondary stress on every even-numbered syllable from the left preceding the penult except the antepenult. The result in six-syllable forms, as in (1e), is a lapse involving the stressless antepenultimate and pre-antepenultimate syllables.[1]

(1) Sentani pattern

a.	ˈbohi	'next'
b.	foˈmale	'we all will go across'
c.	moˌxaˈnale	'I do (it) for him'
d.	haˌxomiˈboxe	'he followed them'
e.	moˌlokoxaˈwale	'I wrote to you'
f.	moˌlokoˌxawaˈlɛne	'because I wrote to you'

The default Sentani pattern can be perturbed by a requirement that stress avoid schwa and by an interesting weight sensitivity that seems to be limited to initial and final syllables.

In the Weak Bracketing (Hyde 2002, 2016) framework for metrical stress, clash and lapse are only introduced into binary default patterns to accommodate stress on initial constituents,

[1] This pattern would presumably hold for longer even-parity forms, though we were unable to actually find any even-parity forms with more than six syllables.

stresslessness for final constituents, or both. While this has been demonstrated previously for the other attested binary patterns, it has yet to be demonstrated for Sentani. Our purpose in this paper is to fix the place of the Sentani pattern in the typology of binary default patterns and to demonstrate that its clashes and lapses arise for the same reasons that they arise in other default patterns. In particular, in presenting a Weak Bracketing analysis of Sentani, we will demonstrate that clashes and lapses arise to accommodate stress on an initial constituent and stresslessness for a final constituent. In particular, clash and arise to accommodate stress on initial feet and stresslessness for final syllables.[2]

The family of constraints promoting stresslessness for final constituents is the NONFINALITY family (Prince and Smolenky 1993/2004). The general formulation for NONFINALITY is given in (2). *BCat* is the element banned from final position, *FCat* is the relevant final constituent, and *DCat* is the relevant prosodic domain. NONFINALITY constraints prohibit *BCat* from occurring on the final *FCat* of *DCat*.

(2) NONFINALITY(*BCat*, *FCat*, *DCat*): *⟨*BCat*, *FCat*, *DCat*⟩ | *BCat* coincides with the final *FCat* of *DCat*.
"Assess a violation for every ⟨*BCat*, *FCat*, *DCat*⟩ such that *BCat* coincides with the final *FCat* of *DCat*."

A NONFINALITY constraint might ban foot-level grid entry from coinciding with the final syllable of a prosodic word, for example, or it might ban a prosodic-word level grid entry from coinciding with the final foot of a prosodic word.

The family of constraints promoting stress on initial constituents is the INITIAL PROMINENCE family. The general formulation for INITIAL PROMINENCE constraints is given in (3). *RCat* is the category of the element required in initial position, *ICat* is the category of the relevant initial constituent, and *DCat* is the category of relevant prosodic domain. INITIAL PROMINENCE constraints require *RCat* to occur on the initial *ICat* of *DCat*.

(3) INITIAL PROMINENCE(*RCat*, *ICat*, *DCat*): *⟨*RCat*, *ICat*, *DCat*⟩ | No *RCat* coincides with the initial *ICat* of *DCat*.
"Assess a violation for every ⟨*RCat*, *ICat*, *DCat*⟩ such that no *RCat* coincides with the initial *ICat* of *DCat*."

An Initial Prominence constraint might require a foot-level grid entry to appear on the initial syllable of a prosodic word, for example, or it might require a foot-level grid entry to appear on the initial foot of a prosodic word.

Though both families are well motivated (Hyde 2009), only the constraints made available by the NONFINALITY formulation have actually been deployed in a variety large enough to warrant the "family" designation. The NONFINALITY formulation has been demonstrated to

[2] Sentani has been previously analyzed in a Weak Layering (Itô and Mester 1993/2003) framework by Elenbaas (1999) and Elenbaas and Kager (1999). Since our purpose is to provide an analysis within the Weak Bracketing framework, and to situate Sentani within the typology predicted by Weak Bracketing, we will not revisit the earlier Weak Layering analysis here or discuss the advantages of a Weak Bracketing framework over the Weak Layering framework. The Weak Layering analysis of Sentani was generally successful and the advantages that Weak Bracketing has over Weak Layering lie in other areas. For a more general discussion of the advantages of Weak Bracketing, see Hyde (2002, 2012b, 2016.)

apply to domain-final moras, syllables, and feet, and they have been demonstrated to apply at the syllable, foot, and prosodic word levels (Hyde 2007), but INITIAL PROMINENCE constraints have only been demonstrated to apply to initial syllables at the prosodic word level. While this is not necessarily concerning—there is no a priori reason that NONFINALITY and INITIAL PROMINENCE should have symmetrical ranges of application—seeing additional applications of INITIAL PROMINENCE would further support its inclusion in the theory. In applying INITIAL PROMINENCE to initial feet, the analysis of Sentani provides this additional support.

The version of the Weak Bracketing framework that we use in the analysis of Sentani is the version presented in Hyde 2016. The only significant difference between this version and the version presented in Hyde 2002 is that Generalized Alignment (McCarthy and Prince 1993) constraints have been replaced by Relation Specific Alignment (Hyde 2012a) constraints. Relation Specific Alignment allows the theory to avoid a set of pathological predictions—the midpoint pathology (Hyde 2012a, 2016a, b)—that arise under Generalized Alignment, and it allows the theory to provide a uniform account of stress windows of various sizes and types (Hyde 2012a, 2016). The particular version of alignment used, however, does not make a difference for the issues examined here, but see Hyde 2012a for discussion of the differences between Generalized Alignment and Relation Specific Alignment. More recent innovations in the Weak Bracketing framework (Hyde, forthcoming) also play no role in the issues examined here.

The article proceeds as follows. Section 1 situates Sentani in the typology of iambic patterns and briefly examines those that are most similar to Sentani. Section 2 presents the constraints of the Weak Bracketing framework and illustrates how they have been deployed to analyze similar iambic patterns in previous work. Sections 3 and 4 discuss the additional constraints required in the analysis of Sentani in particular and work through the account. Section 5 examines the possibility that Sentani might be analyzed as a ternary pattern. Section 6 contains a summary and concluding remarks.

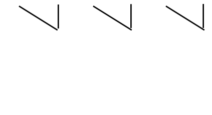
Section 1 Default patterns

Among the possible default patterns that a language might exhibit, there are only four with a perfect binary alternation. In other words, there are only four default patterns where prominence is located on every other position so that a form contains neither clashes nor lapses. These four *perfect alternation* patterns can be divided into two pairs, each pair consisting of one trochaic pattern and one iambic pattern. The first pair, the *minimal alternation* patterns, have the fewest prominences possible without a lapse. The minimal alternation patterns are illustrated in (4) with the structures they would be assigned in the Weak Bracketing framework. In (4) and throughout the article, entries on the metrical grid are positioned above the syllable string and foot structure is indicated with association lines below the syllable string. The head syllables of feet are indicated with vertical association lines.

(4) Minimal alternation

a. Trochaic

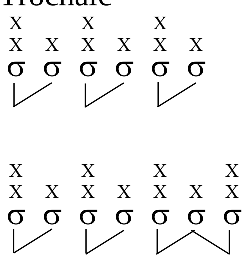
b. Iambic



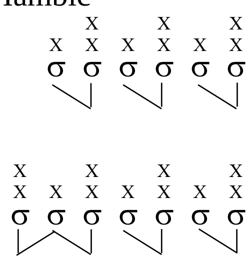
The second pair, the *maximal alternation* patterns, have the most prominences possible without a clash. The maximal alternation patterns are illustrated in (5).

