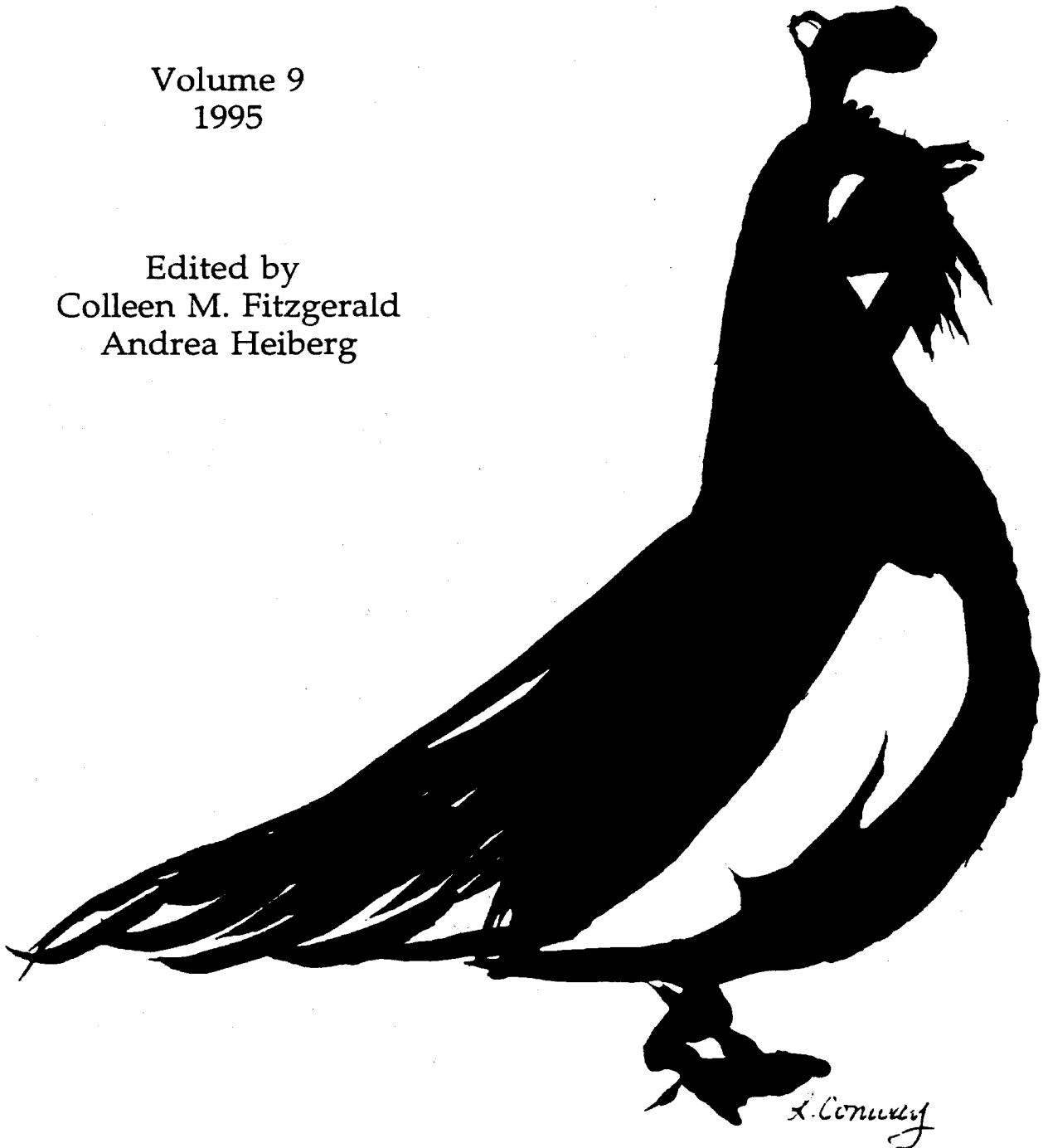


COYOTE PAPERS

Working Papers in Linguistics from A to Z

Volume 9
1995

Edited by
Colleen M. Fitzgerald
Andrea Heiberg



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The University of Arizona ®
Tucson, Arizona

Preface

The Linguistics Circle at the University of Arizona is pleased to present Volume 9 of the continuing series of *Coyote Papers*, our working papers in linguistics.

We would like to thank our fellow students in the Linguistics Department for their encouragement and support. Thanks also to all the contributors who have made this volume possible. Special thanks to Laura Conway for the cover artwork and to Pat Perez for sharing her invaluable *Coyote Papers* wisdom. For financial support, we thank the Associated Students of The University of Arizona.

Colleen M. Fitzgerald
Andrea Heiberg

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The Meter of Tohono O'odham Songs*

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0. Introduction

The evaluation of poetry and songs has been essential to the progress of generative metrical¹ theory. The bulk of work done in generative metrics focuses on English poetry (although Kiparsky (1968), Maling (1973), and Prince (1989) are some notable exceptions). Limitations of such a focus become evident when metricists make typological claims, as in Hayes (1989). Research on the meter of other languages is thus critical for a valid typology of meter and metrical rules. With such a goal in mind, I examine the meter of Tohono O'odham songs. Tohono O'odham (henceforth TO; formerly Papago) is a Native American language of the Uto-Aztecan family spoken in southern Arizona. An examination of these songs provides a valuable test for theories of meter, such as that advanced in Hayes (1989). The songs comprise part of an oral tradition and represent an instance of meter which is Native American, rather than Indo-European. These two characteristics unite to produce a metrical system which differs from that of English poetry.

Here I give both a description and an analysis of the meter of previously unanalyzed Tohono O'odham traditional songs. The crucial problem is characterizing the line. Song lines are flexible in the number of syllables and stresses that they allow, but are not completely unconstrained. The positioning of stressed material is strictly regulated, as stresses are prohibited from appearing adjacent to another stress, or in the second and final metrical positions of a line. I argue for binary trochaic feet, built at left edges and wherever stressed syllables occur; stresses are further prohibited from appearing in weak position. The analysis has four results: 1) lines are flexible in some traditions, 2) binary feet, with constituency, are necessary, 3) poetic meter is shown to invoke morphology to satisfy constraints on the meter, and 4) metrical rules for left edges may be strict, contra Hayes (1989).

This study also has relevance beyond meter, specifically for phonological theory and the study of Native American literature. Recent work in phonology has focused on the nature of constraints, particularly work in Optimality Theory (McCarthy and Prince 1993, Prince and Smolensky 1993). Optimality Theory argues that constraints may be violable or undominated (and inviolable); here I show evidence from meter for two inviolable constraints which govern the meter (the Edge Constraint and the Binary Foot Constraint). To prevent violations, the morphology is systematically manipulated. The TO meter provides one example of how a constraint governed system in meter operates (see Hayes (1993) for specific discussion of relevant issues for meter and optimization).

*Many people have given helpful comments along the way, including the participants of the 1993 WECOL. The following have responded to written versions of this paper: Ken Hale, Mike Hammond, Andrea Heiberg, Jane Hill, Leanne Hinton, Terry Langendoen, Peg Lewis, Diane Ohala, Pat Pérez, Gilbert Youmans and Ofelia Zepeda. Special thanks to Mike Hammond for extensive input on multiple drafts. Any errors are my own. For surface forms, I use the official orthography of the Tohono O'odham nation, which was developed by Albert Alvarez and Ken Hale. This orthography approximates a phonemic transcription. I modify the orthography slightly and mark primary stress, which is not represented in the official orthography.

¹The term 'metrical' is used in two ways: 1) 'A theory of phonology in which phonological strings are represented in a hierarchical manner, using such notions as segment, syllable, foot and word (cf. also prosodic phonology). Originally introduced as a hierarchical theory of stress, the approach now covers the whole domain of syllable structure and phonological boundaries' (Crystal 1991, 218). 2) The (linguistic) study of versification, as in poetry and songs. I use the second sense of this term, except when referring to the metrical grid of Hayes (1983, 1989).

This study is also germane to work on Native American literature, as it shows that oral literature, here the songs, may have a system of meter comparable to those found in written literature, such as the poetry of William Shakespeare. Hinton (1984, 1990) looks at the meter of Havasupai songs from a linguistic perspective. This paper takes a similar approach. This type of work furthers recognition of Native American songs, narratives, and speeches as a valid and important body of literature.

This paper is structured as follows. The first section gives the necessary background on the theory of meter. This is followed by background on reduplication and stress in Tohono O'odham and a description of the songs. The second section presents the analysis of the song meter discussed above. In the third section, I discuss implications of this analysis for the theory of meter proposed in Hayes (1989). Specifically, I examine his typological claims for metrical rules, and show that the typology must be expanded to account for the strict left edge meter presented here. Finally, I conclude the paper with a discussion of the importance of the study for metrical theory.

1.0 Background

This section provides the theoretical and descriptive underpinnings necessary for an analysis of the TO song meter. The first section briefly gives background on meter and generative metrics. This is followed with a discussion of the necessary descriptive facts, both of TO phonology and the songs. This is especially important to determine how to characterize this meter and, just as importantly, to determine how this meter can not be characterized. This section starts with a look at the relevant facts of TO phonology, then moves into background on the song format and the songs themselves.

1.1 Meter and Generative Metrics

Meter is a regular pattern of rhythm, where the pattern may be associated with one or more of several factors: quantity, stress, syllable count, and tone. Quantitative meter is a pattern based on the arrangement of heavy and light syllables, as in Greek or Latin verse. Stress, or accentual meter, uses stressed syllables as the basic unit; Old English poetry, such as *Beowulf*, is an example of this. A third pattern is characterized by a fixed number of syllables; this pattern is typical of Romance versification, as in the 12-syllable line of French Alexandrine verse. A fourth type results with the intersection of stress and syllable count, as in English iambic pentameter, which consists of a relatively fixed number of both stresses and syllables.² Meter may also regulate verse on the basis of tone, as in the Chinese poetry examined in Chen (1979).

Generative meter takes as its basic premise that these styles reflect the unconscious use of language. One of the goals of generative metrics is to show the principles which underly the rule-governed behavior of language in meter. Likewise, that is the goal of this paper.

Work in the theory of meter has focused on what constitutes the proper representation of stress for meter. There are three current theories which each argue for a different representation of stress: tree-based, grid-based, and Arboreal Grid-based. Much of the debate in generative meter has centered on the metrical representation of the words (that is, language) to which the constraints refer. This paper does not address that debate; rather, I am concerned with what the representation of the line must be for the proper treatment of the meter.

Now I will give examples of grid and tree systems³ and explain some terminology, using English iambic pentameter as an example. Iambic pentameter is a line of poetry consisting of ten alternating stressless and stressed syllables. Each syllable constitutes a metrical position in the line, and these metrical positions may be restricted in what type of material they can contain. An iamb consists of a stressless syllable followed by a stressed one (W S). Strong positions are

² There is also free verse, where neither syllables nor stress are regulated.

³ Speaking generatively, that is. Actually, there is an additional theory proposed by Halle and Keyser (1971); see Kiparsky (1975) for arguments against it.

those which generally contain stressed syllables, although unstressed syllables are also allowed here. Weak positions, in contrast, are those which contain unstressed syllables; stressed syllables only appear in these positions under special circumstances.⁴

First, there is the tree-based theory of meter found in Kiparsky (1977), which represents a line of iambic pentameter as below:

- (1) ^ ^ ^ ^ ^
 W S W S W S W S W S

Trees represent prominence relations between two metrical positions⁵, the S position is more prominent than the W. Additionally, trees also allow a representation of constituency; here two metrical positions are each constituents of a single unit, the foot. More hierarchical structure may be added, such that two feet comprise a unit.⁶

A second representation of meter comes from the grid-based theory presented in Hayes (1983, 1989). Grids indicate stressed syllables with an "X" and stressless syllables with a "."; the height of the X column over a stressed syllable indicates its relative level of stress. In this theory, the underlying meter of a line of iambic pentameter is a grid, as below.

