The Odd-Parity Parsing Problem[1]

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1 Introduction

Although it is a simple matter to divide a form into binary feet when it contains an even number of syllables, it is not so simple when it contains an odd number of syllables. In parsing an odd-parity form, there is always an odd, leftover syllable that must be treated differently than the others. How the leftover syllable is treated depends on the assumptions about prosodic layering that a particular proposal adopts.

The standard view of prosodic layering is the Weak Layering approach of Itô and Mester (1992), which allows syllables to remain unfooted under certain conditions. In Weak Layering accounts, two types of layering irregularities are available for dealing with the leftover syllable of odd-parity forms. The leftover syllable can be parsed as a monosyllabic foot, as in (1a), or it can remain unparsed, as in (1b).

(1) Layering Irregularities under Weak Layering

a. Monosyllabic Foot	b. Unparsed Syllable
(σσ)(σσ)(σσ)(σ)	(σσ)(σσ)(σσ)σ

The choice between the two options is determined by the interaction between two well-motivated requirements: the requirement that syllables be parsed into feet, typically implemented in Optimality Theoretic accounts using the PARSE-SYLLABLE constraint, and the requirement that feet be minimally bimoraic, typically implemented in OT accounts using the FOOT-BINARITY constraint.

(2)
a. PARSE-SYLLABLE: Every syllable is parsed into a foot.
b. FOOT-BINARITY: Every foot is binary (either disyllabic or bimoraic).

The combined effect of the two constraints is to require exhaustive binary parsing.

[1] Thanks to Eric Baković, Joe Pater, and Alan Prince for helpful discussion of some of the issues addressed in this paper. Any flaws are my responsibility.

Although their combined demands are easily met when parsing an even-parity form, the limitation of possible layering irregularities to unparsed syllables and monosyllable feet means that PARSE-σ and FT-BIN are always potentially in conflict when parsing an odd-parity form. As indicated in (3), the candidate that parses the leftover syllable as monosyllabic foot satisfies PARSE-σ. Since the monosyllabic foot is built on a light syllable, however, it violates FT-BIN. Similarly, the candidate that leaves the leftover syllable unfooted is able to satisfy FT-BIN, but the unparsed syllable causes it to violate PARSE-σ.

(3) The Conflict between PARSE-SYLLABLE and FOOT-BINARITY

LLLLLLL	PARSE-SYLLABLE	FOOT-BINARITY
a. (LL)(LL)(LL)(L)		*
b. (LL)(LL)(LL)L	*	

The conflict illustrated in (3) is a crucial component of Weak Layering accounts. Since the differences created by monosyllabic feet and unfooted syllables are responsible for much of the variation among individual stress patterns, the conflict plays a central role in allowing Weak Layering accounts to predict an appropriate range of stress systems. The difference is crucial, for example, in distinguishing between the trochaic Maranungku (Tryon 1970) and Pintupi (Hansen and Hansen 1969) patterns.

(4) a. Maranungku Pattern
    i. (yáŋar)(màta) 'the Pleiades'
    ii. (láŋka)(ràta)(tì) 'prawn'

  b. Pintupi Pattern
    i. (má̰a)(wàna) 'through (from) behind'
    ii. (púḽiŋ)(kàla)tju 'we (sat) on the hill'

The two patterns are identical except for the final syllables of odd-parity forms. A monosyllabic foot accounts for the presence of final stress in Maranungku, and an unfooted syllable accounts for the absence of final stress in Pintupi.

Though the choice of layering irregularities creates the conflict between the parsing and minimality requirements responsible for much of the desirable variation between stress systems, it also creates conflicts that result in significant obstacles to the success of Weak Layering accounts. PARSE-σ and FT-BIN often conflict when evaluating the output candidates of odd-parity inputs, but it is possible under certain circumstances to satisfy both simultaneously. The difficulty arises because the avenues available for achieving this result create undesirable conflicts with either faithfulness requirements or directional requirements. I will refer to the collection of predictions that result from such conflicts as the *Odd-Parity Parsing Problem*.

The Odd-Parity Parsing Problem can be divided into two sub-problems: the *Even-Only Problem* and the *Odd Heavy Problem*.[2] The Even-Only Problem arises from an undesirable conflict with faithfulness constraints. To avoid the necessity of violating either FT-BIN or PARSE-σ, a syllable can be added to or subtracted from an odd-parity input to make it even-parity on the surface. Whether a syllable is added or subtracted depends on which of the faithfulness constraints, MAX or DEP, is violated.

(5) Faithfulness Constraints (McCarthy and Prince 1995)
  a. MAX: Every syllable in the input is present in the output.
  b. DEP: Every syllable in the output is present in the input.

When high-ranking FT-BIN and PARSE-σ require MAX to be violated, as in (6), a single syllable is deleted from an odd-parity input to allow exhaustive binary footing.

(6) Deletion for Even-Parity

LLLLLLL	PARSE-SYLLABLE	FOOT-BINARITY	MAX
☞ a. (LL)(LL)(LL)			*
b. (LL)(LL)(LL)(L)		*!	
c. (LL)(LL)(LL)L	*!		

When FT-BIN and PARSE-σ require DEP to be violated, as in (7), a single syllable is added to allow exhaustive binary footing.

[2] The name *Odd Heavy Problem* was suggested by Joe Pater.

(7) Insertion for Even-Parity

LLLLLLL	PARSE-SYLLABLE	FOOT-BINARITY	DEP
☞ a. (LL)(LL)(LL)(LL)			*
b. (LL)(LL)(LL)(L)		*!	
c. (LL)(LL)(LL)L	*!		

In either case, the ranking predicts a language that allows only even-parity surface forms.

(8) Even-Only Languages

a. Deletion Languages: PARSE-σ, FT-BIN >> MAX

LL	→	(LL)
LLL	→	(LL)
LLLL	→	(LL)(LL)
LLLLL	→	(LL)(LL)

b. Insertion Languages: PARSE-σ, FT-BIN >> DEP

LL	→	(LL)
LLL	→	(LL)(LL)
LLLL	→	(LL)(LL)
LLLLL	→	(LL)(LL)(LL)

Such languages appear to be unattested.

The Odd Heavy Problem arises from a similar conflict, but the conflict in this case is with constraints that produce directionality effects. Since the locations of irregular layering are the primary indicators of a particular directional orientation, the constraints responsible for directionality must have control over the positions in which layering irregularities occur. To illustrate, foot alignment constraints produce directionality effects by locating layering irregularities in peripheral positions, the positions where they most frequently occur in quantity-insensitive systems.

(9) Alignment Constraints (McCarthy and Prince 1993)

a. ALLFEETL: The left edge of every foot is aligned with the left edge of some prosodic word.

b. ALLFEETR: The right edge of every foot is aligned with the right edge of some prosodic word.

When the relevant irregularity is a monosyllabic foot, ALLFEETL creates the appearance of right-to-left parsing by positioning it at the left edge of the word, and ALLFEETR creates the appearance of left-to-right parsing by positioning it at the right edge.

(10) a. Positions of Monosyllabic Feet

i. Leftward Alignment
(σ)(σσ)(σσ)(σσ)

ii. Rightward Alignment
(σσ)(σσ)(σσ)(σ)

b. Positions of Unparsed Syllables

i. Leftward Alignment
(σσ)(σσ)(σσ)σ

ii. Rightward Alignment
σ(σσ)(σσ)(σσ)

When the relevant irregularity is an unparsed syllable, ALLFEETL creates the appearance of left-to-right parsing by positioning it at the right edge of the word, and ALLFEETR creates the appearance of right-to-left parsing by positioning it at the left edge.

The difficulty emerges when PARSE-σ and FT-BIN can be satisfied simultaneously by locating a layering irregularity in a position that conflicts with the demands of directional constraints. The directional constraints cede control over the position of the layering irregularity to PARSE-σ and FT-BIN, and they no longer have the ability to reliably produce directional parsing effects. The relevant situation arises whenever an odd-numbered heavy syllable is present in an odd-parity form.

The tableau in (11) illustrates the problem using ALLFEETL to represent the demands of directional constraints.

(11) Conflict with Directional Requirements

LLHLHLL	PARSE-σ	FT-BIN	ALLFEETL
☞ a. (LL)(H)(LH)(LL)			** *** *****
b. (LL)(HL)(H)(LL)			** **** *****!
c. (L)(LH)(LH)(LL)		*!	* *** *****
d. (LL)(HL)(HL)L	*!		** ****

When odd-numbered heavy syllables are present in an odd-parity form, PARSE-σ and FT-BIN can both be satisfied by parsing one as a monosyllabic foot, as in (11a) and (11b). Parsing a single odd-numbered syllable as a monosyllabic foot creates strings to either side that are either even-parity or empty. The (non-empty) strings can then be divided into disyllabic feet, and the form achieves exhaustive binary parsing.[3] Notice that the lower-ranked ALLFEETL loses much of the control that it would normally have over the position of the monosyllabic foot but it does retain some influence. Since multiple odd-numbered heavy syllables are available in this example, ALLFEETL ensures that the monosyllabic foot is constructed on the one closest to the left edge.

The directional constraints' loss of control over the position of layering irregularities results in a peculiar type of quantity-sensitivity where footing is sensitive to the weight of odd-numbered syllables in odd-parity forms. Though numerous variations on the theme are possible, the basic characteristics of the Odd Heavy Problem are given in (12).

(12) The Odd Heavy Problem
A heavy syllable *H* is parsed as a monosyllabic foot *iff*
a. *H* occurs in an odd-parity form; and
b. *H* is odd-numbered.

As we shall see below, the particular manifestations of the OHP vary from account to account depending on the constraints that are used to produce directional parsing effects. In general, however, since it arises from the constraints most heavily involved in creating binary stress patterns, the peculiar quantity-sensitivity of the OHP pervades the typologies of binary stress systems predicted by Weak Layering accounts. It is so pervasive, in fact, that it seems impossible for a Weak Layering account to predict a reasonably accurate typology of quantity-insensitive systems.

In this paper, I examine the predictions of Weak Layering approaches in light of the Odd-Parity Parsing Problem, focusing in particular on the Odd Heavy Problem. I have two primary aims. The first is to demonstrate that the problem is due to the structural assumptions of Weak Layering rather than to specific approaches to directionality or to the constraint interactions or global evaluation procedure of Optimality Theory. In support of this aim, Sections 2-4 examine the manifestations of the Odd Heavy Problem in three OT accounts, the Symmetrical

[3] Parsing multiple odd-numbered heavy syllables as monosyllabic feet, as in (LL)(H)(L)(H)(LL) or (LL)(H)L(H)(LL), for example, offers no advantage with respect to FT-BIN and PARSE-σ. Since the string between the two heavy syllables must be odd-parity, either a light monosyllabic foot or an unfooted syllable is required to parse it.

Alignment account of McCarthy and Prince (1993), the Asymmetrical Alignment account of Alber (2005), and the Rhythmic Licensing account of Kager (2001, 2005). Although each of these accounts takes a different approach to directionality effects, we will see that the Odd Heavy Problem emerges in all of them. In Section 6, I consider the manifestations of the Odd Heavy Problem under a simplified version of the serial account of Hayes (1995). In comparing the serial account to the most similar OT account, Symmetrical Alignment, we will find that the differences are fairly small. Although it is exacerbated to some degree in the OT framework, the Odd Heavy Problem is a prominent aspect of the serial account as well. Since the problem cannot be attributed to constraint interaction or global evaluation, the remaining option is that it is due to Weak Layering.

With the structural nature of the problem established, Section 7 outlines a structural solution based on the Weak Bracketing proposal of Hyde (2001, 2002), which takes a different approach to layering irregularities. Under Weak Bracketing, a leftover syllable can be parsed as a monosyllabic foot, as in (13a), or it can be parsed into a disyllabic foot that overlaps another disyllabic foot, as in (13b).

(13) Layering Irregularities under Weak Bracketing

a. Monosyllabic Foot

σ σ σ σ σ σ σ

F F F F

b. Improperly Bracketed Feet

σ σ σ σ σ σ σ

F F F F

The advantage of the type of improper bracketing illustrated in (13b) is that it provides a way to achieve exhaustive binary footing in odd-parity forms without creating conflicts with either faithfulness requirements or directional requirements.

The second of the paper's primary aims is to assess the effectiveness of the different directional constraints that distinguish the three OT approaches considered in Sections 2-4. There has been much discussion in the recent literature of the deficiencies of gradient alignment (Eisner 1997, Kager 2001, McCarthy 2003), but alignment has a distinct advantage in the context of the Odd Heavy Problem. In comparing the different approaches to directionality, we will find that the manifestations of the OHP are least colorful under Symmetrical Alignment, the account where alignment constraints play the most substantial role. As the role of alignment is reduced in favor of restrictions on clash and lapse in the Asymmetrical Alignment and Rhythmic Licensing accounts, the manifestations of the OHP become more and more exotic. For readers who remain unconvinced that the Odd-Parity Parsing Problem presents an insurmountable obstacle for Weak Layering, an account relying heavily on gradient alignment constraints would seem hold the most promise for minimizing its effects.

2 Symmetrical Alignment

The Symmetrical Alignment account of McCarthy and Prince (1993) was the first account of metrical stress in Optimality Theory, and it has become the standard against which all subsequent OT accounts have been judged. In addition to PARSE-σ and FT-BIN, Symmetrical Alignment uses the following four alignment constraints to establish parsing directionality.

(14) Alignment Constraints

a. PRWDL: The left edge of every prosodic word is aligned with the left edge of some foot.

b. PRWDR: The right edge of every prosodic word is aligned with the right edge of some foot.

c. ALLFEETL: The left edge of every foot is aligned with the left edge of some prosodic word.

d. ALLFEETR: The right edge of every foot is aligned with the right edge of some prosodic word.

PRWDL and PRWDR influence the position of a single foot within the prosodic word. PRWDL requires that a single foot occur at left edge, and PRWDR requires that a single foot occur at the right edge. In contrast, ALLFEETL and ALLFEETR influence the position of every foot within the prosodic word. ALLFEETL draws every foot towards the left edge, and ALLFEETR draws every foot towards the right edge. Both types play an important role in positioning layering irregularities under Symmetrical Alignment.

As McCarthy and Prince demonstrate, Symmetrical Alignment produces binary stress patterns only when PARSE-σ and FT-BIN both dominate ALLFEETL and ALLFEETR, as in (15).

(15) Rankings Resulting in Binary Patterns

a. Exhaustive Parsing: PARSE-σ >> FT-BIN >> ALLFEETL, ALLFEETR

b. Underparsing: FT-BIN >> PARSE-σ >> ALLFEETL, ALLFEETR

Though the ranking between FT-BIN and PARSE-σ is not crucial in promoting binary footing in general, it is crucial in determining what type of layering irregularity emerges to parse the leftover syllable of an odd-parity form. Ranking PARSE-σ over FT-BIN, as in (15a), ensures that the leftover syllable is parsed as a monosyllabic foot. Ranking FT-BIN over PARSE-σ, as in (15b), often requires that the leftover syllable remain unparsed, though, as we shall see below, this is not always the case.

After the interaction between the higher-ranked PARSE-σ and FT-BIN has determined the type of layering irregularity to be used in an odd-parity form, the interaction between the lower-ranked ALLFEETL and ALLFEETR largely determines the irregularity's position. When the ranking PARSE-σ >> FT-BIN creates a monosyllabic foot in an odd-parity form, ALLFEETL positions it at the left edge, as in (16).

(16) Exhaustive Parsing: PARSE-σ >> FT-BIN >> ALLFEETL

a. Trochaic: Passamaquoddy (LeSourd 1993)
   i. (wìcoh)(kèta)(hámal) 'he thinks of helping the other'
   ii. (tèh)(sàhkwa)(pàsol)(tíne) 'let's walk around on top'

b. Iambic: Suruwaha (Everett 1996)
   i. (dakù)(hurú) 'to put in the fire'
   ii. (bì)(hawù)(hurá) 'to fly'

The oppositely specified ALLFEETR positions the monosyllabic foot at the right edge, as in (17).