(5) Maximal alternation

a. Trochaic



b. Iambic

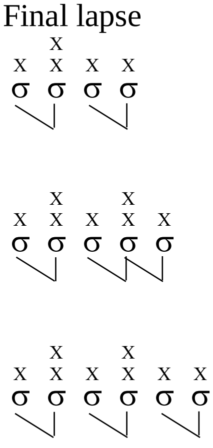


Under the Weak Bracketing approach, default patterns with clash or lapse emerge as variations on the perfect alternation patterns, either due to a requirement that a prominence occur in initial position or a requirement that a prominence avoid final position.

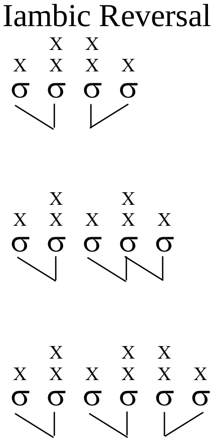
The portion of the typology that concerns us here is the group of iambic default patterns that emerge as variations on the iambic minimal alternation pattern in (4b). This group emerges under a requirement that prominence avoid final syllables. Two members of the group have been discussed previously in the context of the Weak Bracketing analysis. The first is the variation where a lapse occurs at the right edge in even-parity forms. The pattern in (6a) is just like the iambic minimal alternation pattern in (4b) except that the final prominence of even-parity forms is absent, resulting in a lapse. We will refer to this variation as the *final lapse* variation. The second variation is one where a clash configuration occurs near the right edge in even-parity forms. The pattern in (6b) is just like the iambic minimal alternation pattern in (4b) except that the final prominence in even-parity forms shifts one position to the left, resulting in a clash. This variation is often referred to as *iambic reversal* since the final foot in even-parity forms switches from iambic to trochaic.

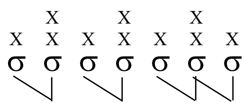
(6) Variations on iambic minimal alternation

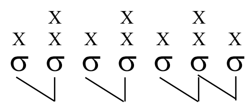
a. Final lapse



b. Iambic Reversal







The final lapse variation can be seen in Choctaw (Nicklas 1972, 1975), Hixkaryana (Derbyshire 1985), and Central Alaskan Yupik (Miyaoka1985, Woodbury 1987).[3] Examples from Choctaw are given in (7). In longer Choctaw forms, syllables with long vowels are stressed. Every even numbered syllable from the left, except the final syllable, has a long vowel.

(7) Choctaw

a.	ˈpisɑ	‘see’
b.	piˈsɑːli	‘see-I (subj.)’
c.	čiˈpiːsɑli	‘you (obj.)-see-I (subj.)’
d.	čiˈpiːsɑˈčiːli	‘you (obj.)-see-CAUS.-I (subj.)’
e.	čiˈhɑːbiˈnɑːčili	‘you (obj.)-receive a gift-CAUS.-I (subj.)’

The iambic reversal variation can be seen in De’kwana (Hall 1988), Aguaruna (Payne 1990, Hung 1994), Southern Paiute (Sapir 1930), and Axininca Campa (Payne 1981). Examples from De’kwana are given in (8).

(8) De’kwana pattern

a.	ˈtuna	‘water’
b.	tɨʔˈkaːdɨ	‘to dig, excavate’
c.	eˌduˈwato	‘new’
d.	waˌtasoˈkadɨ	‘noises’
e.	woːˌwanoˌmaˈtoho	‘school’
f.	kɨnˌwəneˌtɨ hoˈʔaʔto	‘they had dreamed various times’
g.	wiˌʃedeˌnanɨˌʔaˈkene	‘I had dried (them)’

The Sentani default pattern constitutes a third variation on iambic minimal alternation. As (9), illustrates, the Sentani variation combines aspects of the previous two. As in the two previous variations, odd-parity forms are identical to the odd-parity forms of iambic minimal alternation from (4b). In even-parity forms, the final prominence shifts one position to the left as it does in the iambic reversal variation in (6b) but it does not always result in iambic reversal’s clash. It results in a clash in forms where the initial and final foot are adjacent (i.e., forms with four syllables), as in (9a), but not in forms where the initial and final foot are not adjacent (i.e., forms with more than four syllables), as in (9c). In forms where the initial and final foot are not adjacent, the prominence expected on the antepenult is removed, resulting in a lapse. Even-parity forms with more than four syllables, then, have a lapse like the final lapse variation, though the lapse arises in a different location.

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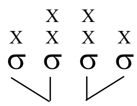
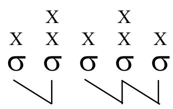
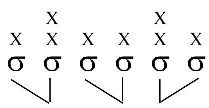
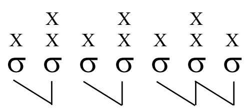
[3] According to Miyaoka (1985), prosodic word-final accents in Central Alakan Yupik are not part of the default pattern; rather, they are weaker boundary accents that arise only in specific phonological and morphological contexts. Once the boundary accents are set aside, the default pattern of Central Alaskan Yupik is a straightforward example of the final lapse pattern.

(9) The Sentani variation

a. 

b. 

c. 

d. 

Below, we demonstrate how the Sentani variation emerges under circumstances similar to those that produce the final lapse and iambic reversal variations. Like the other variations, the Sentani variation emerges under a requirement that prominence avoid final position. Unlike the other variations, however, the Sentani variation requires a constraint restricting the position of primary stress. It can only emerge when primary stress is restricted to the final foot. The Sentani variation also requires a constraint insisting that the initial foot, in particular, be stressed (in addition to a constraint insisting that feet generally be stressed). Both of the additional requirements are available from constraint families—ALIGNMENT (McCarthy and Prince 1993, McCarthy 2003, Hyde 2012a) and INITIAL PROMINENCE (Hyde 2002, 2016)—that have previously been established as fundamental to the Weak Bracketing analysis.

Section 2 The Weak Bracketing analysis

Before presenting the Weak Bracketing analysis of Sentani, we briefly examine the Weak Bracketing analysis of iambic minimal alternation, iambic final lapse, and iambic reversal. (For a more thorough discussion, see Hyde 2016.) The five constraints most immediately responsible for iambic minimal alternation and its variations discussed below, beginning with two ALIGNMENT constraints.

We employ the Relation-Specific Alignment formulation of Hyde (2012a, 2016). (See also McCarthy 2003 and Hyde and Paramore 2016). For those unfamiliar with the formulation, the general schemas for Relation-Specific Alignment constraints are given in (10). Each schema has two components separated by a slash. The component to the right of the slash is the *prohibited configuration of misalignment*, and the component to the left of the slash defines a *locus of violation*. The prohibited configuration is constructed from three categories. *ACat1* and *ACat2* are the two categories whose edges are being aligned, and *SCat* is the “separator category”, the category whose intervention between the relevant edges of *ACat1* and *ACat2* constitutes misalignment. The locus of violation can consist of either two categories or three. It can consist of the two aligned categories, *ACat1* and *ACat2*, or it can consist of the two aligned categories plus the separator category, *SCat*.

(10) Alignment Constraint Schemas

a. Left-Edge: *⟨*ACat1*, *ACat2*, (*SCat*)⟩ / [… *SCat* … *ACat2* …]$_{ACat1}$
"Assess a violation mark for every ⟨*ACat1*, *ACat2*, (*SCat*)⟩ such that *SCat* precedes *ACat2* within *ACat1*."

b. Right-Edge: *⟨*ACat1*, *ACat2*, (*SCat*)⟩ / [… *ACat2* … *SCat* …]$_{ACat1}$
"Assess a violation mark for every ⟨*ACat1*, *ACat2*, (*SCat*)⟩ such that *ACat2* precedes *SCat* within *ACat1*."

c. Opposite-Edge: *⟨*ACat1*, *ACat2*, (*SCat*)⟩ / *ACat1* … *SCat* … *ACat2*
"Assess a violation mark for every ⟨*ACat1*, *ACat2*, (*SCat*)⟩ such that *ACat1* precedes *SCat* and *SCat* precedes *ACat2*."