- (2) . X . X . X . X . X

Grids encode the level of stress and their local relations. Stress levels of syllables can only be compared where syllables are adjacent. The absence or presence of stress is also encoded, as is the stress level. However, the grid cannot represent constituency.⁷

In this paper, I will use the grid-based representation for TO. I do so as a formal convenience, rather than as an argument that the grid constitutes the proper representation of the language. As I will show later in the paper, it is the tree-based theory of meter which is critical for representing TO meter.

1.2 Stress in Tohono O'odham

As this paper focuses on TO song metrics, a discussion of the stress system in TO is a prerequisite to examining the meter. For the purposes of this paper, I use only the primary stress in words.⁸ As Hill and Zepeda (1992) show, primary stress falls on the first syllable of a stem. This can be seen in forms from Hill and Zepeda (1992: 356, 367) in (3).

(3)	<u>Underlying Form</u>	<u>Surface</u>	<u>Gloss</u>
a.	/ma:ci/	má:c	'knowing'
b.	/da:-da:ka/	dá:dk	'noses'
c.	/da-dagaʂapa/	dádagʂp	'pressing down with fingers repeatedly'
d.	/ku:bisi-ce/	kú:bsc	'made smoky, dusty'
e.	/si-da-dapa-ka/	s-dádpk	'smooth (plural)'

⁴Iambic pentameter also characterizes weak positions (W) as odd and strong positions (S) as even.

⁵With the addition of more hierarchical structure, trees may indicate other prominence relations as well. See for example, Kiparsky (1977) and Youmans (1989) for more discussion of these matters.

⁶Such structure is argued to be binary in Prince (1989).

⁷However, Hammond (1991) presents arguments for the Arboreal Grid based on the meter of Thomson. The Arboreal Grid theory of Hammond (1988) is an amalgam of tree and grid theory, representing both constituency and levels of stress. However, it also allows feet which are not binary. As I will show later, TO meter requires strict binarity of feet. For this reason, I assume a grid-based theory, rather than the Arboreal Grid.

⁸Primary stress is crucial for the characterization of the meter; however, it is not clear that the same is true for secondary stress.

The form in (3a) shows a monomorphemic form, which receives primary stress on the initial syllable.⁹ When words are reduplicated, as in (3b-c, e), primary stress falls on the prefixal reduplicant. Suffixes, as shown in (3d), do not affect stress assignment. The form in (3e) shows that the stative prefix, *s-*, does not receive stress. Other prefixes (e.g., third person pl. obj, *ha-*) do not receive stress. These facts are further shown in (4)¹⁰:

(4)	<u>Surface</u>	<u>Gloss</u>
a.	gógs	'dog'
b.	gógogs	'dogs'
c.	ñéid	'seeing'
d.	ha-ñéid	'seeing (pl. object)'
e.	ñéñeid	'seeing (sg. object)'
f.	ha-ñéñeid	'seeing them (pl. object)'

1.3 The Song Corpus

This section gives background on the song corpus, the format in which I give the song data, and the specific phenomena of song lines. As we will see in the following subsections, the phonology of these songs is rather complex. I try to give song lines in a format which makes the song phonology more accessible. Also, while work such as Bahr (1980, 1983), Chesky (1943), Haefer (1981) and Underhill (1938) have dealt with the music and songs of the O'odham, this is the first theoretical treatment of the meter of O'odham songs. The unanalyzed status of the corpus thus necessitates the exposition of what the songs look like before presenting the analysis.

The song corpus used in this paper consists of 11 songs totaling 78 lines. The songs used are traditional¹¹, where the description of traditional corresponds to a specific purpose and melodic content, and a specific type of origin. The songs are used for social or ceremonial purposes, such as traditional round dance songs or healing songs. Musical content is generally associated with a specific purpose; for instance, a certain type of dance requires a certain rhythm (much like a polka or waltz requires certain rhythms). Also, traditional songs are those which are either passed down from one generation of a singer to another or come to the singer via the inspiration of a dream.

In this study, I analyze songs which all come from one source, Wallace (1981).¹² Haefer (1977) discusses how variation in songs serves both as a way to discriminate between the quality of singers and as a means to create a new song. By using one source, we isolate characteristics of a given singer or singers, much as Kiparsky (1977) and others have sorted various English poets into 'dialects' of English poetry (i.e., Tudor poets, Milton, etc.) by the variation in their metrical rules.

The example below shows a song line, which I give in the format I use in this paper. Each song line is noted by SONG; the example given differs from its notation in what I term CITATION form. CITATION is used to gloss the TO song forms into TO dictionary forms.¹³ I then provide

⁹Hill and Zepeda (1992) argue for demoraicization of unstressed syllables in certain environments. In the above figure, I give only sketchy derivations. For more detailed exposition of these arguments, refer to their paper. At this point, the reader only needs to know where primary stress occurs in TO words.

¹⁰As the orthography used for TO does not indicate stress, I have taken the liberty of doing so here. These forms come from Zepeda (1988).

¹¹My understanding of a definition of 'traditional' comes primarily from Haefer (1977) and Ofelia Zepeda (p.c.).

¹²The description of the songs in Wallace (1981) shows that they can be easily characterized under the auspices of a single system of meter.

¹³Citation forms are confirmed in Mathiot (1973) and Saxton, et al. (1989). They appear here in the official orthography.

an English gloss of the O'odham forms in GLOSS.¹⁴ The final line, TRANSLATION, represents the song line in an approximate English translation. The format is given in (5):

(5)	SONG	Wí-pis-mel	ñé-ñei	wa-ñ	bí-je-mi-da.
	CITATION	wípismel	ñéñe'i	a	ñ-bíjemid
	GLOSS	hummingbird	pl-song	AUX	1SG-to surround
	TRANSLATION	'Hummingbird songs surround me.'			

The notion of a line is referred to above and deserves some attention. Informally, I consider a line a set of one or more clauses, such that a group of lines constitutes a song. A line may also consist of just one phrase or may split a phrase between two lines. While clauses and phrases are important, they are not necessary to the definition of line. For our purposes, LINE is a string of words which corresponds to a musical phrase in the song.

There are two facts which suggest that the definition suffices in giving a characterization of line for TO songs. Lines in the songs may be repeated; one common pattern is A A B C B C, where the first line is repeated twice (A), the next new line (B) alternates with another new line (C), and the (B C) sequence repeats.

1.4 Reduplication

In this section, I examine reduplication within the songs. Reduplication is used morphologically in TO to indicate the plurality of nouns, verbs, and some postpositions. Of the 48 instances of reduplication found in the song corpus, only 20 of these are plural reduplications. This means that there are 28 reduplicated forms which do not have an associated plural meaning. Here, I will first contrast morphological and nonmorphological (or Vacuous) reduplication. Following this, I will present an examination of where Vacuous Reduplication occurs. The data here will show that Vacuous Reduplication is motivated by stress considerations. Finally, I will give the generalizations of this section, which lay the groundwork for the analysis of meter I present later in this paper.

As mentioned above, the songs do contain examples of straightforward, morphological reduplication. An example of this appears below, with the reduplicated word underlined in song and citation lines. The singular form, *gíd-wul* 'swallow' reduplicates as *gígí-dwul* 'swallows' (the reduplicant is underlined).

(6)	E-ḍa	g	<u>gígí</u> -dwul-e	ñéi-o-pa-ha
	eḍa	g	<u>gígí</u> dwul	ñé'io-pa VOC ¹⁵
	while	DET	PL-swallow	PL-to fly
	'While the swallows flying...'			

However, there are also song lines which contain reduplication without a corresponding semantic change. That is, singular nouns and verbs reduplicate in song lines, where they would not reduplicate in citation lines. This can be seen in the examples below, with prefixal reduplicants underlined.¹⁶

(7) a. Vacuous Reduplication line-initially:

¹⁴Ofelia Zepeda, a native speaker of O'odham and a linguist, was an invaluable source of help in both the TO and English glossing of the songs.

¹⁵Vocables are contentless syllables, as in the final syllable, *-ha* in the song form *ñéi-o-pa-ha*. Vocables (glossed as VOC) consist of adding an entire syllable, not just a vowel, at the end of a word. While I do not deal with vocables here, Hymes (1981) and Hinton (1980) give evidence that these 'nonsense syllables' have specific function within a text. Vocables do seem able to appear both line-medially and line-finally, and there are examples which have two vocables next to each other. Future research may reveal the role played by vocables in these songs.

¹⁶I rely on the helpful intuitions of Ofelia Zepeda for where reduplication is vacuous and where syllables are meaningless, or 'vocables'.

<u>Wá</u> -wai	gí-wa-lige	we-co	ná-ha-gio	kc	in	mém-ě-li-hi-me.
Wáw	gíwulk	weco	náhagio	kc	in	mémelihim.
rock	Cinched	below	mouse	CONJ	LOC	to run to repeatedly

'The mouse runs around there below Cinched Rock.'

b. Vacuous Reduplication line-finally:

Jíós	oi	ká-wu-li-ki	yam-e	<u>ké</u> -he-ka
Jíós	'o	i-gáwulk	'am	ké:k
God	AUX	INIT-to differ	LOC	to stand

'God starts to differ standing there.'

c. Multiple instances of Vacuous Reduplication within a line:

oi	na	<u>şó</u> -şo	<u>kú</u> :-ku:-ņe.
oi	na	şón	kú:g
soon	perhaps	the beginning	the end

'soon perhaps the beginning, the end.'

The first example in (7a) shows two things: 1) Vacuous Reduplication may occur line-medially, 2) Extra vowels or syllables (or both) may also occur where there is Vacuous Reduplication.

The example in (7b) and the second form in (7c) also show that extra vowels may occur with Vacuous Reduplication. The line-final vowel in (7b) may occur in speech, while the extra line-final vowel of (7c) does not occur in speech. These forms also show that Vacuous Reduplication may occur line-finally. Finally, the two reduplicated forms in (7c) also show that a given line may have more than one occurrence of this type of reduplication.

At this point, let me also point out the generalizations of Vacuous Reduplication, as suggested by the data in (7). First, only monosyllabic citation forms (*wáw*, *ké:k*, *şón*, and *kú:g*) correspond with the reduplicated song forms. Second, these forms are all either nouns or verbs, and hence, bear lexical stress.¹⁷ Third, the forms either precede a stressed syllable (as each precedes either a verb or noun) or occur line-finally (or both, as in (7d)). The crucial point here is that all words which reduplicate are stressed monosyllabic words, providing these words do not precede an unstressed syllable. These generalizations become clearer in the chart below, where I present a breakdown of the conditions where Vacuous Reduplication occurs:

(8) Distribution of citation line factors where Vacuous Reduplication occurs:

<u>Category</u>	<u>Length in σ</u>	<u>Precedes Stressed σ</u>	<u>Occurs Line-finally</u>
Nouns	1	6	7
Verbs	1	2	5

The hypothesis, then, is that it is conditions in the citation lines which correspond with song lines that show Vacuous Reduplication. This is borne out when we consider whether there are any song lines that allow stressed syllables to be adjacent or occur line-finally. The contrast obtains, as the corpus has no examples of song lines with either adjacent stresses or line-final stresses for monosyllables. There are, however, examples of polysyllabic words with stress appearing adjacent to a stressed syllable or line-finally. These cases do not occur with Vacuous Reduplication (unless they have a phonological shape, as does *jewe d* 'earth', which allows

¹⁷To simplify things here, I exclude postpositions which are stressed. Fitzgerald (1993) shows that these postpositions, when monosyllabic, behave the same way as words with lexical stress, as both types of words reduplicate preceding a stressed syllable. In certain cases, the postposition appears to be receiving stress from emphatic use. Both Kiparsky (1977) and Hayes (1983) show how contrastive stress or emphasis may change the normal scansion for stressed syllables.

scansion as monosyllables¹⁸). In (9), I give these examples (only Vacuous Reduplication is underlined).

