NonFinality

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1 Introduction

In the Hyde 2002 approach to metrical stress, NonFinality constraints play a more prominent role than in previous approaches in producing basic binary patterns. In particular, NonFinality is crucial in predicting iambic-trochaic asymmetries, asymmetries that arise in the attested typology when an attested trochaic pattern does not have an attested iambic counterpart or when an attested iambic pattern does not have an attested trochaic counterpart. As I hope to demonstrate here, however, NonFinality's role is even more fundamental than the results of Hyde 2002 suggest. I will argue that NonFinality operates at multiple prosodic levels and that its effects can be observed in a variety of seemingly unrelated phenomena. In examining NonFinality's broader applications, I will focus on three areas: extrametricality effects, weight sensitivity effects, and lengthening effects.

The proposed formulation for NonFinality is a slight departure from the standard. As Prince and Smolensky (1993) explain, NonFinality differs from its predecessor extrametricality in that it focuses on the location of stress peaks rather than the parsability of final elements. The revised formulation (1a) retains NonFinality's stress peaks focus, but it departs from the standard formulation (1b) in taking entries on the metrical grid, rather than prosodic heads, to constitute stress peaks.

(1) a. Revised NonFinality
No PCat1-level gridmark occurs over the final Cat of a PCat2 (where PCat1 and PCat2 are prosodic categories, and Cat is a prosodic category or a segment).

b. Standard NonFinality (adapted from Prince and Smolensky 1993)
No PCat1-head occurs in final position in a PCat2 (where PCat1 and PCat2 are prosodic categories).

Two issues motivate the departure. First, the revised formulation makes NonFinality compatible with the other components of Hyde 2002, which assumes that grid entries represent stress. Second, the revised formulation allows NonFinality to duplicate a wider range of extrametricality effects. In particular, it will allow NonFinality to duplicate the effects of an extrametrical final consonant.

Revised NonFinality constraints have three components. First, they specify a grid level (prosodic word-level, foot-level, mora-level) whose entries must avoid final position. Second, they specify a particular category (foot, syllable, mora, segment) that constitutes the relevant final position.[1] Finally, they specify the prosodic category (prosodic word, foot, syllable) that

[1] The difference in how the revised and standard formulations treat stress peaks leads to a second difference. The revised version needs to specify a particular final element that stress must avoid, but the standard version does not. For example, if we want secondary stress to avoid the prosodic word-final syllable, under standard NonFinality, it is sufficient to say that foot-heads cannot occur in final position. Regardless of a final syllable's shape, since foot-heads are coextensive with syllables, standard NonFinality will be violated if the final syllable is a foot-head. Under revised NonFinality, however, since foot-level gridmarks are not always coextensive with syllables, it is insufficient to say that foot-level gridmarks cannot occur in final position. If the final syllable contains an intervening mora, as in (ia), or an

constitutes the domain in which final position must be avoided. Although there are numerous possible combinations of grid level, final category, and prosodic domain, I will focus below on the constraints in (2, 3). The names of the constraints take the form XNonFinal(Y, Z), where X is the grid level, Y is the final category, and Z is the prosodic domain.

In Section 2, I will demonstrate how the (2) constraints reproduce basic foot, syllable, and consonant extrametricality effects.

(2) a. □NonFinal(F, □)
No prosodic word-level gridmark occurs over the final foot of a prosodic word.

b. FNonFinal(□, □)
No foot-level gridmark occurs over the final syllable of a prosodic word.

c. □NonFinal(C, □)
No mora-level gridmark occurs over the final consonant of a prosodic word.

The □NonFinal(F, □) constraint (2a) is the constraint that most closely matches foot extrametricality. It prohibits prosodic word-level gridmarks over prosodic word-final feet. The FNonFinal(□, □) constraint (2b) duplicates the effects of syllable extrametricality by prohibiting foot-level gridmarks over prosodic word-final syllables. Finally, the □NonFinal(C, □) constraint (2c) helps to reproduce consonant extrametricality effects by banning mora-level gridmarks from prosodic word-final consonants.

In Sections 3 and 4, I will demonstrate how the (3) constraints produce weight sensitivity and rhythmic lengthening effects, extending NonFinality analyses beyond extrametricality's traditional range.

(3) a. FNonFinal(□, □)
No foot-level gridmark occurs over the final mora of a prosodic word.

b. FNonFinal(□, F)
No foot-level gridmark occurs over the final mora of a foot.

c. □NonFinal(□, □)
No prosodic word-level gridmark occurs over the final mora of a syllable.

d. FNonFinal(□, □)
No foot-level gridmark occurs over the final mora of a syllable.

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intervening coda, as in (ib), NonFinality will not be violated, and it cannot prohibit foot-level gridmarks on final syllables.

(i) a. Intervening mora b. Intervening coda

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     x                 x
     x x               x
     □ □               □
     |/                |
  …C V              …C V C
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Under the revised formulation, if we want to ban foot-level gridmarks from final syllables generally, then syllables must be specified.

The FNonFinal(□, □) constraint (3a) makes stress sensitive to the weight of prosodic-word-final syllables, and the FNonFinal(□, □) constraint (3d) makes stress sensitive to the weight of syllables generally. FNonFinal(□, □) prohibits foot-level gridmarks over prosodic word-final moras. FNonFinal(□, □) prohibits foot-level gridmarks over syllable-final moras. FNonFinal(□, □), along with the FNonFinal(□, F) constraint (3b) and the □NonFinal(□, □) constraint (3c), will also be important in the discussion of rhythmic lengthening. FNonFinal(□, F), which bans foot-level gridmarks from foot-final moras, promotes lengthening in the stressed syllables of right-headed feet. □NonFinal(□, □), which bans prosodic word-level gridmarks from syllable-final moras, promotes lengthening in syllables bearing primary stress. FNonFinal(□, □) promotes lengthening in stressed syllables generally.

Since the approach to metrical stress adopted here departs in several respects from previous approaches, I will briefly mention the most relevant differences.[2] (For a more detailed presentation, see Hyde 2002.) The first difference concerns the dominance relationships between prosodic categories. Where most current approaches tolerate weak layering (see Itô and Mester 1992 and McCarthy and Prince 1993a, among others), the adopted approach requires strict succession:[3]

(4) Strict Succession Condition (adapted from Itô and Mester 1992)
Every prosodic category of level *n* (< the maximum level) is immediately dominated by a prosodic category of level *n* + 1.

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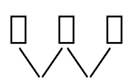
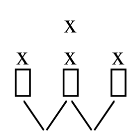
[2] One important departure that I will not address below concerns the bracketing of prosodic categories. Where standard approaches require that prosodic categories be properly bracketed (see Liberman 1975, Itô and Mester 1992, and Kenstowicz 1995, among others), the adopted approach allows configurations like those in (i).

(i) a. Intersection

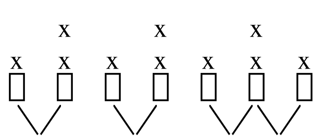


b. Gridmark sharing



The (ia) configuration, referred to as an *intersection*, contains two improperly bracketed feet that share a syllable. The (ib) configuration, referred to as a *gridmark-sharing* configuration, contains two improperly bracketed feet that share a foot-level gridmark. The primary role of intersection and gridmark sharing is to provide an alternative to monosyllabic feet for parsing the odd-syllable of odd-parity forms:

(ii)



Since configurations like (ii) do not result in final stress, they do not produce interesting interactions involving NonFinality, and there is no need to address them here.

[3] The strict succession requirement is not new. It was incorporated into Selkirk's (1984) Strict Layer Hypothesis and adopted in numerous subsequent accounts.

The Strict Succession Condition is nonviolable, and forms that fail this condition cannot be considered as output candidates.[4] Moras must be constituents of syllables, syllables must be constituents of feet, and feet must be constituents of prosodic words.

Second, where most current approaches abandon the metrical grid for a system of prosodic heads, the adopted approach maintains both prominence systems side by side. We can think of prosodic heads as the potential locations for stress, and we can think of gridmark columns as the actual locations of stress. (In examples throughout the article, I will indicate prosodic heads with vertical association lines, and I will indicate grid entries with an 'x' above the prosodic structure.) The (5) conditions are nonviolable restrictions applying to prosodic heads and grid entries.

(5) a. Headedness Condition
For every prosodic category (> mora) of level *n*, there is a prosodic category of level *n* – 1 designated as its head.

b. Gridmark to Head Condition
Every entry on the metrical grid (> mora-level) occurs within the domain of a prosodic head of the appropriate level.

c. Head Mora Condition
The head mora of every syllable coincides with a mora-level gridmark.

The Headedness Condition (5a) establishes the prosodic hierarchy's internal prominence system. Syllables must have head moras, feet must have head syllables, and prosodic words must have head feet. The Gridmark to Head Condition (5b) establishes the relationship between grid entries and prosodic heads. All gridmarks above the mora level must coincide with an appropriate prosodic head. Foot-level gridmarks must coincide with the head syllables of feet, and prosodic word-level gridmarks must coincide with the head feet of prosodic words. Although there is no general reverse requirement that prosodic heads coincide with gridmarks, there is a specific requirement for head moras. The Head Mora Condition (5c) requires that head moras coincide with mora-level gridmarks, helping to establish the grid's base level.

The violable MapGridmark constraints in (6) are responsible for constructing the remainder of the grid.

(6) a. MapGM(□)
A prosodic word-level gridmark occurs within the domain of every prosodic word.

b. MapGM(F)
A foot-level gridmark occurs within the domain of every foot.

c. MapGM(□)
A mora-level gridmark occurs over every mora.

The MapGM(□) constraint (6c) requires all moras to coincide with mora-level gridmarks. It extends the Head Mora Condition's mapping of head moras to moras generally. The

[4] Following Hyde 2002, I distinguish between *conditions* and *constraints*. Conditions are nonviolable restrictions on the grammar's Gen component, and Gen cannot produce output candidates that fail these restrictions. (Since forms that fail conditions cannot be output candidates, they are never included in tableaux that illustrate the proposed analyses.) Constraints are the violable and ranked requirements that operate in the grammar's Eval component. They select among the output candidates than Gen produces.

MapGM(F) constraint (6b) requires all feet to coincide with foot-level gridmarks, and the MapGM(□) constraint (6a) requires all prosodic words to coincide with prosodic word-level gridmarks.

The violability of the MapGridmark constraints is the third departure from standard approaches. Where most current approaches require a one-to-one correspondence between feet and stress (following Selkirk 1980), for example, the adopted approach often tolerates stressless feet.[5] Stressless prosodic categories are possible because violable constraints govern the relationships between prosodic categories and grid entries. Prosodic categories will only be stressed if the (6) constraints rank sufficiently high.

Finally, most current approaches establish alignment relationships between prosodic categories and other prosodic categories. The adopted approach establishes alignment relationships between prosodic categories and peaks of prominence, either prosodic heads, as in (7a, b), or grid entries, as in (7c, d).

(7) a. Hds-L
The left edge of every foot-head is aligned with the left edge of some prosodic word.

b. Hds-R
The right edge of every foot-head is aligned with the right edge of some prosodic word.

c. FG-L
The left edge of every foot-level gridmark is aligned with the left edge of some prosodic word.

d. FG-R
The right edge of every foot-level gridmark is aligned with the right edge of some prosodic word.

The foot-head alignment constraints (7a, b) help to determine both foot type and footing directionality in binary systems. The foot-gridmark alignment constraints (7c, d) help to produce the strings of stressless syllables and the directional orientation of unbounded systems. Although I will draw on examples from both binary and unbounded systems in the discussion below, I will treat the rankings for unbounded systems in greater detail than the rankings for binary systems. Since Hyde 2002 provides detailed discussion of binary systems within the adopted framework, examples from binary systems will focus only on the constraints that produce important interactions with NonFinality. Additional constraints will be introduced at appropriate points below.