(17) Exhaustive Parsing: PARSE-σ >> FT-BIN >> ALLFEETR

a. Trochaic: Maranungku (Tryon 1970)
   i. (yáŋar)(màta) 'the Pleiades'
   ii. (láŋka)(ràta)(tì) 'prawn'

b. Iambic: *Unattested*
   i. (σσ́)(σσ́)(σσ́)
   ii. (σσ́)(σσ́)(σσ́)(σ́)

When the two directional patterns are realized in both a trochaic version and an iambic version, the result is four distinct stress patterns, three of which are attested.

When the ranking FT-BIN >> PARSE-σ leaves a single syllable unparsed in odd-parity forms, ALLFEETL locates the unparsed syllable at the right edge.

(18) Unidirectional Underparsing: FT-BIN >> PARSE-σ >> ALLFEETL

a. Trochaic: Pintupi (Hansen and Hansen 1969)

i. (tjámu)(lìmpa)(tjùnku) ‘our relation’

ii. (t̪íl̪i)(řìŋu)(làmpa)tju ‘the fire for our benefit flared up’

b. Iambic: Araucanian (Echeverria and Contreras 1965)

i. (elú)(muyù) ‘give us’

ii. (elú)(aè)new ‘he will give me’

In contrast, ALLFEETR locates the unparsed syllable at the left edge.

(19) Unidirectional Underparsing: FT-BIN >> PARSE-σ >> ALLFEETR

a. Trochaic: Nengone (Tryon 1967)

i. (àča)(káze) ‘sorcerer’

ii. wa(čàru)(wíwi) ‘eel’

b. Iambic: *Unattested*

i. (σσ́)(σσ́)(σσ́)

ii. σ(σσ́)(σσ́)(σσ́)

When the two directional patterns are realized in trochaic and iambic versions, the result is again four distinct stress patterns, three of which are attested.

Adding PRWDL and PRWDR to the mix allows Symmetrical Alignment to produce additional underparsing patterns, patterns that exhibit a conflicting directional orientation. Since PRWDL and PRWDR position a single foot at the specified edge, they can limit the ability of a lower-ranked ALLFEETL or ALLFEETR constraint to draw every foot in the opposite direction. This means that they also limit the ability of ALLFEETL and ALLFEETR to push an unparsed syllable as far away from the designated edge as they would normally prefer. Ranking PRWDL above ALLFEETR strands a single foot at the left edge while the remaining feet are drawn to the right. The result is that the unparsed syllable follows the initial foot, as in (20).

(20) Bidirectional Underparsing:
FT-BIN >> PARSE-σ >> ALLFEETR; PRWDL >> ALLFEETR

a. Trochaic: Garawa (Furby 1974)
   i. (yáka)(làka)(làmpa) ‘loose’
   ii. (ŋánki)ři(kìřim)(pàya) ‘fought with boomerangs’

b. Iambic: *Unattested*
   i. (σσ́)(σσ́)(σσ́)
   ii. (σσ́)σ(σσ́)(σσ́)

Ranking PRWDR above ALLFEETL strands a single foot at the right edge while the remaining feet are drawn to the left. This locates the unparsed syllable just to the left of the final foot, as in (21).

(21) Bidirectional Underparsing:
FT-BIN >> PARSE-σ >> ALLFEETL; PRWDR >> ALLFEETL

a. Trochaic: Piro (Matteson 1965)
   i. (pèt͡šhi)(t͡šìmat)(lóna) ‘they say they stalk it’
   ii. (rùslu)(nòti)nit(kána) ‘their voices already changed’

b. Iambic: *Unattested*
   i. (σσ́)(σσ́)(σσ́)
   ii. (σσ́)(σσ́)σ(σσ́)

Since the two bidirectional parsing patterns can be realized with either iambic or trochaic footing, four additional stress patterns are predicted. The trochaic versions are attested, but the iambic versions are unattested.

The patterns in (16-21) are believed to be the core predictions of Symmetrical Alignment. Since the patterns are all thought (and intended) to be quantity-insensitive, however, the belief is actually mistaken. As we saw in Section 1, the presence of heavy syllables can allow PARSE-σ and FT-BIN to be satisfied simultaneously in a way that brings them in to conflict with directionality constraints, resulting in the Odd Heavy Problem.

2.1 The Effects of Odd-Numbered Heavy Syllables

Although the constraints utilized by a particular account to determine parsing directionality do not actually create the Odd Heavy Problem, they do help to the determine its specific manifestations by placing additional restrictions on the position of heavy monosyllabic feet. ALLFEETL and ALLFEETR prefer that monosyllabic feet, in general, occur as close as possible to the designated edge of alignment. This means, of course, that they prefer the heavy monosyllabic foot created under the OHP to occur as near as possible to the designated edge. This effect produces Symmetrical Alignment's particular manifestation of the OHP.

(22) The Odd Heavy Problem: Symmetrical Alignment Version
A heavy syllable *H* is parsed as a monosyllabic foot *iff*
a. *H* occurs in an odd-parity form; and
b. *H* is odd-numbered; and
c. *H* is the heavy syllable conforming to (a,b) that is closest to the preferred edge of alignment.

The Symmetrical Alignment version has the basic property, discussed in Section 1, of making footing sensitive to the weight of odd-numbered syllables in odd-parity forms. It also specifies, however, which syllable footing will be sensitive to when multiple odd-numbered heavy syllables are available. When multiple odd-numbered heavy syllables are present, the one closest to the edge preferred by the highest ranked foot alignment constraint, ALLFEETL or ALLFEETR, is parsed as a monosyllabic foot.

Every quantity-insensitive binary pattern predicted by Symmetrical Alignment exhibits the effects of the OHP, which means, of course, that Symmetrical Alignment does not actually produce quantity-insensitive binary patterns. To illustrate, consider the ranking FT-BIN >> PARSE-σ >> ALLFEETL. With trochaic footing, this ranking is intended to position stress on every odd-numbered syllable counting from the left, except the final syllable, a pattern that can be found in Pintupi. When one or more odd-numbered heavy syllables are present in an odd-parity form, however, as illustrated in (23), the Symmetrical Alignment version of the OHP emerges.

(23) The Effect of Odd-Numbered Heavy Syllables

LLHLHLL	FT-BIN	PARSE-σ	ALLFEETL
a. (Ĺ)(ĹH)(ĹH)(ĹL)	*!		* *** *****
b. (ĹL)(H́L)(H́L)L		*!	** ****
☞ c. (ĹL)(H́)(ĹH)(ĹL)			** *** *****
d. (ĹL)(H́L)(H́)(ĹL)			** **** *****!

In (23), candidate (b) exhibits the quantity-insensitive Pintupi pattern, the pattern that the example ranking is intended to produce, but the quantity-sensitive candidate (c) emerges as the winner. The high-ranking FT-BIN excludes candidates that have a light monosyllabic foot, and PARSE-σ excludes candidates that have an unparsed syllable, including the candidate with the desired pattern, candidate (b). In contrast, candidates (c,d) parse a single odd-numbered heavy syllable as a monosyllabic foot, satisfying FT-BIN and PARSE-σ simultaneously. The lower ranked ALLFEETL excludes candidate (d) in favor of candidate (c), ensuring that the monosyllabic foot is constructed on the odd-numbered heavy syllable closest to the left edge.

Given the results in (23), we can see that the ranking intended to produce the quantity-insensitive Pintupi pattern actually produces the quantity-sensitive pattern summarized in (24).

(24) FT-BIN >> PARSE-σ >> ALLFEETL

a. (ĹL)(ĹL)(ĹL) Even-parity

b. (ĹL)(ĹL)(ĹL)L Odd-parity without odd-numbered H syllables

c. (ĹL)(H́)(ĹH)(ĹL) Odd-parity with odd-numbered H syllables

When an odd-parity form does not have odd-numbered heavy syllables, as in (24b), a final unparsed syllable results in a final lapse configuration, as expected. When odd-numbered heavy syllables are present in an odd-parity form, however, as in (24c), the leftmost is parsed a monosyllabic foot. The result is an internal clash rather than a final lapse.

2.2 Summary of Predictions

Although the peculiar type of quantity-sensitivity characteristic of the Odd Heavy Problem is obviously not the desired result, it emerges in every ranking of PARSE-σ, FT-BIN, ALLFEETL, and ALLFEETR that produces binary patterns. In other words, it emerges in every binary pattern predicted under Symmetrical Alignment. Since the relevant constraint interactions would be similar to those discussed in the previous section, I will not examine additional individual rankings. The predicted typology is summarized in (25-27). Two forms are used to illustrate each of the predicted stress systems. The first is an odd-parity form with all light syllables that indicates the ranking's intended result. The second is an odd-parity form with two internal odd-numbered heavy syllables. This form demonstrates the effects of the OHP.

The exhaustive parsing patterns predicted under Symmetrical Alignment are summarized in (25). Four patterns, two trochaic and two iambic, are predicted. Each exhibits the effects of the OHP, and each is unattested.

(25) Exhaustive Parsing: PARSE-σ >> FT-BIN >> ALLFEETL, ALLFEETR

a. *Unattested Trochaic*: ALLFEETL >> ALLFEETR
(Ĺ)(ĹL)(ĹL)(ĹL), (ĹL)(H́)(ĹH)(ĹL)

b. *Unattested Trochaic*: ALLFEETR >> ALLFEETL
(ĹL)(ĹL)(ĹL)(Ĺ), (ĹL)(H́L)(H́)(ĹL)

c. *Unattested Iambic*: ALLFEETL >> ALLFEETR
(Ĺ)(LĹ)(LĹ)(LĹ), (LĹ)(H́)(LH́)(LĹ)

d. *Unattested Iambic*: ALLFEETR >> ALLFEETL
(LĹ)(LĹ)(LĹ)(Ĺ), (LĹ)(HĹ)(H́)(LĹ)

The unidirectional underparsing patterns predicted under Symmetrical Alignment are summarized in (26). There are two trochaic patterns and two iambic patterns, each of which exhibits the effects of the OHP. All four patterns are unattested.

(26) Unidirectional Underparsing: Ft-Bin >> Parse-σ >> AllFeetL, AllFeetR

a. *Unattested Trochaic OHP*: AllFeetL >> AllFeetR
(ĹL)(ĹL)(ĹL)L, (ĹL)(H́)(ĹH)(ĹL)

b. *Unattested Trochaic*: AllFeetR >> AllFeetL
L(ĹL)(ĹL)(ĹL), (ĹL)(H́L)(H́)(ĹL)

c. *Unattested Iambic*: AllFeetL >> AllFeetR
(LĹ)(LĹ)(LĹ)L, (LĹ)(H́)(LH́)(LĹ)

d. *Unattested Iambic*: AllFeetR >> AllFeetL
L(LĹ)(LĹ)(LĹ), (LĹ)(HĹ)(H́)(LĹ)

Finally, (27) summarizes the bidirectional underparsing patterns predicted under Symmetrical Alignment. Four patterns, two trochaic and two iambic are predicted. Each suffers the effects of the OHP, and each is unattested.

(27) Bidirectional Underparsing: Ft-Bin >> Parse-σ >> AllFeetL, AllFeetR

a. *Unattested Trochaic*: PrWdR >> AllFeetL
(ĹL)(ĹL)L(ĹL), (ĹL)(H́)(ĹH)(ĹL)

b. *Unattested Trochaic*: PrWdL >> AllFeetR
(ĹL)L(ĹL)(ĹL), (ĹL)(H́L)(H́)(ĹL)

c. *Unattested Iambic*: PrWdR >> AllFeetL
(LĹ)(LĹ)L(LĹ), (LĹ)(H́)(LH́)(LĹ)

d. *Unattested Iambic*: PrWdL >> AllFeetR
(LĹ)L(LĹ)(LĹ), (LĹ)(HĹ)(H́)(LĹ)

As indicated in (25-27), then, Symmetrical Alignment fails to predict any of the attested quantity-insensitive patterns, but it does predict unattested OHP variations on these patterns. The overall result is a rather serious problem of both undergeneration and overgeneration.[4]

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[4] The undergeneration aspect of the problem could be partially addressed by positing separate moraic and syllabic minimal foot requirements. A syllabic minimality requirement would allow OT Weak Layering accounts to produce quantity-insensitive underparsing patterns. The case for an independent syllabic requirement is not particularly strong, however. First, as Hayes (1995) notes, there do not seem to be any clear cases of languages that have heavy syllables but that categorically prohibit heavy monosyllabic feet. Second, most OT approaches already have constraints that promote minimally disyllabic feet, at least in non-minimal forms. AllFeetL, AllFeetR, and *Clash, for example, all have this effect. Finally, disyllabic minimality would do nothing to solve the other sub-problem of the Odd-Parity Parsing Problem, the Even-Only Problem. Adopt-

3 Asymmetrical Alignment

In some respects, the Asymmetrical Alignment account of Alber (2005) is quite similar to the Symmetrical Alignment account: FT-BIN, PARSE-σ, and alignment all continue to play central roles. There are some important differences, however. The constraints primarily responsible for producing directional parsing effects are given in (28).

(28) a. Alignment Constraints
- i. ALLFEETL: The left edge of every foot is aligned with the left edge of some prosodic word.
- ii. LEFTMOST: The left edge of every prosodic word is aligned with the left edge of some head foot.
- iii. RIGHTMOST: The right edge of every prosodic word is aligned with the right edge of some head foot.

b. Rhythmic Well-Formedness Constraints
- i. *CLASH: No adjacent stressed syllables.
- ii. *LAPSE: No adjacent stressless syllables.

Notice that the ALLFEETL constraint of the Symmetrical Alignment account is present but that the ALLFEETR constraint is missing. The gap is intended to allow Asymmetrical Alignment to avoid some of the unattested patterns produced under Symmetrical Alignment, but it also means that *CLASH (Liberman and Prince 1977, Prince 1983) and *LAPSE (Selkirk 1984) must play central roles in producing directionality effects. *Clash prohibits adjacent stressed syllables, and *Lapse prohibits adjacent stressless syllables. Notice also that the constraints aligning the edges of prosodic words with feet, LEFTMOST and RIGHTMOST, refer specifically to head feet. This limits the position of primary stress with respect to unparsed syllables in certain configurations, a result that need not be of special concern here.

The rankings that produce binary patterns are similar to those involved in Symmetrical Alignment. For a binary pattern to emerge, it is typically the case that PARSE-σ and FT-BIN must both dominate ALLFEETL, as in (29).

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ing a separate syllabic minimality requirement would seem, at best, then, to be an ad hoc solution to the Odd Heavy problem, and an ad hoc half-solution at that. It would not fully address the undergeneration aspect of the problem, and it would do nothing to address the overgeneration aspect.

(29) Rankings Resulting in Binary Patterns

a. Exhaustive Parsing: PARSE-σ >> FT-BIN >> ALLFEETL

b. Underparsing: FT-BIN >> PARSE-σ >> ALLFEETL

(30) Additional Ranking Resulting in Binary Patterns

*LAPSE >> ALLFEETL >> PARSE-σ

The ranking between PARSE-σ and FT-BIN determines the type of layering irregularity that emerges in odd-parity forms. Ranking PARSE-σ above FT-BIN, as in (29a), results in a monosyllabic foot. Ranking FT-BIN above PARSE-σ, as in (29b), typically results in an unfooted syllable. Note, however, that the presence of *LAPSE in the constraint set does offer a way to obtain some binary patterns without requiring that PARSE-σ dominate ALLFEETL. This is important because patterns that emerge under the addtional ranking in (30) escape the effects of the Odd Heavy Problem.

Since I have already discussed the effects of alignment, I begin here by examining the effects of *CLASH and *LAPSE. Under Weak Layering, clash and lapse avoidance have a significant effect on the position of layering irregularities, though their influence is only indirect. First, consider the effect of *CLASH. The potential for clash in binary patterns typically emerges only with the presence of a monosyllabic foot, so the influence of *CLASH is usually limited to forms with exhaustive parsing. In trochaic systems, clash arises whenever a monosyllabic foot precedes a trochee, so *CLASH requires that a monosyllabic foot occur in final position, as in (31a). In iambic systems, clash arises whenever a monosyllabic foot follows an iamb, so *CLASH requires that a monosyllabic foot occur in initial position, as in (31b).

(31) Exhaustive Parsing without Clash: PARSE-σ >> FT-BIN >> ALLFEETL

a. Trochaic: Maranungku	b. Iambic: Suruwaha
*CLASH >> ALLFEETL	*CLASH, ALLFEETL
(ĹL)(ĹL)(ĹL)	(LĹ)(LĹ)(LĹ)
(ĹL)(ĹL)(ĹL)(Ĺ)	(Ĺ)(LĹ)(LĹ)(LĹ)

The result is two exhaustive parsing patterns, one trochaic and one iambic. Both are attested.