- (9) a. § wa s wá-pu-si-me wú-wa-ke.
 § oa s-wápusim wúwhag
 REP CON STAT-PL -damply to emerge
 'Damply it emerges.'
- b. Áw-pa hió-sig ga-pe hí-me-na-ha.
 áuppa hiósig ga VOC híma VOC VOC
 cottonwood blossom over there to walk
 'Over there, cottonwood blossoms pass by.'
- c. Pí-si-ne mó-ka-me jé-je-wen
 písin mó'o-kam jéwed
 bison head-one with earth
 'Bison Head (place).'

The song lines in (9a-b) lines allow two lexically stressed words to appear adjacent to each other, without Vacuous Reduplication. Note that these examples do not have adjacent stresses, as in the previous examples from (7), as the underlined forms are not monosyllables. This means that there are intervening unstressed syllables.

The final two stressed words in (9a-b) show that such polysyllabic forms also appear line-finally. Again, the forms do not reduplicate. However, unlike the forms from (7), the stressed syllables of these words do not appear as the final syllable of the line.

Based on these two sets of facts (the first showing where Vacuous Reduplication does occur, the second showing where it does not), I propose that Vacuous Reduplication is motivated by the metrical system of the song.

In order to view the metrical nature of Vacuous Reduplication, I give the song lines from (7) again below in (10). In this example, I show both citation and song lines in the grid-based theory of meter used by Hayes (1983, 1989). An examination of these forms shows that Vacuous Reduplication only occurs wherever either two stresses are adjacent (XX) or wherever a stress would fall line-finally at the rightmost edge of a line (X).

- (10) a. X X . . . X . . . X . . . X . . . X
 Wá-wai gí-wa-lige we-co ná-ha-gio kc in mém-ě-li-hi-me.
 X X . . . X . . . X . . . X . . . X
 Wáw gíwulk weco náhagio kc in mémelihim.
 rock cinched below mouse CONJ LOC to run to repeatedly
 'The mouse runs around there below Cinched Rock.'

¹⁸Two disyllabic words always reduplicate line-finally: *dó'ag* 'mountain' and *jéwed* 'earth'. The intuition here is that they are treated as monosyllables by the meter, much as in English, *heaven* may be scanned as monosyllabic *heav'n*; in fact, their medial onsets do allow them to be pronounced as monosyllables in less careful speech. However, in line-medial positions, they do not always pattern with monosyllables.

(10) b. X X X . . .
 Jiós oi ká-wu-li-ki yam-e ké-he-ka
 X X X . . .
 Jiós 'o i-gáwulk 'am ké:k
 God AUX INIT-to differ LOC to stand
 'God starts to differ standing there.'

c. X X
 Oi na só-šo kú:-ku:-ŋe.
 X X
 oi na són kú:g
 soon perhaps the beginning the end
 'soon perhaps the beginning, the end.'

By aligning the song and citation lines to the metrical grid, the generalization is validated: Wherever citation lines appear with adjacent stresses or a line-final stress, the song line appears with the leftmost word of two stressed words or the final word in a line vacuously reduplicated. These observations suggest two conclusions: 1) Stress clash and line-final stresses are impermissible in the song meter and 2) Vacuous Reduplication resolves these stress violations where they would otherwise occur, given the corresponding citation line.

Song lines may include additional vowels. Let me now cover the interaction of the effects of Vacuous Reduplication with these vowels to show that they are irrelevant to this metrical process. Below I compare examples of Vacuous Reduplication in song lines with and without extra vowels. The examples in (11b,c) show that extra vowels may also appear in the same environment (where two stresses are adjacent or where a stress is line-final) where Vacuous Reduplication occurs. I have underlined adjacent stresses and double-underlined line-final stresses.

(11) a. X X X X
 SONG Wá-wai gí-wa-lige we-co ná-ha-gio kc in mém-ě-li-hi-me.
 CIT X X X X
 Wáw gíwulk weco náhagio kc in mémelihim.
 rock cinched below mouse CONJ LOC to run to
 'The mouse runs around there below Cinched Rock.'
 RED X X X X
 ONLY Wá-wai gí-walk we-co ná-ha-gio kc in mém-ě-li-him.
 VOW X X X X
 ONLY Wáw gí-wa-lige we-co ná-ha-gio kc in mém-ě-li-hime.

(11) b.	X	.	X	.	.	.	<u>X</u>	.
SONG	Jiós	oi	ká-wu-li-ki	yam-e			<u>ké</u> -he-ka	
	X	.	X	.	.	.	<u>X</u>	
CIT	Jiós	'o	i-gáwulk	'am			<u>ké:k</u>	
	God	AUX	INIT-to differ	LOC			to stand	
	'God starts to differ standing there.'							
	X	.	X	.	.	.	<u>X</u>	.
RED ONLY	Jiós	oi	ká-wulk	yam			<u>ké</u> -hek	
	X	.	X	.	.	.	<u>X</u>	.
VOW ONLY	Jiós	oi	ká-wu-li-ki	yam-e			<u>ké</u> -ka	
	.	.	<u>X</u>	.	.	.	<u>X</u>	.
SONG	Oi	na	şó-şo				<u>kú</u> :-ku:-ŋe.	
	.	.	<u>X</u>	.	.	.	<u>X</u>	.
CIT	oi	na	şón				<u>kú:g</u>	
	soon	perhaps	the beginning				the end	
	'soon perhaps the beginning, the end,'							
	.	.	<u>X</u>	.	.	.	<u>X</u>	.
RED ONLY	oi	na	şó-şo				<u>kú</u> :-ku:ŋ	
	.	.	<u>X</u>	.	.	.	<u>X</u>	.
VOW ONLY	oi	na	şón				<u>kú</u> :-ŋe	

The first two examples show that extra vowels and Vacuous Reduplication may occur in the same environment; that is, wherever stresses are adjacent or line-final. However, the forms in (11a,c) are critical in showing that only Vacuous Reduplication is motivated by this environment. *Wáw* in (11a) and *şón* in (11c) both reduplicate adjacent to another stress, without surfacing with extra vowels. This indicates that these vowels, regardless of whether they appear in TO speech or underlying forms, do not affect Vacuous Reduplication. They must be invisible to the meter in order to meet the conditions for Vacuous Reduplication.

1.5 Characteristics of Song Lines

In this section, I cover three characteristics of song lines. First, I discuss the length of song lines, and show that there is a flexible number of syllables. Second, I show further flexibility in the number of stresses per line. Third, I discuss two important metrical positions of TO song lines, second and final to show that distributional facts reveal these two positions are never filled with stressed syllables. These facts indicate how TO song lines are rigid.

This section is important for several reasons. First, it will help in determining how to characterize the underlying metrical pattern of TO song meter. Second, recall from the discussion of meter above that rhythmic patternings are derived from quantity, stress, or syllables. Here the discussion shows that it is difficult to place TO song meter in one of these categories.

First, let us examine line length. Line length in these songs is rather variable; songs may use lines of anywhere from 7 to 19 syllables, as seen below:

(12)

a. § 'a-me g yód-ha-me yu huwi . Ó-'od-ha-me we-wem-e jú-ne-kam.
 § 'am g ó'odham i-huwi. ó'odham wem júñkam
 REP LOC DET people over here. people with to exist-one
 'They say over here are the People. With the People is the one who was.'

b. oi na só-šo kú:-ku:-ŋe.
 oi na són kú:g
 soon perhaps the beginning the end
 'soon perhaps the beginning, the end,'

c. § wa s-wá-pu-si-me wú-wa-ke
 § oa s-wápusim wúwhag
 REP CON STAT-PL-damply to emerge
 'There, they say, damply they emerge.'

The song line in (12a) has 19 syllables, (12b), has 7 syllables and the third example (12c) is 10 syllables.

Songs do not individually cluster about a certain line length either, as each song may contain lines of varying lengths. This in itself is not unusual, as it is characteristic of Old English verse, such as *Beowulf* (cf. Cable 1974, 1991; Russom 1987). However, the variability in OE meter can be reduced by factoring out resolution.¹⁹ This is not true of TO meter. While the statistics show how long (or short) lines may be, there is little to tell what the limits to the lower and upper reaches actually are. Therefore, I suggest that the length of a song line is unconstrained.

The number of stresses per line, and where they appear, is also an important factor in characterizing the flexible nature of the line. The number of stresses per line appears to cluster around 3, although like line length, these numbers are relatively flexible. A given line may contain anywhere from 1 to 5. The actual numbers for the distribution are given here in (13):

(13) Distribution of lines according to number of stresses:

STRESS:	0	1	2	3	4	5	6
NUMBER OF LINES:	0	4	28	33	7	2	0

The numbers in (13) show that most song lines contain either 2 or 3 stresses. In (14), I combine information to show the interaction of number of stresses per line with number of syllables.

¹⁹Resolution is 'whereby a short stressed syllable and the following syllable, long or short, are scanned as one' (Cable 1974, 7).

(14) Distribution of song lines, according to line length and number of stresses

Syllables per song line:

	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Number of stresses per line	0														
1		2	2												
2		6	6	1	4	6	2	2					2		
3				7	7	8	2	2	3	3				2	
4								2	3				2		
5												2			
6															

This chart shows that as the number of stresses increases, so does the number of syllables. One stress per line corresponds with song lines of the smallest attested lengths, 7 and 8 syllables. These lengths have more lines with 2 stresses per line; at 2 stresses per line larger lines also start to appear, with line lengths of 9-13, and 18 attested at this point. These line lengths (9-11 syllables) become more common with three stresses per line; in fact, they are the lower cutoff point for this range. At three stresses per line, lines of 12-15 syllables, and 19 syllables begin to appear. At four stresses per line, the lower cutoff becomes 13 syllables in length; 14 and 18 syllable lines also appear with four stresses per line. Finally, 5 stresses per line, the highest attested number of stresses, appears in 17 syllable lines.

The crucial generalization here has been with respect to the nature of a song line; it cannot be characterized consistently in terms of length in syllables or number of stresses. It does appear that as the number of stresses per line increase, so do the syllables. However, there is no clear evidence for there being restrictions on either, except for the restrictions on where stresses can appear in a line.