Note that the separator category is only optionally included in the locus of violation. When the separator category is included, the constraint is distance-sensitive: the number of violations it assesses increases as the degree of misalignment increases. When the separator category is omitted, the constraint is distance-insensitive: it assesses a single violation for each pair of misaligned categories regardless of the degree of misalignment.

The ALIGNMENT constraints most relevant to producing iambic minimal alternation and it's variants are ALLRIGHT(σ_{Hd}) and ALLLEFT(σ_{Hd}), given in (11). ALLRIGHT(σ_{Hd}) draws the head syllables of feet towards the right edge of the prosodic word, and ALLLEFT(σ_{Hd}) draws the head syllables of feet towards the left edge. Recall that the head syllables of feet are always indicated with vertical association lines.

(11) a. ALLRIGHT(σ_{Hd}): *⟨ω, σ_{Hd}, σ⟩ / [… σ_{Hd} … σ …]$_{\omega}$
"Assess a violation for every ⟨ω, σ_{Hd}, σ⟩ such that σ_{Hd} precedes σ within ω."

b. ALLLEFT(σ_{Hd}): *⟨ω, σ_{Hd}, σ⟩ / [… σ … σ_{Hd} …]$_{\omega}$
"Assess a violation for every ⟨ω, σ_{Hd}, σ⟩ such that σ precedes σ_{Hd} within ω."

Since the separator category "σ" is included in the loci of violation, the constraints are distance-sensitive. They register degrees of misalignment rather then the simple fact of misalignment. ALLRIGHT(σ_{Hd}) assesses a number of violations that is equal the number of syllables intervening between each foot and the right edge of the prosodic word in which it occurs. Similarly, ALLLEFT(σ_{Hd}), assesses a number of violations that is equal the number of syllables intervening between each foot and the left edge of the prosodic word in which it occurs.

Constraints that map prosodic categories to entries on the metrical grid play a key role in the Weak Bracketing framework. The general formulation for MAP constraints (Hyde 2002) is given in (12). κ is the prosodic category to be mapped to the grid and x_κ is a κ-level grid entry.

(12) MAP(κ): *κ | κ does not map to an x_κ.
"Assess a violation for every κ such that κ does not map to an x_κ."

The MAP constraint that is key at this point in the discussion is MAP(f), given in (13). MAP(f) requires that each foot have a foot-level grid entry within its domain.

(13) MAP(f): *f | f does not map to an x_f.
"Assess a violation for every f such that f does not map to an x_f."

Though foot-level grid entries must coincide with head syllables (indicated with vertical association lines), it is not case that all head syllables will coincide with grid entries. We will encounter an additional MAP constraint, MAP(ω), in Section 3. MAP(ω) requires prosodic words to map to prosodic-word level grid entries.

The next constraint key to producing iambic minimal alternation and its variants is *CLASH (Liberman and Prince 1977, Prince 1983). *CLASH requires that any two adjacent entries on one level of the metrical grid have an intervening entry on the next level lower. This prevents grid entries from occurring too close together.

(14) *CLASH: *⟨x_1, x_2⟩ | x_1 and x_2 occur on level $\lambda + 1$ of the grid without an intervening entry, x_3, on level λ.
"Assess a violation for every ⟨x_1, x_2⟩ such that x_1 and x_2 occur on level $\lambda + 1$ of the grid without an intervening entry, x_3, on level λ"

The final key constraint is a NOFINALITY constraint. NONFIN(x_f), given in (15), prohibits foot-level grid entries from occurring on prosodic word-final syllables.

(15) NONFIN(x_f): *⟨ x_f, σ, ω⟩ | x_f coincides with the final σ of ω.
"Assess a violation for every ⟨ x_f, σ, ω⟩ such that x_f coincides with the final σ of ω."

Iambic minimal alternation and its variations all share the same pattern for their odd-parity forms. This lack of distinction arises because all four of the active constraints required to differentiate between the three patterns— ALLRIGHT(σ_{Hd}), MAP(f), *CLASH, and NONFIN(x_f)— can be maximally satisfied in words with an odd number of syllables, which means that their relative ranking in relation to one another does not alter the optimal candidate for such forms. As long as ALLRIGHT(σ_{Hd}) dominates ALLLEFT(σ_{Hd}), as the tableau in (16) illustrates, a right-aligned iambic pattern emerges regardless of the rankings between ALLRIGHT(σ_{Hd}), MAP(f), *CLASH, and NONFIN(x_f). In the optimal candidate, a pair of overlapping feet at the right edge of the prosodic word share a grid entry, allowing both to satisfy MAP(f) while avoiding NONFIN(x_f) and *CLASH violations.

(16)

	ALLRIGHT	ALLLEFT	MAP(f)	*CLASH	NONFIN
☞w. $\sigma_1\ \sigma_2\ \sigma_3\ \sigma_4\ \sigma_5\ \sigma_6\ \sigma_7$ grid: x_{f1} over σ_2, x_{f2} over σ_4, $x_{f3/f4}$ over σ_6; $x_{\sigma1}$ … $x_{\sigma7}$ feet: f_1 ($\sigma_1\sigma_2$), f_2 ($\sigma_3\sigma_4$), f_3 ($\sigma_5\sigma_6$), f_4 ($\sigma_6\sigma_7$)	9	15			
a. $\sigma_1\ \sigma_2\ \sigma_3\ \sigma_4\ \sigma_5\ \sigma_6\ \sigma_7$ grid: x_{f1} over σ_2, x_{f2} over σ_4, x_{f3} over σ_6, x_{f4} over σ_7; $x_{\sigma1}$ … $x_{\sigma7}$ feet: f_1 ($\sigma_1\sigma_2$), f_2 ($\sigma_3\sigma_4$), f_3 ($\sigma_5\sigma_6$), f_4 ($\sigma_6\sigma_7$)	9	15		W 1	W 1
b. $\sigma_1\ \sigma_2\ \sigma_3\ \sigma_4\ \sigma_5\ \sigma_6\ \sigma_7$ grid: x_{f1} over σ_2, x_{f2} over σ_4, x_{f3} over σ_6; $x_{\sigma1}$ … $x_{\sigma7}$ feet: f_1 ($\sigma_1\sigma_2$), f_2 ($\sigma_3\sigma_4$), f_3 ($\sigma_5\sigma_6$), f_4 ($\sigma_6\sigma_7$)	9	15	W 1		
c. $\sigma_1\ \sigma_2\ \sigma_3\ \sigma_4\ \sigma_5\ \sigma_6\ \sigma_7$ grid: $x_{f1/f2}$ over σ_2, x_{f3} over σ_4, x_{f4} over σ_6; $x_{\sigma1}$ … $x_{\sigma7}$ feet: f_1 ($\sigma_1\sigma_2$), f_2 ($\sigma_2\sigma_3$), f_3 ($\sigma_4\sigma_5$), f_4 ($\sigma_6\sigma_7$)	W 15	L 9			

Iambic minimal alternation and its variations, then, differ only in their even-parity forms. Which of the even-parity patterns emerges depends on the ranking of ALLRIGHT(σ_{Hd}), MAP(f), *CLASH, and NONFIN(x_f). We examine the rankings that produce the different even-parity patterns below.

Section 2.1 Iambic minimal alternation

The key feature distinguishing the iambic minimal alternation pattern from its variations is that iambic minimal alternation has a prominence on the prosodic word-final syllable of even-parity forms. Where iambic minimal alternation has a prominence on its final syllable, iambic final lapse and iambic reversal both avoid final prominence. The key feature of the ranking that results in iambic minimal alternation, then, is that NONFIN(x_f) is low ranked.