The effect of *LAPSE is based on similar considerations. Since the potential for lapse only emerges in binary patterns with the presence of an unparsed syllable, *LAPSE only has an effect in forms that are underparsed. In trochaic systems, lapse arises whenever an unparsed syllable follows a trochee, so *LAPSE requires an unparsed syllable to occur in initial position, as in (32a). In iambic systems, lapse arises whenever an unparsed syllable precedes an iamb, so *LAPSE requires an unparsed syllable to occur in final position, as in (32b). The result is again two patterns, one trochaic and one iambic, and both are attested.

(32) Underparsing without Lapse: FT-BIN >> PARSE-σ >> ALLFEETL

a. Trochaic: Nengone	b. Iambic: Araucanian
*LAPSE >> ALLFEETL	*LAPSE, ALLFEETL
(ĹL)(ĹL)(ĹL)	(LĹ)(LĹ)(LĹ)
L(ĹL)(ĹL)(ĹL)	(LĹ)(LĹ)(LĹ)L

(33) Additional Rankings for Underparsing without Lapse

a. Trochaic: *LAPSE >> ALLFEETL >> PARSE-σ; FT-BIN, *CLASH >> PARSE-σ
b. Iambic: *LAPSE >> ALLFEETL >> PARSE-σ

The (32) patterns are one of two types that can also emerge under the ranking *LAPSE >> ALLFEETL >> PARSE-σ. As indicated in (33), however, for the trochaic version to emerge, it is also necessary that FT-BIN or *CLASH dominate PARSE-σ. This prevents a monosyllabic foot from emerging at the left edge in odd-parity forms.

*CLASH and *LAPSE, then, can have a significant effect on the location of layering irregularities and, if left to themselves, would only produce attested patterns. Unfortunately, since several attested patterns tolerate clash or lapse, an account based on clash and lapse avoidance alone is too restrictive. To remedy this situation, the strategy under Asymmetrical Alignment is to introduce clash and lapse in a few positions through a limited use of alignment constraints.

In exhaustive parsing systems, a trochaic pattern with clash at the left edge is produced when ALLFEETL dominates *CLASH. As indicated in (34), ALLFEETL positions the monosyllabic foot in the odd-parity form at the left edge of the prosodic word, resulting in a clash configuration. No iambic pattern with clash can be produced, however, because Asymmetrical Alignment does not have an ALLFEETR constraint to position the monosyllabic foot at the right edge in odd-parity forms. Since an iambic pattern with clash at the right edge is unattested, this is the desired result.

(34) Exhaustive Parsing with Clash: PARSE-σ >> FT-BIN >> ALLFEETL >> *CLASH
Trochaic: Passamaquoddy
(ĹL)(ĹL)(ĹL)
(Ĺ)(ĹL)(ĹL)(ĹL)

(35) Additional Ranking for Exhaustive Parsing with Clash
*LAPSE >> ALLFEETL >> PARSE-σ >> FT-BIN, *CLASH

As indicated in (35), the (34) pattern is the second type that can emerge under the ranking *LAPSE >> ALLFEETL >> PARSE-σ. In this case, however, it is also necessary that PARSE-σ dominate both FT-BIN and *CLASH

In underparsing systems, a trochaic pattern with lapse at the right edge is produced when ALLFEETL dominates *LAPSE. By drawing all feet to the left of the prosodic word, ALLFEETL positions the unparsed syllable at the right edge in the odd-parity form, resulting in a lapse.

(36) Underparsing with Peripheral Lapse:
FT-BIN >> PARSE-σ >> ALLFEETL >> *LAPSE
Trochaic: Pintupi
(ĹL)(ĹL)(ĹL)
(ĹL)(ĹL)(ĹL)L

No corresponding iambic pattern with lapse at the left edge can be produced, however, because there is no ALLFEETR constraint to locate an unfooted syllable in initial position. Since iambic patterns of this type are unattested, this is the desired result.

To this point, then, the absence of an ALLFEETR constraint allows Asymmetrical Alignment to be extremely accurate in its predictions. *CLASH, *LAPSE, and ALLFEETL all locate layering irregularities in positions where they result in attested patterns. Removing ALLFEETR from the constraint set prevents it from positioning monosyllabic feet at the right edge and unparsed syllables at the left edge, where they are unattested in iambic systems. When we consider the additional alignment constraints, LEFTMOST and RIGHTMOST, however, the results are more mixed.

Given the absence of an ALLFEETR constraint, the LEFTMOST constraint does not have the influence over the position of unparsed syllables that its counterpart, PRWDL, has under Symmetrical Alignment. It usefulness is limited to determining the position of primary stress. The RIGHTMOST constraint, however, can be used to introduce conflicting directionality when it dominates ALLFEETL. As indicated in (37), RIGHTMOST strands a single foot at the right edge of the prosodic word, and ALLFEETL draws the remaining feet towards the left. In odd-parity forms, this positions the unparsed syllable just to the left of the final foot. The result with trochaic footing is an attested pattern, but the result with iambic footing is unattested.

(37) Underparsing with Internal Lapse:
FT-BIN >> PARSE-σ >> ALLFEETL >> *LAPSE; RIGHTMOST >> ALLFEETL

a. Trochaic: Piro	b. Iambic: *Unattested*
(L̀L)(L̀L)(ĹL)	(LL̀)(LL̀)(LĹ)
(L̀L)(L̀L)L(ĹL)	(LL̀)(LL̀)L(LĹ)

The consequence of not having an ALLFEETR constraint in this context is that Asymmetrical Alignment cannot produce conflicting directionality patterns where a single foot is stranded at the left edge. While this is a desirable result in iambic systems, since the iambic version is unattested, it is an undesirable result in trochaic systems. The trochaic version can be found in languages like Garawa, Indonesian (Cohn 1989), Norwegian (Lorentz 1996), and Spanish (Harris 1983).[5]

The patterns in (31, 32, 34, 36, 37) are assumed to be the core predictions of Asymmetrical Alignment. In reality, however, since the patterns do not reflect the effects of PARSE-σ and FT-BIN when heavy syllables are present, the core predictions are actually quite different. Though the presence of *CLASH and *LAPSE in the constraint set does allow Asymmetrical Alignment to produce a few patterns that are truly quantity-insensitive, the remaining patterns are all quantity-sensitive, with most exhibiting one or more versions of the Odd Heavy Problem.

3.1 Manifestations of the Odd Heavy Problem

Three different versions of the Odd Heavy Problem are possible under Asymmetrical Alignment, with the ranking of *CLASH determining which version emerges in a particular system. To illustrate the different versions, we can consider an underparsing pattern where *CLASH is not supposed to be crucial and then observe its

[5] There is some disagreement in the literature as to whether or not Garawa, Indonesian, and Spanish are convincing examples of the initial dactyl pattern. Alber (2005) rejects each of these examples while Kager (2001) rejects Indonesian and Spanish but accepts Garawa. See Hyde (2008a), however, for arguments that each of these languages exhibits the initial dactyl pattern.

effects under various rankings. Consider, for example, a ranking with the dominance relations in (38).

(38) Piro Ranking

FT-BIN >> PARSE-σ >> ALLFEETL >> *LAPSE; RIGHTMOST >> ALLFEETL

If the ranking were truly quantity-insensitive, the result with trochaic footing would be the Piro pattern regardless of whether or not the input contained heavy syllables. Odd-parity forms would have a single foot stranded at the right edge, all other feet would be drawn to the left, and there would be an unparsed syllable just to the left of the final foot.

The first version of the Odd Heavy Problem emerges when *CLASH and FT-BIN both dominate PARSE-σ.

(39) OHP: Asymmetrical Alignment Version 1

A heavy syllable *H* is parsed as a monosyllabic foot *iff*

a. *H* occurs in an odd-parity form; and
b. *H* is odd-numbered; and
c. parsing *H* as a monosyllabic foot would not result in clash.

As indicated in (39), this version retains the essential characteristics of the OHP in that footing is sensitive to the weight of odd-numbered syllables in odd-parity forms. In this version, however, heavy syllables can only be parsed as monosyllabic feet in those positions where a monosyllabic foot would not result in a clash configuration. In iambic systems, this means that only initial heavy syllables can be parsed as monosyllabic feet. In trochaic systems, it means that only final heavy syllables can be parsed as monosyllabic feet.

Adding *CLASH to the Piro ranking in (38) so that it dominates PARSE-σ, we can see the effects of the first version of the OHP in a trochaic bidirectional system.

(40) Odd Heavy Problem: Asymmetrical Alignment Version 1

a. LLHLHLH	*CLASH	FT-BIN	PARSE-σ	RMOST	FEETL
i. (L̀L)(H̀L)H(ĹH)			*!		7
☞ ii. (L̀L)(H̀L)(H̀L)(H́)					12
iii. (L̀L)(H̀)(L̀H)(ĹH)	*!				10
iv. (L̀L)(H̀L)(H̀)(ĹH)	*!				11
b. LLHLHLL					
☞ i. (L̀L)(H̀L)H(ĹL)			*		7
ii. (L̀L)(H̀L)(H̀L)(Ĺ)		*!			12
iii. (L̀L)(H̀)(L̀H)(ĹL)	*!				10
iv. (L̀L)(H̀L)(H̀)(ĹL)	*!				11

In (40a), we see the result for an odd-parity form that has a heavy syllable in a position to avoid clash. Parsing the final heavy syllable as a monosyllabic foot satisfies FT-BIN and PARSE-σ simultaneously without violating *CLASH, and an exhaustive parsing pattern emerges in place of the expected bidirectional pattern. In contrast, in (40b), we see the result for an odd-parity form that has heavy syllables, but not in a position where clash can be avoided. Since FT-BIN and PARSE-σ cannot be satisfied simultaneously in this case without violating *CLASH, a single syllable is left unfooted, and the expected bidirectional pattern emerges.

The results of positioning *CLASH above PARSE-σ in the ranking intended to produce the quantity-insensitive Piro pattern are summarized in (41).

(41) *CLASH, FT-BIN >> PARSE-σ >> ALLFEETL >> *LAPSE; RIGHTMOST >> ALLFEETL

a. (ĹL)(ĹL)(ĹL) Even-parity
b. (ĹL)(ĹL)L(ĹL) Odd-parity without H syllables
c. (L̀L)(H̀L)(H̀L)(H́) Odd-parity with H in non-clash position
d. (L̀L)(H̀L)H(ĹL) Odd-parity with internal H syllables only

When an odd-parity form does not have odd-numbered heavy syllables, as in (41b), the antepenult is left unparsed, resulting in an internal lapse configuration, as expected. When a final odd-numbered heavy syllable is present in an odd-parity form, however, as in (41c), it is parsed as a monosyllabic foot. The result is exhaustive parsing, and the expected internal lapse disappears. When the only heavy syllables occur in nonfinal positions, as in (41d), however, the expected bidirectional pattern reemerges.

The second version of the OHP under Asymmetrical Alignment emerges when ALLFEETL dominates *CLASH.

(42) OHP: Asymmetrical Alignment Version 2
A heavy syllable *H* is parsed as a monosyllabic foot *iff*
a. *H* occurs in an odd-parity form; and
b. *H* is odd-numbered; and
c. *H* is the heavy syllable conforming to (a,b) that is closest to the left edge.

This second version is similar to the version found under Symmetrical Alignment in that the additional restriction on the position of heavy monosyllabic feet is due to alignment. Since only the left edge can be the preferred edge of foot alignment, however, it is always the leftmost odd-numbered heavy syllable that is parsed as a monosyllabic foot.

Positioning *CLASH below ALLFEETL in the ranking intended to produce the quantity-insensitive Piro pattern yields the following results when odd-numbered heavy syllables are present.

(43) Odd Heavy Problem: Asymmetrical Alignment Version 2

a. LLHLHLH	FT-BIN	PARSE-σ	RMOST	FEETL	*CLASH
i. (ĹL)(H́L)H(ĹH)		*!		7	
ii. (ĹL)(H́L)(H́L)(H́)				12!	
☞ iii. (ĹL)(H́)(ĹH)(ĹH)				10	*
iv. (ĹL)(H́L)(H́)(ĹH)				11!	*
b. LLHLHLL					
i. (ĹL)(H́L)H(ĹL)		*!		7	
ii. (ĹL)(H́L)(H́L)(Ĺ)	*!			12	
☞ iii. (ĹL)(H́)(ĹH)(ĹL)				10	*
iv. (ĹL)(H́L)(H́)(ĹL)				11!	*

In (43a,b), the high-ranking FT-BIN and PARSE-σ ensure that a single odd-numbered heavy syllable is parsed as a monosyllabic foot. This is true whether one of the heavy syllables is a position to avoid clash, as in (43a), or not, as in (43b). ALLFEETL establishes the position of the monosyllabic foot in both cases. Since *CLASH is low-ranking, it cannot prevent the clash configurations produced by the internal monosyllabic feet, and it plays no role in selecting the optimal candidates.

The results of positioning *CLASH below ALLFEETL in the Piro ranking are summarized in (44).

(44) FT-BIN >> PARSE-σ >> ALLFEETL >> *CLASH, *LAPSE; RIGHTMOST >> ALLFEETL

a. (ĹL)(ĹL)(ĹL) Even-parity
b. (ĹL)(ĹL)L(ĹL) Odd-parity without H syllables
c. (ĹL)(H́)(ĹH)(ĹH) Odd-parity with H in non-clash position
d. (ĹL)(H́)(ĹH)(ĹL) Odd-parity with internal H syllables only

When an odd-parity form does not have odd-numbered heavy syllables, as in (44b), the antepenult is left unparsed and the expected internal lapse configuration emerges. When odd-numbered heavy syllables are present, however, as in (44c,d), the leftmost is parsed as a monosyllabic foot.

Asymmetrical Alignment's final version of the OHP is a combination of the previous two. It emerges when FT-BIN and PARSE-σ both dominate *CLASH and *CLASH dominates ALLFEETL.

(45) OHP: Asymmetrical Alignment Version 3
A heavy syllable *H* is parsed as a monosyllabic foot *iff*

a. *H* occurs in an odd-parity form; and
b. *H* is odd-numbered; and
c. parsing *H* as a monosyllabic foot would not result in clash; or
d. if there is no heavy syllable that meets (c), *H* is the heavy syllable conforming to (a,b) that is closest to the left edge.

As indicated in (45), the preference is to parse an odd-numbered heavy syllable as a monosyllabic foot in a position where it will not result in a clash configuration. If there is no heavy syllable in a position where clash can be avoided, however, the odd-numbered heavy syllable closest to the left edge will be parsed as a monosyllabic foot.

For a trochaic system like Piro, then, the result changes depending on whether the final syllable is heavy or light.

(46) Odd Heavy Problem: Asymmetrical Alignment Version 3

a. LLHLHLH	FT-BIN	PARSE-σ	RMOST	*CLASH	FEETL
i. (ĹL)(H́L)H(ĹH)		*!			7
☞ ii. (ĹL)(H́L)(H́L)(H́)					12
iii. (ĹL)(H́)(ĹH)(ĹH)				*!	10
iv. (ĹL)(H́L)(H́)(ĹH)				*!	11
b. LLHLHLL					
i. (ĹL)(H́L)H(ĹL)		*!			7
ii. (ĹL)(H́L)(H́L)(Ĺ)	*!				12
☞ iii. (ĹL)(H́)(ĹH)(ĹL)				*	10
iv. (ĹL)(H́L)(H́)(ĹL)				*	11!

If the final syllable is heavy, as in (46a), *CLASH ensures that the monosyllabic foot occurs in final position. Though there are other odd-numbered heavy syllables present that could be parsed as monosyllabic feet with fewer ALLFEETL violations, the final syllable is selected in order to avoid clash. If the final syllable is light, however, as in (46b), a nonfinal odd-numbered heavy syllable is parsed as a monosyllabic foot, with ALLFEETL ensuring that it is the leftmost. Although this results in a *CLASH violation, it allows the high-ranking FT-BIN and PARSE-σ to be satisfied simultaneously.