Now let us explore the distributional facts of where these stresses may appear in a line. As stated above, the second and final metrical positions of a given line are never occupied by stressed syllables. The distributional facts are most easily revealed in the chart below, which gives the distribution of stresses for the first four metrical positions in a line, the final three in a line, and all other (medial) positions

(15) Position of stresses within a song line:

First	Second	Third	Fourth	Other	Antepenult	Penult	Final
34	0	18	35	65	39	9	0

The restriction on these two positions does not hold of citation line. The table in (16) shows that stresses appear in all positions in a (citation) line:

(16) Position of stresses within a citation line:

First	Second	Third	Fourth	Other	Antepenult	Penult	Final
32	7	15	41	16	28	34	5

A comparison of these three distributional charts suggests that the songs restrict the second and final position. The latter restriction is noted as typical of trochaic verse, according to Attridge (1982). The restriction on second position in song lines, when viewed in conjunction with the high number of stresses which appear in the initial metrical position of a line, suggest that song lines begin with a trochaic sequence (S W) or two lexically unstressed syllables (W W), but never begin with an iambic sequence (W S). These elements argue for a trochaic meter, at least at the line's edges.

It is important to note one further point: trochaic meter typically places stresses in the S positions, which are odd, and avoids placing in W positions, the even ones. While this characterization is true of the leftmost W position (it is always even and never has stress), the same is not true of the rightmost position (the final metrical position of a song line may be either odd or even, and never has stress). I postpone further discussion of this for later, when I propose an analysis for TO song meter.

These gaps in the second and final positions of the charts in (15) and (16) become even more intriguing when we note that these positions are occupied in citation lines. The low number of stresses even in citation lines suggests that avoiding stress in these positions plays a role in structuring the line, even at the citation level. I compare these facts in (17), where I compare song and citation lines in the grid.

(17) a. Stress appears in second position in citation line, but not in song line:

X	X	X
Wá-wai	gí-wu-lik-e	nó-no-haŋ
X	X	X
Wáw	gíwulk	dó'ag
rock	constricted	mountain
'Constricted Rock Mountain'		

b. Stress appears in final position in a citation line, but not in a song line:

X	X	X	X
Jiós oi	ká-wu-li-ki	yam-e	ké-he-ka
X	X	X	X
Jiós 'o	i-gáwulk	'am	ké:k
God	AUX INT-to differ	LOC	to stand
'God starts to differ standing there.'			

The contrast in (17) between the song lines and the citation lines shows first that stresses are prohibited in the second and final metrical positions of a line. The line in (17b) also shows that the morphology of TO, which uses reduplication to indicate the plurality of nouns and verbs, may also be employed in order to avoid placing stresses in final position. I showed above that the Vacuous Reduplication in these lines is used to systematically prevent stresses from being adjacent from each other or from appearing line-finally. The example in (17a), which triggers reduplication by virtue of the two adjacent stresses, does show a stress in second position.²⁰ Interestingly, stressed syllables which occupy second position in citation lines also appear adjacent to other stresses, violating two restrictions on the meter. This is resolved by Vacuous Reduplication in the song line. As the reduplication adds another syllable, the stressed second syllable moves into the third metrical position.

Finally, if we look at the line-final stress which triggers reduplication, we see that both conditions (line-final and adjacent stresses) may appear in one line. This can be seen in (18).

²⁰An alternate account of the form *wáwai* 'cliff' is that the form reflects an archaic singular, rather than reduplication (thanks to Jane Hill for noting this). Interestingly, the form *wáw* also appears once, at the beginning of one song, as *wawawai*. The scarcity of other forms like this make it impossible to generalize. I do note here that *wáwai* may reflect a preserved form; this does not change the fact that stressed syllables do not appear in the second metrical position. I assume here that *wáw* is the citation form and *wáwai* a form reflecting Vacuous Reduplication.

- (18)
- | | | | |
|--|---------|---------------|-------------|
| oi | na | X | X |
| | | só-so | kú:-ku:-ŋe. |
| | | X | X |
| oi | na | són | kú:g |
| soon | perhaps | the beginning | the end |
| 'soon perhaps the beginning, the end.' | | | |

In this section, I have made several points regarding the absence of stressed syllables in the second and final metrical positions in a song. Specifically, I have shown that 1) Distributional facts of song lines reveal these positions to never appear with stressed syllables, 2) Citation lines may appear with stressed syllables in these positions, and 3) Vacuous Reduplication strategically allows a stressed final syllable to appear nonfinally, as well as helping to avoid the placement of such syllables in second position. I conclude this section having shown that as the morphology may be manipulated to avoid the appearance of stresses in second and final positions within a song line, it is the case that these positions are systematically devoid of stressed syllables. That is, it is not a coincidence, but rather reflects a metrical strategy of avoiding these two positions in the meter.

2.0 An Analysis of Tohono O'odham Song Meter

In this section I will present an analysis of the TO song meter. The crucial generalizations that this analysis must accommodate are these:

- (19) The descriptive generalizations of Tohono O'odham song meter:
- A. The second and final metrical positions are never filled with stressed syllables as Vacuous Reduplication is used to prevent stresses from appearing in these positions.
 - B. The song's meter is also restrictive in that it prohibits adjacent stresses. Adjacent stresses trigger reduplication of the leftmost element to create an intervening unstressed syllable.
 - C. Lines are flexible in number of stresses and syllables.

In this section I will first present a proposal which covers the first set of generalizations. Then I will propose a treatment of the second set of generalizations; following this, I will discuss the integration and interaction of both constraints.

2.1 The Edge Constraint

There are three sets of related facts which must be dealt with adequately in this section: the restriction on both the second and final metrical positions; the strictness of both edges; and the fact that the final position may be either odd or even. In fact, all noninitial stresses may occur in either odd or even positions. In the first section, we saw the edge effects robustly. Here I will show the third characteristic as well.

The restriction on stress in these two positions suggests that the meter is trochaic (S W); S positions are odd and W positions are even ones within a line. In the examples below, I show one unfortunate consequence of proposing that the meter is trochaic; by aligning each syllable in the song line with alternating odd and even positions, I show that all noninitial stresses may fall in odd or even positions, focusing here on the final position. The examples are given below.

(20) a. Song line ending in odd (S):

	X . .	X . .	X . .
SONG	pí-si-ne	mó-ka-me	jé-je-wen
	S W S	W S W	S W S
	písin	mó'o-kam	jéwed
	bison	head-one	earth
	'Bison Head (place).'		

b. Song line ending in even (W):

	. .	. X . .	X . .
SONG	š wa	s-wá-pu-si-me	wú-wa-ke
	S W	S W S W S	W S W
	š oa	s-wápusim	wúwhag
	REP CON	PL-damply	to emerge
	'Damply they emerge.'		

c. Song line ending in even (W):

	X . .	X . .	X . .
SONG	Nó-lig-kam-e	jé-wen-e	ká-ha-ce
	S W S W	S W S	W S W
	Nóligk 'am	jéwed	ká:c
	to turn LOC	earth	to lie over an area
	'Noligk lies there on earth.'		

d. Song line ending in odd (S):

	X . .	X	X . .
SONG	Wí-pis-mel	ñé-ñei	wa-ñ	bí-je-mi- <u>da</u> .
	S W S	W S	W S	W S W S
	wípismel	ñéñe'i	wa ñ-	bíjemid
	hummingbird	PL-song	CON 1SG-	to surround
	'Hummingbird songs surround me.'			

These four examples show two things: 1) that lines do not consistently end in either odd or even syllables, and 2) if song lines are characterized as trochaic, as above, approximately half of all stresses appear in Weak positions. Six of the eleven stresses appear in Weak position. This observation is important, although at this point, I wish to postpone discussion of it until below, as it does not fit into the current discussion of edge effects. The relevant examples, however, show that the fluidity of the line length makes it difficult to characterize the meter as underlyingly trochaic, if such meter is viewed merely as alternating strong and weak positions as for Hayes.

The current problem is this: how do we characterize the fact that stresses are restricted from these two metrical positions (second and final) on edges of song lines? Is it possible to characterize, in one way, the similar behavior of these two positions (both on the edge, both typically iambic and hence weak), despite the dissimilarities (one is always even, while the other may be even or odd)? Or can it only be characterized as two separate restrictions?

I suggest that it is possible to make a unified characterization of the behavior of these two positions, and that this characterization is imperative in view of the fluidity of line length in TO song meter. My proposal is quite simple: (1) Trochaic feet are built on each edge of a song line; (2) Stresses are prohibited in the Weak positions of these feet. I have formalized the two parts of this proposal as components of the Edge Constraint in (21):

- (21) EDGE CONSTRAINT:
- a. All metrical song lines minimally begin and end with a trochaic foot.
 - b. *Foot
 - ^
 - S W
 - |
 - [... X]

What does each part of (21) do? The statement in (21a) stipulates that the left and right edges of song lines must consist of trochaic feet. Only feet allow the reference to the second and final metrical positions; no other construction ensures reference to the restrictions on these positions. The construction in (21b) prohibits stress in the Weak position of a foot. The Edge Constraint as formulated will only apply to two metrical positions (second, final), because there are no other feet in the meter to which (21b) can apply (at this point, I argue for the presence of feet only at line edges).

Especially striking is the formal reference to the Foot. Without a binary foot, as in (21b), we cannot unify the reference to both positions. In fact, without a foot, it is otherwise impossible to refer to the second position in meter.²¹

The formalization in (21) accomplishes several goals: 1) It accommodates both edge restrictions. 2) Edges are restricted without directly specifying the position, but instead by using a linguistic unit, the foot. 3) It formalizes only a prohibition on stresses in edgemost W's; recall that the evidence of (20) showed that stresses appear in other W positions. At this point in the analysis, the constraint in (21) suggests that there are only two relevant W positions which are evaluated. This can be seen in (22), where I give the song lines in (20) under the Edge Constraint:

- (22) a. No violation of the Edge Constraint in a song line ending in odd:
- | | | | |
|------|-----------------------|----------|-----------|
| | Foot | | Foot |
| | ^ | | ^ |
| | S W | | S W |
| | | | |
| | [X . . | X . . | X . .] |
| SONG | pí-si-ne | mó-ka-me | jé-je-wen |
| | písín | mó'o-kam | jéwed |
| | bison | head-one | earth |
| | 'Bison Head (place).' | | |

²¹The only other possible way to restrict these positions would be if we characterize the line as :[S W ...W], prohibiting stress in all W positions. This characterization would be possible if there were only edge effects in TO song meter and the middles of lines were completely unrestricted. However, the restriction on adjacent stresses as a condition for Vacuous Reduplication suggests that TO song meter consists of more than just edge restrictions. I will show this in more detail in the next section.

(23) a.		Foot ^ S W 		Foot ^ S W
		[X . . X .		[X]
	CIT	Jiós 'o i-gáwulk 'am		<u>ké:k</u>
b.		Foot ^ S W 		Foot ^ S W
	SONG	[X . . . X . .		[X . .]
		Nó-lig-kam-e jé-wen-e		<u>ká</u> -ha-ce
		Nó-ligk 'am jé-weḍ		<u>kác</u>
		to turn LOC earth		to lie over an area
		'Noligk lies there on earth.'		
		Foot ^ S W 		Foot ^ S W
		[X . . X .		[X]
	CIT	Nó-ligk 'am jé-weḍ		<u>kác</u>

In (23) we see that the crucial violations of the Edge Constraint come in those lines where a stressed monosyllabic word falls line-finally (CITATION). The actual song lines (SONG) are without violation because the final word reduplicates. Vacuous Reduplication clearly prevents a violation of the Edge Constraint.