[5] Previous proposals allowing stressless feet include Hayes 1987, Tyhurst 1987, Hung 1993, 1994, Selkirk 1995, and Crowhurst 1996.

2 Extrametricality effects

NonFinality's most common use has been in reproducing extrametricality effects. Traditionally, extrametricality is a collection of rules that designate word-final elements as unavailable for parsing into higher prosodic structure. In Hayes' (1995) account, three final elements—feet, syllables, and consonants—can be designated as extrametrical:

(8) a. Foot Extrametricality
$F \rightarrow \langle F \rangle$ / _____ $]_{word}$

b. Syllable Extrametricality
$\sigma \rightarrow \langle \sigma \rangle$ / _____ $]_{word}$

c. Consonant Extrametricality
$C \rightarrow \langle C \rangle$ / _____ $]_{word}$

Making word-final feet extrametrical prevents them from being included in prosodic words, making word-final syllables extrametrical prevents them from being footed, and making word-final consonants extrametrical prevents them from being moraic.

Of the three rules in (8), the effects of foot and syllable extrametricality are easiest to duplicate using NonFinality constraints, and analyses based on the standard formulation have been presented numerous times in the literature. Despite extrametricality's parsability focus, the typical foot and syllable extrametricality phenomena are directly related to the location of stress: a primary or secondary stress must avoid occurring too near to a word's right edge. Since NonFinality focuses on the location of stress peaks, it usually offers a more direct route for producing the desired phenomena.

It is not so easy, however, for NonFinality to duplicate consonant extrametricality effects, since the typical phenomena are directly related to parsing: a final consonant must be nonmoraic so that it cannot contribute to the weight of a final syllable. With its stress peaks focus, NonFinality could only achieve this result indirectly. As we shall see below, however, the revised formulation does offer an indirect approach, allowing it to absorb consonant extrametricality effects into the NonFinality framework.

In demonstrating below how revised NonFinality reproduces extrametricality effects, I will not be addressing extrametricality analyses in substantial detail. Instead, I will illustrate how NonFinality can be applied to a few patterns representative of basic extrametricality phenomena.[6] I hope to establish two points. First, its ability to duplicate consonant extrametricality effects gives the revised formulation an advantage over the standard. Second, the revised formulation retains the ability to duplicate foot and syllable extrametricality effects.

[6] One traditional role of extrametricality that I will not address here is its role in producing trisyllabic stress windows. Although NonFinality analyses can account for Latin-like stress windows (see Prince and Smolensky 1993), there are substantial difficulties in extending them to Macedonian-like stress windows. For an alternative analysis, see Hyde 2001 and Hyde (in preparation).

2.1 Final consonants

Estonian (Hint 1973, Prince 1980) is one case where the effect of consonant extrametricality is crucial. Estonian automatically stresses every odd-numbered syllable counting from the left, except the final syllable. Final syllables are stressed only if they are heavy, as in (9c, d). When a final syllable is light, as in (9b, f), it is unstressed.[7]

(9)
a. pálatt — 'piece, part. sg.'
b. pímestav — 'blinding'
c. kávalàtt — 'cunning'
d. páhemàit — 'worse, part. pl.'
e. rételìle — 'ladder, all. sg.'
f. pímestàvale — 'blinding, ill. sg.'
g. hílisèmattèle — 'later, all. pl.'

I will address the issue of final stress in Section 3.1. The point of interest here is how Estonian distinguishes between heavy and light final syllables. Since odd-numbered final syllables are stressed when they are CVV, CVVC, or CVCC, these types must pattern together in counting as heavy. Since final syllables are stressless when they are CV or CVC, these types must pattern together in counting as light.

The correct division is created when final consonants do not contribute to the weight of final syllables. Given its parsability focus, extrametricality achieves this result simply by preventing final consonants from having moraic status:

(10) Light syllables

a. $\begin{array}{cc} & \mu \\ & | \\ C & V \end{array}$ b. $\begin{array}{ccc} & \mu & \\ & | & \\ C & V & \langle C \rangle \end{array}$

(11) Heavy syllables

a. $\begin{array}{ccc} & \mu & \mu \\ & | & | \\ C & V & V \end{array}$ b. $\begin{array}{cccc} & \mu & \mu & \\ & | & | & \\ C & V & V & \langle C \rangle \end{array}$ c. $\begin{array}{cccc} & \mu & \mu & \\ & | & | & \\ C & V & C & \langle C \rangle \end{array}$

When final consonants are nonmoraic, as illustrated in (10, 11), final CVC syllables emerge as monomoraic like final CV syllables, and final CVVC and CVCC syllables emerge as bimoraic like final CVV syllables.

Despite NonFinality's stress peaks focus, an appropriate NonFinality analysis can produce similar results. Although NonFinality cannot directly prohibit moras from associating with final consonants, by referring to a stress peak that coincides with moras generally, it can indirectly affect the moras themselves. The success of the NonFinality approach, however, crucially depends on the treatment of stress peaks. Because standard NonFinality defines stress peaks in terms of prosodic heads, there are no stress peaks that coincide with moras generally under the standard formulation. A mora coincides with a stress peak only when it

[7] Estonian has an optional ternary pattern, which I will not address here. I also set aside the complications arising from initial superheavy syllables.

is the head mora of a syllable, but banning head moras from final position does not ban moras generally. Consider the following two constraints:

(12) a. NonFinality(hd-□)
No head mora of a syllable occurs in final position in a prosodic word.

b. Coda/□
Every coda consonant is associated with a mora.

NonFinality(hd-□) is a standard-type NonFinality constraint that prohibits head moras from occurring in final position. The Coda/□ constraint requires coda consonants to have moraic status. To produce the correct division for final syllables in Estonian, final CVC syllables must emerge as monomoraic, but, as (13) demonstrates, NonFinality(hd-□) fails to produce the desired result.

(13)

…CVC	NonFinality(Hd-□)	Coda/□
a. …C V C □ □		*!
☞ b. …C V C □ □ □		

In (13), since neither syllable's head mora is in final position, both candidates satisfy NonFinality(hd-□), and the decision passes to Coda/□. Since the coda consonant is moraic in candidate (b) and nonmoraic in candidate (a), the bimoraic candidate (b) incorrectly emerges as the winner.

Revised NonFinality avoids this difficulty by referring to grid entries. The MapGM(□) constraint, repeated in (14a), associates each mora with a mora-level gridmark. When MapGM(□) is satisfied, moras generally are associated with a type of stress peak that NonFinality constraints can refer to.

(14) a. MapGM(□)
A mora-level gridmark occurs over every mora.

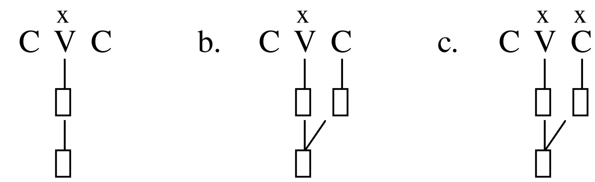
b. □NonFinal(C, □)
No mora-level gridmark occurs over the final consonant of a prosodic word.

The relevant NonFinality constraint is □NonFinal(C, □), repeated in (14b). By banning mora-level gridmarks from prosodic-word final consonants, □NonFinal(C, □) can also prevent final consonants from associating with moras.

To illustrate, consider the possible configurations for a CVC syllable in (15). The (15a) syllable is monomoraic, and the (15b, c) syllables are bimoraic. The difference between the heavy syllables is in how they map to the metrical grid. In (15c), the mapping is exhaustive.

Every mora coincides with a mora-level gridmark. In (15b), the mapping is partial. Only one mora coincides with a mora-level gridmark.

(15) a. b. c.



When a heavy syllable like (15c) occurs in final position, it violates □NonFinal(C, □). Heavy syllables like (15b) violate MapGM(□). Both types' disadvantages can be avoided, however, by removing the mora from the coda consonant, as in (15a). By omitting the final mora, (15a) avoids a mora-level gridmark over its final consonant without creating a mismatch between moras and mora-level gridmarks.

As (16) demonstrates, the ranking □NonFinal(C, □), MapGM(□) >> Coda/□ produces the desired result.

(16)

…CVC	□NonFinal(C, □)	MapGM(□)	Coda/□
☞ a. …C V C			*
b. …C V C		*!	
c. …C V C	*!		

□NonFinal(C, □) excludes candidate (c) because it has a mora-level gridmark over the prosodic word-final consonant. MapGM(□) excludes candidate (b) because its final mora does not coincide with a mora-level gridmark. Although the optimal candidate (a) violates Coda/□, having a nonmoraic final consonant allows it to satisfy the higher ranked □NonFinal(C, □) and MapGM(□) simultaneously.

The (17) tableau demonstrates the ranking's effect for final CVCC syllables. □NonFinal(C, □) and MapGM(□) still prevent the final consonant from being moraic, but Coda/□ preserves the moraic status of the remaining coda consonant, ensuring that final CVCC syllables emerge as bimoraic.

(17)

…CVCC	□NonFinal(C, □)	MapGM(□)	Coda/□
x x ☞ a. …C V C C □ □ □			*
x b. …C V C C □ □			**!
x x c. …C V C C □ □ □ □		*!	
x x x d. …C V C C □ □ □ □	*!		

In (17), □NonFinal(C, □) excludes candidate (d) because it has a mora-level gridmark over the prosodic word-final consonant, and MapGM(□) excludes candidate (c) because its final mora does not coincide with a mora-level gridmark. Candidates (a) and (b) both have nonmoraic final consonants, satisfying □NonFinal(C, □) and MapGM(□) simultaneously, so the decision passes to Coda/□. Coda/□ excludes candidate (b) because it has an extra nonmoraic coda consonant, and the (a) candidate's bimoraic CVCC syllable correctly emerges as the winner.

The ranking's effects for the remaining syllable types should be clear. Since □NonFinal(C, □) does not prohibit mora-level gridmarks over prosodic word-final vowels, the ranking does not affect the weight of final CV and CVV syllables. Final CV syllables will be monomoraic, and final CVV syllables will be bimoraic. As with final CVC and CVCC syllables, the ranking strips final moras from final CVVC syllables, leaving them bimoraic. I omit the additional tableaux.

In examining the weight distinctions for final syllables in Estonian, we have seen that revised NonFinality duplicates consonant extrametricality effects where the standard formulation cannot. Crucial to the revised formulation's success is its definition of stress peaks in terms grid entries. Individual stress peaks— in this case, mora-level gridmarks— must correspond to individual moras. By banning mora-level gridmarks from prosodic word-final consonants, revised NonFinality indirectly prevents final consonants from having moraic status.

2.2 Final syllables

In this section and the following, I will demonstrate that revised NonFinality retains the ability to duplicate syllable and foot extrametricality by examining some of their traditional effects in binary systems. The clearest examples of syllable extrametricality are languages where the stress pattern is perturbed at a word's right edge. A final stress that would be anticipated based on continued binary alternation either arrives early or is absent altogether.

The iambic Aguaruna (Payne 1990, Hung 1994) pattern is a case where the anticipated final stress arrives early:

(18)	a.	ičínàka	'pot (nom)'
	b.	ičínakàna	'pot (acc)'
	c.	čaŋkínaŋùmìna	'your basket (acc)'
	d.	čaŋkínaŋùminàki	'only your basket (acc)'

Aguaruna stresses the penult and every even-numbered syllable preceding the penult.[8] In even-parity forms, such as (18a, c), both the penult and the antepenult are stressed.

