Iambicity, Rhythm, and Non-Parsing*

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1. Introduction

This paper presents an account of final stresslessness effects in a number of iambic languages within the framework of Optimality Theory.

1.1 The theory of extrametricality (Hayes 1980 et seq., Prince 1983, Harris 1983) has played a crucial role in our understanding of metrical systems. According to this theory, final constituents may be excluded from the parse. As a result, these constituents are effectively absent when it comes to the calculation of stress.[1] This is the explanation which is provided to account for the widespread observation that final constituents are so often metrically weak.

There is another way of approaching the issue of metrically weak constituents in final position. Prince and Smolensky (1993: Chapter 4) suggest that the primary focus of inquiry be shifted toward the prominential status of the final syllable and away from its prosodic status. They propose that the relevant constraint is one of final stresslessness, or Nonfinality. The issue is further complicated by the data, which demonstrate that there isn't just one form of final stresslessness. The data also show that the ban on final stress is far from absolute. As I will demonstrate in this paper, the array of facts can be managed fairly easily within the framework of Optimality Theory (Prince & Smolensky 1993), a theory which eschews input-driven rewrite rules in favor of output constraints which are ranked, and most importantly, which are violable. Under OT, it is not at all surprising that the ban against final stress is not absolute. Moreover, we will see that the array of facts involving final stresslessness can be shown to follow from the interaction of Nonfinality with other constraints.

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[1] See Poser (1984) and Inkelas (1989) who address non-metrically related "invisibility" effects.

1.2 Consider the data in (1). All four of these languages are iambic, and each exhibits a very different kind of final stresslessness effects. (In the data the symbol <:> means that the underlying long vowel is shortened.)

(1)	Negev B.A.	A.Campa	Yidiñ	Araucanian[1]
a.	a9áma	chorína	gudága	tipánto
			[gudá:ga][2]	
b.	gaháwah	howáma<:>		
c.	zalámatak	kitíriri	gúdagáni	elúmuyù
d.	biná	síma	wúru	wulé
e.	jimál	chími<:>	wurú:	

The iambic character of Negev Bedouin Arabic was first demonstrated in Hayes (1991:189) whose source of data is Blanc (1970). In this language, CVC constitutes a heavy syllable for the purposes of calculating stress. But in the two forms **gaháwah** and **zalámatak**, the final CVC syllables do not attract stress. As in all dialects of Arabic, CVC is heavy everywhere except at the end of the word. This suggests that some form of final stresslessness is at work here. But then in the case of the last two forms, **biná** and **jimál**, final stresslessness is ignored.

The iambic character of Axininca Campa is demonstrated in McCarthy and Prince (1993a: Appendix) whose source of data is Payne, Payne and Santos (1982). In this language it is CVV that constitutes a heavy syllable. A quick look at the data reveals that not only is it the case that final stresslessness is always met, but it can also be said that it is met rather aggressively in the sense that final long vowels are shortened, as in **chími<:>** and **howáma<:>**.[3]

Compare this now to the Yidiñ data, where like Axininca Campa, CVV is heavy (original metrical analysis due to Hayes 1982, data from Dixon 1977a,b). Feet

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[1] Unlike the other three languages, Araucanian is a QI system.

[2] Vowel length here is not underlying, rather it is due to what Dixon calls "Penultimate Lengthening."

[3] It is not entirely true that final stresslessness is always met. The two exceptions are final diphthongs and disyllabic words whose initial vowel is voiceless (see McCarthy and Prince 1993a; Hung forthcoming).

in Yidiñ are basically iambic, but under certain circumstances they are trochaic (see Hewitt (1992) and Kirchner (1993) for different approaches to the matter). In my dissertation I suggest that trochaic parsing is directly related to final stresslessness: feet are trochaic just in case an iambic parse would otherwise result in final stress (see Hung forthcoming). Assuming that this is the correct approach, we see final stresslessness at work in **wúru** and **gúdagáni**. However, the requirement is not as aggressive as it is in Axininca Campa: the Yidiñ form **wurú:** surfaces with stress on the final long vowel in contrast to the Axininca Campa form **chími<:>**.