Let me now summarize this section. I have isolated the generalizations about edge effects, and proposed the Edge Constraint to resolve these effects. The Edge Constraint has two parts: 1) It builds trochaic feet at each edge of a song line and 2) It prohibits stresses in the weak positions of feet. By building feet only at the edges, I have made a proposal which unifies the edge effects under one treatment. This analysis also has the benefit of allowing a characterization of the restriction on the final metrical position, which can be either odd or even, but is never filled with a stressed syllable. Finally, this analysis is compatible with the flexible song line.

2.2 An Account of Adjacent Stresses

Let me review the relevant facts about Vacuous Reduplication first. Recall from the first section that a stressed monosyllable will reduplicate when to the left of a stressed syllable or occurring line-finally. As the Edge Constraint treats only those stresses appearing line-finally, the behavior of adjacent stresses must be accounted for. Crucially, Vacuous Reduplication creates an unstressed syllable between two stressed ones.

I propose that Vacuous Reduplication enables the meter to construct a binary trochaic foot which does not violate the Edge Constraint. Again, the proposal is simple: by adding a principle which builds binary feet from stresses, the Edge Constraint will rule out any illicit feet. However, for the Edge Constraint to apply, there must be feet. Recall that from the earlier discussion, I showed the difficulty of characterizing the final metrical position with the meter aligned to alternating S and W positions. In (24), I show song lines with Vacuous Reduplication aligned to this metrical pattern:

(24) a. X . X . . . X . .

SONG	Wá-wai	gí-wu-lik-e	nó-no-haj
	S W	S W S W	S W S

CIT	X	X .	X .
	Wáw	Gíwulk	dó'ag
	S	W S	S W
	rock	constricted	mountain
	'Constricted Rock Mountain'		

b.			X .	X . .
SONG	Oi	na	só-so	kú:ku:-ŋe
	S	W	S W	S W S

CIT	Oi	na	són	kú:k
	S	W	S	W
	soon	perhaps	the beginning	the end
	'soon perhaps the beginning, the end.'			

c.			X . .	X .		X . .
SONG	am	ha-wui	mé-he-da.	ká-cim	ha wu-wui	hí-me-da
	S	W S	W S W	S W	S W S	W S W

CIT	'am	ha-wui	méd.	kácim	ha-wu'uwui	híma
	S	W S	W	S W	S W S W	S W
	LOC	3PL-to	to run.	sky	3PL-DIST.PL-to	to move to
	'They are running towards it. Towards them, the sky moves.'					

For the first and third examples, with two adjacent stresses in a citation line, the first of these occurs in a strong position and the second in a weak position. Presumably, the Edge Constraint will rule them out and Vacuous Reduplication will create the legal unstressed syllable for the weak position.²² Note that the song lines in (24) also place stressed syllables in strong positions. However, (24c) is problematic for such an account. In this example, both in the citation and the song line, it is the first stress of two adjacent stresses which falls in the weak position. The Edge Constraint is violated in both lines, despite the efforts of Vacuous Reduplication. This shows that the characterization of the meter as a string of alternating S and W positions is not correct. The correct characterization must consistently place the second of two adjacent stresses in weak position. I have shown previously that stresses will appear in odd (S) or even (W) positions if the song meter is characterized as alternating S and W positions.

Here, I propose that the proper treatment of the metrical pattern is one which allows all stresses to appear in S position. This gives an adequate formal characterization of the prohibition on adjacent stresses; these stresses head binary feet. Binary feet consist of two positions, and the Edge Constraint will rule out any foot made up of two stressed syllables.

To achieve this effect, the meter requires one more constraint, which will effectively build binary feet wherever stresses appear. In (25), I formalize this rule:

²²The nature of Vacuous Reduplication deserves a comment. As it is prefixal, it actually allows the stress to move from one syllable to the newly created one. This has the ultimate effect, however, of creating a weak position in the meter. Also, the phonological changes found in songs, especially those related to features, nasalization, and lenition, are often reflected in the reduplicated forms.

- (25) BINARY FOOT CONSTRAINT:
 a. All stresses appear in the strong position of a foot.
 b. All feet are binary (following Hayes 1987).

With the proposed Binary Foot Constraint (BFC) of (25), we also require a formalization of Vacuous Reduplication to reduplicate and prefix syllables that result in the eventual filling of the necessary weak positions by the BFC. I give this formalization in (26) (following McCarthy and Prince (1990)). The formalism creates a prefixal reduplicant wherever a vacant position appears in a foot in the meter.

- (26) Vacuous Reduplication: (In this rule, *šón* typifies the forms which participate in this process; that is, stressed monosyllables.)

$$\begin{aligned} \Sigma : \Phi (\text{šón}) &= \Sigma - (\text{šón} : \Phi) * \text{má} : \text{s} / \Phi \\ &= \Sigma - (\text{šón} \Phi) \\ &= \text{šóšón} \end{aligned}$$

where

Foot
\wedge
S W
X

The rule in (26) will reduplicate monosyllables wherever they are not followed by an unstressed syllable. Note that stressed syllables cannot fill these positions, as this violates the second half of the Edge Constraint (21b). In the data in (27), I show the effects of the proposed BFC and Vacuous Reduplication. Note the empty weak positions (underlined) that result from the ban on a stress in weak position:

- (27) a.
- | | | | | |
|------|---|-------------|-------|-----------------|
| | Foot | Foot | Foot | Foot |
| | \wedge | \wedge | | \wedge |
| | S W | S W | | S W |
| | | | | |
| | X . | X | | X |
| SONG | Wá-wai | gí-wa-lig-e | we-co | ná-ha-gio kc in |
| | wáw | gíwulk | weco | náhagio kc 'in |
| | rock | cinched | below | mouse CONJ LOC |
| | 'The mouse runs around there below Cinched Rock.' | | | |
| | Foot | Foot | Foot | Foot |
| | \wedge | \wedge | | \wedge |
| | S W | S W | | S W |
| | | | | |
| | X — | X . | | X |
| CIT | wáw | gíwulk | weco | náhagio kc in |
| | | | | mémelihim |

(27)	b.	Foot		Foot		Foot
		^		^		^
		S W		S W		S W
		X . . .		X . . .		X . . .
SONG		Nó-lig-kam-e		jé-wen-e ²³		ká-ha-ce
		Nóligk 'am		jéweɖ		ká:c
		to turn (place) loc		earth		to lie over an area
		'Noligk lies there on earth.'				

		Foot		Foot		Foot
		^		^		^
		S W		S W		S W
		X .		X .		X —
CIT		Nóligk 'am		jéweɖ		ká:c

	c.			Foot		Foot
				^		^
				S W		S W
				X .		X .
SONG		oi na		şó-şo		kú-ku:-ŋe. (20:6)
		oi na		şón		kú:g
		soon perhaps		the beginning		the end
		'soon perhaps the beginning, the end.'				

				Foot		Foot
				^		^
				S W		S W
				X —		X —
CIT		oi na		şón		kú:k

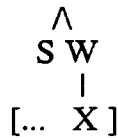
The lines in (27) show several consequences of the second part (BFC ; Vacuous Reduplication) of my proposal: 1) The second of two adjacent stresses cannot fill the weak position of the foot, following the Edge Constraint. 2) Line-final stresses cannot build binary feet to satisfy the BFC, for they have no material to fill the weak position. 3) All stresses will necessarily appear in strong positions. 4) The BFC and Vacuous Reduplication make redundant part of the Edge Constraint, specifically, building feet on right edges.

It is this final consequence which suggests that the Edge Constraint should be revised to build feet only at left edges. I give the simplified Revised Edge Constraint below in (28).

²³This example also shows the ambiguity in how the meter treats *jéweɖ*. The form must be scanned as a disyllable here as it does not reduplicate.

(28) REVISED EDGE CONSTRAINT: Tohono O'odham song meter is governed by the following:

- a. The left edges of song lines minimally begin with a trochaic foot.
- b. *Foot



To conclude this section, the significance of the lines in (27) are that they confirm the intuition that Vacuous Reduplication is a metrical effect; the significance of the Binary Foot Constraint is that it explains why the extra syllable of Vacuous Reduplication is generated: to build satisfactory trochees. An additional benefit is that the BFC unifies the right edge effects, the prohibition on adjacent stresses, and the effects of Vacuous Reduplication under the auspices of constraints that govern the meter. Thus, the BFC augments the Edge Constraint, and a highly complex, rigid system of meter emerges in the O'odham songs.

2.3 Consequences of the Constraints

Here, I will briefly demonstrate why each part of the two constraints is necessary to rule out nonoccurring lines. There are three types of lines which never occur in the corpus; I give these below, followed with sample lines that are acceptable.

(29) Unacceptable Lines:

- a. * . X
- b. * X
- c. * . . X X

Acceptable Lines:

- d. X
- e. X
- f. X . X
- g. X . X .

Which lines are judged acceptable and unacceptable by only application of the Revised Edge Constraint? Those in (29b-g) are all acceptable, while only (29a) is unacceptable. The line in (29a) is exactly the type of line the Revised Edge Constraint is meant to rule out. How do the lines fare in a comparable treatment with the Binary Foot Constraint? By the Binary Foot Constraint, the acceptable lines are (29a,d-g) and the unacceptable ones are (29b-c). The figure below shows this in more detail:

(30) Revised Edge Constraint

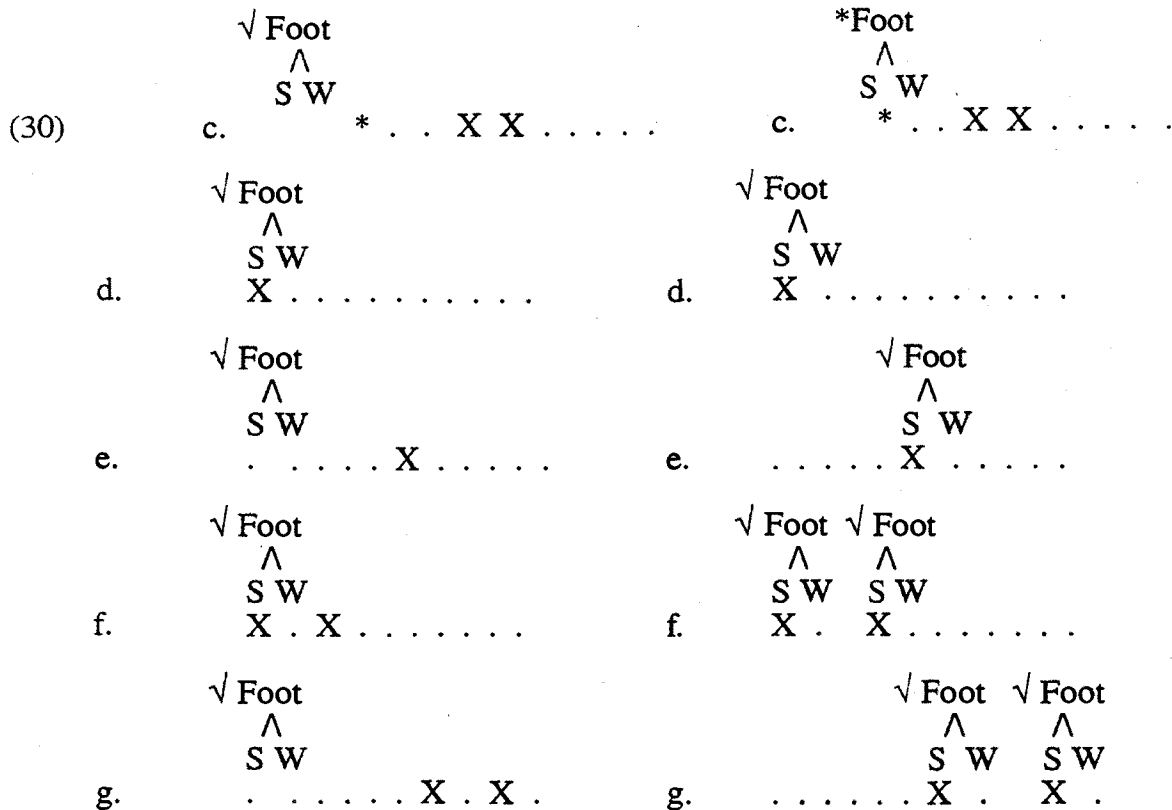
Binary Foot Constraint

- a. *Foot
 $\begin{array}{c} \wedge \\ S \ W \\ | \\ * . X \end{array}$

- a. $\begin{array}{c} \vee \text{Foot} \\ \wedge \\ S \ W \\ * . X \end{array}$

- b. $\begin{array}{c} \vee \text{Foot} \\ \wedge \\ S \ W \\ * X \end{array}$

- b. *Foot
 $\begin{array}{c} \wedge \\ S \ W \\ * X \end{array}$



As this figure shows, the Revised Edge Constraint and the Binary Foot Constraint are both independently needed to account for different types of ungrammatical lines. Each rules out a different subset of the unacceptable lines. Note that for the acceptable lines, there is only overlap in lines like (30d,f), which begin with a stressed syllable followed by an unstressed one. Here, both of the constraints build acceptable feet. This marginal overlap, however, is a consequence which is insignificant in view of the work both constraints do separately on unacceptable lines.