The table in (47) summarizes the results of ranking *CLASH below PARSE-σ and above ALLFEETL in the ranking intended to produce the quantity-insensitive Piro pattern.

(47) FT-BIN >> PARSE-σ >> *CLASH >>ALLFEETL >> *LAPSE; RIGHTMOST >> ALLFEETL

a. (ĹL)(ĹL)(ĹL) Even-parity
b. (ĹL)(ĹL)L(ĹL) Odd-parity without H syllables
c. (ĹL)(H́L)(H́L)(H́) Odd-parity with H in non-clash position
d. (ĹL)(H́)(ĹH)(ĹL) Odd-parity with internal H syllables only

When an odd-parity form does not have odd-numbered heavy syllables, as in (47b), the antepenult is left unparsed and the expected bidirectional pattern emerges. When a final odd-numbered heavy syllable is present in an odd-parity form, as in (47c), it is parsed as a monosyllabic foot. When the only heavy syllables occur in nonfinal positions, as in (47d), the leftmost is parsed as a monosyllabic foot.

3.2 Summary of Predictions

Since the Asymmetrical Alignment approach predicts a number of patterns with different versions of the Odd Heavy Problem, I will summarize the predictions in five steps. In the tables in (48-54), each of the predicted systems is illustrated using three forms. The first is an odd-parity form containing only light syllables. This form illustrates the intended pattern. The second two forms are odd-parity forms with odd-numbered heavy syllables. One contains a heavy syllable in a position where a monosyllabic foot can avoid clash, final in trochaic systems and initial in iambic systems. The other contains only medial heavy syllables. These forms illustrate the effects of the three different manifestations of the OHP under Asymmetrical Alignment.

First are two exhaustive parsing patterns, one trochaic and one iambic, that never tolerate clash.

(48) Exhaustive Parsing without Clash: PARSE-σ >> FT-BIN >> ALLFEETL

a. Trochaic: Maranungku: *CLASH >> ALLFEETL
(ĹL)(ĹL)(ĹL)(Ĺ), (ĹL)(H́L)(H́L)(H́), (ĹL)(H́L)(H́L)(Ĺ)

b. Iambic: Suruwaha
(Ĺ)(LĹ)(LĹ)(LĹ), (H́)(LH́)(LH́)(LĹ), (Ĺ)(LH́)(LH́)(LĹ)

The patterns are both quantity-insensitive, since the same pattern always emerges in odd-parity forms regardless of the occurrence or position of heavy syllables. Both patterns are attested.

The second type of pattern is exhaustive parsing where clash is tolerated. Asymmetrical Alignment predicts two trochaic patterns of this type.

(49) Trochaic Exhaustive Parsing with Clash

a. Passamaquoddy: *LAPSE >> ALLFEETL >> PARSE-σ >> *CLASH, FT-BIN
(Ĺ)(ĹL)(ĹL)(ĹL), (Ĺ)(ĹH)(ĹH)(ĹH), (Ĺ)(ĹH)(ĹH)(ĹL)

b. *Unattested AA OHP 2*: PARSE-σ >> FT-BIN >> ALLFEETL >> *CLASH
(Ĺ)(ĹL)(ĹL)(ĹL), (ĹL)(H́)(ĹH)(ĹH), (ĹL)(H́)(ĹH)(ĹL)

While the pattern in (49a) is quantity-insensitive and attested, the pattern in (49b) exhibits the effects of Asymmetrical Alignment's second version of the OHP and is unattested. The different results are due to the different rankings of ALLFEETL, PARSE-σ, and FT-BIN. When ALLFEETL dominates PARSE-σ and FT-BIN, as in (49a), PARSE-σ and FT-BIN cannot affect the position of the monosyllabic foot, so there are no OHP effects.

The third type of pattern is underparsing without lapse. Asymmetrical Alignment predicts nine patterns of this type: four trochaic patterns and four iambic patterns.[6]

(50) Trochaic Underparsing without Lapse

a. *LAPSE >> ALLFEETL >> PARSE-σ, LEFTMOST
   Nengone: *CLASH >> PARSE-σ, LEFTMOST
   L(ĹL)(ĹL)(ĹL), L(ĹH)(ĹH)(ĹH), L(ĹH)(ĹH)(ĹL)

b. FT-BIN >> PARSE-σ >> ALLFEETL, LEFTMOST; *Lapse >> ALLFEETL, LEFTMOST
   i. *Unattested AA OHP 1*: *CLASH >> PARSE-σ
      L(ĹL)(ĹL)(ĹL), (ĹL)(H́L)(H́L)(H́), L(ĹH)(ĹH)(ĹL)
   ii. *Unattested AA OHP 2*: ALLFEETL >> *CLASH
      L(ĹL)(ĹL)(ĹL), (ĹL)(H́)(ĹH)(ĹH), (ĹL)(H́)(ĹH)(ĹL)
   iii. *Unattested AA OHP 3*: PARSE-σ >> *CLASH >> ALLFEETL
      L(ĹL)(ĹL)(ĹL), (ĹL)(H́L)(H́L)(H́), (ĹL)(H́)(ĹH)(ĹL)

As indicated in (50), one of the trochaic patterns, (50a), is quantity-insensitive and attested. The three trochaic patterns in (50b), however, each exhibit a different version of the OHP, and are unattested.

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[6] An additional trochaic pattern emerges under the rankings *LAPSE >> ALLFEETL >> PARSE-σ, LEFTMOST and FT-BIN >> PARSE-σ >> *CLASH. The result is a quantity-sensitive version of the Nengone pattern where quantity-sensitivity is limited to initial syllables. If the initial syllable of an odd-parity form is heavy, it is stressed: (H́)(ĹL)(ĹL)(ĹL). If it is light, it is unstressed: L(ĹL)(ĹL)(ĹL), L(ĹH)(ĹH)(ĹL). Though quantity-sensitive and unattested, this particular pattern differs from the primary versions of the OHP possible under Asymmetrical Alignment.

(51) Iambic Underparsing without Lapse

a. *LAPSE >> ALLFEETL >> PARSE-σ, RIGHTMOST
Araucanian
(LĹ)(LĹ)(LĹ)L, (HĹ)(HĹ)(HĹ)L, (LĹ)(HĹ)(HĹ)L

b. FT-BIN >> PARSE-σ >> ALLFEETL >> RIGHTMOST

i. *Unattested AA OHP 1*: *CLASH >> PARSE-σ
(LĹ)(LĹ)(LĹ)L, (H́)(LH́)(LH́)(LĹ), (LĹ)(HĹ)(HĹ)L

ii. *Unattested AA OHP 2*: ALLFEETL >> *CLASH
(LĹ)(LĹ)(LĹ)L, (H́)(LH́)(LH́)(LĹ), (LĹ)(H́)(LH́)(LĹ)

iii. *Unattested AA OHP 3*: PARSE-σ >> *CLASH >> ALLFEETL
(LĹ)(LĹ)(LĹ)L, (H́)(LH́)(LH́)(LĹ), (LĹ)(H́)(LH́)(LĹ)

Of the four iambic patterns in (51), one is quantity-insensitive and attested. The remaining three exhibit the effects of the OHP and are unattested. Notice, however, that the pattern in (51bii) is the same as the pattern in (51biii). The second and third versions of the OHP under Asymmetrical Alignment do not produce patterns that are distinct in iambic systems.

The fourth type of pattern is underparsing with a final lapse in odd-parity forms. Asymmetrical Alignment predicts three different trochaic versions.

(52) Trochaic Underparsing with Final Lapse:
FT-BIN >> PARSE-σ >> ALLFEETL >> *LAPSE

a. Wergaia (Hercus 1986): *CLASH >> PARSE-σ
(ĹL)(ĹL)(ĹL)L, (ĹL)(H́L)(H́L)(H́), (ĹL)(H́L)(H́L)L

b. *Unattested AA OHP 2*: ALLFEETL >> *CLASH
(ĹL)(ĹL)(ĹL)L, (ĹL)(H́)(ĹH)(ĹH), (ĹL)(H́)(ĹH)(ĹL)

c. *Unattested AA OHP 3*: PARSE-σ >> *CLASH >> ALLFEETL
(ĹL)(ĹL)(ĹL)L, (ĹL)(H́L)(H́L)(H́), (ĹL)(H́)(ĹH)(ĹL)

Note that the pattern in (52a) is actually attested. Quantity-sensitivity just for final syllables can be found in left-to-right syllabic trochee systems like Wergaia.[7] The pattern in (52b) exhibits the effects of the second version of the OHP under

[7] See Hyde 2007 for a NONFINALITY-based account of final quantity-sensitivity in languages like Wergaia.

Asymmetrical Alignment, and the pattern in (52c) exhibits the effects of the third. Both are unattested.

The final type is underparsing where an internal lapse is tolerated. Asymmetrical Alignment predicts six versions of this pattern, three trochaic and three iambic.

(53) Trochaic Underparsing with Internal Lapse:
Ft-Bin >> Parse-σ >> AllFeetL >> *Lapse; Rightmost >> AllFeetL
a. *Unattested AA OHP 1*: *Clash >> Parse-σ
(L̀L)(L̀L)L(ĹL), (L̀L)(H̀L)(H̀L)(H́), (L̀L)(H̀L)H(ĹL)
b. *Unattested AA OHP 2*: AllFeetL >> *Clash
(L̀L)(L̀L)L(ĹL), (L̀L)(H̀)(L̀H)(ĹH), (L̀L)(H̀)(L̀H)(ĹL)
c. *Unattested AA OHP 3*: Parse-σ >> *Clash >> AllFeetL
(L̀L)(L̀L)L(ĹL), (L̀L)(H̀L)(H̀L)(H́), (L̀L)(H̀)(L̀H)(ĹL)

(54) Iambic Underparsing with Internal Lapse:
Ft-Bin >> Parse-σ >> AllFeetL >> *Lapse; Rightmost >> AllFeetL
a. *Unattested AA OHP 1*: *Clash >> Parse-σ
(LL̀)(LL̀)L(LĹ), (H̀)(LH̀)(LH̀)(LĹ), (LL̀)(HL̀)H(LĹ)
b. *Unattested AA OHP 2*: AllFeetL >> *Clash
(LL̀)(LL̀)L(LĹ), (H̀)(LH̀)(LH̀)(LĹ), (LL̀)(H̀)(LH̀)(LĹ)
c. *Unattested AA OHP 3*: Parse-σ >> *Clash >> AllFeetL
(LL̀)(LL̀)L(LĹ), (H̀)(LH̀)(LH̀)(LĹ), (LL̀)(H̀)(LH̀)(LĹ)

Recall, however, that Asymmetrical Alignment's second and third versions of the OHP do not result in distinct patterns in iambic systems. The pattern in (54b) is the same as the pattern in (54c). Overall, then, the result is five distinct unattested patterns.

While Asymmetrical Alignment predicts more attested quantity-insensitive patterns than Symmetrical Alignment, thus reducing the undergeneration aspect of the problem, it makes no progress on the overgeneration aspect. In fact, Asymmetrical Alignment multiplies the manifestations of the OHP and makes them more exotic.

The addition of *Lapse to a constraint set that also includes alignment constraints is mostly beneficial. A high-ranking *Lapse allows AllFeetL to dominate Ft-Bin and Parse-σ, suppressing OHP effects and resulting in Asymmetrical Alignment's ability to produce the Passamaquoddy, Nengone, and Araucanian patterns. The consequences of adding *CLASH to the constraint set, however, are mixed. Though it allows Asymmetrical Alignment to produce the Maranungku and Suruwaha patterns, *CLASH is also responsible for the additional, and increasingly colorful, manifestations of the OHP under Asymmetrical Alignment.

4 Rhythmic Licensing

In the Rhythmic Licensing account of Kager (2001, 2005), alignment's role is reduced even further, and the task of establishing directionality effects is given over almost completely to constraints that restrict clash and lapse. As in the Asymmetrical Alignment account, *CLASH and *LAPSE have an indirect influence on the position of layering irregularities in that they restrict monosyllabic feet and unparsed syllables to positions where they do not result in clash or lapse.

In exhaustive parsing patterns, as indicated in (55), *CLASH restricts monosyllabic feet to final position in trochaic systems and restricts them to initial position in iambic systems.

(55) Exhaustive Parsing without Clash: PARSE-σ >> FT-BIN; *CLASH

a. Trochaic: Maranungku	b. Iambic: Suruwaha
(ĹL)(ĹL)(ĹL)	(LĹ)(LĹ)(LĹ)
(ĹL)(ĹL)(ĹL)(Ĺ)	(Ĺ)(LĹ)(LĹ)(LĹ)

The result is two attested patterns, one trochaic and one iambic.

In underparsing patterns, as indicated in (56), *LAPSE restricts unfooted syllables to initial position in trochaic systems and to final position in iambic systems.

(56) Underparsing without Lapse: FT-BIN >> PARSE-σ

a. Trochaic: Nengone	b. Iambic: Araucanian
*LAPSE, FT-BIN >> PRWDL	*LAPSE, FT-BIN >> PRWDR
(ĹL)(ĹL)(ĹL)	(LĹ)(LĹ)(LĹ)
L(ĹL)(ĹL)(ĹL)	(LĹ)(LĹ)(LĹ)L

Again, the result is a pair of attested patterns, one trochaic and one iambic.

To produce additional directionality effects, the Rhythmic Licensing account uses constraints that either prohibit clash and lapse in specific locations or license clash and lapse in specific locations.

(57) Additional Rhythmic Well-Formedness Constraints

a. *Lapse-in-Trough: No lapse occurs between secondary stresses.
b. Lapse-at-End: Lapse must be adjacent to the right edge.
c. Clash-at-Edge: Clash must be adjacent to the left or right edge.[8]

*LAPSE-IN-TROUGH prohibits lapses that that occur between two secondary stresses. LAPSE-AT-END licenses lapse configurations at the right edge of a prosodic word, and CLASH-AT-EDGE licenses clash configurations at either edge of a prosodic word. Like the more general *CLASH and *LAPSE, these additional rhythmic constraints only have an indirect influence on parsing directionality.

One limitation of constraints that restrict clash and lapse, however, either through prohibition or licensing, is that they cannot actually create clash and lapse, so the additional constraints in (57), by themselves, do nothing to expand the predicted typology beyond the four patterns in (55, 56). To produce additional underparsing patterns, Rhythmic Licensing retains the alignment constraints PRWDL and PRWDR. In trochaic systems, lapse emerges under the ranking PRWDL, FT-BIN >> *LAPSE. Since PRWDL requires a foot at the left edge of the prosodic word, unparsed syllables cannot occur in initial position, the only position where they might occur in a trochaic pattern without creating a lapse. Similarly, in iambic systems, lapse emerges under the ranking PRWDR, FT-BIN >> *LAPSE. Since PRWDR requires a foot at the right edge, unparsed syllables cannot occur in final position, the only position where lapse can be avoided in iambic patterns.

When a lapse is required in odd-parity forms, the location of the lapse is determined by interactions that vary in complexity depending on the type of foot involved. Iambic systems can only emerge with internal lapses and will do so whenever PRWDR and FT-BIN dominate *LAPSE and LAPSE-AT-END. For a trochaic system to emerge with an internal lapse, PRWDL and FT-BIN must both dominate *LAPSE, and FT-BIN, PRWDL, and PRWDR must all dominate LAPSE-AT-END. Once an internal lapse is assured in either an iambic or trochaic system, the position of the internal lapse is determined by *LAPSE-IN-TROUGH and the position of primary stress. If the head foot is initial, the unparsed syllable occurs just to the right of

[8] In Kager 2001, CLASH-AT-EDGE is defined as licensing clash only at the left edge. However, Kager's tableaux indicate that CLASH-AT-EDGE is satisfied when clash occurs at either edge. Kager also posits a constraint *CLASH-AT-PEAK, which prohibits clash configurations involving a primary stress. Though it has the potential to introduce some additional wrinkles in the context of the OHP, by causing primary stress to shift positions in forms with clash, I will not consider it in detail here.

the head foot, as in (58ai,bi), to ensure that the lapse configuration is adjacent to the primary stress. If the head foot is final, the unparsed syllable occurs just to the left of the head foot, as in (58aii,bii).