As the tableau in (17) illustrates, iambic minimal alternation emerges when ALLRIGHT(σ_{Hd}) and MAP(f) both dominate NONFIN(x_f). The thoroughly trochaic candidate (c) and the iambic reversal candidate (b) both avoid the final prominence of iambic minimal alternation by grouping their final two syllables into a trochaic foot. Since trochaic footing results in worse rightward head syllable alignment than iambic footing, ALLRIGHT(σ_{Hd}) excludes candidates (c) and (b). The iambic final lapse candidate (a) avoids the final prominence of iambic minimal alternation by leaving its final iamb stressless. Since the stressless final foot is an unmapped foot, MAP(f) excludes candidate (a). The iambic minimal alternation candidate (w) emerges as optimal. (The ranking of *CLASH is not actually crucial in the iambic minimal alternation ranking, but we include it in the tableau to facilitate comparison with the rankings where it is crucial.)

(17)

	*CLASH	ALLRIGHT(σHd)	MAP(f)	NONFIN(xf)
x_{f1} x_{f2} x_{f3} $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ ☞w. $\sigma1$ $\sigma2$ $\sigma3$ $\sigma4$ $\sigma5$ $\sigma6$ f_1 f_2 f_3		6		1
x_{f1} x_{f2} $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ a. $\sigma1$ $\sigma2$ $\sigma3$ $\sigma4$ $\sigma5$ $\sigma6$ f_1 f_2 f_3		6	1 W	L
x_{f1} x_{f2} x_{f3} $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ b. $\sigma1$ $\sigma2$ $\sigma3$ $\sigma4$ $\sigma5$ $\sigma6$ f_1 f_2 f_3	1 W	7 W		L
x_{f1} x_{f2} x_{f3} $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ c. $\sigma1$ $\sigma2$ $\sigma3$ $\sigma4$ $\sigma5$ $\sigma6$ f_1 f_2 f_3		9 W		L

The Hasse diagram summarizing the crucial rankings for iambic minimal alternation is given in (18).

(18) Iambic minimal alternation ranking

ALLRIGHT(σHd)   MAP(f)   *CLASH

NONFIN(xf)

Section 2.2 Iambic final lapse

The key feature distinguishing the iambic final lapse pattern is that it has a stressless final iamb in even-parity forms. Where iambic final lapse lacks a prominence within its final foot in even-parity forms, iambic minimal alternation has a stressed final iamb and iambic reversal has a stressed final trochee. The key feature of the ranking that results in the stressless final foot of iambic final lapse is the low ranking of MAP(f).

The tableau in (19) illustrates how iambic final lapse emerges when ALLRIGHT(σHd) and NONFIN(xf) both dominate MAP(f). The thoroughly trochaic candidate (c) and the iambic reversal candidate (b) both avoid the unmapped final foot of the final lapse pattern by mapping their final trochaic feet. Since trochaic footing results in worse rightward head syllable alignment than iambic footing, however, ALLRIGHT(σHd) excludes candidates (c) and (b). The iambic minimal alternation candidate (a) avoids the final unmapped foot of the final lapse pattern by mapping its final iambic foot. Since the stressed final iamb positions prominence on the final syllable, NONFIN(xf) excludes candidate (a). The iambic final lapse candidate (w) emerges as optimal. (The ranking of *CLASH is not crucial here.)

(19)

	*CLASH	ALLRIGHT(σ_{Hd})	NONFIN(x_f)	MAP(f)
☞ w. x_{f1} over σ2, x_{f2} over σ4 $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ σ1 σ2 σ3 σ4 σ5 σ6 f_1 (σ1 σ2) f_2 (σ3 σ4) f_3 (σ5 σ6)		6		1
a. x_{f1} over σ2, x_{f2} over σ4, x_{f3} over σ6 $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ σ1 σ2 σ3 σ4 σ5 σ6 f_1 (σ1 σ2) f_2 (σ3 σ4) f_3 (σ5 σ6)		6	W 1	L
b. x_{f1} over σ2, x_{f2} over σ4, x_{f3} over σ5 $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ σ1 σ2 σ3 σ4 σ5 σ6 f_1 (σ1 σ2) f_2 (σ3 σ4) f_3 (σ5 σ6)	W 1	W 7		L
c. x_{f1} over σ1, x_{f2} over σ3, x_{f3} over σ5 $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ σ1 σ2 σ3 σ4 σ5 σ6 f_1 (σ1 σ2) f_2 (σ3 σ4) f_3 (σ5 σ6)		W 9		L

The Hasse diagram summarizing the crucial rankings for iambic minimal alternation is given in (20).

(20) Iambic final lapse ranking

ALLRIGHT(σ_{Hd}) NONFIN(x_f) *CLASH

MAP(f)

Section 2.3 Iambic reversal

The key distinguishing feature of iambic reversal is the final trochaic foot in otherwise iambic even-parity forms. Where iambic reversal has a final trochaic foot, iambic minimal alternation and iambic final lapse both have thoroughly iambic footing. The key feature of the ranking that results in the final trochee of iambic reversal is the low ranking of ALLRIGHT(σ_{Hd}) and *CLASH.

As the tableau in (21) demonstrates, iambic reversal is optimal when NONFIN(x_f) and MAP(f) both dominate ALLRIGHT(σ_{Hd}), and ALLRIGHT(σ_{Hd}) dominates *CLASH. The thoroughly iambic footing of the minimal alternation and final lapse patterns allows them to have the best rightward alignment and to avoid clash. NONFIN(x_f) excludes the final prominence of the minimal alternation candidate (c), however, and MAP(f) excludes the unmapped final iamb of the final lapse candidate (b). The thoroughly trochaic candidate (a) avoids clash, but its multiple trochaic feet yield the worst rightward alignment. ALLRIGHT(σ_{Hd}) excludes (a), and the iambic reversal candidate (w) emerges as optimal.

(21)

	NONFIN(x_f)	MAP(f)	ALLRIGHT(σ_{Hd})	*CLASH
☞ w. x_{f1} over σ2, x_{f2} over σ4, x_{f3} over σ5 $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ σ1 σ2 σ3 σ4 σ5 σ6 f_1 (σ1 σ2) f_2 (σ3 σ4) f_3 (σ5 σ6)			7	1
a. x_{f1} over σ1, x_{f2} over σ3, x_{f3} over σ5 $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ σ1 σ2 σ3 σ4 σ5 σ6 f_1 (σ1 σ2) f_2 (σ3 σ4) f_3 (σ5 σ6)			9 W	L
b. x_{f1} over σ2, x_{f2} over σ4 $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ σ1 σ2 σ3 σ4 σ5 σ6 f_1 (σ1 σ2) f_2 (σ3 σ4) f_3 (σ5 σ6)		1 W	6 L	L
c. x_{f1} over σ2, x_{f2} over σ4, x_{f3} over σ6 $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ σ1 σ2 σ3 σ4 σ5 σ6 f_1 (σ1 σ2) f_2 (σ3 σ4) f_3 (σ5 σ6)	1 W		6 L	L

The Hasse diagram in (22) summarizes the crucial rankings for the iambic reversal pattern.

(22) Iambic reversal ranking

NONFIN(x_f) MAP(f)

ALLRIGHT(σ_{Hd})

*CLASH

Section 3 The Sentani variation: six-syllable forms

Where the iambic reversal variation employs clash in even-parity forms to avoid final prominence, and the iambic final lapse variation employs lapse, the Sentani variation employs both. In forms with four-syllables—forms where the initial and final feet are adjacent—Sentani uses clash to avoid prominence on the final syllable. In six-syllable and longer even-parity forms—forms where the initial and final feet are not adjacent— Sentani uses lapse to avoid prominence on the final syllable. We consider six-syllable and longer even-parity forms in this section and four-syllable forms in Section 4.