The iambic Choctaw (Nicklas 1972, 1975) pattern is a case where an anticipated final stress is absent. The examples in (19) are combinations of /pisa/ 'to see', /či-/ 'you (object)', /-či/ 'causative', and /-li/ 'I (subject)':

(19)	a.	pisa
	b.	čipísa
	c.	čipísali
	d.	čipísačíli

Choctaw stresses every even-numbered syllable counting from the left, except the final syllable:[9] In even-parity forms, such as (19a, c), the final two syllables are stressless.

An extrametricality approach would produce the Aguaruna and Choctaw patterns by making word-final syllables extrametrical and then constructing the foot layer from left to right. The difference between the two, as illustrated in (20), would be that Aguaruna tolerates degenerate feet and Choctaw does not.

(20) a. Degenerate feet permitted b. Degenerate feet prohibited

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a.  (   x )(   x )( x )        b.  (   x )(   x )
     x   x   x   x   x   x          x   x   x   x   x   x
     σ   σ   σ   σ   σ ⟨σ⟩          σ   σ   σ   σ   σ ⟨σ⟩
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When a final syllable is extrametrical, it cannot be footed and, therefore, cannot be stressed. If an odd syllable intervenes between the rightmost binary foot and the extrametrical syllable, the situation for even-parity forms in both languages, the treatment of degenerate feet determines the status of the anticipated final stress. If the language tolerates degenerate feet, as in (20a), the odd syllable is parsed, and the anticipated final stress arrives early. If the language

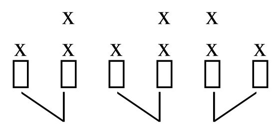
[8] Hung (1994) infers the position of stress from the absence of vowel reduction processes. Her account is based on Payne's (1990) description.

[9] The Choctaw pattern may be perturbed by underlyingly heavy syllables. As we shall see in Section 4.1, Choctaw is also an iambic lengthening language.

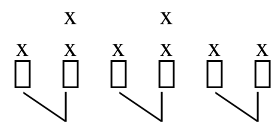
prohibits degenerate feet, as in (20b), the odd syllable remains unparsed, and the anticipated final stress is absent altogether.

A NonFinality analysis produces similar results, but the proposed approach utilizes different structures:

(21) a. Final trochee



b. Stressless foot



When an anticipated final stress arrives early, the proposed approach uses a final trochee, as in (21a), rather than a degenerate foot preceding an unfooted syllable. When an anticipated final stress is absent altogether, the proposed approach uses a stressless foot, as in (21b), rather than two unfooted syllables.[10]

The NonFinality constraint promoting the (21) structures is FNonFinal(□, □), repeated in (22a), which bans foot-level gridmarks from prosodic word-final syllables.

(22) a. FNonFinal(□, □)
No foot-level gridmark occurs over the final syllable of a prosodic word.

b. Hds-R
The right edge of every foot-head is aligned with the right edge of some prosodic word.

c. MapGM(F)
A foot-level gridmark occurs within the domain of every foot.

When satisfying FNonFinal(□, □) requires violating Hds-R, repeated in (22b), the result is a final trochee. Hds-R is the constraint in the Hyde 2002 framework that promotes both rightward footing and iambic footing. In contrast, when satisfying FNonFinal(□, □) requires violating MapGM(F), repeated in (22c), the result is a stressless final foot. MapGM(F) requires all feet to coincide with foot-level gridmarks.

The ranking FNonFinal(□, □), Hds-R >> MapGM(F) produces the Choctaw pattern. In even-parity forms, the iambic footing produced by Hds-R positions a foot-head at the prosodic word's right edge. Since stressing this foot-head would violate FNonFinal(□, □), the final foot is left stressless at the expense of the lower ranked MapGM(F). The (23) tableau demonstrates using a four-syllable form like (19c), /čipísali/.

[10] This partially contrasts with standard NonFinality approaches. Like the proposed approach, the standard approach would obtain the Aguaruna pattern with a final trochee (see, for example, the McCarthy and Prince 1993b analysis of Axininca Campa). Unlike the proposed approach, the standard approach does not allow stressless feet, so it would obtain the Choctaw pattern with two unfooted syllables, as in the extrametricality approach (see, for example, the Kenstowicz 1995 analysis of Carib).

(23)

□□□□	FNonFinal(□, □)	Hds-R	MapGM(F)
☞ a. x x x x x □ □ □ □		* *	*
b. x x x x x x □ □ □ □		* **!	
c. x x x x x x □ □ □ □	* !	* *	

In (23), FNonFinal(□, □) excludes candidate (c). Stressing its final iambic foot positions a foot-level gridmark over the prosodic word-final syllable. Hds-R excludes candidate (b). Making its final foot trochaic means shifting the final foot-head one syllable to the left. Although the (a) candidate's stressless final iamb violates MapGM(F), it allows (a) to satisfy the higher ranked FNonFinal(□, □) and to perform as well as possible, given the form's length, on the higher ranked Hds-R. Candidate (a) correctly emerges as the winner, and its stressless foot creates the effect of an anticipated final stress being absent.

The Aguaruna pattern emerges when we reverse the ranking between Hds-R and MapGM(F) so that FNonFinal(□, □) and MapGM(F) both dominate Hds-R. In even-parity forms, MapGM(F) associates each foot with a foot-level gridmark. Since stressing a final iambic foot would violate FNonFinal(□, □), the final foot is made trochaic at the expense of the lower ranked Hds-R. The (24) tableau demonstrates using a four-syllable form like (18a), /ičínàka/.

(24)

□□□□	FNonFinal(□, □)	MapGM(F)	Hds-R
a. x x x x x □ □ □ □		* !	* *
☞ b. x x x x x x □ □ □ □			* **
c. x x x x x x □ □ □ □	* !		* *

In (24), FNonFinal(□, □) excludes the (c) candidate's stressed final iamb, and MapGM(F) excludes the (a) candidate's stressless final foot. Although the (b) candidate's final trochaic foot produces an additional Hds-R violation, a stressed final trochee satisfies the higher ranked MapGM(F) without violating FNonFinal(□, □). Candidate (b) emerges as the winner, and its stressed final trochee creates the effect of an anticipated final stress arriving early.

In examining Choctaw and Aguaruna, we have seen that revised NonFinality retains the ability to duplicate syllable extrametricality effects. It produces the effect of an anticipated final stress arriving early, and it produces the effect of an anticipated final stress being absent altogether. Next, we will see that the revised formulation also retains the ability to duplicate foot extrametricality effects.

2.3 Final feet

The clearest cases of foot extrametricality are languages where primary stress is regularly the penultimate stress. The position of primary stress in Banawá (Buller et al. 1993 and Everett 1996a, b) is an example:

(25)	a.	fáa	'water'
	b.	téme	'foot'
	c.	mákarì	'cloth'
	d.	tátikùne	'hair'
	e.	mètuwásimà	'find them'
	f.	tìnarífabùne	'you are going to work'

Banawá stresses every odd-numbered syllable counting from the left.[11] In odd-parity forms with three or more syllables, like (25c, e), the stress over the antepenult is primary. In even-parity forms with four or more syllables, like (25d, f), the stress over the preantepenult is primary. In one- and two-syllable forms, like (25a, b), primary stress is initial.

As illustrated in (26), an extrametricality approach would make the word-final foot of trisyllabic and longer forms extrametrical, excluding it from the prosodic word, so that the morphological word's penultimate foot becomes the prosodic word's final foot.

(26) a. Even-parity form

```
(         x      )
( x     )( x     )□( x     )□
  x   x   x   x   x   x
  □   □   □   □   □   □
```

b. Odd-parity form

```
(         x      )
( x     )( x     )□( x )□
  x   x   x   x   x
  □   □   □   □   □
```

When the prosodic word positions its gridmark above its final foot, the word's penultimate stress becomes the primary stress. Extrametricality would be blocked in one- and two-syllable forms, which contain only a single foot, under the assumption that extrametricality cannot exhaust the domain of the stress rules. This allows the single foot of smaller forms to be included in a prosodic word, so that these have primary stress as well.

To duplicate the effect of foot extrametricality in Banawá, NonFinality must shift primary stress from the final foot to an available penultimate foot, but it must also refrain from creat-

[11] Two factors may perturb Banawá's basic pattern: the presence of heavy syllables and word-initial vowels. I will not address these issues here.

ing smaller forms without primary stress. The relevant NonFinality constraint is □NonFinal(F, □), repeated in (27a), which bans prosodic word-level gridmarks from prosodic word-final feet.

(27) a. □NonFinal(F, □)
No prosodic word-level gridmark occurs over the final foot of a prosodic word.

b. Hd-R
The right edge of every prosodic word-head is aligned with the right edge of some prosodic word.

c. MapGM(□)
A prosodic word-level gridmark occurs within the domain of every prosodic word.

To shift primary stress from the final foot to an available penultimate foot, □NonFinal(F, □) must dominate a constraint like Hd-R, given in (27b). Hd-R positions the prosodic word-level gridmark by aligning the head foot as far to the right as possible. To avoid smaller forms without primary stress, MapGM(□), repeated in (27c), must dominate □NonFinal(F, □). MapGM(□) requires all prosodic words to coincide with prosodic word-level gridmarks.

The (28) tableau demonstrates the ranking MapGM(□) >> □NonFinal(F, □) >> Hd-R using a six-syllable form like (25f), /tìnaríkfabùne/. In the optimal candidate (a), primary stress is the penultimate stress.

(28)

□□□□□□	MapGM(□)	□NonFinal(F, □)	Hd-R
x (over the 3rd syllable) x x x (over the 1st, 3rd and 5th syllables) x x x x x x ☞ a. □ □ □ □ □ □ F F F			**
x (over the 1st syllable) x x x (over the 1st, 3rd and 5th syllables) x x x x x x b. □ □ □ □ □ □ F F F			***!*
x (over the 5th syllable) x x x (over the 1st, 3rd and 5th syllables) x x x x x x c. □ □ □ □ □ □ F F F		*!	
x x x (over the 1st, 3rd and 5th syllables) x x x x x x d. □ □ □ □ □ □ F F F	*!		

In (28), MapGM(□) excludes candidate (d) because the prosodic word does not have a prosodic word-level gridmark. □NonFinal(F, □) excludes candidate (c) because the prosodic word-level gridmark occurs over the final foot. Candidates (a) and (b) both satisfy MapGM(□) and □NonFinal(F, □), but because the (b) candidate's head foot occurs further to the left, it has more Hd-R violations than candidate (a). Hd-R excludes candidate (b), and candidate (a) correctly emerges as the winner.

The (29) tableau demonstrates that the same ranking retains primary stress in disyllabic forms like (25b), /téme/.

(29)

□□	MapGM(□)	□NonFinal(F, □)	Hd-R
x x x x ☞ a. □ □		*	
x x x b. □ □	*!		

In (29), MapGM(□) excludes candidate (b) because the prosodic word does not have a prosodic word-level gridmark. Although the optimal candidate (a) violates □NonFinal(F, □), the primary stress over its single foot satisfies the higher ranked MapGM(□).

