Kashaya Extrametricality and Formal Symmetry*

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Kager (2012), Martínez-Paricio & Kager (2013), and Martínez-Paricio (2013) — collectively MPK — propose the layered feet ((σσ)σ) and (σ(σσ)) to account for a variety of phenomena, including stress windows, mixed binary and ternary alternations, and extrametricality. Although many metrical theories do not accommodate left-edge extrametricality, they use constraints that are almost entirely symmetrical and can therefore capture initial extrametricality in a language like Kashaya. Building on their work, however, I argue that the full facts of Kashaya require even more extensive use of the layered, or recursive, foot than in the other languages that they discuss, including recursion over a degenerate foot in (σ(σ́)). To account for these facts formally, I claim that NON-FINALITY has the counterpart NON-INITIALITY and that the constraint system is therefore fully symmetrical; and in contrast to many previous formalizations, both are defined in terms of foot structure rather than as avoidance of stress at the edge.

In section 1, I give the essential facts of Kashaya stress, including extrametricality and phrasal domains. In section 2, I discuss the lapse approach of Kager (2001, 2005), which cannot generate left-edge extrametricality and makes use of non-local constraint formulations. In section 3, I discuss Buckley's (2009) symmetrical alignment-based theory, which addresses these problems, but has other formal difficulties. In section 4, I show that MPK's layered feet largely resolve these shortcomings. But in section 5, I argue that a further refinement is necessary, which makes the theory fully symmetrical.

1 Kashaya stress

Kashaya, a Pomoan language of northern California, has a complex but almost entirely regular system for assigning stress (Oswalt 1961, 1988). The basic analysis involves iambic feet beginning at the left edge, with iambic lengthening of stressed open syllables (Buckley 1994a,b); however, vowels located in a large class of "outer" suffixes, such as *-mela* below, do not undergo lengthening. Main stress falls on the first foot; secondary stress is not transcribed in the sources, but iterative feet are required to account for iambic lengthening and other phenomena.[1] In words with a monosyllabic root, the first iamb is fully at the left edge, and stress falls on an initial heavy, otherwise the second syllable. The roots, such as /him/ 'go get (food)', are shown in bold; spaces indicate syllabification, for ease of reading.

(1)	a.	(**hím**) (tʰuʔ)	'don't go get (anything)!'
	b.	(**hi m**á:) (du ce:) du	'always go to gather (food)'
(2)	a.	(**qóm**) (qa ba)	'after bathing (someone)'
	b.	(**qo m**á:) (du wa:) du	'keep bathing in different places'
(3)	a.	(**s'í**h) (qa me) la	'I persuaded someone to do it'
	b.	(**s'i** cé:) du	'keep doing'

* Examples are drawn from Oswalt (1964) and his unpublished dictionary and field notes, housed in the California Language Archive at the University of California, Berkeley. I am grateful to René Kager and Violeta Martínez-Paricio for discussion of ideas in this paper.

[1] I set aside here complications involving the behavior of underlying long vowels, which do not affect the basic facts about extrametricality; see Buckley (1994a,b) for full details. I assume, noncrucially, that a light syllable at the right edge is not parsed unless required for the placement of main stress.

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In words beginning with a disyllabic or longer root, such as /tumhu/ 'buy', or any word containing an instrumental prefix, as in /di-hyoqʰ/ 'shake and fall', the first syllable is extrametrical. Footing begins on the second syllable, which takes the stress if it is heavy; otherwise stress falls on the third syllable.

(4)	a.	< **tum** > (**húʔ**) kʰe	'will buy'
	b.	< **tum** > (**hu** tá:) (c'i yi:) (c'am)	'they always buy'
	c.	< **tum** > (**hu** cí:) du	'keep buying'
(5)	a.	< **ma** > (**ʔá**h) (qaw)	'feed'
	b.	< **ma** > (**ʔa** téʔ)	'let's eat!'
	c.	< **ma** > (**ʔa** cí:) du	'keep eating'
(6)	a.	< di**h** > (**yóqʰ**) (ma wa:) du	'shake hanging in different places'
	b.	< di**h** > (**yóqʰ**) (ciw)	'fall over from shaking'
	c.	< di**h** > (**yo qʰ**á:) (law)	'small pieces fall down on something'
(7)	a.	< du > (**bíl**) (qa wa:) (de la)	'I told someone to send it'
	b.	< du > (**bi l**í:) c'i	'send someone to do it for you!'
	c.	< du > (**bi l**á:) (ta du)	'keep fetching things'

The blocking of extrametricality in words with monosyllabic roots can be captured by a requirement that at least one vowel from the root be parsed in a foot (Buckley 1997); see also section 5.

1.1 *Phrasal stress* The preceding examples represent single words that take stress as independent constituents. But very often, two or more words are grouped together with a single footing that determines the location of stress for the entire phrase (Buckley & Gluckman 2012). Most important for the present discussion is that any extrametricality in this phrasal stress depends on the properties of the first word. If that word has a short root — including if the first word is just a monosyllable — then the feet begin at the edge and stress falls on the first or second syllable depending on weight.