In Kenstowicz (1994:556), Araucanian is used to illustrate a left to right trough-first, i.e. iambic, system. The data from Echeverría and Contreras (1965) shows that stress is final whenever there are an even number of syllables in the word. Thus in this particular system, final stresslessness is met only in words containing an odd number of syllables.

Clearly final stresslessness is not an absolute requirement. Moreover, final stresslessness is violated under a different set of circumstances in each of the three languages. In Negev Bedouin Arabic, disyllables with initial light syllables have final stress; in Axininca Campa, none of these words have final stress; in Yidiñ only words with final heavy syllables have final stress; and in Araucanian all words containing an even number of syllables have final stress.

2. Constraints and Constraint Interaction

In this paper the goal is to account for this array of facts by examining the **interaction** of Nonfinality with two other constraints within an OT framework.

2.1 Under OT, constraints are ranked and violable. In order to match the output form with a given input form, candidate forms (supplied by the function GEN) are evaluated with respect to the constraint hierarchy (a set of universal constraints on structural well-formedness, CON, upon which a specific ranking is imposed) which defines a particular grammar. The form which is optimal as defined by the evaluation function (H-eval) is the form which emerges as the output. For a more precise and detailed description of the theory, the reader should consult one of the following: Prince and

Smolensky (1993), McCarthy and Prince (1993a,b). For the purposes of reading this paper, one need only understand the basic concept of constraint interaction, which may be explained as follows. Suppose we have a mini-grammar which consists of only two constraints A and B. If both may be satisfied, then clearly the candidate form which satisifies both is the optimal candidate. But this is not an interesting case. Consider instead a situation in which either A or B may be met, but not both. This is shown in the tableau in (3). Candidate X satisfies constraint A, as indicated by the symbol √, but fails to satisfy constraint B, as indicated by the symbol *. Conversely, candidate Y satisfies B but not A. This is what is meant by constraint interaction: two constraints interact if they impose conflicting demands such that satisfaction of one necessarily entails violation of the other.

(3)		Constraint A	Constraint B
	Candidate X	√	*
	Candidate Y	*	√

Which candidate is optimal? The answer depends entirely on the ranking. If A ranks higher than B, then X must be optimal, since X meets the higher ranking constraint A. This is shown in (5). The symbol » signifies constraint domination; the symbol p indicates the optimal form, i.e. the predicted output form. Note that constraint violation in and of itself does not entail ill-formedness.

(4)		Constraint A	»	Constraint B
p	Candidate X	√		*
	Candidate Y	*!		√

The exclamation mark following the asterisk points to the violation which is crucial to the overall decision. Any successes beyond this point are rendered irrelevant.

If on the other hand B ranks higher than A, which is clearly a possibility to consider given that linguistic variation is said to be derived from differences in constraint rankings, we get the tableau in (5), where Y is optimal since it meets the higher-ranking constraint B, whereas X does not.

(5)

		Constraint B »	Constraint A
	Candidate X	*!	√
p	Candidate Y	√	*

2.2 In this paper I will be examining the interaction of Nonfinality with two other constraints with which it is in direct conflict.

2.2.1 First, a note regarding Nonfinality. In my dissertation I propose that final stresslessness is motivated by rhythmic requirements, where the term rhythmic is used in the sense of Liberman and Prince (1977) to describe the phenomenon of alternation observed in stress systems. I propose that the relevant constraint is **Rhythm**, a well-formedness condition on the metrical grid which is defined as follows:

(6) **Rhythm**

A stressed element must be followed by an unstressed element.

This version of Avoid Clash (Liberman and Prince 1977, Prince 1983) not only rules out adjacent pairs of stresses, but also final stress, since a final stress is one which is not followed by an unstressed element. Although there are other consequences involved in adopting this constraint, the reader should bear in mind that for the purposes of the arguments in this paper, **Rhythm** and Nonfinality are identical in that they both rule out final stress.