In examining primary stress in Banawá, we have seen that revised NonFinality reproduces foot extrametricality effects as well as syllable and consonant extrametricality effects. Although it is important that NonFinality duplicate the effects of its predecessor, we shall see below that it is also possible to extend NonFinality analyses beyond extrametricality's traditional range. There are two reasons. First, NonFinality's stress peaks focus allows it to apply to *prosodic* domains. Although it is typically applied to the prosodic word domain, there is nothing to prevent it from applying to the foot and syllable domains as well. For example, NonFinality might ban foot-level gridmarks from foot-final moras, or NonFinality might ban foot-level gridmarks from syllable-final moras. In contrast, because extrametricality focuses on parsability, it must apply within *morphological* domains. It would be less than helpful, for example, to make a prosodic word-final foot extrametrical, because the foot would already have to be parsed into higher prosodic structure to be prosodic word-final in the first place. Similarly, extrametricality could not exclude foot-final syllables from higher prosodic structure, because a syllable would already have to be parsed into higher prosodic structure to be foot-final in the first place. Although applying extrametricality to a morphological word has the effect of applying it to a prosodic word-like domain, there would seem to be little chance of applying extrametricality to foot-like or syllable-like domains.

The second reason is that NonFinality's stress peaks focus allows it to prohibit stress over domain-final moras. Although mora extrametricality has been proposed (see, for example, Halle and Vergnaud 1987), Hayes (1995) rejects it due to the structural difficulties it presents. Uniquely excluding final moras from higher prosodic structure requires abandoning either exhaustive syllabification or syllable integrity. Because NonFinality does not require nonparsing, it avoids these difficulties.

Below, we will see examples of moraic NonFinality in the syllable, foot, and prosodic word domains. Section 3 will demonstrate how NonFinality makes stress sensitive to syllable weight, and Section 4 will demonstrate how NonFinality produces iambic and trochaic lengthening. By treating these additional phenomena as NonFinality effects, we can incorporate them into a broader framework and give them a more general and uniform analysis.

3 Weight sensitivity

Two types of weight sensitivity have been prominently addressed in the literature. The first type is addressed in the quantity sensitive parameter of Hayes 1981 and in the Weight to Stress principle of Prince 1991. This type, which requires that heavy syllables be stressed, has the effect of discouraging stressless heavy syllables. The second type is addressed in the obligatory branching parameters of Hayes 1981 and Hammond 1986 and in the Stress to Weight constraint of Hammond and Dupoux 1996. This type, which requires that stressed syllables be heavy, has the effect of discouraging stressed light syllables. We will see below that this second type of weight sensitivity can easily be absorbed into a NonFinality framework. Section 3.1 will demonstrate how NonFinality helps to avoid stress on light prosodic word-final syllables, and Section 3.2 will demonstrate how NonFinality helps to avoid stress on light syllables generally.

3.1 Weight sensitivity in final syllables

Wergaia (Hercus 1986) and Estonian are two languages that ban stress from prosodic word-final syllables only if they are light. To illustrate, Wergaia automatically stresses every odd-numbered syllable counting from the left, except the final syllable.

(30)	a. LLL	gúrewa	‘bird, hoary-headed grebe’
	b. LHL	bíriŋge	‘tea’
	c. LLH	búnadùg	‘broad-leaved mallee’
	d. LLLL	wúregùda	‘to go on talking’
	e. LLLH	wúregwùraŋ	‘speaking together, gabbing’

Odd-numbered final syllables are stressed only if they are heavy, as in (30c). If they are light, as in (30a, b), they are unstressed.

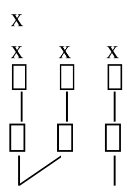
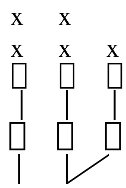
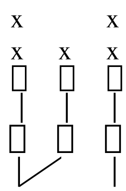
To frame the issue in terms familiar from the discussion of Choctaw and Aguaruna, a final stress is anticipated in Wergaia’s odd-parity forms based on continued binary alternation. When the final syllable is heavy, the anticipated stress is present. When the final syllable is light, the anticipated stress is absent. As in Choctaw and Aguaruna, the crucial interactions are between MapGM(F), Hds-R, and NonFinality. For Wergaia, however, the relevant NonFinality constraint is FNonFinal(□, □), repeated in (31).

(31) FNonFinal(□, □)
No foot-level gridmark occurs over the final mora of a prosodic word.

When stress occurs over a monomoraic final syllable, it must also occur over the prosodic word-final mora. Since FNonFinal(□, □) bans foot-level gridmarks from prosodic word-final moras, it also bans foot-level gridmarks from light final syllables. FNonFinal(□, □) does not, however, prevent foot-level gridmarks from occurring over heavy final syllables. When a bimoraic final syllable is stressed, since an additional mora is available to support the gridmark column, the stress need not occur over the prosodic word-final mora.

Wergaia is similar to Choctaw in that a high ranking NonFinality constraint sometimes produces a stressless final foot. With the Wergaia ranking FNonFinal(□, □), Hds-R ≫ MapGM(F), however, a stressless final foot emerges only in odd-parity forms with light final syllables. The (32) tableau demonstrates using a three-syllable form like (30a), /gúrewa/.

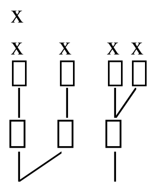
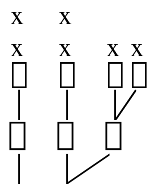
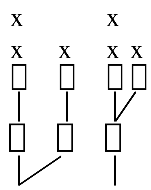
(32)

LLL	FNonFinal(□, □)	Hds-R	MapGM(F)
☞ a. 		* *	*
b. 		* **!	
c. 	*!	* *	

In (32), FNonFinal(□, □) excludes candidate (c). Since (c) stresses its light final syllable, it positions a foot-level gridmark over the prosodic word-final mora. Hds-R excludes candidate (b) because its final trochaic foot shifts the rightmost foot-head further to the left. Although candidate (a) has a final stressless foot in violation of MapGM(F), leaving the final foot stressless allows (a) to avoid a foot-level gridmark over its prosodic word-final mora, satisfying the higher ranked FNonFinal(□, □), and to avoid shifting its rightmost foot-head to the left, better satisfying the higher ranked Hds-R. Candidate (a) correctly emerges as the winner, and its stressless final foot creates the effect of an anticipated final stress being absent.

The ranking's results differ when an odd-parity input has a heavy final syllable. As (33) demonstrates using a three-syllable form like (30c), /búnadùg/, the final syllable can be stressed without violating FNonFinal(□, □), so there is no need for a stressless final foot.

(33)

LLH	FNonFinal(□, □)	Hds-R	MapGM(F)
a. 		* *	*!
b. 		* **!	
☞ c. 		* *	

Although the optimal candidate (c) stresses its final syllable, the foot-level gridmark does not occur over the prosodic word-final mora. Since every foot in (c) is stressed, it satisfies MapGM(F). Since stressing the final foot does not mean either stressing the final mora or making the final foot trochaic, (c) also satisfies the higher ranked FNonFinal(□, □) and better satisfies the higher ranked Hds-R. For odd-parity forms with a heavy final syllable, then, the anticipated final stress is actually present.

The Estonian pattern is similar, but it differs in how it distinguishes heavy and light final syllables. In Wergaia, final CVC syllables are heavy, and final CV syllables are light. In Estonian, final CVV, CVVC, and CVCC syllables are heavy, but final CVC syllables pattern with final CV syllables in counting as light. The analysis in Section 2.1 demonstrated how revised NonFinality helps to produce this division.

The crucial cases here are Estonian odd-parity forms with final CVC syllables. Such forms create a conflict between the constraints from Section 2.1 that require final CVC syllables to be light and the MapGM(F) constraint from (32, 33). The conflict arises because MapGM(F) might force a final CVC syllable to be bimoraic, so that it could be stressed without violating the higher ranked FNonFinal(□, □). To ensure that final CVC syllables are light and therefore unstressable, however, it is simply necessary to combine the ranking from Section 2.1 with the Wergaia ranking from (32, 33) so that □NonFinal(C, □) and MapGM(□) both dominate MapGM(F):

(34) Estonian ranking

FNonFinal(□, □), □NonFinal(C, □), MapGM(□) >> MapGM(F), Coda/□

When □NonFinal(C, □) and MapGM(□) dominate MapGM(F) the requirement that final CVC syllables be light outweighs the requirement that feet be stressed.

As (35) demonstrates using a three-syllable form like (9b), /pímestav/, the (34) ranking maintains a final CVC syllable’s light status and prevents it from bearing stress. (The following tableau assumes that Hds-R is also highly ranked, and I have omitted possible candidates where the final foot is trochaic.)

(35)

CV.CV.CVC	FNonFin (□, □)	□NonFin (C, □)	MapGM (□)	MapGM (F)	Coda/□
x x x x ☞ a. CV CV CVC				*	*
x x x x x b. CV CV CVC			*!		
x x x x x x c. CV CV CVC		*!			
x x x x x d. CV CV CVC	*!				*

In (35), FNonFinal(□, □) excludes candidate (d) because a foot-level gridmark occurs over a light final syllable. □NonFinal(C, □) excludes candidate (c) because a mora-level gridmark occurs over the prosodic word-final consonant, and MapGM(□) excludes candidate (b) because the final mora does not coincide with a mora-level gridmark. The optimal candidate (a) has a nonmoraic final consonant, violating Coda/□, and a stressless final foot, violating MapGM(F). Its nonmoraic final consonant, however, allows (a) to satisfy the higher ranked □NonFinal(C, □) and MapGM(□) simultaneously. Also, since its nonmoraic final consonant makes its final syllable light, leaving its final foot stressless allows (a) to satisfy the higher ranked FNonFinal(□, □).

In examining Wergaia and Estonian, we have seen that NonFinality can make stress sensitive to the weight of prosodic word-final syllables. The FNonFinal(□, □) constraint bans stress from light final syllables but not from heavy final syllables. Next, I will demonstrate how NonFinality can make stress sensitive to the weight of syllables generally. The discussion will focus on weight sensitive unbounded systems, both default to same side systems and default to opposite side systems. Applying NonFinality to the syllable domain provides a mechanism to shift stress from a light syllable at the default edge to an available heavy syllable.

3.2 General weight sensitivity

Before examining weight sensitive unbounded systems, it will help to briefly discuss the weight insensitive versions. The simplest types have a single stress at one edge or the other of the prosodic word:

(36) Tinrin forms

- a. húːe ‘white’
- b. húsaːu ‘sometimes’
- c. s̥ɯ́vehaɽu ‘to like’

(37) Uzbek forms

- a. aitdí ‘he said’
- b. kitobím ‘my book’
- c. aŋladilár ‘they understood’

The single stress may occur over the initial syllable, as in Tinrin (Osumi 1995), or it may occur over the final syllable, as in Uzbek (Poppe 1962).[12]

In the Hyde 2002 framework, the foot-gridmark alignment constraints, repeated in (38), help to produce unbounded stress patterns.

(38) a. FG-L
The left edge of every foot-level gridmark is aligned with the left edge of some prosodic word.

b. FG-R
The right edge of every foot-level gridmark is aligned with the right edge of some prosodic word.

FG-L and FG-R have two roles. First, they influence directionality. FG-L aligns foot-level gridmarks with the prosodic word’s left edge, and FG-R aligns foot-level gridmarks with the prosodic word’s right edge. By influencing the position of a gridmark column’s foot-level gridmark, foot-gridmark alignment influences the position of the column as a whole and determines the location of the single stress in weight insensitive systems. FG-L and FG-R’s

[12] A third type of weight insensitive system regularly stresses the penult. This is the situation in Yawelmani (Newman 1944, Kroeber 1963), for example. Such a system can be obtained by modifying the Uzbek ranking in the discussion below so that it includes high ranking MapGM(□) and FNonFinal(□, □) constraints. See Hyde 2001 for an analysis of Yawelmani stress within the adopted framework.

second role is to produce stressless feet. When ranked above MapGM(F), a foot-gridmark alignment constraint can strip foot-level gridmarks from feet that would not position them at the designated edge. By creating stressless feet, foot-gridmark alignment produces the strings of stressless syllables characteristic of unbounded patterns.