The Sentani variation cannot emerge under the set of constraints discussed thus far because the pattern found in six-syllable and longer even-parity forms is harmonically bounded by the iambic final lapse pattern with respect to these constraints.[4] As the tableau in (23) demonstrates, the two patterns perform equally well on NONFIN(x_f), MAP(f), and *CLASH, but

[4] Consideration of additional constraints employed in previous presentations of the Weak Bracketing framework would reveal that the Sentani pattern is harmonically bounded by a combination of patterns. For example, if we added ALLLEFT(σ_{Hd}) to the tableau in (19) and a candidate with trochaic minimal alternation, the Sentani pattern would perform better than trochaic minimal alternation on MAP(f) and ALLRIGHT(σ_{Hd}), the same on NONFIN(x_f) and *CLASH, and worse on ALLLEFT(σ_{Hd}). The Sentani pattern would then be harmonically bounded by the combination of iambic minimal alternation and trochaic minimal alternation.

iambic final lapse performs better on ALLRIGHT(σ_{Hd}). The result is that the Sentani pattern cannot be optimal under any ranking of this set of constraints.

(23)

	NONFIN(x_f)	MAP(f)	*CLASH	ALLRIGHT(σ_{Hd})
w. $\;\;\;\;\;\;\;\;\; x_{f1} \; x_{f3}$ $x_{\sigma1}\; x_{\sigma2}\; x_{\sigma3}\; x_{\sigma4}\; x_{\sigma5}\; x_{\sigma6}$ $\sigma1\; \sigma2\; \sigma3\; \sigma4\; \sigma5\; \sigma6$ $\;\;\; f_1 \;\;\;\;\;\;\; f_2 \;\; f_3$		1		7
☞a. $\;\;\;\;\;\;\;\;\; x_{f1} \;\;\;\;\;\;\;\;\; x_{f2}$ $x_{\sigma1}\; x_{\sigma2}\; x_{\sigma3}\; x_{\sigma4}\; x_{\sigma5}\; x_{\sigma6}$ $\sigma1\; \sigma2\; \sigma3\; \sigma4\; \sigma5\; \sigma6$ $\;\;\; f_1 \;\;\;\;\;\;\; f_2 \;\;\;\;\;\;\; f_3$		1		6 L

The reason that the six-syllable Sentani pattern is harmonically bounded by iambic final lapse with this set of constraints is that leaving the penultimate foot unmapped does not offer all of the same advantages as leaving the final foot unmapped. While the six-syllable Sentani pattern avoids final prominence and clash, it does not avoid the final trochaic foot that results in an additional ALLRIGHT(σ_{Hd}) violation.

Despite not offering the advantage of avoiding a final trochee, lapse arises in the Sentani variation for essentially the same reasons that it arises in the iambic final lapse pattern. It arises to avoid final stress and clash. The lapse arises in a different position in Sentani because the position of lapse in the final lapse pattern in simply unavailable in Sentani. As discussed above, primary stress always occurs within the final foot of a Sentani form. This has two consequences. The first is that the foot hosting primary stress—the final foot—has to be trochaic in order to avoid final stress. The second is that the final two syllables—the syllables that constitute the final foot—are unavailable for hosting a lapse. To avoid the clash that would otherwise result from a final trochaic foot, the penultimate foot is left unmapped, resulting in a lapse preceding the primary stress.

The first consideration in producing the Sentani pattern, then, is to locate primary stress within the final foot. The two constraints most directly responsible for locating primary stress in Sentani are MAP(ω), given in (24), and ALLRIGHT(f_{Hd}), given with its counterpart, ALLLEFT(f_{Hd}), in (25). MAP(ω), requires that each prosodic word have a prosodic word-level grid entry within its domain. The prosodic word-level grid entry must fall within a head foot.

(24) MAP(ω): *ω | ω does not map to an x_ω.
"Assess a violation for every ω such that ω does not map to an x_ω."

ALLRIGHT(f_{Hd}) draws the head foot of the prosodic word toward the prosodic word's right edge ALLLEFT(f_{Hd}) draws the head foot of the prosodic word toward the prosodic word's left edge. Because the primary prominence must always fall within the head foot, restricting the position of the head foot also restricts the position of the primary prominence.

(25) a. ALLRIGHT(f_{Hd}): *⟨ω, f_{Hd}, σ⟩ / [… f_{Hd} … σ …]$_\omega$
"Assess a violation for every ⟨ω, f_{Hd}, σ⟩ such that f_{Hd} precedes σ within ω."

b. ALLLEFT(f_{Hd}): *⟨ω, f_{Hd}, σ⟩ / [… σ … f_{Hd} …]$_\omega$
"Assess a violation for every ⟨ω, f_{Hd}, σ⟩ such that σ precedes f_{Hd} within ω."

As the tableau in (26) illustrates, the combined effect of ALLRIGHT(f_{Hd}) and MAP(ω) is to enforce mapping of the final foot in particular. ALLRIGHT(f_{Hd}) and MAP(ω) can be satisfied simultaneously only when the final foot is mapped. When the prosodic word maps to a prosodic word-level grid entry and the prosodic word-level entry occurs over a head foot in final position, as in candidate (a), both constraints are satisfied. The mapping status of the penultimate foot is of no concern. ALLRIGHT(f_{Hd}) is only violated if the head foot is not the final foot, as in candidate (c), and MAP(ω) is only violated if the prosodic word does not map to a prosodic word-level entry, as in candidate (b). In contrast, the effect of MAP(f) is more general. MAP(f) requires every foot to map to the metrical grid. If either the final foot is left unmapped, as in candidates (b) and (c), or the penultimate foot is left unmapped, as in candidate (a), MAP(f) is violated.

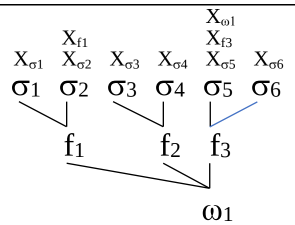
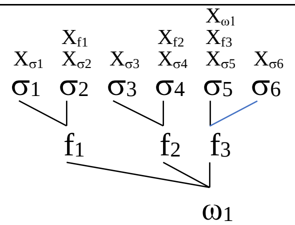
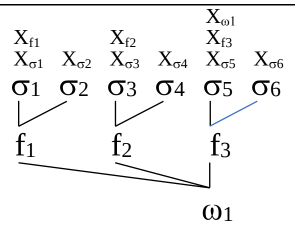
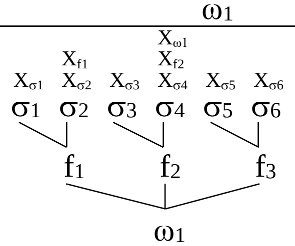
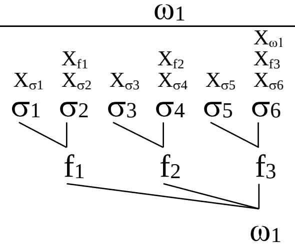
(26)

	ALLRIGHT(f_{Hd})	MAP(ω)	MAP(f)
☞ a. $x_{\omega1}$ (over σ5) x_{f1} (over σ2), x_{f3} (over σ5) $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ σ1 σ2 σ3 σ4 σ5 σ6 f_1 f_2 f_3 ω_1			1
b. x_{f1} (over σ2), x_{f2} (over σ4) $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ σ1 σ2 σ3 σ4 σ5 σ6 f_1 f_2 f_3 ω_1		W 1	1
c. $x_{\omega1}$ (over σ4) x_{f1} (over σ2), x_{f2} (over σ4) $x_{\sigma1}$ $x_{\sigma2}$ $x_{\sigma3}$ $x_{\sigma4}$ $x_{\sigma5}$ $x_{\sigma6}$ σ1 σ2 σ3 σ4 σ5 σ6 f_1 f_2 f_3 ω_1	W 1		1

To streamline the discussion, we will assume from this point on that MAP(ω) is undominated, and we will not consider candidates without a primary prominence. Given this situation, a high-ranking ALLRIGHT(f_{Hd}) can be used to ensure that the obligatory primary prominence occupies the final foot and that the final foot cannot be unmapped.