2.2.2 The second constraint that is relevant for this paper is **Parse**, a block of constraints which ensure that all prosodic constituents are organized according to the Prosodic Hierarchy (McCarthy and Prince 1986 et seq.), in accordance with Selkirk's (1984) Strict Layer Hypothesis (see also Ito and Mester 1992).

(7) Prosodic Hierarchy

PrWd

F

σ

μ

(8) **Parse**

A prosodic constituent is dominated by a prosodic constituent of the immediately superordinate type.

Within this block there are distinct constraints of the type Parse-Mora, Parse-Syllable, and Parse-Foot, but such distinctions will not be necessary for the purposes of this paper (see however the analysis of Latin in Prince and Smolensky 1993 for proof that such distinctions are in fact needed in other areas of the phonology). Since I will not be dealing with any specific evidence in favor of the "dispersion" of **Parse** constraints, I will treat them as a single block.[1]

The claim here is that a constituent which is not parsed has not only consequences for the prosodic organization, but for the rhythmic organization as well (see Hung forthcoming for a more detailed explanation). The basic idea here is that an unparsed prosodic constituent cannot be projected onto the metrical grid above the level of the stress-bearing unit, which is in general the syllable.

(In the examples (9a-c) below, angled brackets indicate non-parsing, and parentheses indicate footing. A short dash indicates the position in the grid which crucially cannot be filled.) An unparsed mora <μ> is a mora which is not part of a syllable and therefore cannot contribute to the weight of a syllable as shown in (9a). While the syllable is registered st the level of the stress-bearing unit, it cannot be projected any further. Moreover an unparsed mora, like an unparsed segment, cannot receive any phonetic interpretation and therefore is essentially "deleted."

```
      -
      x
      o
(9a)  μ<μ>
```

[1] The term "dispersion" comes from Ito, Mester and Padgett (1993) and refers to the necessity of distinguishing among the members of a family of constraints.

An unparsed syllable <o> is one which is not part of a foot and therefore cannot be the head of a foot, as shown in (9b). Again, the syllable can only project to the first level of the grid and no further. I assume that an unparsed syllable is part of the PrWd, as in Ito and Mester (1992).

```
             x    -
        x    x    x
(9b)   (o    o)   <o>
```

An unparsed foot <F> is not part of the PrWd and therefore cannot have a head, as shown in (9c). Such a foot is assumed to be part of the LxWd, so that it is at least morphologically parsed. This notion is similar to that of Inkelas (1989) who attributes invisibility effects to a mismatch between the prosodic structure and the morphological structure.

```
             x         -
        x    x    x    x
(9c)   (o    o)  <(o   o)>
```

Note that although the foot is not parsed in (9c), that is not to say that the syllables which make up the foot are not parsed. This point is crucial here as well as in McCarthy's (1993) analysis of raising and syncope in Bedouin Hijazi Arabic.

What is of interest here is that **Rhythm** and **Parse**, as formulated in (6) and (8), crucially interact with one another. In other words, the two constraints may impose conflicting demands on a given input, so that the output will depend entirely on the ranking of the two constraints. For example, **Rhythm** and **Parse**(Foot) interact when in an iambic system, a foot appears in final position, as in (10). If the foot is parsed as an iambic foot, stress will be final, and **Rhythm** is violated. If the foot is not parsed and therefore headless, **Rhythm** will be met.

(10)		Rhythm	Parse(Foot)
	… (o ó) #	*	√
	… <(o o)>#	√	*

This means that it is possible for an unparsed i.e. a headless foot to be optimal, namely if **Rhythm** dominates **Parse**(Foot).

Rhythm and **Parse** also interact when a heavy syllable appears in final position, as in (11). If both moras are parsed, then the syllable is stressed ("if heavy then stressed") and **Rhythm** is violated. If the second mora is not parsed, then **Rhythm** is satisfied.