(58) Underparsing with Internal Lapse: FT-BIN >> PARSE-σ

a. Trochaic:
PRWDL, FT-BIN >> *LAPSE; FT-BIN, PRWDL, PRWDR >> LAPSE-AT-END

i. Garawa	ii. Piro
(ĹL)(L̀L)(L̀L)	(L̀L)(L̀L)(ĹL)
(ĹL)L(L̀L)(L̀L)	(L̀L)(L̀L)L(ĹL)

b. Iambic: PRWDR, FT-BIN >> *LAPSE, LAPSE-AT-END

i. *Unattested*	ii. *Unattested*
(LĹ)(LL̀)(LL̀)	(LL̀)(LL̀)(LĹ)
(LĹ)L(LL̀)(LL̀)	(LL̀)(LL̀)L(LĹ)

The result is that Rhythmic Licensing predicts the four bidirectional underparsing patterns in (58). There are two problems with this result. The first is that the predicted iambic systems are unattested. The second is that Rhythmic Licensing does not predict an initial dactyl pattern with initial secondary stress, the pattern found in Indonesian, Norwegian, and Spanish (see footnote 5).

In trochaic systems, but not iambic systems, a lapse can occur in final position when FT-BIN, PRWDL, and LAPSE-AT-END all dominate PRWDR. The result is an attested trochaic pattern.

(59) Underparsing with Final Lapse: FT-BIN >> PARSE-σ
Pintupi: PRWDL, FT-BIN >> *LAPSE; FT-BIN, PRWDL, LAPSE-AT-END >> PRWDR
(ĹL)(ĹL)(ĹL)
(ĹL)(ĹL)(ĹL)L

Note that LAPSE-AT-END cannot be used to produce an additional iambic pattern because lapse cannot arise in final position in iambic systems, at least, not with the single unparsed syllable expected from the ranking FT-BIN >> PARSE-σ.

One consequence of alignment's reduced role under Rhythmic Licensing is that the account cannot position monosyllabic feet in way that creates clash in odd-parity forms. This ability is required to produce the trochaic Passamaquoddy pattern, for example, where odd-parity forms exhibit a clash at the left edge. Though the Rhythmic Licensing approach does contain alignment constraints like

PRWDL and PRWDR, these constraints can only influence the position of a single foot. This allows them to limit the positions of unparsed syllables sufficiently to require a lapse, but they cannot influence the position of monosyllabic feet in a way that results in clash. Only alignment constraints like ALLFEETL and ALLFEETR, which influence the position of every foot, have this ability. Rather than speculate on alternative mechanisms that might be used to introduce clash in odd-parity forms, I will simply note at this point that Rhythmic Licensing does not predict the Passamaquoddy pattern.[9] This also means, however, that we will not be able to see the influence that CLASH-AT-EDGE has on the position of monosyllabic feet until we examine the different manifestations of the Odd Heavy Problem under Rhythmic Licensing.[10] Since the presence of heavy syllables creates the potential for monosyllabic feet, and, thus, for clash configurations, CLASH-AT-EDGE is quite important in this context.

The patterns in (55, 56, 58, 59), then, are assumed to be the basic predictions of the Rhythmic Licensing approach. Since they do not take into account the effects of PARSE-σ and FT-BIN when heavy syllables are present, however, the actual predictions are really quite different. Although the predicted patterns are all intended to be quantity-insensitive, most actually occur with one or more of the different manifestations of the Odd Heavy Problem possible under Rhythmic Licensing. Which of the different manifestations emerges is determined by the ranking of *CLASH and CLASH-AT-EDGE.

4.1 Manifestations of the Odd Heavy Problem

To illustrate the different manifestations of the Odd Heavy Problem under Rhythmic Licensing, we can consider an underparsing pattern, where the rankings of *CLASH and CLASH-AT-EDGE are not supposed to be crucial, and examine the effect of ranking them in different positions. Consider, a trochaic system where the ranking FT-BIN >> PARSE-σ requires an unfooted syllable in odd-parity parity forms, the ranking PRWDL, FT-BIN >> *LAPSE creates a lapse configuration, and

[9] The Passamaquoddy pattern could be produced under the Rhythmic Licensing account with a nonfinality constraint that prohibits stress on final syllables. In general, however, nonfinality does not appear to play a central role in any of the OT Weak Layering accounts. At least, it does not play a central role in producing the basic binary stress patterns.

[10] In Kager's (2001) discussion, CLASH-AT-EDGE appears to be directed at two languages, Tauya (MacDonald 1990) and Gosiute Shoshone (Miller 1996), where clash is said to occur in even-parity forms. Since the focus here is on odd-parity forms, I omit discussion of these cases. The inclusion of CLASH-AT-EDGE in the constraint set does have consequences for odd-parity forms, however, and it is these consequences that I address here.

the ranking FT-BIN, PRWDL, PRWDR >> LAPSE-AT-END ensures that the lapse configuration is internal. With the head foot at the right edge, the intended result is a quantity-insensitive pattern like that found in Piro.

The first manifestation of the Odd Heavy Problem under Rhythmic Licensing is the same as the first manifestation under Asymmetrical Alignment. It arises when *CLASH and FT-BIN both dominate PARSE-σ.

(60) Odd Heavy Problem: Rhythmic Licensing Version 1

A heavy syllable *H* is parsed as a monosyllabic foot *iff*

a. *H* occurs in an odd-parity form; and
b. *H* is odd-numbered; and
c. parsing *H* as a monosyllabic foot would not result in clash.

In this version, footing is sensitive to odd-numbered heavy syllables in odd-parity forms but only when they occur in a position where a monosyllabic foot would not result in clash.

In the tableaux that follow, the ranking intended to produce the Piro pattern is assumed, but only the constraints most directly relevant to OHP effects are shown.

(61) Odd Heavy Problem: Rhythmic Licensing Version 1

a. HLHLHLH	*CLASH	FT-BIN	PARSE-σ	*LAPSE
i. (H̀L)(H̀L)H(ĹH)			*!	*!
☞ ii. (H̀L)(H̀L)(H̀L)(H́)				
iii. (H̀)(L̀H)(L̀H)(ĹH)	*!			
iv. (H̀L)(H̀L)(H̀)(ĹH)	*!			
v. (H̀L)(H̀)(L̀H)(ĹH)	*!			
b. HLHLHLL				
☞ i. (H̀L)(H̀L)H(ĹL)			*	*
ii. (H̀L)(H̀L)(H̀L)(Ĺ)		*!		
iii. (H̀)(L̀H)(L̀H)(ĹL)	*!			
iv. (H̀L)(H̀L)(H̀)(ĹL)	*!			
v. (H̀L)(H̀)(L̀H)(ĹL)	*!			
c. LLHLHLL				
☞ i. (L̀L)(H̀L)H(ĹL)			*	*
ii. (L̀L)(H̀L)(H̀L)(Ĺ)		*!		
iii. (L̀)(L̀H)(L̀H)(ĹL)	*!	*!		
iv. (L̀L)(H̀L)(H̀)(ĹL)	*!			
v. (L̀L)(H̀)(L̀H)(ĹL)	*!			

In (61a), we see the result for an odd-parity form with a peripheral heavy syllable in a position to avoid clash (final position in trochaic systems). The final syllable is parsed as a monosyllabic foot satisfying the high-ranking *CLASH, FT-BIN, and PARSE-σ simultaneously. The result is an exhaustive parsing pattern rather than the expected bidirectional pattern. In (61b,c), we see the result for inputs that have heavy syllables, but not in a position to avoid clash. In (61b), odd-numbered heavy syllables occur only in medial positions and in the peripheral position where clash cannot be avoided (initial for trochaic systems). In (61c), odd-numbered heavy syllables occur only in medial positions. Although the candidates in (61b,c) all have odd-numbered heavy syllables, these cannot be parsed as monosyllabic feet without violating the high-ranking *CLASH. This being the case the core constraints of the Piro ranking can assert their preferences, and the expected bidirectional pattern emerges.

The table in (62) summarizes the effects of Rhythmic Licensing’s second version of the OHP with respect to the ranking intended to produce the quantity-insensitive Piro pattern.

(62) *CLASH, FT-BIN >> PARSE-σ; PRWDL, FT-BIN >> *LAPSE; FT-BIN, PRWDL, PRWDR >> LAPSE-AT-END

a.	(ĹL)(ĹL)(ĹL)	Even-parity
b.	(ĹL)(ĹL)L(ĹL)	Odd-parity without H syllables
c.	(H̀L)(H̀L)(H̀L)(H́)	Peripheral H syllable in non-clash position
d.	(H̀L)(H̀L)H(ĹL)	Peripheral H syllable in clash position only
e.	(L̀L)(H̀L)H(ĹL)	Medial H syllables only

When an odd-parity form does not have odd-numbered heavy syllables, as in (62b), the antepenult is left unparsed and the expected bidirectional pattern emerges. When an odd-numbered heavy syllable is present in an odd-parity form in a position where clash can be avoided, as in (62c), it is parsed as a monosyllabic foot. The form is exhaustively parsed without clash, and the expected Piro pattern disappears. When the only heavy syllables occur in positions where clash cannot be avoided, as in (62d,e), the expected Piro pattern reemerges.

Rhythmic Licensing’s second version of the OHP is similar to the first, but it allows heavy syllables to be parsed as monosyllabic feet in an additional position. This second version emerges in underparsing patterns when CLASH-AT-EDGE and FT-BIN dominate PARSE-σ and PARSE-σ dominates *CLASH. It emerges in exhaustive parsing patterns when CLASH-AT-EDGE and PARSE-σ both dominate FT-BIN and FT-BIN dominates *CLASH.

(63) Odd Heavy Problem: Rhythmic Licensing Version 2
A heavy syllable *H* is parsed as a monosyllabic foot *iff*
a. *H* occurs in an odd-parity form; and
b. *H* is odd-numbered; and
c. parsing *H* as a monosyllabic foot would not result in clash; or
d. if there is no heavy syllable that meets (c), parsing H as a monosyllabic foot would result in a peripheral clash.

The version of the OHP in (63) still prefers that monosyllabic feet be limited to heavy syllables in positions where clash can be avoided, the right edge for trochees and the left edge for iambs, but it will allow a heavy syllable at the opposite edge to be parsed as a monosyllabic foot in those cases where clash cannot be avoided.

Returning to the ranking intended to produce the Piro pattern, we can see the effects of the Rhythmic Licensing's second version of the OHP.

(64) Odd Heavy Problem: Rhythmic Licensing Version 2

a. HLHLHLH	CLASH-AT-EDGE	FT-BIN	PARSE-σ	*LAPSE	*CLASH
i. (H̀L)(H̀L)H(ĹH)			*!	*!	
☞ ii. (H̀L)(H̀L)(H̀L)(H́)					
iii. (H̀)(L̀H)(L̀H)(ĹH)					*!
iv. (H̀L)(H̀L)(H̀)(ĹH)	*!				*
v. (H̀L)(H̀)(L̀H)(ĹH)	*!				*
b. HLHLHLL					
i. (H̀L)(H̀L)H(ĹL)			*!	*!	
ii. (H̀L)(H̀L)(H̀L)(Ĺ)		*!			
☞ iii. (H̀)(L̀H)(L̀H)(ĹL)					*
iv. (H̀L)(H̀L)(H̀)(ĹL)	*!				*
v. (H̀L)(H̀)(L̀H)(ĹL)	*!				*
c. LLHLHLL					
☞ i. (L̀L)(H̀L)H(ĹL)			*	*	
ii. (L̀L)(H̀L)(H̀L)(Ĺ)		*!			
iii. (L̀)(L̀H)(L̀H)(ĹL)		*!			*
iv. (L̀L)(H̀L)(H̀)(ĹL)	*!				*
v. (L̀L)(H̀)(L̀H)(ĹL)	*!				*

If the input has a heavy syllable in a peripheral position that can avoid clash, as in (64a), that syllable will be parsed as a monosyllabic foot. This allows for exhaustive binary footing in a way that satisfies both *CLASH and CLASH-AT-EDGE. If the input does not have a peripheral heavy syllable in a position where clash can be avoided, but it has a heavy syllable at the opposite edge, as in (64b), the heavy syllable at the opposite edge will be parsed as a monosyllabic foot. While the resulting configuration violates *CLASH, it allows exhaustive binary parsing while respecting CLASH-AT-EDGE. In (64c), we see that an input that has only medial heavy syllables exhibits the same output pattern as an input that has only light syllables. Although (64c) has nonperipheral heavy syllables, the clash configurations that result from parsing one of them as a monosyllabic foot violate the high-ranking CLASH-AT-EDGE.

The table in (65) summarizes the effects of Rhythmic Licensing's second version of the OHP in connection with the ranking intended to produce quantity-insensitive Piro.

(65) CLASH-AT-EDGE, FT-BIN >> PARSE-σ >> *CLASH; PRWDL, FT-BIN >> *LAPSE; FT-BIN, PRWDL, PRWDR >> LAPSE-AT-END

a.	(ĹL)(ĹL)(ĹL)	Even-parity
b.	(ĹL)(ĹL)L(ĹL)	Odd-parity without H syllables
c.	(H̀L)(H̀L)(H̀L)(H́)	Peripheral H syllable in non-clash position
d.	(H̀)(L̀H)(L̀H)(ĹL)	Peripheral H syllable in clash position only
e.	(L̀L)(H̀L)H(ĹL)	Medial H syllables only

As indicated in (65c), a peripheral heavy syllable that avoids clash will be parsed as monosyllabic foot. If there is no peripheral syllable in a position to avoid clash, a heavy syllable at the opposite edge is parsed as a monosyllabic foot, as in (65d). If a form contains only medial heavy syllables, as in (65e), these cannot be parsed as monosyllabic feet, and the expect bidirectional pattern reemerges.

Rhythmic Licensing's final version of the OHP allows heavy monosyllabic feet in even more positions. It emerges when FT-BIN and PARSE-σ dominate *CLASH and CLASH-AT-EDGE.

(66) OHP: Rhythmic Licensing Version 3

A heavy syllable *H* is parsed as a monosyllabic foot *iff*

a. *H* occurs in an odd-parity form; and
b. *H* is odd-numbered; and
c. parsing *H* as a monosyllabic foot would not result in clash; or
d. if there is no heavy syllable that meets (c), parsing H as a monosyllabic foot would result in a peripheral clash; or
e. if there is no heavy syllable that meets (c) or (d), parsing H as a monosyllabic foot would result in a non-peripheral clash.

In this version, heavy monosyllabic feet are still preferred in peripheral position, and in the peripheral position that avoids clash, if possible. If there are no peripheral heavy syllables, however, a medial odd-numbered heavy syllable will be parsed as a monosyllabic foot.

In (67), we see the results of positioning *CLASH and CLASH-AT-EDGE below FT-BIN and PARSE-σ in the ranking intended to produce quantity-insensitive Piro.

(67) Odd Heavy Problem: Rhythmic Licensing Version 3

a. HLHLHLH	FT-BIN	PARSE-σ	*LAPSE	*CLASH	CLASH-AT-EDGE
i. (H̀L)(H̀L)H(ĹH)		*!	*!		
☞ ii. (H̀L)(H̀L)(H̀L)(H́)					
iii. (H̀)(L̀H)(L̀H)(ĹH)				*!	
iv. (H̀L)(H̀L)(H̀)(ĹH)				*!	*
v. (H̀L)(H̀)(L̀H)(ĹH)				*!	*
b. HLHLHLL					
i. (H̀L)(H̀L)H(ĹL)		*!	*!		
ii. (H̀L)(H̀L)(H̀L)(Ĺ)	*!				
☞ iii. (H̀)(L̀H)(L̀H)(ĹL)				*	
iv. (H̀L)(H̀L)(H̀)(ĹL)				*	*!
v. (H̀L)(H̀)(L̀H)(ĹL)				*	*!
c. LLHLHLL					
i. (L̀L)(H̀L)H(ĹL)		*!	*!		
ii. (L̀L)(H̀L)(H̀L)(Ĺ)	*!				
iii. (L̀)(L̀H)(L̀H)(ĹL)	*!			*	
☞ iv. (L̀L)(H̀L)(H̀)(ĹL)				*	*
☞ v. (L̀L)(H̀)(L̀H)(ĹL)				*	*

If there is a heavy syllable in the peripheral position where a monosyllabic foot can avoid clash, as in (67a), that syllable will be parsed as a monosyllabic foot. If no heavy syllable is in a position to avoid clash, as in (67b), a heavy syllable at the opposite edge will be parsed as a monosyllabic foot. If there is no peripheral heavy syllable, as in (67c), a medial odd-numbered heavy syllable will be parsed as a monosyllabic foot. Note, however, that when multiple medial heavy syllables are available, Rhythmic Licensing does not have the alignment constraints necessary to determine which one should be parsed as a monosyllabic foot. The result in this situation is that two or more candidates tie and there is no unique optimal output.