To illustrate, the ranking FG-L >> MapGM(F) positions a single gridmark column at the prosodic word's left edge, the appropriate configuration for Tinrin. The (39) tableau demonstrates using a four-syllable form like (36c), /ʂɯ́vehaɽu/.

(39)

□□□□	FG-L	MapGM(F)
x x x x x x ☞ a. □ □ □ □		*
x x x x x x b. □ □ □ □	*!*	*
x x x x x x x c. □ □ □ □	*!*	

In (39), candidate (b) has a single gridmark column over its second foot, and candidate (c) has a gridmark column over both feet. FG-L excludes candidates (b) and (c) because both have a foot-level gridmark that does not occur at the prosodic word's left edge. The optimal candidate (a) has a single gridmark column at the left edge of the leftmost foot. Although the absence of a foot-level gridmark over its second foot forces (a) to violate MapGM(F), it also allows (a) to satisfy the higher ranked FG-L. We would obtain the Uzbek pattern similarly with the ranking FG-R >> MapGM(F). A gridmark column would occur at the right edge of the rightmost foot, and all other feet would be stressless. I omit the additional tableau.

Foot-gridmark alignment plays similar roles in weight sensitive systems. It creates strings of stressless syllables and influences directionality. Although foot-gridmark alignment will not unilaterally determine the position of stress, it will establish the default edge.

3.2.1 Default to same side systems

Having presented the core rankings for unbounded systems, we will now see how applying NonFinality to the syllable domain can shift stress from a default edge to an available heavy syllable. Default to same side systems position stress on the heavy syllable nearest a given edge or, in the absence of a heavy syllable, on the light syllable nearest the same edge. For example, in Murik (Abbott 1985), stress occurs over the leftmost heavy syllable when heavy syllables are present, and it occurs over the leftmost light syllable when heavy syllables are absent:

(40) Murik forms

a.	LL	dámag	‘garden’
b.	LLL	dák^{h}anɨmp	‘post’
c.	LLLH	anənp$^{\acute{K}}$aɾɛ́ːt^{h}	‘lightning’
d.	LLHL	numaɾóːgo	‘woman’

(41) Aguacatec forms

a.	LL	kaʔpén	‘day after tomorrow’
b.	LLL	tʃinhojlíh̤-ts	‘they search for me’
c.	LH	ʔintáː	‘my father’
d.	HL	míːtuʔ	‘cat’

In Aguacatec (McArthur and McArthur 1956), stress occurs over the rightmost heavy syllable when heavy syllables are present, and it occurs over the rightmost light syllable when heavy syllables are absent.

To produce default to same side patterns, we simply add FNonFinal(□, □), repeated in (42), and MapGM(□) to the weight insensitive rankings discussed above.

(42) FNonFinal(□, □)
No foot-level gridmark occurs over the final mora of a syllable.

By prohibiting foot-level gridmarks over syllable-final moras, FNonFinal(□, □) also prohibits stress over light syllables. MapGM(□) ensures that each form has primary stress. As indicated in (43), MapGM(□) dominates FNonFinal(□, □), and FNonFinal(□, □) dominates the foot-gridmark alignment constraint that establishes the default edge.

(43) Default to same side rankings

a. MapGM(□) >> FNonFinal(□, □) >> FG-L >> MapGM(F)

b. MapGM(□) >> FNonFinal(□, □) >> FG-R >> MapGM(F)

Ranking MapGM(□) and FNonFinal(□, □) above foot-gridmark alignment ensures that stress will occur over an available heavy syllable, even if the heavy syllable is not at the default edge. Ranking MapGM(□) above FNonFinal(□, □) ensures that a stress will still occur at the default edge when no heavy syllable is available.

To illustrate, the (43a) ranking produces the Murik pattern. When a heavy syllable is present, stress shifts from the default (left) edge to the heavy syllable. The (44) tableau demonstrates using a four-syllable form like (40d), /numaɾóːgo/. (In this and the remaining tableaux that illustrate unbounded patterns, I have not indicated the positions of feet or violations of the low ranked MapGM(F). I am still assuming, however, that each stress coincides with a foot and that strings of stressless syllables result from stressless feet.)

(44)

LLHL	MapGM(□)	FNonFinal(□, □)	FG-L
☞ a. x (over the heavy syllable) x (over the heavy syllable) x x x x x □ □ □□□ □ □ □ □			* *
b. x (over the first syllable) x (over the first syllable) x x x x x □ □ □□□ □ □ □ □		* !	
c. x x x x x □ □ □□□ □ □ □ □	* !		

In (44), MapGM(□) excludes candidate (c) because the form does not contain a prosodic word-level gridmark. FNonFinal(□, □) excludes candidate (b) because its supporting foot-level gridmark occurs over a light syllable and, therefore, over a syllable-final mora. Although the optimal candidate (a) violates FG-L, the gridmark column occurs over a heavy syllable, allowing candidate (a) to satisfy the higher ranked MapGM(□) and FNonFinal(□, □) simultaneously.

Note also that, if we were able to consider a Murik form with more than one heavy syllable,[13] FG-L would position the gridmark column over the leftmost:

[13] Languages presented as default to same side systems often are not completely convincing in this classification. For example, Amele (Roberts 1987) and Murik are both described as having stress on the first heavy syllable, or in the absence of a heavy syllable, on the first syllable. However, since individual forms never contain more than one heavy syllable in these languages, it is impossible to tell whether it is being the first, the last, or some other designation that causes the heavy syllables to be stressed. Similarly, Aguacatec is described as having stress on the last heavy syllable, or in the absence of a heavy syllable, on the last syllable. Since McArthur and McArthur do not demonstrate the pattern for forms with more than one heavy syllable, however, the importance of being the last heavy syllable is unclear.

(45)

LHLHL	MapGM(□)	FNonFinal(□, □)	FG-L
☞ a. x x x x x x x x x □ □□□ □□□ □ □ □ □ □			*
b. x x x x x x x x x □ □□□ □□□ □ □ □ □ □			**!*

In (45), both candidates stress a heavy syllable. Although they perform equally well on MapGM(□) and FNonFinal(□, □), positioning its gridmark column over the leftmost heavy syllable allows the optimal candidate (a) to perform better on FG-L.

In forms where heavy syllables are absent, the same ranking stresses the light syllable at the default (left) edge. The (46) tableau demonstrates using a three-syllable form like (40b), /dák^{h}anɨmp/.

(46)

LLLL	MapGM(□)	FNonFinal(□, □)	FG-L
☞ a. x x x x x x □ □ □ □ □ □ □ □		*	
b. x x x x x x □ □ □ □ □ □ □ □		*	*!**
c. x x x x □ □ □ □ □ □ □ □	*!		

In (46), MapGM(□) excludes candidate (c) because the prosodic word does not coincide with a prosodic word-level gridmark. Candidates (a) and (b) both satisfy MapGM(□) by stressing a light syllable in violation of FNonFinal(□, □), and the decision between them passes to FG-L. FG-L excludes candidate (b) because its supporting foot-level gridmark occurs further to the right, and candidate (a) correctly emerges as the winner.

Although I omit the additional tableaux, the (43b) ranking would obtain the Aguacatec pattern similarly. In forms where heavy syllables are present, MapGM(□) and FNonFinal(□, □) would shift stress from the default (right) edge and onto a heavy syllable, with FG-R ensuring that stress occurred over the rightmost. In forms where heavy syllables are absent, MapGM(□) and FG-R would ensure that stress occurred on the light syllable at the default (right) edge.

NonFinality applied to the syllable domain, then, produces the type of weight sensitivity found in default to same side systems. Next, I will extend the analysis to default to opposite side systems. The extension will not involve additional NonFinality constraints, but it will require additional mechanisms to position stressed heavy syllables.

3.2.2 Default to opposite side systems

Default to opposite side systems resemble default to same side systems in shifting stress from a default edge to an available heavy syllable. In default to opposite side systems, however, stress occurs on the heavy syllable furthest from the default edge. For example, in Selkup (Kuznecova et al. 1980, Halle and Clements 1983), stress occurs over the leftmost light syllable when heavy syllables are absent, but it shifts to the rightmost heavy syllable when heavy syllables are present:

(47) Selkup forms

a.	LLL	ámɨrna	‘eats’
b.	LLLL	qólʲcɨmpatɨ	‘found’
c.	LLH	kanaŋmíː	‘our dog’
d.	HHL	uːcɔ́ːmɨt	‘we work’
e.	LHLH	qumoːqlɪlíː	‘your two friends’

(48) Kwakwala forms

a.	LLL	c’əxəlá	‘to be sick’
b.	LLL	məc’ətá	‘to heal (pl.)’
c.	HLL	xʷáːkʷ’əna	‘canoe’
d.	HLH	dᶻə́mbətəls	‘to bury in hole in ground’
e.	LHH	məxə́nxənd	‘to strike edge’

In Kwakwala (Boas 1947, Zec 1994), stress occurs over the rightmost light syllable when heavy syllables[14] are absent, but it shifts to the leftmost heavy syllable when heavy syllables are present.

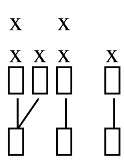
The default to same side rankings from (43) form the core for default to opposite side rankings. The foot-gridmark alignment constraints still determine the default edge, and FNonFinal(□, □) still shifts stress from the default edge to an available heavy syllable. Additional constraints are required, however, to produce the conflicting directionality that positions stress over the heavy syllable furthest from the default edge. These additional constraints will provide a single distinction between stressed heavy syllables and other syllable types and will use this distinction to ensure that stressed heavy syllables are appropriately positioned.

[14] In Kwakwala, heavy syllables either contain long vowels or are closed by a sonorant.

At first glance, there seems to be no single feature that can distinguish stressed heavy syllables from all other types. Mora count, for example, distinguishes stressed heavy syllables from light syllables but fails to distinguish them from unstressed heavy syllables. Similarly, stress distinguishes stressed heavy syllables from stressless syllables but fails to distinguish them from stressed light syllables. To provide the desired distinction, I draw on the possibility mentioned in Section 2.1 that heavy syllables may be either partially or exhaustively mapped to the grid's mora level.

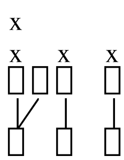
The distinction between partial mapping and exhaustive mapping is similar to Prince's (1983) distinction between monopositional and bipositional mapping. The distinction is independently justified, since it allows the theory to predict the difference between languages like the trochaic Cahuilla (Seiler 1965, 1967, 1977 and Seiler and Hioki 1979), which allow a stressed heavy syllable to be immediately followed by another stressed syllable, and languages like the trochaic Wargamay (Dixon 1981), which do not. The explanation is based on the ability of the different types of mapping to avoid clash. The Cahuilla situation is predicted if heavy syllables are exhaustively mapped, so that a mora-level gridmark intervenes between the two relevant foot-level gridmarks, as in (49a). In this case, stressing the two adjacent syllables does not produce clash.

(49) a. Cahuilla



háʔtìsqɑl 'he is sneezing'

b. Wargamay



gíːbɑɽɑ 'fig tree'

In contrast, the Wargamay situation is predicted if heavy syllables are only partially mapped, as in (49b). Since there would be no intervening mora-level gridmark, stressing the following syllable would produce clash. (See Prince 1983 and Hyde 2001 for further discussion.)