(11)	/μμ/	Rhythm	Parse(Mora)
	… (ó) # μμ	*	√
	… o # μ<μ>	√	*

2.2.3 The third constraint is one which governs the headedness (as opposed to the constituency) of a foot. The statement of this constraint, which I call **Foot-Form** is as follows:[1]

(12) **Foot-Form**

If there is a head, it is on the L/R.

In an iambic system, the constraint reads, "if there is a head, it is on the right."

This constraint also interacts with **Rhythm**, as shown in (13). In an iambic system a foot in final position satisfies either **Foot-Form** or **Rhythm**, but not both. The tableau below shows that given the appropriate ranking it is possible for a trochaic foot to be optimal even within a fundamentally iambic system, an observation first made in Prince and Smolensky (1993: 54).

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[1] This is essentially the same constraint as Prince and Smolensky's **RhType** (1993: 54) and McCarthy and Prince's "Feet are iambic" (1993a: 151). The constraint here is stated in this particular way so that a headless foot vacuously satisfies it.

(13)				Rhythm	Foot-Form
…	(o	ó)	#	*	√
…	(ó	o)	#	√	*

3. A Typology Based on Rankings

So we have two constraints which interact with **Rhythm**: **Parse** and **Foot-Form**. According to OT, different rankings should give rise to different systems. This is how we get linguistic variation. The goal here is to show that by fiddling with the rankings of these three particular constraints, we can reproduce the typology of final stresslessness effects in iambic systems such as the ones exemplified in (1), namely Negev Bedouin Arabic, Axininca Campa, Yidiñ and Aguaruna. The basic idea here is that as long as **Rhythm** dominates either **Parse** or **Foot-Form**, we will observe some sort of final stresslessness effects. To be precise, if **Rhythm** dominates **Parse** we will observe non-parsing, and if **Rhythm** dominates **Foot-Form** we will observe trochaic parsing.

Let us begin with an **a priori** consideration of the set of possible rankings, with special attention paid to the relation of **Rhythm** to the other two constraints. First, **Rhythm** might dominate **Parse** but not **Foot-Form**. Second, **Rhythm** might dominate both **Parse** and **Foot-Form**. Third, **Rhythm** might dominate **Foot-Form** but not **Parse**. And fourth, **Rhythm** might dominate neither **Parse** nor **Foot-Form**. This is summarized in (14).

(14)	Type	Ranking
	A	Foot-Form» Rhythm » Parse
	B	Rhythm » Foot-Form, Parse[1]
	C	Parse » Rhythm » Foot-Form
	D	Foot-Form, Parse » Rhythm

What this means is that in a type A system, non-parsing may be observed at the end of the word, but not trochaic parsing. This we will see, is reflected in

[1] The ranking between the latter two constraints is taken to be **Foot-Form** over **Parse**. In principle it is possible for yet another system to emerge from the opposite ranking. For the purposes of this paper however, the focus is on the ranking of **Rhythm** relative to the other two constraints.

Negev Bedouin Arabic (as well as Hixkaryana and Ojibwa, see Hung forthcoming). In a type B system, both non-parsing and trochaic parsing are observed. This is reflected in Axininca Campa (as well as Choctaw, Ulwa, Southern Paiute, Aguaruna, Hopi, and Ignaciano, see Hung forthcoming, and Bedouin Hijazi Arabic, according to McCarthy 1993). In a type C system, trochaic parsing is observed, but not non-parsing. This is Yidiñ. And in a type D system, no such final stresslessness effects are observed. This is Araucanian.[1]

4. Evaluating the Stress Patterns

Now let us take a closer look at the individual iambic systems exemplified in (1) and see what properties they share, and just where it is that they diverge. To do this we will compare the parsing of specific configurations across language types.