(8)	a.	(**yál**) (šabaʔ)	'they taught us'
		yal + šabaʔ	*'us' + 'teach (pl)'*
	b.	(**ya** ló) (waʔ)	'we spoke'
		ya + lowaʔ	*'we' + 'speak (pl)'*
(9)	a.	< **bih** > (**šé**h) (coʔ)	'killed the deer'
		bihše + hcoʔ	*'deer' + 'kill'*
	b.	< **bih** > (**še** bó) (ʔo taʔ)	'they hunted deer'
		bihše + boʔotaʔ	*'deer' + 'hunt (pl)'*

These phrasal feet are indisputably distinct from the lexical footing that is responsible for iambic lengthening, as demonstrated by two observations. First, no lengthening applies based on the phrasal footing, so that the stressed vowels in the (b) examples above are short, despite occurring in open syllables: **(yaló:)(waʔ)*. Second, the phrasal feet that span words often contradict the lexical feet that condition lengthening.

(10)	a.	(<u>hi má:</u>) du	'go get (it)!'
	b.	< ʔah > (qʰa <u>hí</u>) (<u>ma:</u>) du	'go get water!'

Addition of *ʔahqʰa* 'water' before the verb causes a new phrasal footing pattern: the initial syllable /hi/ in the verb has to be in the weak branch of a foot in order for the following /ma/ to lengthen in the lexical structure, yet ends up as the stressed syllable in the phrasal footing. This fact will be important in the specific analysis of Kashaya extrametricality proposed here, but first I consider implications of the very existence of left-edge extrametricality.

2 Lapses

Certain theories of metrical structure are inherently symmetrical, and have no difficulty making an initial syllable extrametrical (Prince 1983, Halle & Vergnaud 1987, Halle & Idsardi 1995). Other authors, due to the paucity of languages that appear to require this analysis, construct theories that cannot represent it (Prince & Smolensky 1993, Hayes 1995, Hyde 2002).[2] Notable among these is Kager (2001, 2005), who builds a typology on the distribution of lapses, or sequences of two unstressed syllables. His major goal is to eliminate gradient foot alignment, using reference to lapses as an indirect means of controlling the positions of feet, while at the same time producing a tighter typology of possible stress systems.

Central to Kager's typology are constraints that favor lapses at right end of the word, but not at the left; and penalize word-final feet, but not initial feet (formulations from Kager 2005).

(11) a. LAPSE-AT-END Every sequence of two unstressed syllables is strictly final in PrWd.
b. NON-FINALITY No foot is final in the word.

This asymmetrical constraint inventory is intended to account for apparent gaps in attested languages. For example, LAPSE-AT-END predicts left-to-right trochees (σσ́)(σσ̀)(σσ̀)σ, which is common cross-linguistically — for example, in Pintupi. But without "LAPSE-AT-BEGINNING", the mirror image system involving iambs is excluded, i.e. *σ(σσ̀)(σσ̀)(σσ́). This type is indeed unattested in the literature; right-to-left iambic languages appear to require a degenerate foot at the end of the parse rather than an unfooted syllable, as found in Weri (σ̀)(σσ̀)(σσ̀)(σσ́). At the same time, right-to-left iambs are rare in any form, so the claim of a necessary correlation with degenerate feet is relatively weak.

In the patterns just mentioned, a lapse occurs incidentally when an extra syllable is left over at the end of the parse. But other languages actively require that a lapse occur in a particular position. It is well accepted that languages such as Macedonian require a constraint like NON-FINALITY to force a trochee away from the right edge of the word, resulting in antepenultimate stress, with the parses σ(σσ̀)(σσ́)σ] ~ (σσ̀)(σσ̀)(σσ́)σ] if we assume iterative footing (which may not be the case for every language; see below). The mirror-image pattern, an iambic foot that is forced away from the left edge of the word in [σ(σσ́)(σσ̀)σ ~ [σ(σσ́)(σσ̀)(σσ̀), cannot be accommodated by a theory that lacks NON-INITIALITY or the equivalent; yet the data in the preceding section show that this is required to account for Kashaya. In addition, evidence from other languages also points to a rare, but real, possibility of stress restricted to the first three syllables of the word, as in Azkoitia Basque (Hualde 1998) and Choguita Rarámuri (Kager 2012).

3 (Anti-)alignment

Buckley (2009) proposes a significant re-thinking of Kager's typology based on two motivations. First, the formulations that Kager employs are often non-local, as when LAPSE-AT-END requires a sequence of two syllables to be at the end of the word — in σ̆ σ̆] the first of the two syllables is not adjacent to the edge — and entails a computationally problematic theory. Second, as just noted, the asymmetry inherent in LAPSE-AT-END renders the typology empirically inadequate in the face of languages like Kashaya. As an alternative, Buckley proposes strictly local formulations in which reference to positional lapse is replaced by anti-alignment constraints. For example, *ALIGN-FT-R penalizes any candidate with a foot at the absolute right edge; in effect, this pushes a foot away from end of the word and in a trochaic system favors