As the tableau in (27) demonstrates, the six-syllable pattern of the Sentani variation emerges under two key ranking conditions. The first condition is that NONFIN(x_f) and ALLRIGHT(f_{Hd}) both dominate ALLRIGHT(σ_{Hd}). Ranking NONFIN(x_f) above ALLRIGHT(σ_{Hd}) excludes the option of a stressed final iamb, as in candidate (d), and ranking ALLRIGHT(f_{Hd}) above ALLRIGHT(σ_{Hd}) excludes the option of shifting the primary stress off of a final iamb so that the final iamb can remain stressless, as in candidate (c). The second key ranking condition is that ALLRIGHT(σ_{Hd}) and *CLASH both dominate MAP(f). Ranking ALLRIGHT(σ_{Hd}) above MAP(f) excludes the option of a thoroughly trochaic pattern, as in candidate (b), and ranking *CLASH above MAP(f) excludes the option of tolerating a clash configuration, as in candidate (a). In the optimal candidate (w), a stressless iamb precedes a stressed final trochee. This allows (w) to maintain mostly iambic footing and primary stress on the final foot while avoiding clash and stress on the final syllable.

(27)

	NFIN(x_f)	ALLR(f_{Hd})	ALLR(σ_{Hd})	*CLASH	MAP(f)
☞w. 			7		1
a. 			7	W 1	L 0
b. 			W 9		L 0
c. 		W 2	L 6		1
d. 	W 1		L 6		L 0

While the ranking conditions demonstrated in (27) produce the correct result for six-syllable and longer forms, they are unable to produce the correct result for four-syllable forms. As they do with six-syllable forms, the ranking conditions would leave the penultimate foot stressless in four-syllables. Since the penultimate foot is initial in four-syllable forms and non-initial in six-syllable and longer forms, however, we can obtain the correct result with a constraint that requires initial feet to be stressed.

Section 4 The Sentani variation: four-syllable forms

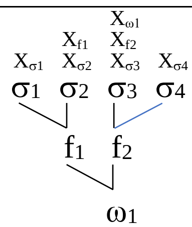
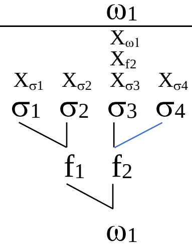
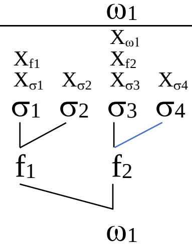
The constraint family that can require stress on initial elements is the INITIAL PROMINENCE family. INPROM(x_f, f), given in (28), is the INITIAL PROMINENCE constraint requiring stress on prosodic word-initial feet. INPROM(x_f, f) insists that some foot-level grid entry coincide with the initial foot of every prosodic word.

(28) INPROM(x_f, f): *⟨f, ω⟩ | No x_f coincides with the initial f of ω.
"Assess a violation for every ⟨f, ω⟩ such that no x_f coincides with the initial f of ω."

Adding INPROM(x_f, f) to constraint ranking examined in (26) so that it dominates *CLASH is sufficient to produce the correct results for four-syllable forms.

The tableau in (29) demonstrates the result of ranking both ALLRIGHT(σ_{Hd}) and INPROM(x_f, f) above *CLASH for a four-syllable form. Note that the tableau does not consider output candidates that fail to maintain primary stress on a final trochaic foot, as required by the ranking NONFIN(x_f), ALLRIGHT(f_{Hd}) >> ALLRIGHT(σ_{Hd}). Ranking ALLRIGHT(σ_{Hd}) above *CLASH excludes the option of a thoroughly trochaic pattern, as in candidate (b). Ranking INPROM(x_f, f) above *CLASH excludes the option of stressless initial/penultimate foot, as in candidate (a). The optimal candidate (w) tolerates a clash configuration to ensure that the initial foot is iambic and stressed while also ensuring that the final foot contains a primary stress that avoids the final syllable. (The low-ranked MAP(f) is included in the tableau to highlight the fact that it plays no role in this context.)

(29)

	ALLRIGHT(σ_{Hd})	INPROM(x_f, f)	*CLASH	MAP(f)
☞ w. 	3		1	
a. 	3	W 1	L 0	W 1
b. 	W 4		L 0	

The Hasse diagram depicting the constraint ranking responsible for the Sentani variation is given in (30):

(30) Sentani ranking

NONFIN(x_f) ALLRIGHT(f_{Hd})

INPROM(x_f, f) ALLRIGHT(σ_{Hd})

*CLASH

MAP(f)

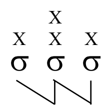
Section 5 Binary vs. Ternary

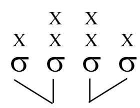
A reviewer states that the default pattern of Sentani is consistent with a ternary pattern (with nonfinality) and that it provides support for the Internally Layered Ternary foot framework (ILT; Martínez-Paricio and Kager 2015). While we agree that the available data for the default pattern is consistent with a ternary pattern with nonfinality, the ILT approach is not actually capable of producing this pattern or similar key patterns.

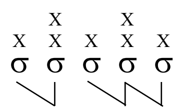
As the reviewer states, the avaible data for the Sentani default pattern could be analyzed in terms of amphibrachs—internally layered ternary feet with left-aligned internal iambs. Forms that do not divide evenly into ternary feet would use binary feet to exhaustively parse leftover syllables. One iamb would be employed at the left edge in 3*n*+2 forms and two iambs would be employed at the left edge in 3*n*+1 forms. In four-syllable forms a final iamb would be replaced by a final trochee to accommodate final stresslessness. The structures in (31b) illustrate the ternary foot analysis for forms of up to seven syllables—the longest in available data. The proposed Weak Bracketing structures are repeated in (31a) for comparison.

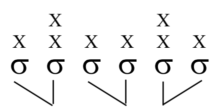
(31) The Sentani variation

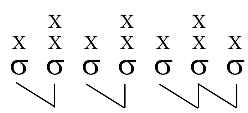
a. Binary Analysis

i. 

i. 

ii. 

iii. 

iv. 

b. Ternary Analysis

ii. ([σˈσ] σ)

i. (σˈσ) (ˈσ σ)

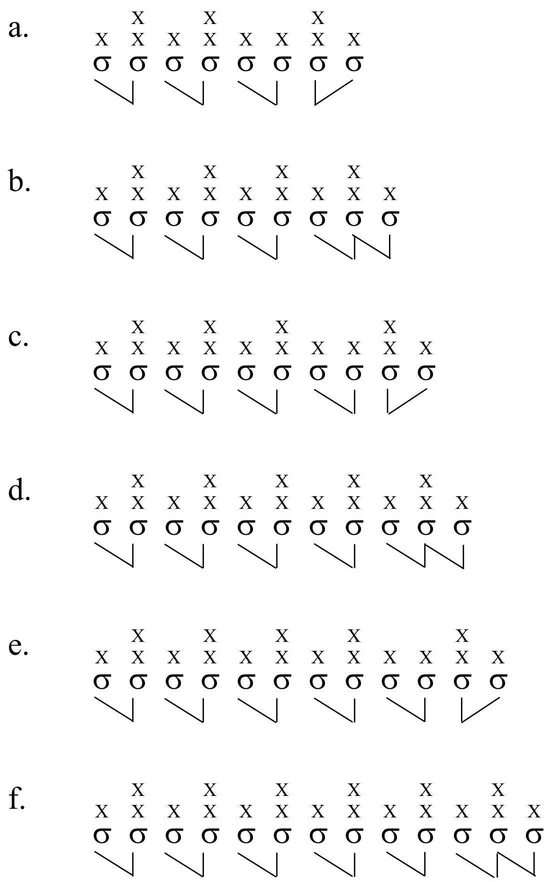
ii. (σˈσ) ([σˈσ] σ)

iii. ([σˈσ] σ) ([σˈσ] σ)

iv. (σˈσ) (σˈσ) ([σˈσ] σ)

The predictions of the binary and ternary analyses would start to diverge beginning with nine-syllable forms. The binary pattern described by Elenbaas is given in (32) with the proposed Weak Bracketing structures.