Let me quickly review the analysis presented in this section. My analysis consists of three parts, the Revised Edge Constraint, the Binary Foot Constraint and Vacuous Reduplication. The Revised Edge Constraint consists of two parts: 1) All metrical song lines minimally begin with a trochaic foot, and 2) Stresses are prohibited in the weak positions of feet. This filter constrains the meter by restricting the left edge position which does not allow stress, the second metrical position. The Revised Edge Constraint allows us to refer to this metrical position by using the Foot, as there is no other category which covers the set of distributional facts. I argue that the Edge Constraint in its earliest version is further confirmed by the behavior of monosyllabic stressed words line-finally. For the Revised Edge Constraint, the manipulation of the stressed syllables by the morphology shows that the avoidance of the two positions is significant, and not that they were merely overlooked.

I further argued that the critical effect of Vacuous Reduplication is to create an extra syllable which results in separating two stresses by an unstressed syllable. This effect can also be characterized under the Revised Edge Constraint, if we make one crucial modification to the analysis. I proposed that the Binary Foot Constraint effectively makes a binary foot for each stressed syllable. Here again we see how the Revised Edge Constraint rules out any foot with a stress in the weak position. Binary feet ensure that stressed monosyllables will never appear line-finally, as they create degenerate feet.²⁴ Thus the Binary Foot Constraint allows both a

²⁴The meter does show surface dactylic (S W W) effects. This is seen at the right edge with respect to the extra vowels, as pointed out to me by Leanne Hinton and Gilbert Youmans. Forms such as *ké:k* surface as a dactyl when line-final: *kéheka*. Note that a dactylic account fails when we consider the fact that trisyllabic words, such as *bíjemid*, 'to surround' ends with an extra vowel in the songs: *bí-je-mi-da* (36:1). Also, vowel-final disyllables may

characterization of the distributional facts (no adjacent stresses, stress may fall in either even or odd metrical positions), as well as an account of Vacuous Reduplication which coheres with the entire metrical system of the songs.

This analysis of Tohono O'odham song meter enriches our understanding of metrical theory. There is no other way in which we can characterize the data presented here; the metrical categories of foot and line are strongly motivated, and indeed, we are able to construct a metrical theory using rather simple theoretical entities. Further, the system argues for strict binarity in the representation of the foot in meter.

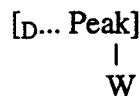
3. On Meter and Universals

In this section I will discuss Hayes' theory of meter with respect to the analysis presented in the previous section. Hayes (1989) claims that metrical requirements are lax line-initially. The analysis of TO requires modification of the typological claims made in Hayes (1989), as O'odham metrics requires strict left edge metrical constraints.

Let me review Hayes' rule typology. Three rule types make up 'an exhaustive typology of the ways in which metrical rules may refer to bracketing. A given rule may belong to more than one type' (Hayes 1989: 246). In (31), I list and define these three types:

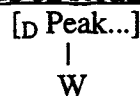
(31) a. BOUNDING RULE: 'considers only those peaks²⁵ that are defined within a given peak in a snapshot of that category.' (p. 245)

b. RIGHT EDGE RULES: 'apply to rule out structures of the following form:



where 'D' is a specified prosodic domain, 'Peak' is a peak in metrical W position defined within D, and '...' is material included in D that the rule may optionally specify. The claim here is that the right edges of prosodic categories are often scanned with special strictness.' (p. 245)

c. LEFT EDGE RULES: 'apply to configurations of the form



where 'Peak' and 'D' and '...' are defined as before. The difference here is that left edge rules, rather than forbidding a specified cadence, may overrule other metrical rules, licensing cadences that would otherwise be ill-formed.' (p. 245)

An interesting situation arises when we consider the Revised Edge Constraint. If we allow a loose definition of domain here, such that Foot and Line are allowed, the Revised Edge Constraint (28a) contradicts Hayes' claim for left edges as lax, as it provides that a foot must be built on the left edge of a line (to prevent a stress in weak position). This is never violated in the songs, robust evidence that left edge rules for TO song meter are strict. The more general part of the Revised Edge Constraint (28b), which prohibits stresses in metrical W, is consistent with

receive no additional syllables, as when *kak-ke* (20:3) 'to ask', surfaces line-finally without change. The formalization of Vacuous Reduplication could easily be changed to produce dactyls for these types of words, as well as for adjacent and line-final stresses. The effects of Vacuous Reduplication clearly support a binary analysis. Finally, the form *káidaghim*, 'resounding noise-CONT' truncates into a disyllable when it ends a line: *káim-he* (24:6). These facts are incompatible with a dactylic analysis of the meter.

²⁵PEAK: any syllable with a higher grid column than AT LEAST ONE of its neighbors (Hayes 1989, 227).

Hayes' formulation of right edge rules. But crucially, it is the instantiation of this for the initial, left edges of song lines which contradicts his typological claim of left edge rules as lax. The necessity of building a strict trochaic foot line-initially presents the argument for a revision to the typology of rules to allow strict left edge rules.

Finally, I would like to discuss the theoretical role played by the categories motivated in this paper: Foot and Line. Hayes notes that the 'bracketed units Line, Colon, and possibly Foot are thus supported by the metrical rules that must refer to them' (1989: 256). A central point of this paper is the motivation of the Foot as a category referred to by metrical rules. Kiparsky (1977),²⁶ Prince (1989), and Youmans (1989) (and others) also provide evidence for the Foot. The second comment is that while Hayes acknowledges that the Metrical Hierarchy (made up of Line, Colon, Foot) plays a role in meter, he observes that the metrical rules referring to categories of the Metrical Hierarchy follow the typology of metrical rules which he proposes. Again, however, I argue that the study here shows that line-initial strictness must be allowed.

4. Conclusion

In this paper, I have argued for a number of points. Let me review them, starting with those of a more descriptive nature. The data involved in this study is very complex, and I have attempted to organize the various phenomena in the songs according to their relevance to the meter, as that is the focus of this paper. Tohono O'odham songs are made up of lines which are flexible in some ways, and rigid in others. The line is flexible in allowing a relatively unconstrained number of stresses and syllables.

Vacuous Reduplication shows itself to be metrically motivated. I have shown that it involves the systematic manipulation of the morphology to avoid adjacent or line-final stresses.

The descriptive facts of Tohono O'odham songs reveal the dual nature of the line: it is flexible in terms of the number of stresses and syllables; it is rigid in terms of regulating where stresses may appear. The closest parallel can be found in Old English poetry, such as *Beowulf*. The meter of *Beowulf* has typically been described as a line which consists of two *verses*, which in turn are made up of two main stresses and an unspecified number of more weakly stressed syllables.²⁷ However, unlike TO song meter, the meter of *Beowulf* can be characterized by the regularity of the number of stresses.

In O'odham song meter, the regularity is derived differently; it is derived through restrictions on where main stresses may appear. Unlike other meters which regulate this characteristic, Tohono O'odham song meter does not regulate line length. Like *Beowulf*, this results in a meter which allows an indeterminate number of syllables of lesser prominence. The characterization of the O'odham song meter may exemplify a novel system of meter. This finding alone is an important one for the typology of versification systems.

The metrical system can be captured in an analysis which relies on the foot. The foot-based analysis also provides for the line's flexibility. The O'odham meter shows that these components are necessary for generative metrics.

I have made two specific proposals the cornerstone of my analysis. First, I argued for the Revised Edge Constraint, which proposes that the prohibition on stressed material in the second metrical position, can only be handled by building a foot at the beginning of each song line and restricting stresses from appearing in the weak position. Second, I showed that the additional restrictions on the line, namely the prohibitions on stresses appearing adjacent to each other or line-finally, can be derived by the Binary Foot Constraint, which states that all feet are binary trochees and all stresses must appear in strong position of feet.

Under my analysis, the flexibility in song lines comes from the fact that the meter only regulates stressed syllables; weak syllables are relevant only when they are incorporated into

²⁶However, see Hayes (1983) for arguments against Kiparsky's analysis.

²⁷However, both Cable (1974) and Russom (1987) argue against this 'textbook' characterization of the meter, and propose their own alternatives.

feet by the Revised Edge Constraint or the Binary Foot Constraint. All other weak syllables in the line are unrestricted. This results in the variability of line lengths seen in the songs.

Three central theoretical points have been developed here. First, I show that the line may be flexible in some poetic traditions. Second, I argue that binary feet, with constituency, are needed in this line. Finally, I argue that Tohono O'odham songs attest to the existence of strict metrical rules for left edges. The necessity of beginning each line with a foot, to ensure the strict enforcement of no stresses in the second metrical position, provides the impetus to revise the typology of meter presented in Hayes (1989): He argues for a typology of metrical rules that states left edge rules are lax. The importance of this study from a typological perspective is evident.

In conclusion, this study has isolated certain problem areas in generative metrics, as well as providing evidence for a novel system of versification. By using data that from Tohono O'odham, a Native American language steeped in the oral tradition, we can see not only where metrical theory is lacking, but also recognize the unique properties of the system of meter used in these songs. The metrical system is rooted in three simple principles (the Revised Edge Constraint, the Binary Foot Constraint and Vacuous Reduplication) which produce the intricately organized metrical pattern, the meter of Tohono O'odham songs.

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Arapaho Accent¹

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1. Introduction

Arapaho is an Algonquian language spoken by a population of about 3500 in Wyoming and Oklahoma (Salzmann 1983). The accent system of Arapaho is quite complex and presents a challenge to any theory of stress/accent which attempts to account for these phenomena in a derivational manner (Salzmann 1965, Tsay 1989). In this essay it is argued that Arapaho accent involves both lexical and derivational aspects. In section 2, the phonetic characteristics of Arapaho accent are outlined. Section 3 briefly overviews Idsardi's (1992) theory of the computation of stress. In section 4, the Arapaho data are presented and the crucial generalizations are stated. Section 5 contains an analysis of these facts, utilizing Idsardi's theory. An alternative analysis is offered in section 6, and finally in section 7 the theoretical implications of the Arapaho facts are discussed.