4.1 We begin first with words containing an odd number of light syllables. In all the iambic systems I have looked at, the parsing of such words involves positing a loose syllable. This loose syllable obviously violates **Parse**(Syllable), but this violation is inevitable given the demands of the more highly-ranked **Foot-Binarity**, formulated below.[2]

(15) **Foot-Binarity**
Feet are subject to a binary analysis, at the level of the syllable or the mora.

In other words, the two constraints, **Parse** and **Foot-Binarity**, impose conflicting demands, as shown in (16). Either the entire string of syllables is parsed into feet, violating **Foot-Binarity** but satisfying **Parse**, or there is a loose syllable, violating **Parse** but satisfying **Foot-Binarity**. Given the empirical facts, it appears that **Foot-Binarity** is generally undominated.[3]

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[1] Gene Buckley (p.c.) tells me Kashaya may be an example of such a system. And while Creek comes to the minds of most people, there is some question as to whether Haas' (1977) term "final accent" really equals final prominence (see Hung forthcoming).

[2] The origins of this constraint go as far back as Prince (1976). More recent references include McCarthy and Prince (1986, 1990) and Prince (1990).

[3] Though perhaps not universally so. McCarthy and Prince (1986) present the case of Manam monomoraic roots as a possible exception to Foot-Binarity.

(16)		Ft-Bin »	Parse(Syllable)
p	(o ó) (o ó) <o>	√	*
	(o ó) (o ó) (ó)	*!	

Moreover in the vast majority of iambic systems, an odd-numbered string of loose syllables is footed such that the loose syllable is the final syllable. This reflects the observation that the vast majority of iambic systems are left-to-right systems.[1] This can be accounted for by a constraint such as Nonfinality or **Rhythm**, as argued in McCarthy and Prince (1993a: Appendix). While the existence of a loose syllable is required by **Foot-Binarity**, the position of the loose syllable can be shown to follow from demands pertaining to final stresslessness. As shown in (17), all forms with a loose syllable tie with respect to **Foot-Binarity** and **Parse**, but only the candidate form with a final loose syllable satisfies **Rhythm**. This is true regardless of the ranking of **Rhythm** with respect to **Parse**.

(17)		Ft-Bin »	Parse	Rhythm
p	(o ó) (o ó) <o>	√	*	√
	<o> (o ó) (o ó)	√	*	*!

In this particular respect, all iambic systems seem to be alike. Odd-numbered strings of light syllables always exhibit stress on every even-numbered syllable, as shown in (18).

(18)				
	A	N. B. Arabic	(a9á)<ma>	'blind'
	B	A. Campa	(Chorí)<na>	'type of palm'
	C	Yidiñ	(gudá)<ga>	'dog-ABS'
			[gudá:ga]	
	D	Araucanian	(tipán)<to>	'year'

4.2 From this point on, we will see how parsing in iambic systems may differ. Let us first consider those words which contain what I will call a **terminal** foot, namely a foot whose right boundary coincides with the right

[1] Possible exceptions include Weri (Boxwell and Boxwell, 1966) and Tübatulabal (Voegelin 1935). See Kager (1993) for discussion.

edge of a word. Crucially it is not the only foot in the word. We will look at **solitary** feet in Section 4.3.

The important thing to see here is that it is not possible to satisfy all three constraints, **Rhythm**, **Foot-Form** and **Parse** at the same time. As we saw earlier, **Rhythm** and **Parse** conflict, as do **Rhythm** and **Foot-Form**. So if we consider just these three constraints, at least one of them will have to be violated, and (under the right conditions) the optimal form will always be the form which only violates the lowest-ranking constraint of the three.

We begin with Negev Bedouin Arabic, a language exemplifying the rankings of a type A system. As shown in (19) a terminal foot may be unparsed and therefore headless, it may be iambic or it may be trochaic. Since the rankings are such that **Parse** is the lowest-ranked constraint, the form containing an unparsed terminal foot will emerge as optimal.

(19)	/zalamatak/	FF	»	Rhythm	»	Parse
p	(o ó) <(o o)>	√		√		*
	(o ó) (o ó)	√		*!		
	(ó o) (ó o)	*!				