The effects of the third version of the OHP under Rhythmic Licensing, in context of the ranking intended to produce the quantity-insensitive Piro pattern, are summarized in (68).

(68) Ft-Bin >> Parse-σ >> *Clash, Clash-at-Edge; PrWdL, Ft-Bin >> *Lapse; Ft-Bin, PrWdL, PrWdR >> Lapse-at-End

a.	(ĹL)(ĹL)(ĹL)	Even-parity
b.	(ĹL)(ĹL)L(ĹL)	Odd-parity without H syllables
c.	(H̀L)(H̀L)(H̀L)(H́)	Peripheral H syllable in non-clash position
d.	(H̀)(L̀H)(L̀H)(ĹL)	Peripheral H syllable in clash position only
e.	(L̀L)(H̀L)(H̀)(ĹL), (L̀L)(H̀)(L̀H)(ĹL)	Medial H syllables only

In this case, the expected bidirectional pattern emerges in an odd-parity form only when odd-numbered heavy syllables are absent, as in (68b). When an odd-numbered heavy syllable is present in a peripheral position where clash can be avoided, as in (68c), it is parsed as a monosyllabic foot. If the only peripheral heavy syllable is in a position where clash cannot be avoided, however, as in (68d), it can still be parsed as a monosyllabic foot. In the absence of peripheral heavy syllables, a medial odd-numbered heavy syllable will be parsed as a monosyllabic foot. When multiple medial heavy syllables are available, however, as in (68e), the grammar cannot decide between them.

4.2 Summary of Predicted Patterns

When we take the presence of heavy syllables into account, we get a very different picture of the predictions of Rhythmic Licensing. Though the rankings are intended be quantity-insensitive, the results are typically patterns with the peculiar type of quantity-sensitivity characteristic of the Odd Heavy Problem. Since the Rhythmic Licensing approach is fairly complex, I will summarize its predictions in four stages.

For each of the predicted systems described below, four forms are supplied to illustrate the pattern in different contexts. The first is an odd-parity form containing only light syllables. This form illustrates the basic pattern that a given ranking is intended to produce. The remaining three forms are odd-parity forms with heavy syllables in various positions, and these illustrate the effects of the OHP. In the first, every odd-numbered syllable is heavy, offering the possibility of constructing a heavy monosyllabic foot in a non-clash position. In the second, medial odd-numbered syllables and the peripheral syllable in a clash position are heavy, offering the possibility of constructing a monosyllabic foot in a peripheral clash position. In the third form, only medial odd-numbered syllables are heavy.

First, the Rhythmic Licensing approach predicts six patterns with exhaustive parsing, three trochaic and three iambic.

(69) Trochaic Exhaustive Parsing: PARSE-σ >> FT-BIN

a. Maranungku: *CLASH >> FT-BIN
(ĹL)(ĹL)(ĹL)(Ĺ), (H́L)(H́L)(H́L)(H́), (H́L)(H́L)(H́L)(Ĺ), (ĹL)(H́L)(H́L)(Ĺ)

b. *Unattested RL OHP 2*: *CLASH-AT-EDGE >> FT-BIN >> *CLASH
(ĹL)(ĹL)(ĹL)(Ĺ), (H́L)(H́L)(H́L)(H́), (H́)(ĹH)(ĹH)(ĹL), (ĹL)(H́L)(H́L)(Ĺ)

c. *Unattested RL OHP 3*: FT-BIN >> *CLASH, CLASH-AT-EDGE
(ĹL)(ĹL)(ĹL)(Ĺ), (H́L)(H́L)(H́L)(H́), (H́)(ĹH)(ĹH)(ĹL),
(ĹL)(H́)(ĹH)(ĹL) ~ (ĹL)(H́L)(H́)(ĹL)

(70) Iambic Exhaustive Parsing: PARSE-σ >> FT-BIN

a. Suruwaha: *CLASH >> FT-BIN
(Ĺ)(LĹ)(LĹ)(LĹ), (H́)(LH́)(LH́)(LH́), (Ĺ)(LH́)(LH́)(LH́), (Ĺ)(LH́)(LH́)(LĹ)

b. *Unattested RL OHP 2*: *CLASH-AT-EDGE >> FT-BIN >> *CLASH
(Ĺ)(LĹ)(LĹ)(LĹ), (H́)(LH́)(LH́)(LH́), (LĹ)(HĹ)(HĹ)(H́), (Ĺ)(LH́)(LH́)(LĹ)

c. *Unattested RL OHP 3*: FT-BIN >> *CLASH, CLASH-AT-EDGE
(Ĺ)(LĹ)(LĹ)(LĹ), (H́)(LH́)(LH́)(LH́), (LĹ)(HĹ)(HĹ)(H́),
(LĹ)(H́)(LH́)(LĹ) ~ (LĹ)(HĹ)(H́)(LĹ)

Two of the patterns, (69a) and (70a), are quantity-insensitive, with the same pattern emerging regardless of the occurrence or position of heavy syllables. Both are attested. The remaining four patterns exhibit the effects of some version of the OHP and are unattested.

Next, consider underparsing patterns that avoid lapse. Rhythmic Licensing predicts three trochaic patterns and three iambic patterns of this type.

(71) Trochaic Underparsing without Lapse:
FT-BIN >> PARSE-σ; *LAPSE, FT-BIN >> PRWDL

a. *Unattested RL OHP 1*: *CLASH >> PARSE-σ
L(ĹL)(ĹL)(ĹL), (H́L)(H́L)(H́L)(H́), H(ĹH)(ĹH)(ĹL), L(ĹH)(ĹH)(ĹL)

b. *Unattested RL OHP 2*: *CLASH-AT-EDGE >> PARSE-σ >> *CLASH
L(ĹL)(ĹL)(ĹL), (H́L)(H́L)(H́L)(H́), (H́)(ĹH)(ĹH)(ĹL), L(ĹH)(ĹH)(ĹL)

c. *Unattested RL OHP 3*: PARSE-σ >> *CLASH, CLASH-AT-EDGE
L(ĹL)(ĹL)(ĹL), (H́L)(H́L)(H́L)(H́), (H́)(ĹH)(ĹH)(ĹL),
(ĹL)(H́)(ĹH)(ĹL) ~ (ĹL)(H́L)(H́)(ĹL)

(72) Iambic Underparsing without Lapse:
FT-BIN >> PARSE-σ; *LAPSE, FT-BIN >> PRWDR

a. *Unattested RL OHP 1*: *CLASH >> PARSE-σ
(LĹ)(LĹ)(LĹ)L, (H́)(LH́)(LH́)(LH́), (LĹ)(HĹ)(HĹ)H, (LĹ)(HĹ)(HĹ)L

b. *Unattested RL OHP 2*: *CLASH-AT-EDGE >> PARSE-σ >> *CLASH
(LĹ)(LĹ)(LĹ)L, (H́)(LH́)(LH́)(LH́), (LĹ)(HĹ)(HĹ)(H́), (LĹ)(HĹ)(HĹ)L

c. *Unattested RL OHP 3*: PARSE-σ >> *CLASH, CLASH-AT-EDGE
(LĹ)(LĹ)(LĹ)L, (H́)(LH́)(LH́)(LH́), (LĹ)(HĹ)(HĹ)(H́),
(LĹ)(H́)(LH́)(LĹ) ~ (LĹ)(HĹ)(H́)(LĹ)

Each of the six patterns suffers from some version of the OHP and is unattested.

Next, consider underparsing patterns with an internal lapse configuration. Rhythmic licensing predicts six trochaic patterns of this type, three where the unparsed syllable, when present, follows the initial foot and three where it precedes the final foot. Six iambic patterns are predicted, as well, three with the unparsed syllable following the initial foot and three with the unparsed syllable preceding the final foot.

(73) Trochaic Underparsing with Internal Lapse: FT-BIN >> PARSE-σ; FT-BIN, PRWDL >> *LAPSE; FT-BIN, PRWDL, PRWDR >> LAPSE-AT-END

a. *Unattested RL OHP 1 Head Foot Initial*: *CLASH >> PARSE-σ
(ĹL)L(L̀L)(L̀L), (H́L)(H̀L)(H̀L)(H̀), (H́L)H(L̀H)(L̀L), (ĹL)H(L̀H)(L̀L)

b. *Unattested RL OHP 1 Head Foot Final*: *CLASH >> PARSE-σ
(L̀L)(L̀L)L(ĹL), (H̀L)(H̀L)(H̀L)(H́), (H̀L)(H̀L)H(ĹL), (L̀L)(H̀L)H(ĹL)

c. *Unattested RL OHP 2 Hd Foot Initial*: *CLASH-AT-EDGE >> PARSE-σ >> *CLASH
(ĹL)L(L̀L)(L̀L), (H́L)(H̀L)(H̀L)(H̀), (H́)(L̀H)(L̀H)(L̀L), (ĹL)H(L̀H)(L̀L)

d. *Unattested RL OHP 2 Hd Foot Final*: *CLASH-AT-EDGE >> PARSE-σ >> *CLASH
(L̀L)(L̀L)L(ĹL), (H̀L)(H̀L)(H̀L)(H́), (H̀)(L̀H)(L̀H)(ĹL), (L̀L)(H̀L)H(ĹL)

e. *Unattested RL OHP 3 Hd Foot Initial*: PARSE-σ >> *CLASH, CLASH-AT-EDGE
(ĹL)L(L̀L)(L̀L), (H́L)(H̀L)(H̀L)(H̀), (H́)(L̀H)(L̀H)(L̀L),
(ĹL)(H̀)(L̀H)(L̀L) ~ (ĹL)(H̀L)(H̀)(L̀L)

f. *Unattested RL OHP 3 Hd Foot Final*: PARSE-σ >> *CLASH, CLASH-AT-EDGE
(L̀L)(L̀L)L(ĹL), (H̀L)(H̀L)(H̀L)(H́), (H̀)(L̀H)(L̀H)(ĹL),
(L̀L)(H̀)(L̀H)(ĹL) or (L̀L)(H̀L)(H̀)(ĹL)

(74) Iambic Underparsing with Internal Lapse:
FT-BIN >> PARSE-σ; FT-BIN, PRWDR >> *LAPSE, LAPSE-AT-END

a. *Unattested RL OHP 1 Head Foot Initial*: *CLASH >> PARSE-σ
(LĹ)L(LL̀)(LL̀), (H́)(LH̀)(LH̀)(LH̀), (LĹ)H(LH̀)(LH̀), (LĹ)H(LH̀)(LL̀)

b. *Unattested RL OHP 1 Head Foot Final*: *CLASH >> PARSE-σ
(LL̀)(LL̀)L(LĹ), (H̀)(LH̀)(LH̀)(LH́), (LL̀)(HL̀)H(LH́), (LL̀)(HL̀)H(LĹ)

c. *Unattested RL OHP 2 Hd Foot Initial*: *CLASH-AT-EDGE >> PARSE-σ >> *CLASH
(LĹ)L(LL̀)(LL̀), (H́)(LH̀)(LH̀)(LH̀), (LĹ)(HL̀)(HL̀)(H̀), (LĹ)H(LH̀)(LL̀)

d. *Unattested RL OHP 2 Hd Foot Final*: *CLASH-AT-EDGE >> PARSE-σ >> *CLASH
(LL̀)(LL̀)L(LĹ), (H̀)(LH̀)(LH̀)(LH́), (LL̀)(HL̀)(HL̀)(H́), (LL̀)(HL̀)H(LĹ)

e. *Unattested RL OHP 3 Hd Foot Initial*: PARSE-σ >> *CLASH, CLASH-AT-EDGE
(LĹ)L(LL̀)(LL̀), (H́)(LH̀)(LH̀)(LH̀), (LĹ)(HL̀)(HL̀)(H̀),
(LĹ)(H̀)(LH̀)(LL̀) ~ (LĹ)(HL̀)(H̀)(LL̀)

f. *Unattested RL OHP 3 Hd Foot Final*: PARSE-σ >> *CLASH, CLASH-AT-EDGE
(LL̀)(LL̀)L(LĹ), (H̀)(LH̀)(LH̀)(LH́), (LL̀)(HL̀)(HL̀)(H́),
(LL̀)(H̀)(LH̀)(LĹ) ~ (LL̀)(HL̀)(H̀)(LĹ)

Each of the twelve patterns exhibits the effects of some version of the OHP and is unattested.

Finally, consider underparsing patterns with a final lapse. Three such patterns are predicted with trochaic footing.

(75) Trochaic Underparsing with Final Lapse: FT-BIN >> PARSE-σ; FT-BIN, PRWDL >> *LAPSE; FT-BIN, PRWDL, LAPSE-AT-END >> PRWDR

a. Wergaia: *CLASH >> PARSE-σ
(ĹL)(ĹL)(ĹL)L, (H́L)(H́L)(H́L)(H́), (H́L)(H́L)(H́L)L, (ĹL)(H́L)(H́L)L

b. *Unattested RL OHP 2*: *CLASH-AT-EDGE >> PARSE-σ >> *CLASH
(ĹL)(ĹL)(ĹL)L, (H́L)(H́L)(H́L)(H́), (H́)(ĹH)(ĹH)(ĹL), (ĹL)(H́L)(H́L)L

c. *Unattested RL OHP 3*: PARSE-σ >> *CLASH, CLASH-AT-EDGE
(ĹL)(ĹL)(ĹL)L, (H́L)(H́L)(H́L)(H́), (H́)(ĹH)(ĹH)(ĹL),
(ĹL)(H́)(ĹH)(ĹL) ~ (ĹL)(H́L)(H́)(ĹL)

The first pattern, (75a), is an attested quantity-sensitive pattern. As mentioned in Section 3.2 above, quantity-sensitivity restricted to final syllables can be found in left-to-right syllabic trochee languages like Wergaia. The remaining two patterns both exhibit the effects of some version of the OHP and are unattested.

Overall, then, the predictions of Rhythmic Licensing must be seen as a step backward compared to the predictions of Asymmetrical Alignment and, in the context of the overgeneration aspect of the problem, compared to the predictions of Symmetrical Alignment, as well. Like Asymmetrical Alignment, Rhythmic Licensing makes use of restrictions on clash and lapse. The clash restrictions are problematic, as they are under Asymmetrical Alignment, because they are responsible for the additional, and more colorful, manifestations of the OHP. Although the lapse restrictions do not create additional OHP-related difficulties, they are not as beneficial as they are under Asymmetrical Alignment, because they do not actually help Rhythmic Licensing to predict additional attested patterns. A high-ranking *LAPSE improves the performance of the Asymmetrical Alignment account because it allows alignment constraints to limit the effects of PARSE-σ and FT-BIN. Given its much more limited use of alignment constraints, this result cannot be reproduced under Rhythmic Licensing.

5 Interim Summary and Remarks

In examining three different OT approaches to quantity-insensitive binary stress patterns, we have been able to observe the effects of different types of directional constraints on the layering irregularities possible under Weak Layering. We saw that the constraints were reasonably effective, as long as forms with heavy syllables are not considered. When forms with heavy syllables are considered, however, it is clear that the different accounts all have substantial difficulty producing quantity-insensitive systems. The Odd Heavy Problem emerges, and the directional constraints lose their ability to control the positions of layering irregularities in a way that reliably results in attested patterns. Since this is true regardless of the particular approach to directionality involved, the OHP cannot be attributed to any one of them in particular.

In terms of being able to produce a single optimal output for a given input, however, alignment is clearly the directional device that is most effective at restricting the positions of layering irregularities. When multiple positions for a layering irregularity are possible, alignment can always limit the choice to one. Though we saw that the addition of *LAPSE helped to produce attested quantity-insensitive patterns in the Asymmetrical Alignment account, the result was dependent on the presence of appropriate alignment constraints in the constraint set. The effect could not be reproduced under Rhythmic Licensing, where the role of alignment is greatly diminished.