[2] Hyde (2012) and Hyde et al. (2012) propose an analysis of the Kashaya left-edge three-syllable window without extrametricality. The essence is a constraint INITIAL-WINDOW that prohibits the main stress from being preceded by a foot that is further separated from that stress by a syllable, thus *[...(σσ)...σ...σ́. They analyze a third-syllable stress with the configuration [(σσ)(σσ́), where the first two syllables are parsed as a disyllabic foot and the stress falls trochaically on the first syllable of the next foot; since no syllable occurs between the main stress and the preceding foot, the constraint is satisfied. This analysis does not, however, appear to be compatible with a system that is quantity-sensitive overall, but ignores the weight of an initial syllable in the determination of extrametricality: for example, it seems to predict second-syllable stress *[(σ̄)(σ́ in words such as *<dih>(yoqʰá:)(law)*. These assumptions also raise questions about the proper distribution of secondary stresses and iambic lengthening, given the trochaic foot structure for the main stress. Simply excluding the initial syllable from the iambic foot does not present these problems.

final lapse, (σ́σ)σ]. Evaluation of unwanted configurations such as *)] refers to adjacent edges, so the system is strictly local. And because symmetry is assumed, *ALIGN-FT-L easily generates the effect of left-edge extrametricality or NON-INITIALITY — as well as LAPSE-AT-BEGINNING, which (at present) has less empirical support but that is the price of empirical adequacy.

Two technical problems do arise in this system, however. The main issue is a foot that is not adjacent to any edge, partly as the result of anti-alignment. The difference between conceivable footings such as antepenultimate σσσ(σ́σ)σ and ill-formed pre-antepenultimate *σσ(σ́σ)σσ cannot be captured by local constraints: the foot is liable to "drift" in the word with nothing in the middle to anchor it. In Kager's theory, a non-local constraint such as *FINAL-LONG-LAPSE, prohibiting a sequence of three or more unstressed syllables at the right edge of the word, will correctly choose the antepenultimate stress, but is even less local than simple LAPSE-AT-END. Buckley (2009) proposes that footing is more exhaustive than is often supposed, so that the real competition is σ(σ̀σ)(σ́σ)σ versus *(σ̀σ)(σ́σ)σσ; in this case, a constraint such as PARSE-2, penalizing sequences of unfooted (not just unstressed) syllables, will make the distinction in a local manner. It would be preferable, however, to account for languages that seem to have no evidence for iterative feet without making that assumption.

The second, and related, problem involves the treatment of ternary stress alternations. Following Halle & Vergnaud (1987), Buckley argues that the only locally coherent ternary foot is the amphibrach, (σσ́σ); under this view, a language such as Cayuvava that appears to have dactyls from right to left, as in (σ̀σσ)(σ́σσ), actually has amphibrachs combined with right-edge extrametricality, (σ̀σ)(σσ́σ)σ. Importantly, a dactyl cannot be permitted in a theory that also contains extrametricality, since this predicts the existence of pre-antepenultimate stress, *(σ́σσ)σ]. That outcome does not arise with the amphibrach, which predicts attested antepenultimate (σσ́σ)σ] even with extrametricality.

This approach works well enough for most ternary languages, but encounters the drifting foot problem in Tripura Bangla, which includes patterns such as σ́σσσ̀σσσ with three unstressed syllables at the end. This is easy with dactyls, (σ́σσ)(σ̀σσ)σ, but the amphibrach requires (σ́σ)(σσ̀σ)σσ. That analysis in turn raises two difficulties. First, one would need to explicitly require a stress on the first syllable to force a binary instantiation of the amphibrach; although that is formally possible, and necessary for other language types, it notably adds a layer of complexity compared to simple dactyls in which initial stress follows directly from the foot headedness. Second, the rightmost foot is subject to drift, as in *(σ́σ)σ(σσ̀σ)σ. Again, there is a formal solution to this problem, but the need for additional mechanics casts doubt on the basic analysis.

4 Layered feet

MPK propose an approach to ternary foot structure that addresses the main points of Buckley (2009): they employ local constraint formulations, and can accommodate left-edge extrametricality. At the same time, their theory avoids the problem of drifting feet just discussed. I now pursue the implications of their approach for the treatment of Kashaya extrametricality, and show that while it is largely effective, a further change is necessary, one that has the interesting consequence of eliminating an asymmetry in their constraint set.

The essence of the theory that MPK propose is that feet are fundamentally binary, but a syllable can be adjoined to a binary foot to create a ternary constituent with an internal layer. Thus, to generate a language such as Tripura Bangla, MPK make use of feet (c) that combine the characteristics of two other major approaches (a,b).

(12)	a.	binary feet with weak local parsing	(σ́σ) σ (σ̀σ) σ (σ̀σ) σ
	b.	flat ternary feet	(σ́σσ) (σ̀σσ) (σ̀σσ)
	c.	internally layered feet	((σ́σ)σ) ((σ̀σ)σ) ((σ̀σ)σ)

Similar to the use of weak local parsing (Hayes 1995), the MPK layered feet include binary groupings as part of the expression of ternary alternation. But similar to flat dactylic feet, there is a three-syllable constituent as well, and the ternary pattern does not rely on unparsed syllables; instead, the extra syllable is adjoined rather than excluded from foot structure.