To utilize this distinction in default to opposite side systems, the analysis must ensure that stressed heavy syllables are exhaustively mapped and that stressless heavy syllables are partially mapped. Stressed heavy syllables will then be unique in having two mora-level gridmarks, and stressless heavy syllables will pattern with stressed and unstressed light syllables in having only a single mora-level gridmark. The (50) constraints help to produce the desired results.

(50) a. MapGM(□, □-hd)
A mora-level gridmark occurs over every mora within the head foot of the prosodic word.

b. MG-L
The left edge of every mora-level gridmark is aligned with the left edge of some prosodic word.

c. MG-R
The right edge of every mora-level gridmark is aligned with the right edge of some prosodic word.

MapGM(□, □-hd) is similar to MapGM(□), but its effect is limited to the domain of the prosodic word-head. In other words, MapGM(□, □-hd) requires all moras that occur in the head foot to coincide with mora-level gridmarks.[15] The mora-gridmark alignment constraints, MG-L and MG-R, have two effects similar to those of foot-gridmark alignment. First, they have a directionality effect. MG-L aligns mora-level gridmarks with the prosodic word's left edge, and MG-R aligns mora-level gridmarks with the prosodic word's right edge. Most importantly, there will be a concentration of mora-level gridmarks accompanying exhaustively mapped heavy syllables. MG-L prefers that these concentrations occur as near as possible to the prosodic word's left edge, and MG-R prefers that the same concentrations occur as near as possible to the right edge. Second, when ranked above MapGM(□), mora-gridmark alignment strips mora-level gridmarks from nonhead moras. (The nonviolable Head Mora Condition prevents them from being stripped from head moras.) This is the effect that creates a partial mapping for unstressed heavy syllables.

To see how the (50) constraints position stressed heavy syllables, consider the ranking MapGM(□, □-hd) >> MG-R >> MapGM(□). When a form contains two or more heavy syllables, stress occurs over the rightmost:

[15] The MapGM(□, □-hd) constraint is taken from Hyde 2001, which discusses in greater detail the treatment of unbounded systems within the adopted framework. The constraint has a type of prominence enhancing effect for head feet by ensuring that a head foot takes up a maximal amount of space on the grid's base level.

(51)

LHLHL	MapGM (□, □-hd)	MG-R	MapGM (□)
x x x x x x x x ☞ a. □ □□□ □□□ □ □ □ □ □		* * ** *** ****	*
x x x x x x x x b. □ □□□ □□□ □ □ □ □ □		* ** *** *** ***!*	*
x x x x x x x x x c. □ □□□ □□□ □ □ □ □ □		* * ** *** *** **!**	
x x x x x x x d. □ □□□ □□□ □ □ □ □ □	*!	* ** *** ****	**
x x x x x x x e. □ □□□ □□□ □ □ □ □ □	*!	* ** *** ****	**

In (51), each candidate has primary stress over a heavy syllable. MapGM(□, □-hd) excludes candidates (d) and (e) because the primary stressed syllables are not exhaustively mapped. (Although footing is not indicated, primary stressed syllables must, of course, be in the head foot.) MG-R excludes candidates (b) and (c) because exhaustively mapping the first heavy syllable, whether stressed or unstressed, creates additional violations. In the optimal candidate (a), the stress occurs over the second heavy syllable. Because the stressed syllable is exhaustively mapped, candidate (a) satisfies MapGM(□, □-hd). Also, because the first heavy syllable is partially mapped, and because the concentration of mora-level gridmarks accompanying primary stress occurs over the rightmost heavy syllable, candidate (a) better satisfies MG-R. To obtain the situation where stress occurs over the leftmost heavy syllable, we would simply substitute MG-L for MG-R. The result would be MapGM(□, □-hd) >> MG-L >> MapGM(□).

Having established the rankings that position stressed heavy syllables, the next step is to merge these rankings with the default to same side rankings from (43):

(52) Default to opposite side rankings

a. MapGM(□) >> FNonFinal(□, □), MapGM(□, □-Hd) >> MG-R >> FG-L, MapGM(□)

b. MapGM(□) >> FNonFinal(□, □), MapGM(□, □-Hd) >> MG-L >> FG-R, MapGM(□)

In the merged rankings, FNonFinal(□, □) dominates the mora-gridmark alignment constraint. This prevents stress from occurring over a light syllable in order to avoid exhaustively mapping a heavy syllable. In turn, the mora-gridmark alignment constraint dominates the foot-gridmark alignment constraint with the opposite directional specification. This gives alignment of exhaustively mapped heavy syllables priority over alignment of stress to the default edge.

The (52a) ranking produces the Selkup pattern. In forms where heavy syllables are present, the ranking shifts stress from the default (left) edge to the rightmost heavy syllable. The (53) tableau demonstrates using a four-syllable form like (47e), /qumoːqlılı́ː/. (In this and the following tableau, only candidates that satisfy the high ranked MapGM(□) are considered.

(53)

LHLH	FNonFinal (□, □)	MapGM (□, □-Hd)	MG-R	FG-L
☞ a. x x x x x x x □ □□□ □□ □ □ □ □			* ** ***	***
b. x x x x x x x □ □□□ □□ □ □ □ □			* ** ** **!*	*
c. x x x x x x □ □□□ □□ □ □ □ □		*!	* ** ***	*
d. x x x x x x □ □□□ □□ □ □ □ □	*!		* ** ***	

In (53), FNonFinal(□, □) excludes candidate (d) because its supporting foot-level gridmark occurs over a light syllable. MapGM(□, □-hd) excludes candidate (c) because its stressed heavy syllable is only partially mapped, and MG-R excludes candidate (b) because exhaustively mapping the first heavy syllable creates additional violations. In the optimal candidate (a), stress occurs over a heavy syllable, satisfying FNonFinal(□, □), and the stressed syllable is exhaustively mapped, satisfying MapGM(□, □-hd). Because the exhaustively mapped heavy syllable is also the rightmost heavy syllable, candidate (a) also performs better on MG-R.

In forms where heavy syllables are absent, the same ranking positions stress on the light syllable nearest the default (left) edge. The (54) tableau demonstrates using a four-syllable form like (47b), /qóľʲcɨmpatɨ/.

(54)

LLLL	FNonFinal (□, □)	MapGM (□, □-Hd)	MG-R	FG-L
x x x x x x ☞ a. □ □ □ □ │ │ │ │ □ □ □ □	*		* ** ***	
x x x x x x b. □ □ □ □ │ │ │ │ □ □ □ □	*		* ** ***	*!**

In (54), the candidates contain only light syllables. Candidate (a) stresses the leftmost, and candidate (b) stresses the rightmost. Since (a) and (b) perform equally well on FNonFinal(□, □), MapGM(□, □-hd), and MG-R, the decision falls to FG-L. FG-L excludes candidate (b) because its gridmark column occurs further to the right, and candidate (a) emerges as the winner.

Although I omit the additional tableaux, the (52b) ranking would produce the Kwakwala pattern similarly. In forms where heavy syllables are present, FNonFinal(□, □), MapGM(□, □-hd), and MG-L would locate stress over the leftmost. In forms where heavy syllables are absent, FG-R would locate stress over the rightmost light syllable.

NonFinality applied to the syllable domain, then, produces a type of weight sensitivity appropriate for unbounded systems. When highly ranked, FNonFinal(□, □) shifts stress from a default edge to an available heavy syllable. Which heavy syllable is stressed is determined by particular combinations of alignment constraints. When foot-gridmark alignment alone is responsible for positioning stress, the result is a default to same side system, but, when mora-gridmark alignment introduces conflicting directionality, the result is a default to opposite side system.

Although the proposed analysis is somewhat less direct than the recent licensing approach of Zoll (1997) and Walker (1996a, b), it also has certain advantages. First, the licensing approach is based on the idea that stressed light syllables are marked but can be licensed in initial or final position. The problem for this conception, as Walker (1996a) points out, arises in default to opposite side languages where the penultimate syllable is the default. Since stressed light syllables are only licensed in initial or final position, default stress on the penult is unexpected. Although Walker (1996a) takes such languages to be unattested, Walker (1996b) cites Goroa (Seidel 1900, Hayes 1981) as an example. In contrast, since the proposed analysis does not depend on the concept of licensing, it avoids this difficulty.

Second, to ensure that marked structures occur in one of the licensing positions, the licensing approach uses constraints like those in (55), which align 'stressed light syllables' with the edges of prosodic words, to establish the default edge.

(55) a. Align ($\acute{\sigma}_{\mu}$, L, ω, L)
The left edge of every stressed light syllable is aligned with the left edge of some prosodic word.

b. Align ($\acute{\sigma}_{\mu}$, R, ω, R)
The right edge of every stressed light syllable is aligned with the right edge of some prosodic word.

Approaches that allow alignment to refer to objects as complex as 'stressed light syllables', however, are clearly less restrictive. Once this door is opened, nothing prevents alignment from referring to additional objects of equal or even greater complexity. Alignment constraints might refer to 'monosyllabic feet with primary stress', for example, or to 'stressed syllables with labial onsets and dorsal codas'. In contrast, the proposed account has the virtue of restricting alignment's reference to prosodic and metrical primitives, such as grid entries, prosodic heads, and prosodic categories.

Finally, the proposed account does not merely stipulate the markedness of stressed light syllables; it derives their markedness from the properties of particular constraints within a general NonFinality framework. Stressed light syllables are marked because they violate constraints that prohibit stress over domain-final moras.

4 Lengthening effects

Thus far, we have seen that revised NonFinality reproduces foot, syllable, and consonant extrametricality effects and that it accounts for the type of weight sensitivity that discourages stressed light syllables. Next, I will demonstrate that NonFinality can also account for rhythmically induced lengthening effects. This is possible when we take lengthening to be a special case of the weight sensitivity discussed above. Under this approach, stressed syllables lengthen to avoid stress over domain-final moras.

It has been suggested previously by Kager (1995) and Hyde (2001), among others, that applying NonFinality to the foot domain can influence the shape of feet. I will build on this suggestion below by applying NonFinality to both the foot and syllable domains to provide a general account of iambic and trochaic lengthening. The relevant NonFinality constraints are FNonFinal(μ, F), repeated in (56a), and FNonFinal(μ, σ).

(56) a. FNonFinal(μ, F)
No foot-level gridmark occurs over the final mora of a foot.

b. Dep-μ
All mora present in the output are present in the input.

In banning foot-level gridmarks from foot-final moras, FNonFinal(μ, F) also bans stress from light foot-final syllables. A stressed foot might satisfy this constraint in two ways: the stressed syllable can be heavy, or the foot can be trochaic. In banning foot-level gridmarks from syllable-final moras, FNonFinal(μ, σ) also bans stress from light syllables generally. The only way that a stressed foot can satisfy this constraint is for its stressed syllable to be heavy. Lengthening occurs when either FNonFinal(μ, F) or FNonFinal(μ, σ) dominates Dep-μ, given in (56b), which prohibits the insertion of moras.

4.1 Iambic lengthening

In examining iambic lengthening, I will focus on two languages: Choctaw, which we examined previously in Section 2.2, and Carib (Hoff 1968, Inkelas 1989):

(57) Choctaw forms

a. pisa
b. čipisa □ čipi:sa
c. čipisali □ čipi:sali
d. čipisačili □ čipi:sači:li

(58) Carib forms

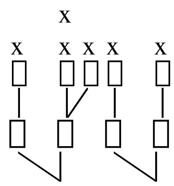
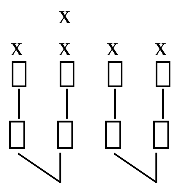
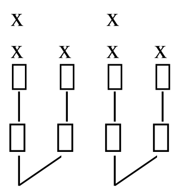
a.	kupi □ ku:pi	'bathe'
b.	tonoro □ tono:ro	'large bird'
c.	kuriyara □ kuri:yara	'canoe'
d.	woturoporo □ wotu:ropo:ro	'cause to ask'
e.	woturopotake □ wotu:ropo:take	'I shall ask'

In trisyllabic and longer words, the Choctaw and Carib patterns are similar and can be inferred from the location of lengthened syllables. Both stress every even-numbered syllable counting from the left, except the final syllable.[16] As we saw in Section 2.2, the stressless final syllable results from the ranking FNonFinal(□, □), Hds-R >> MapGM(F).