The inability of clash restrictions to arrive at a unique optimal output in every context is the reason for the increasingly exotic manifestations of the OHP under Asymmetrical Alignment and Rhythmic Licensing. In the Asymmetrical Alignment account, the preferences of *CLASH could sometimes determine the position of a monosyllabic foot. When they could not, however, the decision was left to alignment, whose preferences could be very different. In the Rhythmic Licensing account, if *CLASH could not determine the position of a monosyllabic foot, the decision fell to CLASH-AT-EDGE, which had its own preferences. If CLASH-AT-EDGE could not determine the position of a monosyllabic foot, there was nowhere else to turn, so the position of the monosyllable could not be determined.

Though they help to shape the different manifestations of the Odd Heavy Problem, the directional devices of the different accounts did not cause the Odd Heavy Problem. The directional devices employed in the three accounts differed substantially, yet the OHP still emerged. What the three accounts have in common is Weak Layering, constraint interaction, and global evaluation, so it is likely that the OHP derives from one of these sources. To demonstrate that Weak Layering is the source, rather than constraint interaction or global evaluation, we briefly examine a simplified version of the serial account of Hayes (1995) in the next section.

6 A Serial Account

If constraint interaction and global evaluation are the source of the Odd Heavy Problem, rather than Weak Layering, then the effects of the OHP should disappear in a serial framework with the same structural assumptions. In examining a simplified version of Hayes's (1995) approach, we can see that this is not the case.[11]

In the basic algorithm for producing binary stress patterns, the preference for disyllabic feet over monosyllabic feet is captured in (76c). Monosyllabic feet are only constructed under iterative parsing and, then, only when the number of available syllables is insufficient to construct a disyllabic foot.

(76) a. Foot Minimality (Optional):
Monomoraic feet are prohibited.

b. Non-Iterative Parsing (Optional):
Construct a single disyllabic foot at the left/right edge.

c. Iterative Parsing:
Construct disyllabic feet, if possible, and monosyllabic feet otherwise, left-to-right/right-to-left.

Conflicting directionality can be produced by applying the optional non-iterative parsing rule in (76b) before iterative foot construction. The optional prohibition on monomoraic feet in (76a) can be used to enforce a bimoraic minimal foot requirement.

Setting aside for the moment the possibility of inputs with heavy syllables, iterative foot construction is typically assumed to produce the same set of patterns as Symmetrical Alignment. This turns out to be true for underparsing patterns but not for exhaustive parsing patterns. The underparsing patterns, produced when (76a) is enforced, are given in (77).

[11] The version of Hayes's approach considered here is simplified in that it ignores the details of the foot inventory intended to capture the different types of quantity-sensitivity found in iambic and trochaic systems. Since my concern here is primarily with basic assumptions about layering and the algorithm that implements directional parsing, I will not address the quantity-sensitive foot inventory.

(77) Monomoraic Feet Prohibited

a. Iterative Footing Left-to-Right

i. Trochaic: Pintupi	ii. Iambic: Araucanian
(ĹL)(ĹL)(ĹL)	(LĹ)(LĹ)(LĹ)
(ĹL)(ĹL)(ĹL)L	(LĹ)(LĹ)(LĹ)L

b. Iterative Footing Right-to-Left

i. Trochaic: Nengone	ii. Iambic: *Unattested*
(ĹL)(ĹL)(ĹL)	(LĹ)(LĹ)(LĹ)
L(ĹL)(ĹL)(ĹL)	L(LĹ)(LĹ)(LĹ)

c. Final Foot + Iterative Footing Left-to-Right

i. Trochaic: Piro	ii. Iambic: *Unattested*
(ĹL)(ĹL)(ĹL)	(LĹ)(LĹ)(LĹ)
(ĹL)(ĹL)L(ĹL)	(LĹ)(LĹ)L(LĹ)

d. Initial Foot + Iterative Footing Right-to-Left

i. Trochaic: Garawa	ii. Iambic: *Unattested*
(ĹL)(ĹL)(ĹL)	(LĹ)(LĹ)(LĹ)
(ĹL)L(ĹL)(ĹL)	(LĹ)L(LĹ)(LĹ)

The exhaustive parsing patterns, produced when (76a) is not enforced, are given in (78).

(78) Monomoraic Feet Permitted

a. Iterative Footing Left-to-Right

i. Trochaic: Maranungku
(ĹL)(ĹL)(ĹL)
(ĹL)(ĹL)(ĹL)(Ĺ)

ii. Iambic: *Unattested*
(LĹ)(LĹ)(LĹ)
(LĹ)(LĹ)(LĹ)(Ĺ)

b. Iterative Footing Right-to-Left

i. Trochaic: Passamaquoddy
(ĹL)(ĹL)(ĹL)
(Ĺ)(ĹL)(ĹL)(ĹL)

ii. Iambic: Suruwaha
(LĹ)(LĹ)(LĹ)
(Ĺ)(LĹ)(LĹ)(LĹ)

c. Final Foot + Iterative Footing Left-to-Right

i. Trochaic: *Unattested*
(ĹL)(ĹL)(ĹL)
(ĹL)(ĹL)(Ĺ)(ĹL)

ii. Iambic: *Unattested*
(LĹ)(LĹ)(LĹ)
(LĹ)(LĹ)(Ĺ)(LĹ)

d. Initial Foot + Iterative Footing Right-to-Left

i. Trochaic: *Unattested*
(ĹL)(ĹL)(ĹL)
(ĹL)(Ĺ)(ĹL)(ĹL)

ii. Iambic: *Unattested*
(LĹ)(LĹ)(LĹ)
(LĹ)(Ĺ)(LĹ)(LĹ)

In most cases, the results are the same as those produced by Symmetrical Alignment. The exceptions are the four bidirectional patterns in (78c,d), all of which are unattested. While iterative foot construction can create conflicting directionality in exhaustive parsing patterns, resulting in nonperipheral monosyllabic feet, alignment cannot. Underparsing is always required to see the effects of conflicting directionality with alignment constraints.

Given the four additional unattested patterns in (78), the consistency of iterative parsing in always being able to locate unparsed syllables and monosyllabic feet in the same positions may seem like a disadvantage, but it is actually of some benefit in limiting the effects of the Odd Heavy Problem.

Under the algorithm in (76), layering irregularities can be initial, postpeninitial, antepenultimate, or final. They cannot occur in any other position. In addition, a given choice of directional settings always positions the layering irregularity, whether unparsed syllable or monosyllabic foot, in the same position. As a consequence, heavy syllables can only result in a monosyllabic foot in the one location where the directional settings would have positioned a layering irregularity in first place.

Under iterative foot construction, the effects of the OHP are only apparent when a heavy syllable occurs in a position where we would expect it to be unparsed in a quantity-insensitive system. When we consider inputs with heavy syllables, then, we can see the effects of the OHP in underparsing patterns but not in exhaustive parsing patterns. Three forms are used to illustrate each of the predicted patterns in the tables below. The first form is an odd-parity form containing only light syllables. This form illustrates the intended pattern. The next two forms are odd-parity forms containing heavy syllables, and these illustrate the effects of the OHP, if any. In the first form, every odd-numbered syllable is heavy, including the syllable that occupies the typical position of the layering irregularity. In the second, every odd-numbered syllable is heavy, except the syllable that occupies the typical position of the layering irregularity.

Consider the results for underparsing patterns in (79).

(79) The Effect of Heavy Syllables in Underparsing Patterns

a. Iterative Footing Left-to-Right

i. Trochaic: Wergaia	ii. *Iambic: Unattested OHP*
(ĹL)(ĹL)(ĹL)L	(LĹ)(LĹ)(LĹ)L
(H́L)(H́L)(H́L)(H́)	(HĹ)(HĹ)(HĹ)(H́)
(H́L)(H́L)(H́L)L	(HĹ)(HĹ)(HĹ)L

b. Iterative Footing Right-to-Left

i. *Trochaic: Unattested OHP*	ii. *Iambic: Unattested OHP*
L(ĹL)(ĹL)(ĹL)	L(LĹ)(LĹ)(LĹ)
(H́)(ĹH)(ĹH)(ĹH)	(H́)(LH́)(LH́)(LH́)
L(ĹH)(ĹH)(ĹH)	L(LH́)(LH́)(LH́)

c. Final Foot + Iterative Footing Left-to-Right

i. *Trochaic: Unattested OHP*	ii. *Iambic: Unattested OHP*
(ĹL)(ĹL)L(ĹL)	(LĹ)(LĹ)L(LĹ)
(H́L)(H́L)(H́)(ĹH)	(HĹ)(HĹ)(H́)(LH́)
(H́L)(H́L)L(ĹH)	(HĹ)(HĹ)L(LH́)

d. Initial Foot + Iterative Footing Right-to-Left

i. *Trochaic: Unattested OHP*	ii. *Iambic: Unattested OHP*
(ĹL)L(ĹL)(ĹL)	(LĹ)L(LĹ)(LĹ)
(H́L)(H́)(ĹH)(ĹH)	(HĹ)(H́)(LH́)(LH́)
(H́L)L(ĹH)(ĹH)	(HĹ)L(LH́)(LH́)

In the odd-parity forms in (79), if a heavy syllable occurs in the position where a light syllable would be unparsed, it is parsed as monosyllabic foot. If it occurs in any other position, it does not affect the stress pattern. With the exception of (79ai),however, which can be found in Wergaia, each of these patterns appears to be unattested.

Now consider the results for exhaustive parsing patterns in (80).

(80) The Effect of Heavy Syllables in Exhaustive Parsing Patterns

a. Iterative Footing Left-to-Right

i. Trochaic: Maranungku	ii. Iambic: *Unattested*
(ĹL)(ĹL)(ĹL)(Ĺ)	(LĹ)(LĹ)(LĹ)(Ĺ)
(H́L)(H́L)(H́L)(H́)	(HĹ)(HĹ)(HĹ)(H́)
(H́L)(H́L)(H́L)(Ĺ)	(HĹ)(HĹ)(HĹ)(Ĺ)

b. Iterative Footing Right-to-Left

i. Trochaic: Passamaquoddy	ii. Iambic: Suruwaha
(Ĺ)(ĹL)(ĹL)(ĹL)	(Ĺ)(LĹ)(LĹ)(LĹ)
(H́)(ĹH)(ĹH)(ĹH)	(H́)(LH́)(LH́)(LH́)
(Ĺ)(ĹH)(ĹH)(ĹH)	(Ĺ)(LH́)(LH́)(LH́)

c. Final Foot + Iterative Footing Left-to-Right

i. Trochaic: *Unattested*	ii. Iambic: *Unattested*
(ĹL)(ĹL)(Ĺ)(ĹL)	(LĹ)(LĹ)(Ĺ)(LĹ)
(H́L)(H́L)(H́)(ĹH)	(HĹ)(HĹ)(H́)(LH́)
(H́L)(H́L)(Ĺ)(ĹH)	(HĹ)(HĹ)(Ĺ)(LH́)

d. Initial Foot + Iterative Footing Right-to-Left

i. Trochaic: *Unattested*	ii. Iambic: *Unattested*
(ĹL)(Ĺ)(ĹL)(ĹL)	(LĹ)(Ĺ)(LĹ)(LĹ)
(H́L)(H́)(ĹH)(ĹH)	(HĹ)(H́)(LH́)(LH́)
(H́L)(Ĺ)(ĹH)(ĹH)	(HĹ)(Ĺ)(LH́)(LH́)

In the odd-parity forms in (80), heavy syllables are only parsed as monosyllabic feet where we would have expected a monosyllabic foot in any case. Despite exhibiting no OHP effects, however, only three of the patterns are attested. The unidirectional pattern in (80aii) and the bidirectional patterns in (80c,d) are all unattested.

Overall, then, while its effects are more limited, the iterative foot construction algorithm in (76) still suffers significant difficulties of both undergeneration and overgeneration due to the Odd Heavy Problem. The effects of the OHP can be attributed neither to directional devices nor to the constraint interaction and global evaluation procedure of Optimality Theory. The problem lies in the Weak Layering approach to prosodic structure common to the serial and OT accounts. Since the problem is structural, the solution must be structural, as well.

7 Weak Bracketing

To overcome the Odd-Parity Parsing Problem, it is necessary to take a different approach to the layering irregularities that the grammar uses to deal with the leftover syllable of an odd-parity form. Under the Weak Bracketing approach of Hyde (2001, 2002), leftover syllables can be parsed as monosyllabic feet, as in (81a), or they can be parsed into a disyllabic foot that overlaps another disyllabic foot, as in (81b).

(81) Irregular Layering under Weak Bracketing

a. Monosyllabic Foot

σ σ σ σ σ σ σ
F F F F

b. Improperly Bracketed Feet

σ σ σ σ σ σ σ
F F F F

In Section 7.1, I demonstrate how Weak Bracketing avoids both the Odd Heavy Problem and the Even-Only Problem. Since the translation of overlapping feet into different individual stress patterns may be less than obvious for readers unfamiliar with the approach, in Section 7.2, I briefly indicate how feet can be mapped to the metrical grid under Weak Bracketing in a way that predicts an appropriate range of stress patterns.

7.1 Avoiding the Odd-Parity Parsing Problem

The Odd-Parity Parsing Problem arises under Weak Layering because parsing and minimality requirements conflict not only with each other but also with directional and faithfulness requirements in the context of parsing odd-parity forms. If we are willing to make changes in our assumptions about prosodic layering, however, the nature of the interactions between the various requirements also changes. Under Weak Bracketing, where the possible layering irregularities are monosyllabic feet and overlapping disyllabic feet, the ability of feet to overlap neutralizes the potential conflict between the parsing requirement and the minimality requirement. In odd-parity forms, as illustrated in (82), an overlapping configuration parses three syllables into two disyllabic feet. With an even number of syllables remaining, it is a simple matter to parse the rest of the string into disyllabic feet, as well.

(82) Neutralizing the Conflict between Foot-Binarity and Parse-Syllable

LLLLLLL	Foot-Binarity	Parse-Syllable
☞ a. L L L L L L L		
b. L L L L L L L	*!	
c. L L L L L L L		*!

The result is exhaustive binary parsing of the odd-parity form where both the parsing requirement and the minimality requirement agree on the choice of layering irregularity.

The ability of feet to overlap also neutralizes the extended conflicts between parsing and minimality requirements and directional and faithfulness requirements. Consider the situation where an odd-numbered heavy syllable is present in an odd-parity form, the situation that leads to the Odd Heavy Problem under Weak Layering. Since the position of the overlapping feet is not constrained by the position of the heavy syllable, the simultaneous satisfaction of the parsing and minimality requirements does not bring them into conflict with directional requirements. AllFeetL is used to illustrate below.

(83) Neutralizing the Conflict with Directional Requirements

LLLLHLL	Ft-Bin	Parse-σ	AllFeetL
☞ a. L L L L H L L			* *** *****
b. L L L L H L L			** **** ****!*
c. L L L L H L L			** **** ****!*
d. L L L L H L L	*!		* *** *****
e. L L L L H L L		*!	** ****

In (83c), parsing the heavy syllable as a monosyllabic foot satisfies Parse-σ and Ft-Bin simultaneously, but it creates additional alignment violations. Since overlapping feet satisfy PARSE-σ and FT-BIN simultaneously whether they include the heavy syllable, as in (83b), or not, as in (83a), ALLFEETL is free to position them in the preferred location at the left edge of the form. Weak Bracketing, then, allows the theory to avoid the peculiar quantity-sensitivity of the Odd Heavy Problem.

The ability of the parsing and minimality requirements to agree on overlapping feet also neutralizes the potential conflict with faithfulness requirements. Since overlapping feet always allow odd-parity forms to emerge with exhaustive binary footing, the parsing and minimality requirements never create a pressure to reject the layering irregularity and avoid odd-parity surface forms altogether. There is never a need to add a syllable or subtract a syllable at the expense of faithfulness requirements to achieve exhaustive binary parsing.

(84) Neutralizing the Conflict with Faithfulness Requirements

LLLLLLL	FT-BIN	PARSE-σ	MAX	DEP
☞ a. L L L L L L L				
b. L L L L L L L L				*!
c. L L L L L L			*!	