The recursive, layered structure accounts for several phenomena: ternary stress alternations, which exist in a continuum with binary patterns, captured by variable adjunction of a third syllable; stress windows up to three syllables from the left or right edge, expressed by variation in the location of the foot head within the layered foot; and extrametricality, involving adjunction of a syllable at an edge rather than the non-parsing of a peripheral syllable. The system is largely symmetrical and allows the adjoined syllable at either the left or right edge, partly on the strength of evidence from stress windows at the left edge of a word in some languages. This is a major empirical advantage over Kager (2001, 2005), which excludes the left-edge extrametricality found in Kashaya and a few other known languages.

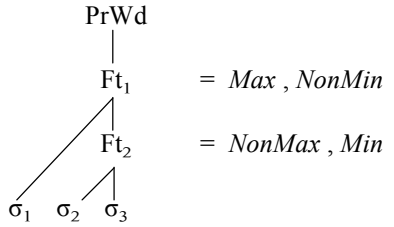
In addition, the formalism solves both problems with Buckley (2009). Most importantly, drifting feet are not a problem once the syllable that is intended to be extrametrical is actually adjoined to a foot; this larger foot is adjacent to the right edge and therefore its position is easily controlled. The difference between apparent σσσ(σσ)σ] and *σσ(σσ)σσ] is then actually between right-aligned σσσ((σσ)σ)] and non-aligned *σσ((σσ)σ)σ]; the second form is penalized by the lack of alignment, without any compunction to assume more exhaustive footing. And as indicated in (12), the Tripura Bangla pattern is expressed by feet analogous to a traditional trochee; the internal layer does not alter the fact that the initial stress is predicted directly by the foot form ((σσ)σ). Potential foot drift is controllable in long forms here as well, i.e. ((σσ)σ)((σσ)σ)σ > ((σσ)σ)σ((σσ)σ) thanks to a constraint preferring that stray syllables occur at the edge of the word (see (19)).

Unlike in a fully ternary system, in Kashaya the structure with a left-adjoined syllable is permitted only in leftmost position; otherwise we will fail to generate the correct binary alternation in iambic lengthening. Words with extrametricality must receive the following representative structures.

(13) a. (dih(yóq^{h})) (mawa:) du * (dih(yóq^{h})) (ma(wadu))
b. (tum(hutá:)) (c'iyi:) (c'am) * (tum(hutá:)) (c'i(yic'am))

We therefore need a way to refer to the layered structure and control its location. As defined by MPK, a Maximal foot is one dominated by the Prosodic Word rather than another foot, whereas a Minimal foot dominates only syllables rather than another foot. Thus the full ternary foot labeled Ft_1 in (14a) is Max because it is not dominated by another foot, and NonMin because it dominates Ft_2. By contrast, the contained binary foot Ft_2 is NonMax because it is dominated by Ft_1, but is Min because it dominates only syllables. A simple binary foot is both Max and Min (14b).

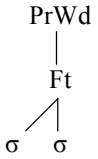
(14) a.



= *Max* , *NonMin*

= *NonMax* , *Min*

b.



= *Max* , *Min*

MPK assume that Gen permits only one layer of foot recursion — that is, no foot that is both NonMin and NonMax — and maximally binary branching at each foot level. To ensure that the layered feet are distributed correctly, they propose a range of constraints referring to the Min and Max categories.

In Kashaya, there are three basic requirements to achieve the right foot structure. First, every branching foot must be right-headed, or iambic, to ensure (σσ) > (σσ) in all Min feet, including (σ(σσ)) > (σ(σσ)) in the layered foot. These formulations follow MPK.[3]

[3] As argued in Buckley (2009), a suitably restrictive theory of constraints follows from the locality assumptions advocated by Eisner (1997a,b). The non-intervention formulations used by MPK are closer to the format of McCarthy (2003), who argues for categorical constraints but does not emphasize locality, and follow Hyde (2012), who has a rather different approach to metrical structure. The constraints used in this paper can be re-cast according to Eisner's formalism, as long as we can make reference to categories such as "Foot head" and "NonMinimal Foot". For example, IAMB can be interpreted as a requirement that $]_{FtHd}$ overlap (in Eisner's terms) with $]_{Ft}$ and this does not require explicit

(15) IAMB = ALIGN-R (Ft-Head, *σ, Ft)
For every foot head, assign a violation mark if some footed syllable intervenes between the foot head and the right edge of its containing foot.

Second, the internal layered foot must be to the right of the adjoined syllable, preferring (σ(σσ́)) over ((σσ́)σ). Indirectly, this means that adjunction occurs on the left, and that the larger structure (the NonMin foot) is right-headed.

(16) NONMINIAMB = ALIGN-R (Ft-Min, *σ, Ft)
For every minimal foot, assign a violation mark if some footed syllable intervenes between the minimal foot and the right edge of its containing foot.

Note that this effect could equally be formulated by reference to a NonMax rather than a Min foot: in the case of a binary foot that is both Min and Max, the constraint is vacuous, since there is no containing foot with which to align.