In disyllabic forms, however, the stress patterns seem to differ. Carib lengthens the initial syllable, but there is no lengthening in Choctaw. The difference is important because it determines which NonFinality constraint is most appropriate in each case. Choctaw's lengthening is thoroughly iambic, so FNonFinal(□, F), which produces lengthening only in right-headed feet, is sufficient. Carib's lengthening, however, is iambic in longer forms but trochaic in disyllabic forms. This case requires FNonFinal(□, □), which produces lengthening in stressed syllables generally.

The ranking Hds-R, FNonFinal(□, F) >> Dep-□ produces the appropriate lengthening for Choctaw. Hds-R ensures that footing is iambic, and FNonFinal(□, F) ensures that iambic feet lengthen their stressed syllables. The (59) tableau demonstrates using a four-syllable form like (57c), /čipisali/.

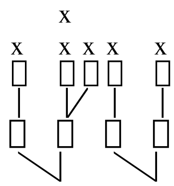
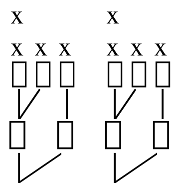
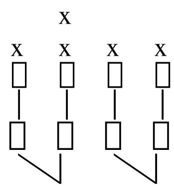
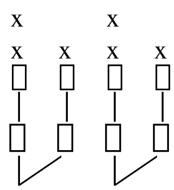
[16] As in Choctaw, Carib's basic pattern can be perturbed by underlyingly heavy syllables.

(59) LLLL	Hds-R	FNonFinal(□, F)	Dep-□
☞ a. 	* *		*
b. 	* *	* !	
c. 	* **!*		

In (59), Hds-R excludes candidate (c). Although the (c) candidate's trochaic footing satisfies FNonFinal(□, F) without lengthening the stressed syllables, it also produces additional alignment violations. FNonFinal(□, F) excludes candidate (b) because it stresses a light foot-final syllable, meaning that stress also occurs over a foot-final mora. The optimal candidate (a) lengthens its stressed syllable, violating Dep-□. Lengthening, however, allows candidate (a) to maintain iambic footing, so that it better satisfies the higher ranked Hds-R, while avoiding stress on the foot-final mora, so that it satisfies the higher ranked FNonFinal(□, F). Since the single foot of disyllabic forms, like the final feet of longer even-parity forms, appears to be stressless, FNonFinal(□, F) would be vacuously satisfied, and there would be no need for lengthening.

For longer Carib forms, the ranking Hds-R, FNonFinal(□, □) >> Dep-□ produces a similar effect. Hds-R ensures that footing is iambic, and FNonFinal(□, □) ensures that stressed syllables lengthen. Note, however, that Hds-R's ranking is not crucial in this context. Since FNonFinal(□, □) promotes lengthening in stressed syllables generally, it is impossible to avoid lengthening simply by making a foot trochaic. The (60) tableau demonstrates using a four-syllable form like (58c), /kuriyara/.

(60)

LLLL	Hds-R	FNonFinal(□, □)	Dep-□
☞ a. 	* *		*
b. 	* **!*		* *
c. 	* *	*!	
d. 	* **!*	*!*	

In (60), the (a) and (b) candidates lengthen their stressed syllables, but the (c) and (d) candidates do not. FNonFinal(□, □) excludes both the iambic candidate (c) and the trochaic candidate (d) because their stressed light syllables position foot-level gridmarks over syllable-final moras. (The (d) candidate's trochaic footing also produces additional Hds-R violations.) Hds-R excludes candidate (b) because its trochaic footing produces more violations than the (a) candidate's iambic footing, and candidate (a) correctly emerges as the winner.

Since FNonFinal(□, □) can produce lengthening in both right-headed feet and left headed feet, it will also produce the correct results for Carib's trochaic disyllabic forms. The main obstacle confronting the analysis is actually that disyllabic forms are stressed at all. In Carib, as in Choctaw, the ranking FNonFinal(□, □), Hds-R >> MapGM(F) should make the single foot of disyllabic forms stressless, just as it makes the final feet of longer even-parity forms stressless. To overcome this obstacle, I will assume that all Carib forms must have a primary stress. In longer forms, the prosodic word-level gridmark need not occur over the final foot but could occur over any of the lengthened syllables to the left. In disyllabic forms, however, primary stress must occur over the final foot. To avoid stressing the final syllable, stress would shift to the initial syllable, making disyllabic forms trochaic. The (61) tableau demonstrates the expanded ranking MapGM(□), FNonFinal(□, □) >> Hds-R >> MapGM(F) using a disyllabic form like (58a), /kupi/.

(61)

□□	MapGM(□)	FNonFinal(□, □)	Hds-R	MapGM(F)
x x x x ☞ a. □ □			*	
x x x x b. □ □		*!		
x x c. □ □	*!			*

MapGM(□) excludes the (c) candidate's stressless iambic foot, and FNonFinal(□, □) excludes the (b) candidate's stressed iambic foot. Although the optimal candidate (a) is trochaic, violating Hds-R, trochaic footing allows (a) to satisfy the higher ranked MapGM(□) and FNonFinal(□, □) simultaneously. Since longer forms can locate primary stress over feet other than the final foot, the revised ranking does not affect the analysis of longer even-parity forms, and their final feet will remain stressless.

With the (61) ranking correctly positioning stress in disyllabic forms, the ranking FNonFinal(□, □) >> Dep-□ correctly lengthens the stressed syllable:

(62)

LL	FNonFinal(□, □)	Dep-□
x x x x x □ □ □ ☞ a. □ □		*
x x x x □ □ b. □ □	*!	

In (62), the optimal candidate (a) lengthens its stressed syllable, violating Dep-□. Lengthening, however, allows (a) to avoid stress over a syllable-final mora, satisfying the higher ranked FNonFinal(□, □).

Before moving on, it is important to note that there is little evidence either for or against the assumption of a primary stress for Carib, aside from its utility in the proposed analysis. Hoff does not actually discuss stress at all, and Inkelas infers the positions of stress from the positions of lengthened syllables. Although Carib does have a tonal accent, which Hoff describes as occurring on the second heavy syllable from the left in forms with at least two heavy syllables and on the final syllable in forms with only one heavy syllable, since final syllables are stressless in Carib, the accent in the latter case would not correspond to a stressed syllable, and we could not connect the accent directly to primary stress. This does not mean, however, that we could not predict the position of the tonal accent based on the location of stress, especially if we assume that the leftmost stress is primary. If this were the case, we might say that the accent is located on the foot-head immediately following the primary stress, so that primary stress is always pretonic. If there were no foot-head following the primary stress, the situation in disyllabic forms, the accent would fall on the final syllable, maintaining the pretonic position of the primary stress.

It is also important to note that we could have made a similar assumption about primary stress for Choctaw without adversely affecting the analysis. Since FNonFinal(□, F) does not promote lengthening in trochaic feet, stressing the initial syllable of disyllabic forms would not have produced lengthening. The assumption would also have certain advantages. If all Choctaw forms were stressed, NonFinality could help to predict certain minimal word effects. For example, FNonFinal(□, F) could predict the bimoraic minimal word of Choctaw nouns. If stress cannot occur on a foot-final mora, then a form must be at least bimoraic to be stressed at all. Also, FNonFinal(□, □) could predict the disyllabic minimal word of Choctaw verbs. If stress cannot occur on a prosodic word-final syllable, then a form must be at least disyllabic to be stressed at all. (See Lombardi and McCarthy 1991 for discussion of minimal word and minimal foot effects in Choctaw.) FNonFinal(□, □) predicts Carib's disyllabic minimal word, as well.

In any case, the assumption would not be unique to the proposed analysis; it is actually implicit for both Carib and Choctaw in most current alignment-based approaches. Since feet are positioned through alignment with the edges of prosodic words, Carib and Choctaw forms would have to have prosodic words. (Also, Prince and Smolensky (1993) argue that the requirement of morphological words to coincide with prosodic words may be nonviolable.) Since prosodic categories cannot be stressless (headless) in most current approaches, Carib and Choctaw forms would also have to have a prosodic word-level stress.

To summarize, then, in examining Choctaw and Carib, we have seen two different ways that NonFinality promotes iambic lengthening. NonFinality applied to the foot domain produces lengthening only in right-headed feet, the appropriate result for Choctaw. NonFinality applied to the syllable domain produces lengthening in both right-headed feet and left-headed feet, the appropriate result for Carib.

4.2 Trochaic lengthening

Although it occurs more frequently in iambic feet, lengthening also occurs in trochaic feet. In examining trochaic lengthening, I will focus on Chimalapa Zoque (Knudson 1975), which lengthens stressed syllables generally, and Icelandic (Arnason 1980, 1985), which lengthens only syllables bearing primary stress.

Chimalapa Zoque stresses the initial syllable and the penult, with the stress on the penult being primary:

(63)	a.	káŋ	‘tiger
	b.	kósaʔ □ kóːsaʔ	‘scold (imperative)’
	c.	hùkútɨ □ hùːkúːtɨ	‘fire’
	d.	mìnsukkéʔtpa	‘they are coming again’
	e.	wìtuʔpaynɨ́ksɨ □ wìːtuʔpaynɨ́ksɨ	‘he is coming and going’
	f.	mìnsukkeʔtpaʔɨ́tta	‘they were going to come again’

If stress falls on an underlyingly light syllable, as in (63b, c, e), the syllable is made heavy by lengthening its vowel.

The Chimalapa Zoque pattern is a variation on the weight insensitive unbounded patterns discussed in Section 3. Expanding the ranking for a left-oriented system, as in (64), produces this variation.

(64) MapGM(□), Hd-R >> FG-L >> MapGM(F)

Ranking MapGM(□) and Hd-R above FG-L ensures that each form has a primary stress and that the primary stress occurs over the final foot. FG-L ensures that the primary stress occurs as far to the left as possible, making the final foot a trochee. Also, because FG-L dominates MapGM(F), it strips stress from all remaining feet that would not position their foot-level gridmark over the initial syllable. The low ranked MapGM(F) ensures that the initial syllable is stressed.[17] The (65) tableau demonstrates using a six-syllable form like (63f), /mìnsukkeʔtpaʔɨ́tta/.

[17] In a few cases that involve potential gridmark sharing configurations (see endnote 2), MapGM(F) is insufficient, and the Initial Gridmark constraint, given in (i), is required to ensure that the leftmost syllable is stressed.

(i) Initial Gridmark
A foot-level gridmark occurs over the leftmost syllable of a prosodic word.

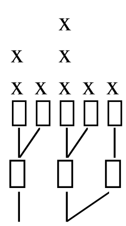
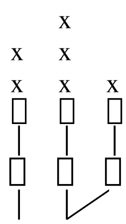
The (i) formulation is taken from Hyde 2002, where Initial Gridmark is discussed in the context of binary systems. For a discussion of its role in Chimalapa Zoque, see Hyde 2001.