2. Arapaho Accent

Prominence in Arapaho is realized phonetically through both pitch and fortition of articulation. Some Arapaho words contain a single accent (i.e., *he:sno:úni* 'famine')², others are characterized by seemingly binary foot structure (i.e., *nixómemí* 'lantern'). Accents may be realized with a falling tone pattern, as in *cí:té* 'foam', and these accents are marked with a hacek. Non-falling accents are realized primarily through fortition (Salzmann 1983).

3. Idsardi's Theory of the Computation of Stress³

Idsardi (1992) provides an algorithm for the construction of metrical grids which allows for the parsing of these grids into domains which may be bounded or unbounded. In this system, five parameter values are set for a given language. First, stress-bearing elements (moras or syllables) project markers (x's) onto line 0 of the metrical grid. Second, a left or right parenthesis may be projected onto line 0 at the left or right edge of certain kinds of elements (e.g., heavy syllables). Third, a left or right parenthesis may be projected at the left or right edge of the left- or rightmost element. This third step is referred to as "edge-marking". Edge-marking settings are listed in abbreviated form where the first letter represents the choice of parenthesis type, the second the choice of element edge and the third the choice of domain edge. The edge-marking setting RLR is to be read "project a right parenthesis to the left of the rightmost element in some domain".

Edge-marking is the mechanism which allows Idsardi's system to account for extrametricality effects, as well as pre- and post-stressing cases (where an unaccented domain

¹Special thanks to Jane Tsay and Mike Hammond for their comments and suggestions in the preparation of this manuscript, and to the editors of this volume for their additional suggestions. All errors are the responsibility of the author.

²The official orthography of the Arapaho tribe is adopted here. Phonetic correspondences are as follows. Consonants: [c] is a spread-glottis palatal affricate; [ʃ] is a spread-glottis interdental fricative. All other consonant symbols are used in the standard manner. Vowels: [e] is a mid, front, lax vowel; [i] is a high, front, lax vowel; [o] is a mid, back, tense vowel; [u] is a high, back, lax vowel.

³The interested reader is referred to Idsardi (1992) for a full explication of this theory, and motivation for the parameters and constraints suggested within it. All aspects of Idsardi's theory which are necessary to this analysis are overviewed here, however.

seems to force an accent to appear on an adjacent, accentless, domain). Edge marking can occur on line 1 as well as on line 0.

The fourth parameter, "iterative constituent construction" (henceforth, ICC), allows iterative binary parsing, either from the right edge leftward or vice-versa. Under the ICC, the type of parentheses projected onto line 0 is constrained by the directionality of the parse. A left-to-right parse always places right parentheses on line 0, whereas a right-to-left parse always places left parentheses.

Finally, languages may mark heads on line 1 either at the right or the left edge of the domains identified by parenthesis projection/insertion. These parameters are applied to a simple stress-type system (Warao) in (1) below. In Warao, stress falls on even numbered syllables counting from the right edge of the word. Main stress falls on the penultimate syllable (Idsardi 1992:6).

(1)	The Warao Parameters:	Line 0: Line 1:	Edge:RRR Edge:RRR	ICC: R	Head:L Head:R
	Example:				
	Project x, Edge:RRR				
					yàpurùkitàneháse
					x x x x x x x x)
					yapurukitanehase
	ICC:R				(x x(x x(x x(x x
					yapurukitanehase
	Head:L				x x x x
					(x x(x x(x x(x x
					yapurukitanehase
	Line 1: Edge:RRR				x x x x)
					(x x(x x(x x(x x
					yapurukitanehase
	Head:R				x)
					x x x x)
					(x x(x x(x x(x x
					yapurukitanehase

Idsardi introduces a number of constraints on the construction of the grid. Constraints take the form of "avoid" clauses, and these disallow the construction of certain configurations on the grid. Ternary systems like Cayuvava, for example, are subject to "avoid (xx("". This causes the ICC to place a parenthesis one marker to the left of the marker that would have been selected under binary construction. An example of the application of "avoid (xx(" is included in (2). In Cayuvava, stress falls on every third mora counting from the right edge of the word, and on the initial mora in shorter words (Idsardi 1992:27).

(2)	The Cayuvava Parameters:	Line 0:	Edge:RLR	ICC:R	Avoid (xx(
	Example:	maráhahaéiki			
	Project x; Edge:RLR	x x x xxx)x marahahaeiki			
	ICC:R	x(x xx(xx)x marahahaeiki			
	Head:L	x x x(x xx(xx)x marahahaeiki			

With this brief explication of Idsardi's theory in mind, section 4 will examine the Arapaho data.

4. Arapaho Nouns

The data analyzed here include only unaffixed nouns. Arapaho nouns show a wide variety of patterns of accent. Monosyllables are never accented, but all polysyllabic words contain at least one accent. Two-syllable words can exhibit an accent on the first or second syllable, or both, and the locus of accent is unpredictable according to syllable weight or mora count. This is illustrated in (3) below.

(3)	Mono- and disyllables:	
	Monosyllables: Unaccented	
	ho3	'arrow'
	Disyllables: Initial Accent	
	yó:kox	'willow'
	bétson	'elbow'
	Disyllables: Final Accent	
	wonót	'abdomen'
	bihí3	'dung'
	Disyllables: Initial and Final Accent	
	3éi3	'cartilage'

It is always the case that adjacent nonfalling accents occur on a CV.VC sequence. Falling accents only occur on long vowels which immediately precede an accented, consonant-initial syllable. Examples are given in (4).

(4)	Adjacent Accents:	
	3éi3	'cartilage'
	céito:	'earring'
	cíté:	'foam'
	nih'êmó'	'blackbird'

Three-syllable words contain one or two accents, and all of the possible accentual patterns are attested. The data in (5) contain examples of accentual patterns in three-syllable words.

(5) Three-syllable Words:

Initial Accent:

né:sortox	'eight'
nóxkuhurt	'button'

Medial Accent:

ni:zí:wo:	'handkerchief'
tecéno:	'gate'

Final Accent:

hemetít	'language'
---------	------------

Two Accents:

céito:	'earring'
sé'temé3	'blood hound'
nih'è:nó'	'blackbird'

Forms longer than three syllables show all possible arrangements of accents, subject to the following restrictions. First, all four-syllable spans have at least one accent. Second, only long vowels can receive falling accents, and these may only surface when they precede accented short vowels. Third, all adjacent non-falling accents occur on CV.V sequences. Example forms are given in (6) through (9) below.

(6) Four-Syllable Words:

ni:sí3oó	'job'
tébexóno:	'chainsaw'
ni:3ó:te:'e:	'braid'
wohomónok	'thread'
ninôxúwut	'governor'
3í'o:ku:3ó:'	'fencepost'
kóúhuyo:'	'honey'

(7) Five-Syllable Words:

tóno'wû:hóe	'cellar'
hé:tese:'éi:t	'bald eagle'
touhómo'ó	'boot'
cinóuto:ono	'grain'
hehí:sé3omo	'laundry'
hi:hó:cebíte:	'butter'
séi'ko:tí'i	'cabbage'

(6) Six-Syllable Words:

he:téci:'éhi:	'gull'
bí:semi3ó:teryo:	'chrysalis'
woníseine:hí:s	'burr'
wonóhno:kútemó:	'handrake'

(7) Seven-Syllable Words:

ce:céibecéinó:	'candy'
hó:wohóo:htéihi	'centipede'
ko:kóúmi:sóúhu'	'dime'

A number of generalizations have emerged from these data. First, there is no span of unaccented syllables longer than 3 syllables. Second, falling accent only surfaces on long vowels which precede accented syllables. Third, adjacent non-falling accents only occur on CV.V sequences. Fourth, both alternating (bounded) and non-alternating (unbounded) accent patterns occur. Fifth, neither syllable weight nor position in a word predict placement of accent. Finally, monosyllabic forms are never accented. An adequate analysis of Arapaho accent must account for each of these generalizations.

5. The Analysis

The generalizations discussed above can be accounted for by an analysis positing that certain components of the accent system must be lexical, while others may be derivational in nature. It is assumed that lexical entries contain only material that is idiosyncratic about a form. Once these lexical properties are defined, the form can be realized through the application of language-invariant parameter settings.

That monosyllables are unaccented indicates a binary minima condition on accentable spans. Since bimoraic monosyllabic words do not receive an accent, it is hypothesized that the domain of stress is the syllable and not the mora. That binarity plays a critical role in the accentual system of Arapaho is evidenced further by the fact that there must be at least one accent on every four-syllable (two-foot) span.

Idsardi's theory allows two unique options for the analysis of Arapaho. First, the positions in which parentheses can be inserted through edge-marking also seem to be the positions in which lexically marked parenthesis must exist in Arapaho nouns. Since the data considered for this analysis consist only of unaffixed nouns, the pre- and post-stressing settings (RLL and LRR) are not attested here. Second, in the forms exhibiting alternating accents (binary feet), the placement of accents is sensitive to the placement of constituent boundaries from lexical marking

(either edge-marking or adjacent accent marking). In the forms exhibiting seemingly unbounded feet, accent always appears at least once in every bipodal string. This suggests that in some forms, accents created by the ICC may be "bled" or deleted at some stage in the derivation.

Third, adjacent stresses are unpredictable in terms of their position within a word, but not with regard to the segmental structures on which they can occur. The first of a pair of adjacent accents may fall on a long vowel or the second may fall on an onsetless syllable. Note that falling accents are always followed by non-falling accents, but there is no way to predict which non-falling accent will be preceded by a falling one. This suggests that lexical marking of adjacent accents is accomplished through the projection of a left parenthesis (since left parentheses force an accent to occur on a constituent to their right). It is therefore hypothesized that marked syllables project two parentheses. Each is a left parenthesis, and one is projected on either side of a marker in the following configuration: (x(.

A short vowel will never surface with a falling accent. If an accented short vowel is immediately followed by an accent, it is also immediately followed by an onsetless syllable. In other words, CV.CV strings will never receive two accents, but CV.V strings may. This situation seems analogous to the falling accent case in that adjacent accents are licit in this configuration, and are illicit in all other configurations except the falling accent case just described. Interestingly, the same form of lexical parenthesis insertion posited for the falling accent cases will account for these sequences as well. For this reason, it is asserted that all cases of adjacent accent are lexically marked, and these are the only lexical accents which are not subject to placement by edge-marking settings.

Words four syllables or longer which contain medial accents always show placement of these accents on alternating syllables rightward of (and sensitive to the placement of) lexically marked constituent boundaries. This suggests that the ICC is binary, rightward, and is sensitive to the placement of lexical parentheses. In order to illustrate this, let us look at the four-syllable words with penultimate accent.

If the ICC operates from left to right, it will place a right parenthesis after the second marker on line 0, resulting in the pattern xx)xx. If it operates from right to left, it will place a left parenthesis to the right of the second marker on line 0, xx(xx. In either case, we must assume that there is some method for limiting such a form to a single accent, and therefore to a single metrical constituent. This will be accomplished by an edge-avoidance constraint on the ICC. In order to get a penultimate accent, a constituent containing the penultimate marker must be created. Only ICC leftward accomplishes this. Further, in order for the accent to appear on the penultimate syllable, the constituent must be left-headed. Thus the ICC must operate from right to left, and feet thus constructed must be left-headed.