Finally, every NonMin foot must be left-aligned with its PrWd, so that all non-initial feet are non-recursive and binary, preferring [(σ(σσ́))(σσ) over [(σσ́)(σ(σσ)) with a misplaced ternary foot, as well as ruling out [(σ(σσ́))(σ(σσ)) with multiple ternary feet.

(17) ALIGN-NONMIN-L = ALIGN-L ([Ft-NonMin]$_\omega$, *Ft, ω)
For every non-minimal foot Ft-NonMin$_i$ assign a violation mark if some foot intervenes between Ft-NonMin$_i$ and the left edge of its containing prosodic word.

This constraint, which like the other two is undominated in Kashaya, ensures that no layered foot occurs in a non-initial position. The following tableau shows how these constraints rule out a variety of representations.

(18)

	IAMB	NONMINIAMB	ALIGN-NONMIN-L
☞ a. [(σ(σσ́)) (σσ̀) σ]			
b. [(σ(σ́σ)) (σσ̀) σ]	*!		
c. [(σ(σ́σ)) (σ̀σ) σ]	*!*		
d. [((σσ́)σ) (σσ̀) σ]		*!	
e. [((σ́σ)σ) (σσ̀) σ]	*!	*	
f. [(σ(σσ́)) (σ(σσ̀))]			*!
g. [(σ(σσ́)) (σ(σ̀σ))]	*!		*

Assuming satisfaction of the three basic constraints listed above, the next tableau shows how further possible representations are ruled out, partly thanks to ALIGN-σ-R, which controls the placement of an unparsed syllable.[4] In addition, familiar constraints such as FT-BIN and PARSE-SYL play a role. For simplicity, I assume satisfaction of END-RULE-L throughout this paper, and only words with the leftmost foot as the main stress are considered. The full facts of the language are more complex, however: see Buckley (1994a,b) regarding the special role of underlying long vowels.

reference to the presence of intervening material; rather, if there is such material, then the required overlap is simply not satisfied.

[4] MPK note that their non-intervention formulation of ALIGN-σ-R does not meet Eisner's definition of locality. But if we assume Eisner's format, as well as the category "unfooted syllable" that we can notate as σ̆, then a requirement that]$_{\breve{\sigma}}$ overlap with]$_\omega$ has the same effect and is strictly local.

(19) ALIGN-σ-R = ALIGN-R ($[\sigma]_\omega$, *Ft, ω)
For every unfooted syllable $[\sigma_i]_\omega$ assign a violation mark if some foot intervenes between $[\sigma_i]\omega$ and the right edge of its containing prosodic word.

(20)

	ALIGN-NONMIN-L	ALIGN-σ-R	FT-BIN	PARSE-σ
☞ a. [(σ(σσ́)) (σσ̀) (σσ̀) σ]				*
b. [(σ(σσ́)) (σσ̀) σ (σσ̀)]		*!		*
c. [(σ(σσ́)) σ (σσ̀) (σσ̀)]		*!		*
d. [σ (σ(σσ́)) (σσ̀) (σσ̀)]		*!		*
e. [(σ(σσ́)) (σσ̀) (σσ̀) (σ̀)]			*!	
f. [(σ(σσ́)) (σ(σσ̀)) (σσ̀)]	*!			

Martínez-Paricio (2013) gives somewhat different interpretations of the traditional constraints FT-BIN and PARSE-SYL. Replacing the former, BIN(FT) requires binary branching at each foot node, and so encompasses whatever constituents are dominated by the foot. For the latter, ALIGN-σ-R and ALIGN-σ-L act together to penalize unparsed syllables in general, which cannot simultaneously satisfy both constraints (except in a monosyllabic word, if it is entirely unfooted). I retain the traditional labels here, but consistent with her BIN(FT), I assume that the upper layer of a recursive foot satisfies FT-BIN whether or not the contained foot is itself binary, since there is necessarily a binary branching at the point of recursion. Thus in (σ(σ́)), a type we will consider below, only the Min layer potentially violates FT-BIN. Since Kashaya is quantity sensitive and freely permits heavy syllables as non-branching feet, a bimoraic foot is also proper; only a light syllable as a monosyllabic foot is degenerate. Under Martínez-Paricio's approach to BIN(FT), a non-branching foot that consists of a heavy syllable can be motivated by the Weight-to-Stress Principle or WSP (Prince 1991), rather than FT-BIN operating at the moraic level (Prince & Smolensky 1993), but either approach is adequate for Kashaya.

The ALIGN-NONMIN-L constraint in (17) restricts the positioning of layered feet, but it does not require that a layered foot be present in the representation; a fully binary footing satisfies it vacuously. MPK force the creation of ternary feet by means of constraints requiring all binary feet (i.e. those that are both Min and Max) to occur at the left or right edge. These constraints are called ALIGN-MIN-L/R for simplicity, but they refer to simultaneous Min and Max feet, and not to Min feet separated from the PrWd by a Max layer. Just as ALIGN-NONMIN-L in Kashaya restricts the layered foot to the left edge, so ALIGN-MIN-L/R requires ternary feet in every location except at the specified edge. Again, this constraint does not penalize parsings with fully ternary feet, as in a six- or nine-syllable word; but ALIGN-MIN-L/R controls the location of the binary foot in a five- or seven-syllable word.