[zalámatak] 'your man'

The same is true in Axininca Campa, where again the lowest-ranking constraint is **Parse**, as shown in (20). Iambic footing violates **Rhythm**, while trochaic parsing violates **Foot-Form**. The optimal form is the one which contains an unparsed foot.

(20)	/kitiriri/	Rhythm	»	FF	»	Parse
p	(o ó) <(o o)>	√		√		*
	(ó o) (ó o)	√		*!		
	(o ó) (o ó)	*!				

[kitíriri] 'yellow'

In Yidiñ, a language exemplifying the rankings of type C, the lowest-ranked constraint is **Foot-Form**, as shown in (21). This means that the optimal form is the one which is parsed in a trochaic manner. Note that preceding feet must also be trochaic if rhythmic alternation is to be maintained throughout.

(21)	/gudagani/	Parse	»	Rhythm	»	FF
p	(ó o) (ó o)	√		√		**
	(o ó) (o ó)	√		*!		
	(o ó) <(o o)>	*!				

[gúdagáni] 'dog-GEN'

And finally in a type D case such as Araucanian, **Rhythm** is dominated by both **Parse** and **Foot-Form**. As shown in (22) the optimal parsing of a terminal foot in such a system is an iambic parse, the result of **Rhythm** being ranked at the bottom of the hierarchy.

(22)	/elumuyu/	FF	;	Parse »	Rhythm
p	(o ó) (o ó)	√		√	*
	(o ó)<(o o)>	√		*!	
	(ó o) (ó o)	*!			

[elúmuyù] 'give us'

4.3 The third type of situation that we wil look at is the case of the solitary foot, i.e. the case where the prosodic word is exhaustively made up of a single foot. The important thing here is the role played by minimal word requirements; the version given in (23) is adapted from McCarthy and Prince (1986 et seq.).

(23) **LxWd=PrWd**
A lexical word must contain a well-formed prosodic word.

This constraint demands that a lexical word contain a well-formed prosodic word. A well-formed prosodic word must of course contain a foot, which in turn must respect **Foot-Binarity**. What this means is that the non-parsing option presented in the case of terminal feet is not an option in the case of solitary feet, given the superordinacy of the constraint in (23). The burden of choosing the optimal form is therefore shifted entirely to the relative ranking between **Foot-Form** and **Rhythm**.

Let us begin with Negev Bedouin Arabic, a type A system. The tableau in (24) shows that while **Parse** is in fact ranked at the bottom of the hierarchy, an unparsed foot is ruled out on the grounds of minimality. We must parse the two syllables given the superordinate status of (23). Of the other two candidate forms, an iambic foot emerges as optimal, and the possibility of a trochaic parse is eliminated, given the ranking of **Foot-Form** over **Rhythm**. Thus a word like **biná** has final stress.

(24)	/bina/	FF	»	Rhythm	»	Parse
p	(o ó)	√		*		
	(ó o)	*!				
	<(o o)> *Lx=Pr!					

[biná] 'he built'

Although the treatment of terminal feet in Axininca Campa and Negev Bedouin Arabic was shown to be identical, the treatment of solitary feet in the two systems is quite different. Since **Parse** is eliminated as a deciding factor, what crucially counts is the ranking between **Rhythm** and **Foot-Form**. In Axininca Campa, the ranking of these two constraints is the opposite of what it is in Negev Bedouin Arabic. As shown in (25), a two-syllabled word in Axininca Campa has initial stress, as in **síma**. In Axininca Campa, a trochaic parse beats out an iambic parse, so to speak.

(25)	/sima/	Rhythm	»	FF	»	Parse
p	(ó o)	√		*		
	(o ó)	*!				
	<(o o)> *Lx=Pr!					

[síma] 'fish'

With respect to the solitary foot, Axininca Campa is more like Yidiñ. In both these languages, **Rhythm** ranks higher than **Foot-Form**, so that a solitary foot must be have a trochaic parse. As shown in (26), a Yidiñ word like **wúru** has initial stress.