(32) Binary Analysis



The ternary pattern described by the reviewer is given in (33) with ILT structures. Note that the predicted stress patterns differ in forms with nine syllables, (32/33b), and in all forms with eleven or more syllables, (32/33d-f).

(33) Ternary Analysis

a. (σˈσ) ([σˈσ]σ) ([σˈσ]σ)

b. ([σˈσ]σ) ([σˈσ]σ) ([σˈσ]σ)

c. (σˈσ) (σˈσ) ([σˈσ]σ) ([σˈσ]σ)

d. (σˈσ) ([σˈσ]σ) ([σˈσ]σ) ([σˈσ]σ)

e. ([σˈσ]σ) ([σˈσ]σ) ([σˈσ]σ) ([σˈσ]σ)

f. (σˈσ) (σˈσ) ([σˈσ]σ) ([σˈσ]σ) ([σˈσ]σ)

Martínez-Paricio and Kager (2015b: 10) identify a version of the ternary pattern in (31b, 33) without nonfinality (a version where four-syllable forms have two iambs) as one of the predictions of their ILT account, and they indicate that it is unattested. The pattern is entirely plausible. It is similar to the ternary default pattern of Chugach (Leer 1985a, b, c) where the iambs would occur to the right of the amphibrachs rather than to the left (Martínez-Paricio and Kager 2015a: 483; 2015b: 10; 2016).

This may seem like good news for the ILT framework. It is not. In considering forms long enough to see the difference between the binary pattern described by Elenbaas and the potential ternary alternative, it becomes clear that ILT cannot actually produce the ternary alternative. The distance-insensitive alignment constraints that ILT uses to produce directionality effects simply break down at longer lengths.

One of the advantages claimed for layered feet is that they can replace unparsed medial syllables in patterns that would require them in standard Weak Layering (Itô and Mester 1993/2003) accounts. In standard Weak Layering accounts, it is necessary to directly influence the position of medial feet relative to medial unparsed syllables in order to distinguish between the trochaic patterns in (34a) and (34b), for example. Influencing the position of medial feet directly requires distance-sensitive ALIGNMENT constraints (see Alber 2005, Hyde 2012a for discussion).

(34) a. (ˈσ σ) σ (ˈσ σ) (ˈσ σ) b. (ˈσ σ) (ˈσ σ) σ (ˈσ σ)

Internally layered feet are thought to eliminate the need for medial unparsed syllables. The pattern in (34a) is recreated in (35a) with a dactyl at the left edge of the form, and the pattern in (34b) is recreated in (35b) with an amphibrach at the right edge. There is no need to position medial feet directly. All that is needed is to position a peripheral ternary foot and to select the right type of ternary foot.

(35) a. ([ˈσ σ] σ) (ˈσ σ) (ˈσ σ) b. (ˈσ σ) (ˈσ σ) (σ [ˈσ σ])

Since ternary feet are thought to eliminate the need for unparsed medial syllables, then, ternary feet are also thought to eliminate the need to influence the position of medial feet directly and, therefore, the need for distance-sensitive ALIGNMENT constraints.[5] The possibility of eliminating distance-sensitive ALIGNMENT is supposed by some to be quite desirable because the violations for distance-sensitive constraints can increase quadratically as the length of the form increases (though it has yet to be demonstrated that this actually has any practical empirical consequences).

[5] Some suspension of disbelief is required for these thoughts to arise, as there are other well established contexts that require the grammar to position medial unparsed syllables and binary feet (or medial unary feet and binary feet). One arises in moraic trochee languages when an odd number of light syllables is isolated between moraic trochees (Alber 2005, Hyde 2012a). In such cases, distance-sensitive alignment is needed to establish the relative position of the medial feet and unparsed syllable: …(ˈH)(ˈLL)L(ˈH)… *vs*. …(ˈH)L(ˈLL)(ˈH)…. This circumstance could easily arise in languages where unparsed syllables are restricted to peripheral position in default patterns. As Martinez-Paricio and Kager (2015a: 498) mention such configurations in connection with difficulties for a lapse-licensing approach (Kager 2001, 2005), they appear to be aware of the issue.

The two constraints that are most directly responsible for locating feet in the ILT framework are given in (36) in the Relation Specific Alignment formulation (see Section 2). In (36), f_T is a ternary foot, f_B a binary foot, and f a foot of any size.[6]

(36) a. TERNARY-R: $*\langle\omega, f_T\rangle$ / $[\ldots f_T \ldots f \ldots]_\omega$
"Assess a violation for every $\langle\omega, f_T\rangle$ such that f_T precedes f within ω."

b. BINARY-L: $*\langle\omega, f_B\rangle$ / $[\ldots f \ldots f_B \ldots]_\omega$
"Assess a violation for every $\langle\omega, f_B\rangle$ such that f precedes f_B within ω."

Since they omit the separator category in the definition of the locus of violation, both constraints are distance-insensitive. They assess violations for the simple fact of misalignment rather than measuring degrees of misalignment. TERNARY-R assesses a single violation for each ternary foot that has a foot (of any size) to its right. BINARY-L assesses a single violation for each binary foot that has a foot (of any size) to its left.

As indicated in (37) and (38), TERNARY-R and BINARY-L correctly locate the three feet needed to parse seven-syllable and eight-syllable forms. The two constraints are best satisfied when a ternary foot occurs at the right edge and a binary foot at the left edge. It is not necessary to influence the position of the medial foot directly. In the seven-syllable form in (37), there is one ternary foot and two binary feet. In the desired winner, the two binary feet precede the ternary foot. TERNARY-R is the key constraint in this case. It locates the single ternary foot at the right edge, forcing the two binary feet to the left. BINARY-L is also satisfied as well as possible given this particular collection of feet.

(37)

	TERNARY-R	BINARY-L
☞ w. (σˈσ) (σˈσ) ([σˈσ] σ)		1
a. (σˈσ) ([σˈσ] σ) (σˈσ)	1 W	1
b. ([σˈσ] σ) (σˈσ) (σˈσ)	1 W	2 W

In the eight-syllable form in (38), there are two ternary feet and one binary foot. In the desired winner, the binary foot precedes the two ternary feet. BINARY-L is the key constraint in this case. It locates the single binary foot at the left edge, forcing the two ternary feet to the right. TERNARY-R is also satisfied as well as possible given this particular collection of feet.

(38)

	TERNARY-R	BINARY-L
☞ w. (σˈσ) ([σˈσ] σ) ([σˈσ] σ)	1	
a. ([σˈσ] σ) (σˈσ) ([σˈσ] σ)	1	1 W
b. ([σˈσ] σ) ([σˈσ] σ) (σˈσ)	2 W	1 W

In general, the approach works as long as there is not more than one type of medial foot. In other words, it works as long as the form contains no more than one ternary foot or no more than one

[6] We have used the RSA formulations to avoid having to introduce another alignment system just for this brief discussion. TERNARY-R is equivalent in this context to Martínez-Paricio and Kager's (2015a) ALIGN-$R_{non\text{-}min}$, and BINARY-L in this context is equivalent to their ALIGN-L_{min}.

binary foot. Whenever there is more than one of both types, however, both types must occur medially and TERNARY-R and BINARY-L are unable to fix the position of the medial feet.

The effect is apparent in 3*n* +1 forms that have at least ten syllables. To produce the correct pattern in a ten-syllable form, for example, two binary feet would need to precede two ternary feet. Since they cannot influence the position of medial feet, however, TERNARY-R and BINARY-L cannot actually locate them in the correct positions. As the tableau in (39) demonstrates, the candidate where the medial trochaic foot precedes the medial binary foot ties with the desired winner where the medial trochaic foot follows the medial binary foot. Note that we would not be able to distinguish between the candidates by considering additional constraints. The two candidates perform identically on *every constraint in the ILT constraint set*.