A general property of many languages that MPK consider is a variability in the presence of binary or ternary feet that depends on the number of syllables in the word. For example, in their analysis of Chugach, ternary layered feet are preferred but binary feet are also used depending on the syllable count, to avoid unparsed syllables and unary feet.

(21) a. (σσ́)
b. ((σσ́)σ)
c. (σσ́) (σσ́) * ((σσ́)σ) σ
d. ((σσ́)σ) (σσ́)
e. ((σσ́)σ) ((σσ́)σ)
f. ((σσ́)σ) (σσ́) (σσ́) * ((σσ́)σ) ((σσ́)σ) σ

This is the sort of pattern predicted by the constraint set that MPK propose, and indeed it makes the right predictions for a range of languages. Chugach and Kashaya share the property of building iambs from the left edge and preferring ternary feet, at least in initial position for Kashaya. They differ in the type of adjunction, since where Chugach has ((σσ́)σ), Kashaya has (σ(σσ́)); but the internal structure of the foot is

independent of its location in the word. More importantly, as I show in the following section, Kashaya diverges from the more common pattern in requiring an adjoined structure even when the internal Min foot is degenerate. This configuration cannot be achieved by the existing constraint set, and motivates the introduction of a NON-INITIALITY constraint as well as a particular formulation of it.

5 Non-Initiality

As illustrated in (21), a language like Chugach has some ternary (layered) feet but also many instances of binary (non-layered) feet, even in first position, as determined by the total number of syllables available for footing. In other languages, the presence of an initial layered foot may be more consistent, but still not without exception. For example, in MPK's analysis of Winnebago, the leftmost foot is always (σ(σσ́)), just as in Kashaya, except in a disyllabic word, where a simple binary foot is preferred.[5]

(22) a. (σσ́)
b. (σ(σσ́))
c. (σ(σσ́)) σ
d. (σ(σσ́)) (σσ́)
e. (σ(σσ́)) (σ(σσ́))

Under this analysis, Winnebago has a stronger preference for layered feet than Kashaya does, since they can occur away from the left edge; but in a disyllable, no layering occurs. This makes sense insofar as the stress is on the second of two syllables, and there is no apparent advantage to a more complex layered structure. In fact, potential (σ(σ́)) would seem to introduce a gratuitous degenerate foot, violating FT-BIN. But Kashaya presents crucial evidence that this is exactly the footing required in disyllables that are eligible for extrametricality, based on the relation between lexical and phrasal foot structure.

Consider a disyllabic word of Kashaya that has a root of two syllables. This arises very often in unaffixed nouns, where the root and word are identical. But it also can occur in verbs when a single-consonant suffix is added, or when the imperative suffix *-i* is added to a vowel-final root, in which case the suffix is deleted by Elision (Buckley 1994a) and the imperative form is identical to the root. The question is whether such words follow what MPK predict for Winnebago, or whether the layered structure found in most words is maintained in disyllables.

(23) a. (**ma** (**ʔa** tí)) 'in order to eat'
b. ? (**ma** (**ʔá**)) 'eat!'
? (**ma ʔá**)

One clue about the footing comes from roots with an initial heavy syllable. Since Kashaya is a quantity-sensitive language, that first syllable would be expected to take the stress if it were included in basic foot structure; but this is an incorrect outcome.

(24) a. (**tum** (**hu** tí)) 'in order to buy'
b. ? (**tum** (**hú**)) 'buy!'
? (**tum hú**)
* (**túm**) **hu**

Although a theory such as OT that involves violable constraints certainly can accommodate a representation like *(tumhú)* in which the usual syllable-weight pattern is suspended, this would be the only such case in the language. And given that exclusion of the first syllable from the Min foot is the reason that its weight is irrelevant in other instances of the same root, as in *(tum(hutí))*, it would be rather suspicious if an entirely different explanation were necessary in disyllables.

[5] MPK do not analyze quantity sensitivity in their paper, so these footings hold for words of light syllables only. It is unclear how their analysis interacts with the famous Dorsey's Law, whereby epenthetic vowels have complex effects on stress placement in Winnebago (Hale & White Eagle 1984, Miner 1989).

Even stronger evidence in favor of layered *(tum(hú))* comes from phrasal stress. Recall from section 1.1 that two or more words are often grouped together prosodically in Kashaya, with the phrasal stress determined by footing that spans the words. The presence or absence of extrametricality in the leftmost word is what, without exception, determines whether the phrase as a whole will show extrametricality as well (Buckley 1994b). Thus the short root /him/ blocks extrametricality in the phrasal footing — just as when the word occurs alone — while the longer root /tumhu/ permits it. Here the (b) examples are accompanied by the pronominal *mul* and a final imperative clitic /ʔ/.

(25) a. (**hím**) (tʰuʔ) 'don't go get (it)!'
b. (**hím**) (tʰu mulʔ) 'don't go get that!'