(65) □□□□□□	MapGM(□)	Hd-R	FG-L	MapGM(F)
x x x x x x x x x ☞ a. □ □ □ □ □ □ F F F			****	*
x x x x x x x x b. □ □ □ □ □ □ F F F			****	**!
x x x x x x x x c. □ □ □ □ □ □ F F F			*****!	**
x x x x x x x x x x d. □ □ □ □ □ □ F F F			** ***!*	
x x x x x x x x e. □ □ □ □ □ □ F F F		*!***		**
x x x x x x x f. □ □ □ □ □ □ F F F	*!			**

In (65), MapGM(□) excludes candidate (f) because the prosodic word does not contain a prosodic word-level gridmark. Next, Hd-R excludes candidate (e). Because candidate (e) locates primary stress over the initial syllable, the head foot cannot occur at the prosodic word's right edge. FG-L excludes candidates (c) and (d). The (c) candidate's supporting foot-level gridmark does not occur as far to the left as possible within the final foot, and the (d) candidate's stressed medial foot positions an additional foot-level gridmark away from the prosodic word’s left edge. The remaining (a) and (b) candidates both have primary stress in a final trochaic foot, and they perform equally well on MapGM(□), Hd-R, and FG-L. The optimal candidate (a), however, also stresses the initial syllable, allowing it to perform better on the low-ranked MapGM(F).

Having established the ranking positioning stress in Chimalapa Zoque, we can now see how stressed syllables are lengthened. Since the ranking FNonFinal(□, □) >> Dep-□ promotes lengthening in either right-headed feet or left-headed feet, as demonstrated for Carib above, it suffices to produce the required lengthening in the left-headed feet of Chimalapa Zoque. The (66) tableau demonstrates using a three-syllable form like (63c), /hùkútɨ/.

(66)

LLL	FNonFinal(□, □)	Dep-□
☞ a. 		* *
b. 	* ! *	

In (66), the optimal (a) candidate’s stressed syllables lengthen their vowels, violating Dep-□. Mora insertion, however, allows the foot-level gridmarks to avoid syllable-final moras, satisfying the higher ranked FNonFinal(□, □). Note that FNonFinal(□, □) also predicts Chimalapa Zoque’s bimoraic minimal word, so that there is no need to separately stipulate a minimal word or a minimal foot.[18] If stress cannot occur over a syllable-final mora, then a form must be at least bimoraic to be stressed at all.

Icelandic also exhibits trochaic lengthening, but it restricts lengthening to the syllable bearing primary stress. Icelandic stresses every odd-numbered syllable counting from the left. The initial stress is primary:

(67)	a.	L □ H	ˈte	‘tea’
	b.	L□ □ H□	ˈtala	‘talk’
	c.	L□□ □ H□□	ˈbakarˌi	‘baker’
	d.	H□□	ˈalmanˌak	‘almanak’
	e.	H□□□	ˈrabbabˌari	‘rhubarb’
	f.	L□□□□ □ H□□□□	ˈbíógrˌafíˌa	‘biography’

[18] As observed in Hyde 2002, aside from their role in producing minimal word effects, minimal foot restrictions contribute little in alignment-based approaches. Alignment constraints already prefer that feet be as large as possible.

If the primary stress falls on an underlyingly light syllable, as in (67a-c, f), the syllable is made heavy by lengthening its vowel.

Restricting lengthening to the primary stressed syllable requires a NonFinality constraint that refers specifically to prosodic word-level gridmarks. □NonFinal(□, □), repeated in (68), bans prosodic word-level gridmarks from syllable-final moras.

(68) □NonFinal(□, □)
No prosodic word-level gridmark occurs over the final mora of a syllable.

Ranking □NonFinal(□, □) above Dep-□ ensures that underlyingly light syllables lengthen their vowels when they bear primary stress. Ranking Dep-□, in turn, above FNonFinal(□, □) ensures that lengthening does not occur in any additional stressed syllables. The (69) tableau demonstrates the ranking □NonFinal(□, □) >> Dep-□ >> FNonFinal(□, □) using a four syllable form like (67f) ˈbíógrˌafíˌa.

(69)

LLLL	□NonFinal(□, □)	Dep-□	FNonFinal(□, □)
☞ a. x x x x x x x x □□□ □ □ □ □ □ □		*	*
b. x x x x x x x x x □□□ □□□ □ □ □ □		**!	
c. x x x x x x x □ □ □ □ □ □ □ □	*!		*

□NonFinal(□, □) excludes candidate (c) because its prosodic word-level gridmark occurs over a syllable-final mora. Dep-□ excludes candidate (b) because it unnecessarily lengthens a syllable with secondary stress. Although the optimal candidate (a) also violates Dep-□, it does so only to the extent necessary to satisfy the higher ranked □NonFinal(□, □). As in Chimalapa Zoque, NonFinality correctly predicts a bimoraic minimal word for Icelandic. Since all words must bear primary stress, monosyllabic forms must be at least bimoraic to satisfy □NonFinal(□, □).

In examining Chimalapa Zoque and Icelandic, we have seen that NonFinality helps to promote trochaic lengthening. In Chimalapa Zoque, FNonFinal(□, □) lengthens stressed syllables generally. In Icelandic, □NonFinal(□, □) lengthens only syllables bearing primary stress.

4.3 A note on lengthening and minimal words

At several points above, I have mentioned NonFinality's potential to establish minimal words. If stress cannot occur over the final syllable of a prosodic word, then a form must be at least disyllabic to be stressed at all. Similarly, if stress cannot occur over the final mora of a prosodic word, foot, or syllable, then a form must be at least bimoraic to be stressed at all.[19] This potential is especially significant in the context of rhythmic lengthening languages, which have a clear tendency to require minimal words that are at least bimoraic. Of the languages discussed above, the requirement is clear in Chimalapa Zoque and Icelandic and in Choctaw nouns, but it is somewhat obscured in Carib and in Choctaw verbs, which actually require larger disyllabic minimal words.[20] Other lengthening languages that appear to require minimal words that are at least bimoraic include Aljutor (Kodzasov and Muravjova 1980, Kenstowicz 1993) Cayuga (Chafe 1977, Foster 1982, Michelson 1988), Hixkaryana (Derbyshire 1985), Maidu (Shipley 1964, Robbins 1991), Menomini (Bloomfield 1939, 1962, 1975), Northern Sierra Miwok (Callaghan 1987), and several varieties of Yupik (Woodbury 1981, 1987, Jacobson 1984, 1985, Krauss 1985a, and Leer 1985, among others). Using the same NonFinality constraints to produce both the lengthening effects and the minimal word effects in these languages would help to explain the correlation.

The correlation is not predicted, however, in frameworks relying on the iambic/trochaic law (see Hayes 1985, 1995) to produce lengthening effects:

(70) Iambic/trochaic law (from Hayes 1995)

a. Elements contrasting in intensity naturally form groupings with initial prominence.

b. Elements contrasting in duration naturally form groupings with final prominence.

In such frameworks, the second syllable of an iambic foot is lengthened (or the first syllable shortened) for the purpose of creating a durational contrast. Aside from the fact that it incorrectly predicts the absence of similar effects in trochaic systems (see Kager 1995 for discussion), the iambic/trochaic law cannot enforce word minimality effects. There is nothing in the law that requires forms to be disyllabic, and, since monosyllabic forms cannot contain a durational contrast, it cannot require monosyllabic forms to be bimoraic. This being the case, such frameworks must also include a separate stipulation concerning word or foot minimality. Since the iambic/trochaic law and the minimality restriction are not necessarily connected, there is no reason that their effects should coincide, and the approach does not capture the tendency of lengthening languages to have minimal words that are at least bimoraic.

On a more general note, the iambic/trochaic law should be approached not as an explanation but as an observation in need of an explanation. As Kager (1995) observes, NonFinality

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[19] In general, NonFinality constraints can predict minimal words requiring either a trochaic foot or a heavy syllable. They could not be used, however, to predict minimal words requiring an iambic foot. Although I have not conducted a formal tally, this last type seems to be fairly rare. See Hyde 2001, however, for additional mechanisms that might produce minimal words.

[20] As mentioned above, FNonFinal(□, □) can account for disyllabic minimal words. This is the same constraint that prevents Choctaw and Carib from stressing final syllables. When more than one NonFinality constraint is active in a language, the effects of those that require larger minimal words may obscure the effects of those that tolerate smaller minimal words.

constraints can go a long way towards accounting for the facts described in the iambic/trochaic law. Under the approach proposed here, lengthening arises to avoid stress on domain-final moras, and part of the explanation for the more frequent lengthening in iambic feet is that there are more constraints to promote it. Trochaic lengthening is only required by NonFinality constraints applying to the syllable domain, but iambic lengthening is required by NonFinality constraints applying to both the syllable and foot domains. In other words, trochaic feet with stressed light syllables are less marked than iambic feet with stressed light syllables. In conjunction with additional constraints that discourage lengthening in trochaic feet specifically,[21] NonFinality constraints can play an important role in deriving the foot inventory.

5 Summary

As demonstrated in the discussion above, NonFinality plays a central role in the theory of metrical stress. In exploring some of NonFinality's potential applications, I introduced a revised formulation that refers to grid entries rather than prosodic heads. There were two reasons for the revision. First, the revised formulation makes NonFinality compatible with the framework for metrical stress presented in Hyde 2002, which assumes that grid entries represent stress. Second, the revised formulation allows NonFinality to duplicate a wider range of traditional extrametricality phenomena.

The revised formulation reproduces traditional extrametricality effects by prohibiting entries on various levels of the metrical grid from occurring over various prosodic-word-final elements. By prohibiting mora-level gridmarks from occurring over prosodic word-final consonants, the revised formulation can also indirectly prevent final consonants from having moraic status. This allows the revised formulation to duplicate consonant extrametricality effects where the standard formulation cannot. We also saw that the revised formulation can duplicate syllable extrametricality effects by prohibiting foot-level gridmarks from occurring over prosodic word-final syllables and that it can duplicate foot extrametricality effects by prohibiting prosodic word-level gridmarks from occurring over prosodic word-final feet.

Revised NonFinality was also applied to phenomena lying outside extrametricality's traditional domain. By prohibiting stress over domain-final moras, NonFinality accounts for the type of weight sensitivity that avoids stress on light syllables. In particular, we saw that prohibiting stress over prosodic word-final moras makes stress sensitive to the weight of prosodic word-final syllables and that prohibiting stress over syllable-final moras makes stress sensitive the weight of syllables generally. In making stress sensitive to syllable weight, NonFinality also provides an analysis of iambic and trochaic lengthening. Constraints that prohibit stress over foot-final moras promote lengthening in the stressed syllables of right-headed feet, and constraints that prohibit stress over syllable-final moras promote lengthening in the stressed syllables of both right-headed and left-headed feet.

By absorbing weight sensitivity and rhythmic lengthening effects into the NonFinality framework along with the more traditional extrametricality effects, the proposal provides a general and uniform analysis for a variety of seemingly unrelated phenomena. The approach is particularly attractive because it accounts for the markedness of stressed light syllables within a broader framework and makes significant progress towards explaining the observations in the iambic/trochaic law. Although we examined only a few of the constraints possible under the revised formulation, these were sufficient to indicate that NonFinality's influence is more pervasive than previously assumed. We saw NonFinality applying in sev-

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[21] Although Kager (1995) mentions lapse avoidance constraints applying foot internally, the constraints I have in mind are the Window constraints of Hyde 2001, which limit the distance between grid entries and the edges of prosodic domains. Hyde (in preparation) examines how the combination of NonFinality and Window constraints helps to derive the foot inventory.

eral combinations of grid level, final element, and prosodic domain. Examining additional combinations will doubtless reveal many additional uses. I leave these further examinations for future research.

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