(39)

	TERNARY-R	BINARY-L
☞ w. (σˈσ) (σˈσ) ([σˈσ] σ) ([σˈσ] σ)	1	1
☞ a. (σˈσ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ)	1	1

The problem arises in every 3*n*+1 form with ten syllables or more. ILT will be unable to choose between two options for ten-syllable forms, between three options for thirteen-syllable forms, between four options for sixteen-syllable forms, and so on.

(40)

2 options for 10 syllable forms	(σˈσ) (σˈσ) ([σˈσ] σ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ)
3 options for 13 syllable forms	(σˈσ) (σˈσ) ([σˈσ] σ) ([σˈσ] σ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ)
4 options for 16 syllable forms	(σˈσ) (σˈσ) ([σˈσ] σ) ([σˈσ] σ) ([σˈσ] σ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ) ([σˈσ] σ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ) ([σˈσ] σ) ([σˈσ] σ) (σˈσ) ([σˈσ] σ)

Some might be tempted to say that this circumstance has little practical consequence since the longest Sentani forms available have just seven syllables. It should be kept in mind, however, that this circumstance also prevents ILT from producing the Chugach pattern, and Chugach does have forms of the relevant lengths.

ILT's distance-insensitive constraints, then, are inadequate for executing the potential ternary analysis of Sentani and similar patterns. While ILT could simply adopt distance-sensitive constraints, doing so would mean abandoning one of the most significant motivations for positing internally layered feet in the first place. ILT's proponents have pointed to other virtues, of course, but these virtues are typically not unique. Much of the supporting evidence presented for internally layered feet is based on segmental processes that have been acknowledged to be captured by overlapping binary feet as well (Martinez-Parecio 2013, Martinez-Paricio and Kager 2016). In many cases, the relevant processes were first discussed in the context of overlapping binary feet (Hyde 2002). It is also possible to point to additional deficiencies of ILT. ILT is generally even less restrictive than standard Weak Layering, and it suffers from the same types of pathological predications (Hyde 2016b, forthcoming).

While ILT is unable to execute the potential ternary analysis of Sentani, there is ample evidence that Elenbaas' description of Sentani as a binary pattern is correct in any case. The Sentani default pattern can be perturbed by the avoidance of stress on schwa in open syllables and by a limited weight sensitivity. Neither phenomenon is straightforward, and the interaction between them is even less straightforward. Trying to provide an analysis would take us far beyond the scope of this paper, but it is worth noting that the perturbations nearly always result in forms that unambiguously exhibit a binary pattern. Occasionally, the results are ambiguous, but they are never unambiguously ternary. What follows provides several examples in which perturbations reveal the binary pattern of Sentani stress placement.

In Sentani, secondary stress tends to avoid occurring on a schwa in an open syllable. In forms with four or more syllables, for example, a secondary stress occurs on the peninitial syllable in the default pattern. To avoid stress on schwa in an open syllable, however, the default penintial stress can shift to an initial syllable without a schwa, as in (41).

(41)	a.	ˌbɛŋəˈkoxe	'he sought it'
	b.	ˌaxəˈlane	'in the forest'
	c.	ˌwɛŋəkoˈxale	'I told to him'
	d.	ˌxanəmiˈkoxe	'he called them'

If both the first and second syllables are open with schwa, then the shift fails to occur, as in (42). Crucially, the stress does not shift to the third syllable even when doing so would avoid schwa without producing a clash, as in the six-syllable (42b). To parse a six-syllable form, the binary analysis would employ three binary feet, but the ternary analysis would employ two ternary feet. The explanation for the failure to shift is straightforward if the stress is always confined to a binary foot at the left edge, as the binary analysis of six-syllable forms assumes. The explanation must be more subtle, however, if the stress occurs in a ternary foot at the left edge, as the ternary analysis of six-syllable forms assumes.

(42)	a.	əˌləkoˈxɛne	'because he said'
	b.	əˌhərawei ˈboiɲe	'because not suppressed'

When stress is able to shift from second to first syllable in six-syllable forms, the results further support binary footing. As (43) illustrates, a secondary stress that would occur on the second syllable in the default pattern shifts to the initial syllable to avoid schwa. In addition to the stress that is shifted, however, an entirely new stress missing from the default pattern appears on the third syllable. The result is straightforwardly consistent with binary footing and straightforwardly inconsistent with ternary footing.

(43)	a.	ˌkiɲəˌnasəˈbonde	'they all will hand me over'
	b.	ˌhabəˌleiməˈjəle	'he runs-he comes'
	c.	ˌeisəˌnanəˈwole	'he always refuses'
	d.	ˌfeiɲəˌboxaˈwale	'I washed you'
	e.	ˌharəˌnaikonˈdɛre	'for they will laugh'
	f.	ˌkiɲəˌnaijɛmˈbombe	'we will hand you all over'

Unlike secondary stress, primary stress seems never to shift to avoid schwa. In the forms in (44), the primary stress remains on the penult despite the possibility of avoiding schwa by shifting to either the right or the left. On first thought, this is unexpected. If secondary stress is incompatible with schwa, then primary stress should be even more so. Under both the binary analysis and the ternary analysis, the effect of NONFINALITY, discussed above, straightforwardly explains the inability of primary stress to shift from the penult to the ultima. Under the binary analysis, confining primary stress to a final binary foot also straightforwardly explains its inability to shift from the penult to the antepenult. Under the ternary analysis, however, if the primary stress is confined to a final ternary foot, as it would be in the examples in (44), there would have to be a more subtle reason for the stress's inability to shift from the penult to the antepenult.

(44)	a.	hoˈjəle	'he always kills'
	b.	kitˈəle	'he goes up'

Finally, we turn briefly to Sentani's limited weight sensitivity. Final heavy syllables always receive the primary stress and initial heavy syllables always receive at least a secondary stress. While providing an analysis of Sentani's weight sensitivity would take us well beyond the scope of this paper, it is worth noting that the perturbations due to syllable weight always result in patterns that are consistent with binary feet. In three-syllable forms, for example, whether the final syllable or the initial syllable is heavy the result always has two stresses, indicating two binary feet, rather than the single stress we would expect with a ternary foot.

(45)	a.	ˌjeuˈfəle	'you must give to me'
	b.	ˌnanˈdolo	'current (water)'
	c.	əˌraˈmam	'food'

While the data we have for the Sentani default pattern are consistent with either a binary or a ternary analysis, then, forms where the default pattern has been perturbed suggest that a binary analysis is correct. Of course, it may be possible for an especially clever ternary approach to supply binary feet for the necessary cases in Sentani. (Its inability to produce the default pattern rules out ILT as a candidate analysis.) However, the prima facie case for the binary analysis is a strong one.

Section 6 Conclusion

Like the other two variations of iambic minimal alternation previously discussed in the literature – iambic final lapse and iambic reversal – the Sentani variation emerges from a requirement that stress avoid the word-final syllable. The iambic final lapse pattern accommodates final stresslessness by omitting the final stress in even-parity forms, resulting in a lapse. The iambic reversal pattern accommodates final stresslessness by shifting the final stress in even-parity forms one syllable to the left, resulting in a clash with the preceding stress. The Sentani pattern is something of a hybrid. It always shifts the final stress one syllable to the left in an even-parity form, but it only tolerates clash in four-syllable forms. In longer even-parity forms, it omits the stress on antepenult, resulting in a lapse preceding the penult.

The Sentani variation emerges in the Weak Bracketing framework as a result of constraints that restrict primary stress to the final foot and a constraint that insists that initial feet, in particular, map to grid. A clash surfaces in Sentani when the initial and final feet are adjacent to one another (i.e., in four-syllable forms). The constraints positioning primary stress and the constraint insisting the initial foot map to the grid prevent stress from being omitted from either foot. However, a lapse surfaces when the initial foot and the final foot are not adjacent (i.e., in even-parity forms with more than four syllables). Omitting stress from a medial foot in longer forms allows them to avoid clash while maintaining stress on initial and final feet.

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