(26) a. (**tum** (**hú**)) 'buy (it)!'
b. (**tum** (**hu** múlʔ)) 'buy that!'
* (**túm**) (**hu** mulʔ)
* (**tum hú**)(mulʔ)

The simplest account of the way extrametricality asserts itself in the phrasal domain is some form of faithfulness between the lexical footing and the phrasal footing. It is natural for the lexical representation to show sensitivity to the size of the root, whereas it would require quite a powerful theory to permit a phrasal phenomenon to make direct reference to the root inside a word. In addition to examining the size of the root, the analysis must accommodate the fact that a handful of roots are lexical exceptions to extrametricality despite being two syllables long, such as /ʔusaq/ 'wash one's face' (Buckley 1994a).[6] This, again, is normally a matter for the lexical grammar.

We know independently from (10) that Kashaya requires a lexical foot structure that is distinct from what is assigned to multiword phrasal groupings, since only lexical feet condition iambic lengthening; and there are further phenomena sensitive to lexical foot structure, such as the selection of suffix allomorphs (Buckley 1998). As a result, the simplest way to account for the different stress behavior of phrases beginning with /him/ versus /tumhu/ is to allow only the lexical footing to be sensitive to the status of the root, and make the phrasal footing dependent in some way on the lexical feet. In a theory such as Stratal OT (Kiparsky 2000, Bermúdez-Otero 2011), the footed output of the lexicon will serve as the input to the phrasal component; in a more fully parallel approach that relies on output-output correspondence (Benua 1997), the footing of a word will be faithful to that of the same word when it occurs in isolation. In either case, the kind of faithfulness required must likely refer to the nature of the foot that is aligned with the left edge of the word, whether Min (in the case of /him/) or NonMin (for words like /tumhu/).

I have argued so far in this section that a disyllabic word ending in a short vowel, and containing a disyllabic root, requires a layered foot structure with a degenerate Min foot, as in *(tum(hú))*. A related argument can be made for words ending in a closed syllable, since the MPK approach might predict a simple binary foot in words like *šiwéy*, where the first syllable is light and a branching iamb predicts the correct stress. But the phrasal facts again show that extrametricality is present, since resyllabification can occur when a cliticized element is added, and if the second syllable is light, stress falls on the third syllable.

(27) a. (**ʔih** (**súl**)) 'condor'
b. (**ʔih** (**su l**é·)) mu 'it's a condor'

(28) a. (**ši** (**wéy**)) ? (**ši wéy**) 'new'
b. (**ši** (**we y**í)) (ne·) mu * (**ši wé**) (**y**i ne·) mu 'because it's new'

[6] This exceptionality typically results from historical deletion of an initial syllable that otherwise would have been extrametrical. In /ʔusaq/ the source of /ʔu/ is probably *huʔuy* 'eye', found also in *huʔu:mo* 'face', but the verb cannot be generated synchronically by the regular phonology and morphology of the language. The exceptionality applies in only one direction: there are no roots that are monosyllabic but undergo extrametricality when suffixed. A different class of words has lexically specified stress in borrowings such as *pé:su* 'money', which cannot be generated by the regular stress rules, with or without extrametricality; but this argument tends to involve the special status of long vowels, which cannot be addressed in the space available here.

(29)	a.	(**ṭʰi** (**lél**))	? (**ṭʰi lél**)	'shell ornament'
	b.	(**ṭʰi** (**lél**)) (tʰi ne·) mu	? (**ṭʰi lél**) (tʰi ne·) mu	'it's not a shell ornament'
	b.	(**ṭʰi** (**le lé**·)) mu	* (**ṭʰi lé**) (**le**·) mu	'it's a shell ornament'

Of course, a monosyllabic root will show the expected lack of extrametricality at both the lexical and phrasal levels. The pair below contrasts short /(h)nat/ with disyllabic /šama/. Although the foot in the isolated disyllabic word is, in principle, ambiguous, the stress in the phrasal pattern that includes /(ʔ)iyow/ 'formerly' shows the correct choice.

(30)	a.	(**na tí**ʔ)	? (**na** (**tí**ʔ))	'try (to do something)'
	b.	(**na tí**) (c'i yow)	* (**na** (**t**i c'í)) (yow)	'used to try'
(31)	a.	(**ša** (**má**w))	? (**ša má**w)	'worse'
	b.	(**ša** (**ma** wí)) (yow)	* (**ša má**) (wi yow)	'used to be worse'

It should be clear that, for roots that are disyllabic or longer, the layered structure that encodes extrametricality is obligatory in the lexicon, even when the entire word is just two syllables. This footing is not predicted by the constraint set of MPK, so some new element is required, one that outranks FT-BIN and potentially forces a degenerate foot in shorter words like *(tum(hú))*. I propose that this is specifically a constraint preventing a simple Min foot on the first syllable, NON-INITIALITY.