(26)	/wuru/	Parse	»	Rhythm	»	FF
p	(ő o)	√		√		*
	(o ő)	√		*!		
	<(o o)> *Lx=Pr!					
	[wúru]	'spear handle'				

And finally, in Araucanian, **Rhythm** is at the bottom of the hierarchy, below **Foot-Form**. Thus no final stresslessness effects are observed: solitary feet are simply iambic feet, and stress is final, as in Negev Bedouin Arabic.

(27)	/wule/	FF	;	Parse »	Rhythm
p	(o ő)	√		√	*
	(ő o)	*!			
	[wulé]	'tomorrow'			

4.4 The final situation we will look at is the parsing of final heavy syllables. The question is, how does a language parse a bimoraic syllable in final position? I assume that there is a uniform definition of what constitutes a heavy syllable in a given language, so that if CVC is heavy, it is heavy everywhere (but see Lamontagne 1992 for a different view).

The important thing here is that there is a direct connection between the weight of a syllable and its prominential status. This is embodied in Prince's (1990) Weight-to-Stress Principle, given in (28). Heavy syllables are stressed, i.e. they are always the heads of feet (compare to Hayes' "weak nodes don't branch"). In other words, one simply cannot ignore the fact that a syllable is heavy.

(28) **Weight-to-Stress Principle**
Heavy syllables are stressed.

In the cases below, we are interested in the interaction of **Rhythm** and **Parse**. The claim here is that we will observe syllable weight demotion effects only if **Rhythm** dominates **Parse**(Mora). Assuming that final weight demotion involves the non-parsing of final moras so that shortening and "final coda extrametricality" are given a unified treatment (see Prince and Smolensky 1993 p.65), some higher constraint such as **Rhythm** must be motivating the **Parse** violation.

(29)	σ		σ	
	μ	<μ>	μ	<μ>
	V		V	C

In Negev Bedouin Arabic, a final heavy syllable in a word like **zalámatak** or **gaháwah** does not attract stress. The reason is because rhythmic demands outweigh parsing demands, and not only must the terminal foot be unparsed, but the final syllable must be treated as light.

(30)	/zalamatak/	FF »	Rhythm »	Parse(F); Parse(μ)
p	(zalá)<(mata)><k>	√	√	**
	(zalá)(maták)	√	*!	
	(zalá)(matak) *WSP!			

In **jimál** however, stress is final because **Foot-Form** dominates **Rhythm**, as we saw earlier with **biná**. In this particular case, it appears that it would not be optimal to leave the final mora unparsed. As shown in (31), both candidate forms violate **Rhythm** anyhow, and are therefore tied. The fully parsed form must therefore emerge as optimal given that constraint violation is always minimal.

(31)	/jimal/ 'camel'	FF »	Rhythm »	Parse(μ)
p	(jimál)	√	*	√
	(jimá)<l>	√	*	*!

As noted earlier, Axininca Campa exhibits final vowel shortening. An example of how a three-syllabled word with a final long vowel is treated is shown in

(32). **Rhythm** is the most highly-ranked constraint, and it demands final stresslessness. Given the principle of **Weight-to-Stress**, it is not possible to have stresslessness without concomitant shortness. A lower ranking constraint, **Parse**(Mora), is therefore violated in order to produce shortness so that the higher ranking constraint, **Rhythm**, may be satisfied. Note that a candidate form which has an unstressed long vowel is immediately ruled out by **Weight-to-Stress**.

(32)	/howama:/	Rhythm »	FF »	Parse(Syll); Parse(μ)
p	(howá)<ma><:>	√	√	**
	(howà)(má:)	*!		
	(howá)(ma:) *WSP!			

[howáma] ‘he killed himself’

An example of how a two-syllabled word with a final long vowel is treated is shown in (33). Here the effects of **Weight-to-Stress** and **Rhythm** are even more pronounced. Not only must **Parse** be violated, but **Foot-Form** must be violated also.