As illustrated in (84), overlapping feet satisfy PARSE-σ and FT-BIN simultaneously while remaining faithful to the odd-parity input. Inserting a syllable simply creates a DEP violation without improving performance on the parsing and minimality requirements, and deleting a syllable simply creates a MAX violation without improving performance on parsing and minimality. Weak Bracketing, then, also allows the theory to avoid the rejection of odd-parity forms associated with the Even-Only Problem.

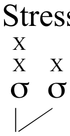
The advantage of Weak Bracketing, then, is that overlapping feet provide a way to achieve exhaustive binary footing in odd-parity forms without creating conflicts with either directional requirements or faithfulness requirements. The absence of a conflict with directional requirements allows Weak Bracketing to avoid the Odd Heavy Problem, and the absence of a conflict with faithfulness requirements allows it to avoid the Even-Only Problem. While this is an important result, it does not automatically follow that a Weak Bracketing approach predicts an accurate typology of stress patterns. In the next section, I briefly present the basic typology predicted under the Weak Bracketing.

7.2 Creating Stress Patterns with Overlapping Feet

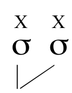
Following Selkirk (1980), the traditional view of the relationship between prosodic categories that project to the metrical grid and the grid entries projected is that they stand in a one-to-one correspondence. Changing the assumptions about prosodic layering in the move from Weak Layering to Weak Bracketing, however, also requires a change in assumptions about how prosodic structure maps to the grid. Though there is still a fundamental relationship between prosodic structure and grid entries in the Weak Bracketing approach, the relationship is somewhat looser than it is in traditional approaches.

The account departs from the traditional view in two ways. The first is that a prosodic category can fail to correspond to a grid entry. A foot, for example, may be stressed or stressless, as illustrated in (85). (In the examples that follow, a vertical association line indicates the head syllable of the foot. Though a foot need not be stressed in every context, it must always have a head syllable.)

(85) a. Stressed Trochee

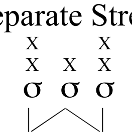


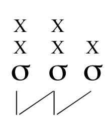
b. Stressless Trochee

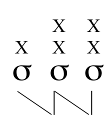


Though the traditional view holds that all feet must be stressed, stressless feet can be found in the proposals of Hayes (1987), Tyhurst (1987), Hung (1993, 1994), Selkirk (1995), Crowhurst (1996), and Hyde (2001, 2002). The second departure is that overlapping prosodic categories may be stressed separately but they may also share a stress.

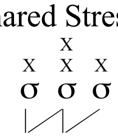
(86) a. Separate Stresses

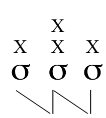
i. 

ii. 

iii. 

b. Shared Stress

i. 

ii. 

In (86a), there is a foot-level gridmark for each foot in the overlapping configurations. In (86b), however, the two feet share a foot-level gridmark.

The mappings where feet and stress stand in the traditional one-to-one correspondence and the mappings where they do not are all made possible by the formulation of the constraints that require prosodic categories to map to the metrical grid. Since the constraints are violable, it is possible to have stressless prosodic categories when they are appropriately low-ranked. Since the constraints only require that each instance of a prosodic category be associated with a grid entry, without the additional requirement that the association be unique, it is possible for two instances of a prosodic category to share an entry, if the categories overlap. The constraint that requires feet to correspond to foot-level gridmarks is given in (87).

(87) MAPGRIDMARK: Each foot has a foot-level gridmark within its domain.

When MAPGRIDMARK is satisfied, each foot will be stressed. When the constraint must be violated, however, a foot may emerge without a stress. In regular layering configurations, where feet do not overlap, the requirement that each foot have a foot-level gridmark within its domain means that there must be a unique gridmark associated with each individual foot. In configurations where feet do overlap, however, each foot can satisfy the requirement simply by positioning a gridmark over the shared syllable, as in (86b). While the constraint can also be satisfied by associating a unique gridmark with each foot, as in (86a), a unique gridmark is not strictly necessary.

To provide a basic picture of the patterns predicted by the Weak Bracketing account, the account includes four constraints that require alignment between the heads of feet and prosodic words.

(88) Foot-Head Alignment
- a. ALLHEADSL: The left edge of every foot-head is aligned with the left edge of some prosodic word.
- b. ALLHEADSR: The right edge of every foot-head is aligned with the right edge of some prosodic word.
- c. HEADL: The left edge of every prosodic word is aligned with the left edge of some foot-head.
- d. HEADR: The right edge of every prosodic word is aligned with the right edge of some foot-head.

ALLHEADSL and ALLHEADSR influence the position of every head syllable, drawing each towards the designated edge of the prosodic word. HEADL and HEADR influence the position of a single head syllable, insisting that one occur at the designated edge of the prosodic word.

As indicated in (89a), drawing foot-heads towrds the left edge of the prosodic word creates a trochaic pattern with overlapping feet at the left edge in odd-parity forms. Similarly, in (89b), drawing foot-heads towards the right edge creates an iambic pattern with overlapping feet at the right edge in odd-parity forms. The *CLASH constraint ensures that the overlapping feet in both cases are mapped to the metrical grid in a gridmark-sharing configuration.

(89) a. Nengone (Trochaic)
ALLHEADSL, *CLASH, MAPGM

```
x   x   x
x x x x x x
σ σ σ σ σ σ

  x   x   x
x x x x x x x
σ σ σ σ σ σ σ
```

b. Araucanian (Iambic)
ALLHEADSR, *CLASH, MAPGM

```
  x   x   x
x x x x x x
σ σ σ σ σ σ

  x   x   x
x x x x x x x
σ σ σ σ σ σ σ
```

The result is a pair of patterns that exhibit neither clash nor lapse. Both are quantity-insensitive, and both are attested.

Ranking HEADL above ALLHEADSR positions a single head syllable at the left edge while drawing all others the right. As indicated in (90a), the result is a trochaic pattern with overlapping feet at the right edge in odd-parity forms. The overlapping feet map to the grid with a separated gridmark configuration. Ranking HEADR above ALLHEADSL positions a single head syllable at the right edge while drawing all others to the left. The result, illustrated in (90b), is an iambic pattern with overlapping feet at the left in odd-parity forms, also mapped with a separated gridmark configuration.

(90) a. Maranungku (Trochaic)
HEADL >> ALLHEADSR; MAPGM

```
x   x   x
x x x x x x
σ σ σ σ σ σ

x   x   x   x
x x x x x x x
σ σ σ σ σ σ σ
```

b. Suruwaha (Iambic)
HEADR >> ALLHEADSL; MAPGM

```
  x   x   x
x x x x x x
σ σ σ σ σ σ

x   x   x   x
x x x x x x x
σ σ σ σ σ σ σ
```

Conflicting alignment, then, results in two additional patterns that exhibit neither clash nor lapse. Both of the patterns are quantity-insensitive, and both are attested.

To this point, then, the patterns predicted by the Weak Bracketing account all exhibit perfect binary alternation. To introduce clash and lapse in appropriate positions, the account also includes the asymmetrical INITIAL GRIDMARK and NONFINALITY constraints.

(91) Constraints Promoting Clash and Lapse

a. INITIAL GRIDMARK: The initial syllable of a prosodic word is stressed.

b. NONFINALITY: The final syllable of a prosodic word is stressless.

INITIAL GRIDMARK (Prince 1983, Hyde 2002, 2008b) requires that the initial syllable of a prosodic word be stressed, and NONFINALITY (Prince and Smolensky 1993, Hyde 2003, 2007, 2008b) requires that the final syllable of a prosodic word be stressless.

The inclusion of INITIAL GRIDMARK in the constraint set allows the account to produce trochaic patterns with clash and lapse as variations on the trochaic pattern in (89a). When INITIAL GRIDMARK and MAPGRIDMARK both dominate *CLASH, the result is a trochaic pattern with clash at the left edge in odd-parity forms, as in (92a). When INITIAL GRIDMARK and *CLASH both dominate MAPGRIDMARK, the result is that the second foot is stressless in odd-parity forms, as in (92b), creating a lapse configuration after the initial stress. Both of these patterns are quantity-insensitive, and both are attested.

(92) a. Passamaquoddy (Trochaic)
ALLHEADSL, INITIALGM, MAPGM >> *CLASH

```
x   x   x
x x x x x x
σ σ σ σ σ σ

x x   x   x
x x x x x x x
σ σ σ σ σ σ σ
```

b. Garawa (Trochaic)
ALLHEADSL, INITIALGM, *CLASH >> MAPGM

```
x   x   x
x x x x x x
σ σ σ σ σ σ

x     x   x
x x x x x x x
σ σ σ σ σ σ σ
```

Since INITIAL GRIDMARK is asymmetric, affecting only the left edge of the prosodic word, it cannot be used to produce mirror image iambic versions of the patterns in (92). Since the iambic mirror images are unattested, this is the desired result.

NONFINALITY allows the account to produce variations on the trochaic pattern in (90a) where a lapse occurs at or near the right edge in odd-parity forms. As indicated in (93a), ranking NONFINALITY and ALLHEADSR above MAPGRIDMARK produces a final stressless foot in odd-parity forms, resulting in a final lapse. As indicated in (93b), ranking NONFINALITY and MAPGRIDMARK above ALLHEADSR moves the final foot-head one syllable to left in odd-parity forms. This creates a final gridmark-sharing configuration with a lapse preceding the rightmost stress. The result is again a pair of attested quantity-insensitive patterns.

(93) a. Pintupi (Trochaic)
HEADL >> ALLHEADSR;
ALLHEADSR, NONFIN >> MAPGM

```
x     x     x
x  x  x  x  x  x
σ  σ  σ  σ  σ  σ

x     x     x
x  x  x  x  x  x  x
σ  σ  σ  σ  σ  σ  σ
```

b. Piro (Trochaic)
HEADL >> ALLHEADSR;
MAPGM, NONFIN >> ALLHEADSR

```
x     x     x
x  x  x  x  x  x
σ  σ  σ  σ  σ  σ

x     x        x
x  x  x  x  x  x  x
σ  σ  σ  σ  σ  σ  σ
```

Since NONFINALITY's asymmetrical formulation prevents it from creating similar lapse configurations at the left edge of the prosodic word, so it cannot be used to produce iambic mirror images of the patterns in (93). Since the iambic mirror images are unattested, this is the desired result.

From the examples above, we can see that the differences between individual stress patterns are not completely determined by the positions of regular and irregular structures in the Weak Bracketing approach. Instead, they are determined both by the positions of regular and irregular structures, as determined by alignment constraints, and by the way in which these structures map to the metrical grid. The positions of the properly and improperly bracketed feet in (89a, 92a, 92b) are the same, but the stress patterns are different, the differences being due to interactions between requirements that all feet be stressed, that the initial syllable be stressed, and that clash be avoided. Similarly, properly and improperly bracketed feet are positioned in the same way in (90a, 93a, 93b), but different stress patterns emerge. In this case, the differences are due to interactions between alignment, the requirement that all feet be stressed, and the requirement that the final syllable be stressless.

Though the brief sketch presented above provides only an incomplete picture of the Weak Bracketing approach, it does indicate that overlapping feet can be mapped to the metrical grid in way that produces an appropriate range of stress patterns. For a more detailed presentation of the assumptions and constraints involved in the Weak Bracketing account, and the typology of stress patterns predicted, see Hyde 2002.

8 Grid-Only Accounts

The Odd-Parity Parsing Problem arises under Weak Layering because it creates problematic conflicts between parsing and minimality requirements and directional and faithfulness requirements. Since both the parsing and minimality requirements are requirements involving feet, it may seem that feet themselves are actually the source of the problem. As we saw in the previous section, however, this is not the case. It is possible to have a foot-based theory of metrical stress that predicts an appropriate range of stress patterns and also manages to avoid the Odd-Parity Parsing Problem.

Still, an alternative solution would be to simply abandon feet in favor of a grid-only approach to metrical stress. If there are no feet, then there need not be any parsing or minimality requirements concerning them, and the Odd-Parity Parsing Problem would disappear. A grid-only approach has reemerged in the proposals of Gordon (2002), and the problem would not arise under Gordon's account. Rather than addressing grid-only approaches in detail, however, I will briefly discuss why they cannot be considered a viable alternative, at least not at this point.

It has been known for some time, since the proposals of Prince (1983) and Selkirk (1984), that grid-only theories are capable of predicting reasonably accurate typologies of stress systems. (Aside from the translation into the OT framework, the most novel aspect of the more recent incarnation is the inclusion of a series of restrictions on extended lapse – sequences of three unstressed syllables – that allow the theory to accommodate ternary stress.) The primary reason for abandoning the earlier grid-only theories was not that they were unable to predict an appropriate range of stress patterns. It was simply that independent evidence from prosodic morphology (McCarthy and Prince 1986), iambic-trochaic lengthening asymmetries (Hayes 1985, 1995), domains of segmental rule application (Nespor and Vogel 1986), and other considerations all converged to make a compelling case for feet.

Feet and their associated parsing and minimality requirements are well-motivated independently of their usefulness in producing stress patterns, and the issues that led to the abandonment of previous grid-only accounts have not gone away. In the absence of concrete proposals that successfully address these issues without feet, a grid-only account cannot be seen as a viable theory of metrical stress, let alone a viable solution to the Odd-Parity Parsing Problem.

Despite their ability to predict a reasonable range of stress patterns, then, and their potential as an alternative solution to the Odd-Parity Parsing Problem, until there are concrete proposals for addressing the types of issues that led to the demise of such theories the first time around, there would seem to be very little point in going down the grid-only road again.

9 Summary and Concluding Remarks

In this paper, I examined two aspects of the Odd-Parity Parsing Problem – the Even-Only Problem and the Odd Heavy Problem – focusing on the latter. In examining the effects of the Odd Heavy Problem in several different accounts of metrical stress, we saw that it is primarily a structural problem and that it requires a structural solution. The best way to avoid the problem completely is to abandon the assumptions of Weak Layering in favor of the assumptions of Weak Bracketing.

The first half of the paper examined manifestations of the Odd Heavy Problem in three OT Weak Layering accounts. Section 2 discussed the Symmetrical Alignment account of McCarthy and Prince (1993), Section 3 the Asymmetrical Alignment account of Alber (2005), and Section 4 the Rhythmic Licensing account of Kager (2001, 2005). The Odd Heavy Problem created significant difficulties for each account, difficulties of both undergeneration and overgeneration, and could not associated with a particular approach to directionality effects.

Section 6 compared the effects of the Odd Heavy Problem under a serial account, a simplified version of the account of Hayes (1995), to its effects under the most similar OT account, Symmetrical Alignment. While the effects of the Odd Heavy Problem are more limited under the serial approach, they still have a substantial effect on the predicted typology. Given this result, it is clear that the Odd Heavy Problem arises due to the structural assumptions common to Weak Layering approaches rather than to such OT-specific considerations as constraint interaction and global evaluation.

With the structural nature of the problem established, Section 7 outlined a structural solution based on the Weak Bracketing proposal of Hyde (2001, 2002). Under Weak Bracketing, a leftover syllable can be parsed as a monosyllabic foot, or it can be parsed into a disyllabic foot that overlaps another disyllabic foot. The advantage of overlapping feet is that they provide a way to achieve exhaustive binary footing in odd-parity forms without creating conflicts with either faithfulness requirements or directional requirements. This allows Weak Bracketing to avoid both the Even-Only Problem and the Odd Heavy Problem altogether.

In Section 8, I briefly mentioned the potential for grid-only approaches to provide an alternative structural solution to the Odd-Parity Parsing Problem. At this point, the grid-only alternative does not seem to be especially viable, since feet and the requirements concerning them are well-motivated, and rejecting them leads to numerous difficulties in related areas.

For readers who remain unconvinced that the Odd-Parity Parsing Problem presents an insurmountable difficulty for Weak Layering accounts, an approach based on traditional gradient alignment seems to hold the most promise for minimizing its effects. When multiple positions for a layering irregularity are possible, alignment can always limit the choice to one. In the Symmetrical Alignment account, alignment constraints could not eliminate the peculiar quantity-sensitivity of the Odd Heavy problem, but they always decided on a particular position for a monosyllabic foot when multiple heavy syllables were available. This was not the case with clash and lapse restrictions. Since clash and lapse restrictions could not arrive at a unique optimal output in every context, the manifestations of the Odd Heavy Problem became increasingly exotic under Asymmetrical Alignment and Rhythmic Licensing.

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