5.1 *Symmetry* Left-edge extrametricality invites an obvious comparison to NON-FINALITY, a common constraint in the metrical literature since Prince & Smolensky (1993). That original formulation makes reference directly to the location of stress, penalizing any word in which the final syllable is stressed, and this is true of the constraint as implemented in Kager (2012) and Martínez-Paricio (2013). One motivation for this approach is that, in a theory permitting ternary feet, a requirement that the final syllable be unfooted has the potential to generate regular pre-antepenultimate stress, *((σσ)σ)σ], which is thought to be impossible.

The symmetrical NON-INITIALITY, therefore, might be expected to penalize stress on the first syllable. This is not adequate for Kashaya, however, because *(šamáw)* and *(ša(máw))* both lack initial stress; simpler *(šamáw)* ought to win, making the wrong prediction at the phrasal level. Requiring that the initial syllable be unfooted yields the mirror-image of the pre-antepenultimate problem, i.e. fourth-syllable *[σ(σ(σσ)]. Instead, a layered foot must be specifically required in *(ša(máw))*. The MPK theory already makes reference to the category NonMin, which is the top layer of a recursive foot, and this can simply be required at the left or right edge of the word.[7]

(32) a. NON-FINALITY = ALIGN-R (PrWd, Ft-NonMin)
b. NON-INITIALITY = ALIGN-L (PrWd, Ft-NonMin)

Although these constraints, like ALIGN-NONMIN-L/R, refer to a relation between that foot type and the word, here a NonMin foot is demanded for every word; by contrast, ALIGN-NONMIN controls the location of any NonMin foot that happens to be present. The revised formulation of NON-FINALITY still generates the necessary patterns when combined with a right-adjoined syllable, ((σσ)σ)], and correctly will not produce pre-antepenultimate stress because the (potentially) ternary foot is aligned with the edge. If NON-FINALITY is combined with an internal footing that places stress close to the edge, such as ((σσ)σ)], then it will not generate the effect of extrametricality; its effect will overlap with that of constraints such as ALIGN-NONMIN-R and perhaps ALIGN-σ-L.

As we have seen, of course, not all words of Kashaya have extrametricality. Buckley (1997), under the assumption of binary feet, posits an undominated constraint FT-ROOT requiring that the root of the word overlap with a foot (mediated by a syllable head, or vowel). If extrametricality is formalized as a layered foot, this formulation is inadequate, because the "extrametrical" syllable is adjoined to a foot and therefore

[7] These formulations do not follow the non-intervention format that MPK adopt from Hyde (2012), but they respect the locality restrictions of Eisner (1997a,b); see also footnotes 3 and 4.

overlaps with the higher layer. Rather, under this newer analysis, a revised constraint must make specific reference to a Min foot, so that the top layer, which is Max but NonMin, does not satisfy the requirement and the layered foot will be blocked. This tableau gives the structure for *(**him**á:)(duce:)du* in (1b), with the monosyllabic root in bold.

(33) MINFT-ROOT
The root of the word overlaps with a Min foot.

(34)

	ALIGN-NONMIN-L	MINFT-ROOT	ALIGN-σ-R	NON-INITIAL
☞ a. [(**σ**σ́) (σσ̀) σ]				*
b. [(**σ**σ́) σ (σσ̀)]			*!	*
c. [(**σ**(σσ́)) (σσ̀)]		*!		
d. [(**σ**σ́) (σ(σσ̀))]	*!			*

Naturally, when the root is at least two syllables, MINFT-ROOT and NON-INITIAL can both be satisfied by the same candidate, and we find extrametricality. The following tableau illustrates how the ranking acts to require adjoined structure in lexicon even when the word is disyllabic and NonMax is degenerate, but only if the root is long enough. Since even degenerate (σ(σ)) is layered, it satisfies NON-INITIAL.

(35)

	MINFT-ROOT	NON-INITIAL	FT-BIN
☞ a. [(**ši** (**wéy**))]			*
b. [(**ši wéy**)]		*!	
c. [(**na** (**tí**ʔ))]	*!		*
☞ d. [(**na tí**ʔ)]		*	

A trochaic layered foot such as ((σ́σ)σ) would also satisfy NON-INITIAL, so the effect of left-edge extrametricality arises only in combination with the right type of layered foot.

Combining all the constraints discussed in this paper, the necessary rankings are as follows.

(36) IAMB , NONMINIAMB , ALIGN-NONMIN-L , MINFT-ROOT , ALIGN-σ-R
>> NON-INITIAL >> FT-BIN >> PARSE-σ

In conclusion, I have shown that the goal of a metrical theory that employs local, categorical constraints is advanced by the weakly layered foot structure proposed by MPK. Their theory is largely symmetrical, and can successfully encode left-edge extrametricality as found in Kashaya and a small number of other languages. The main exception to symmetry in MPK is the presence of NON-FINALITY without a left-edge counterpart; but I have argued from the complex facts of Kashaya metrical structure that the theory must include NON-INITIALITY in order to force extrametrical structure at the left. Further, this constraint (and presumably the more familiar, right-edge NON-FINALITY) must be formulated in this framework as the alignment of a layered foot at the relevant edge. Although this claim is motivated by empirical necessity in Kashaya, it leads to the interesting theoretical result of a more fully symmetrical inventory of constraints, thereby shedding light on what appears to be a fundamental formal property of phonological grammar.

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