(33)	/chimi:/	Rhythm »	FF »	Parse(μ)
p	(chími)<:>	√	*	*
	(chimí:)	*!		
	(chími:) *WSP!			

[chími] ‘ant’

This situation is to be contrasted with that of Yidiñ. Although Axininca Campa and Yidiñ both put initial stress on words consisting of two light syllables (AC. **síma** and Y. **wúru**) the two languages diverge sharply in their treatment of words which consist of a light syllable followed by a heavy syllable. While in Axininca Campa, these words have initial stress and concomitant shortening, in Yidiñ these words have final stress and no shortening, as shown in (34). The reason is because in Yidiñ, **Parse** ranks higher than **Rhythm**.[1] Shortening the vowel would entail a violation of **Parse**, and this is not optimal given the hierarchy.

(34)	/wuru:/	Parse(μ) »	Rhythm	»	FF
p	(wurú:)	√	*		
	(wúru)<:>	*!			
	(wúru:) *WSP!				
	[wurú:]	'river'			

The same reasoning holds for the type D language; again, ranking **Parse** over **Rhythm** means that parsing is more important than final stresslessness.

(35)	/o o:/	FF	;	Parse	»	Rhythm
p	(o ó:)	√		√		*
	(ó o:) *WSP!					

5. Conclusions

The goal of this paper was to make sense of the data given in (1) where it was noted that final stresslessness was, one, not an absolute requirement, and two, it was violated under different circumstances in the four languages. I have attempted to explain this array of facts by appealing to the interaction of **Rhythm**, which demands final stresslessness, with two constraints, **Parse** and **Foot-Form**. The individual rankings are given in (36-39), where a vertical line indicates a dominance relation between constraints. To simplify matters I have treated the members of the **Parse** family of constraints as a unit, ignoring the possibilities of ranking them separately with respect to **Foot-Form** and **Rhythm**.

(36) Negev Bedouin Arabic

[1] In fact, I argue in my dissertation that the high-ranking status of **Parse** forces us to re-examine the issue of final apocope. Instead of final deletion, I regard the vowel-zero alternations as involving ghost segments (see Zoll 1992). Thus insertion (***Fill**) occurs to satisfy **Parse**.

Foot-Form

|

Rhythm

|

Parse (Foot, Syll, Mora)

(37) Axininca Campa

Rhythm

|

Foot-Form

|

Parse (Foot, Syll, Mora)

(38) Yidiñ

Parse (Foot, Syll, Mora)

|

Rhythm

|

Foot-Form

(39 Araucanian

```
Parse (Foot, Syll, Mora)             Foot-Form
                         \           /
                            Rhythm
```

In (40) below I summarize the results. The key is to look separately at terminal feet, solitary feet, and final heavy syllables, as shown in the left hand column of the chart. Depending on the rankings, either an iambic parse, a trochaic parse, or a non-parse may emerge as optimal. One can also see at a glance exactly how two languages are alike, as well as how they are different.

(40)	Negev B.A.	A.Campa	Yidiñ	Araucanian
… F #	<F>	<F>	F^T	F^I
# F #	F^I	F^T	F^T	F^I
<μ> # ?	yes	yes	no	no

So in Negev Bedouin Arabic where **Rhythm** dominates **Parse** but not **Foot-Form**, terminal feet are unparsed, solitary feet are iambic, and final weight demotion is possible. In Axininca Campa where **Rhythm** dominates both **Parse** and **Foot-Form**, terminal feet are unparsed, solitary feet are trochaic and final weight demotion is possible. In Yidiñ where **Rhythm** dominates **Foot-Form** but not **Parse**, both terminal and solitary feet are trochaic, and final weight demotion is impossible. And in Araucanian where **Rhythm** dominates neither **Parse** nor **Foot-Form**, both terminal and solitary feet are iambic and there is no final weight demotion.

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