If the ICC is subject to the constraint "avoid #(x", a number of patterns will result, and these patterns are all attested in Arapaho words. These patterns are exemplified in (8) below. I assume that edge-marking parameters are lexically determined, and limited to just those Idsardi allows. I assume further that no lexical edge-marking need occur. Finally, I assume that adjacent accents are always lexically determined, and not subject to edge-marking parameters. All forms are subject to ICC:L

(8) Patterns Attested in Words Four Syllables and Longer:

Four-Syllable Cases:

Edge:None	x	
Adjacent Accents:None	x x(x x	
	ce'e ibes	'box'
Edge:None	x x	
Adjacent Accents:2nd/3rd	x(x(x x	
	nino:xuwut	'governor'

Edge:LLL	x x	
Adjacent Accents:None	(x x(x x	
	tebexono:	'chainsaw'
Edge:LLR	x x x	
Adjacent Accents:None	(x(x x(x	
	ho u3o o	'clothesline'

Five-Syllable Cases:

Edge:None	x x	
AdjacentAccents:None	x (x x(x x	
	hi:ho:cebite:	'butter'
Edge:RRL	x x	
AdjacentAccents:None	x) x x (xx	
	he:tese:'ei:t	'bald eagle'

Six-Syllable Cases:

Edge:RRL	x x x	
AdjacentAccents:None	(x x(xx (xx	
	be'e3einoo:	'cedar'

Seven-Syllable Cases:

Edge:LLL	x x x x	
AdjacentAccents:5th/6th	(x x(xx (x(x x	
	ho:wohoo:hteihi	'centipede'

This analysis enables us to capture all of the attested patterns except those in which footing does not appear to be iterative. Specifically, the remaining patterns are listed in (9) below.

(9) Non-iterative Patterns (in five-syllable or longer words):

- (a) initial and ultima accent
- (b) second syllable accent
- (c) second and ultima accent
- (d) penultimate accent

If the ICC is operative on all Arapaho forms, then it may be that medial accents are lost through a process of tier conflation. One possibility is the operation of conflation posited by Idsardi (1992:38), in conjunction with line 1 edge-marking. Conflation is an operation in which heads at line 0 are deleted while heads derived on line 1 are retained. If conflation applies to lexically marked forms after line 1 edge-marking, then the patterns in (9) can be accounted for. Derivations for these patterns are given in (10).

(10) Derivations Including Conflation After Line-1 Edge-marking:

Conflation	x	∅	
Edge:LLL-Line1	(x	x	
AdjacentAccents:None	x (xx	(x x	
	ci:nou:tono		'grain'
Conflation	x	∅	x
Edge:LLRandLRR-Line1	(x	x	(x
AdjacentAccents:None	x (xx	(x x	(x
	woniseine:hi:s		'burr'
Conflation	x	∅	x
Edge:LLLandLRR-Line1	(x	x	(x
AdjacentAccents:None	(x x(x	x(x	
	sicene:woxu'		'yucca'
Conflation	∅	x	
Edge:LRL-Line1	x	(x	
AdjacentAccents:None	x(x	x(xx	
	wo3onohoe		'paper'

In sum, the following information is argued to be lexically marked in Arapaho: (i) Long vowels and vowels preceding onsetless syllables may be lexically marked with a left parenthesis to the right and to the left of their markers on line 0. Otherwise, lexical markers can occur in all and only those positions corresponding to Idsardi's edge-marking parameter. (ii) Certain forms are marked to undergo conflation.

Beyond this lexical information, Arapaho has selected the following parameters for the assignment of accents: (i) The ICC operates leftward. (ii) Constituents are left-headed. (iii) Markers are projected from syllables. This analysis predicts that for forms not lexically marked, there should be no more than eleven distinct patterns. Critically, all of the formal possibilities are attested in the data, and all patterns not predicted can be accounted for by lexically marked adjacent stresses or conflation.

6. An Alternative Analysis

Problematic forms for any analysis undertaken using Idsardi's approach are those which fail to exhibit medial accents on syllables where it would seem that the ICC should place constituent boundaries. One way of dealing with these problem forms is to argue that the ICC simply fails to apply to them. Thus the lexical mark on such forms would instruct the ICC not to apply at all, rather than invoking tier conflation. This analysis misses a number of generalizations, however. First, it cannot account for the role of binarity in the failure to assign accent to monosyllabic words. Second, it cannot account for the limit of three unaccented syllables in a string; importantly this limit is not violated even in forms which do not demonstrate binarity of footing. These facts indicate that conflation is a more adequate mechanism for explaining the lack of medial accents in such forms.

7. Implications

Arapaho Accent provides a rigorous test for any theory of stress or accent systems. Although the Arapaho system appears chaotic, it is more constrained than a purely lexical analysis would suggest. It is clearly, however, too complex for a purely derivational theory to accommodate. The system provides interesting support for Idsardi's approach to metrical grids, especially with regard to edge-marking parameters. If accent systems generally make use of the possibilities provided by edge-marking, then the power of Idsardi's theory is in some part

justified. This analysis surely suggests that further study of systems such as the Arapaho one will be a fruitful area of research into the diversity of stress and accentual systems in the languages of the world.

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Deriving Ternarity*

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0. Introduction

Ternary stress patterns have posed a problem for a parametric metrical theory for some time. In this paper, it is argued that ternary systems can be derived in an explanatory fashion from binary systems. The basic idea is that ternary stress systems can be analyzed as binary stress systems if the theory of extrametricality is enriched. Two specific proposals regarding extrametricality are made. First, extrametricality must be tolerated not just at the edge of morphological and syntactic constituents, but also at the edge of phonological constituents. Second, extrametricality can be lost if adjacent feet are subminimal.

The organization of this paper is as follows. First, the foot typology is briefly reviewed. Then the theory of extrametricality is presented. It is argued that regardless of the analysis of ternary systems, the theory of extrametricality must be enriched as outlined above. Four metrical systems are then considered: Cayuvava, Chugach, Winnebago, and Estonian. Each of these systems provides arguments for deriving ternarity as proposed here.

1. Foot typology

For convenience, the metrical theory proposed by Hayes (1987) is adopted.¹ Hayes maintains that there are three metrical constituents: the syllabic trochee, the iamb, and the moraic trochee.

(1)	syllabic trochee	[[σ]σ]
	iamb	[μ[σ]]
	moraic trochee	[[μ]μ]

The syllabic trochee is a left-headed constituent with syllables as terminals. The iamb is a right-headed foot where the left terminal is monomoraic and the right terminal is a syllable or a mora. The moraic trochee is left-headed and takes morae or monomoraic syllables as terminals.

There are also systems that exhibit superficially ternary iteration. Halle & Vergnaud (1987) deal with these systems by supplementing their foot typology with an amphibrachic foot. This is a foot with three terminals and the head in the middle. It will be shown that such a foot cannot capture the range of ternary iteration and misses central generalizations about ternary systems.²

2. Extrametricality

Extrametricality excuses an element from metrification. An element that has been made extrametrical need not be included in the metrical tree to be pronounced and escape stray erasure. This device is constrained by the Peripherality Condition, which stipulates that extrametricality is only available at the edge of a domain (Hayes 1981; 1982; Archangeli 1984-1985).

* Thanks to Diana Archangeli, Stuart Davis, Bruce Hayes, Mike Kenstowicz, Adrienne Lehrer, James Myers, Pat Perez, and Curt Rice for useful suggestions. All errors of data or analysis are the author's.

¹See Hammond (1990) for an alternative to this system.

²There are also systems where the stresses can fall at potentially unbounded distances from each other. These systems are not discussed here and the reader is referred to Hayes (1981) or Halle and Vergnaud (1987) for a traditional treatment of such systems. See Prince (1985) or Hammond (1990) for another proposal.

English nouns provide an example of extrametricality. Oversimplifying, stress falls on a final long vowel. Else, stress falls on a long or closed penult. Else, stress falls on the antepenult.

(2)	<u>long ultima</u>	<u>light penult</u>	<u>long penult</u>	<u>closed penult</u>
	kangaróo	América	aróma	veránda
	Tennessée	cínema	balaláika	agénda
	tiráde	aspáragus	hiátus	consénsus
	repúte	metrópolis	horízon	synópsis
	brigadóon	jávelin	thrombósis	amálgam
	chimpanzée	vénison	coróna	uténsil

Secondary stresses fall on alternating syllables leftward regardless of syllable weight.

(3)	Mississíppi	sèrendípity
	Apalàchicóla	Sriràngapátnam
	Cònestóga	hàmamèlidánthemum
	dèsignátion	còmpeñsácion

To account for the basic pattern of stress, the final rhyme is made extrametrical if it is not long. Then a single moraic trochee is built on the right edge of the word followed by syllabic trochees from right to left.³ Some sample derivations are given below.⁴

(4)				
	x x x x	x x x<x>	x(x x)<x>	(x)(x x)<x>
	America ->	America ->	Ameri ca ->	A meri ca
			x	x x
	x x x	x x <x>	x (x)<x>	(x)(x)<x>
	consensus ->	consensus ->	consensus ->	consensus
			x	x x
	x x x	x x (x)	(x x)(x)	
	anecdote ->	em. n/a ->	anecdote ->	anecdote

Final extrametricality captures the fact that ternarity is exhibited only at the right edge of the word. The moraic trochee captures the fact that only the rightmost stress is sensitive to syllable weight.

The restriction against making a long vowel extrametrical is a natural one. There are a number of languages where heavy syllables of various sorts are immune to extrametricality.⁵ The account of ternary footing to be offered below hinges on the fact that extrametricality may be blocked by syllable weight.

The account to be presented here depends on several other properties of extrametricality. First, the domain peripheralality refers to can be smaller than the domain footing applies to. Second, extrametricality can be assigned before or during the footing process. Third, extrametricality can be

³There are a number of ways of effecting this differential sensitivity to syllable weight. See, for example, Halle and Vergnaud (1987) and Hammond (1990). Since the precise mechanism used to achieve this effect is irrelevant, a simple analysis, which allows feet to be constructed noniteratively, is given in the text. (See Kager, 1989 for a different view.)

⁴The notation in the text is adopted for typographical convenience. In relevant respects, it is a notational variant of the "lollipop" notation developed in Hammond (1984/1988). See Hammond (1987) for discussion.

⁵See Hayes (1981) and Halle and Vergnaud (1987) for examples.

lost if an adjacent foot is subminimal. Fourth, extrametrical elements are invisible to clash. Each of these points is considered below.

It is suggested that the domain of peripherality can also be the foot. That is, extrametrical syllables can satisfy peripherality merely by occurring at the appropriate edge of a foot. That the domain of peripherality should differ from the domain of scansion is not a novel proposal. Prince (1985) proposes this in his treatment of English compounding. He suggests that the right sister of each compound constituent should be extrametrical. In the domain of syllabification, Rubach and Booij (1990) have proposed that an extrasyllabic element can satisfy peripherality at the edge of a medial syllable.

Second, the account to be presented here depends on the possibility of assigning extrametricality at various points in the derivation. This too is not a novel proposal. The normal picture, of course, is that extrametricality is constructed on the fly, as feet are built. However, there are a number of systems that have been analyzed with extrametricality assigned before footing, e.g. Yawelmani (Archangeli 1984-1985) and English (Hayes 1981). In both of these cases, lexical extrametricality is presumed to be present in the underlying representation of certain forms.

The third assumption that is critical for this proposal is that extrametricality can be lost if an adjacent foot is subminimal. Prince (1991) argues that just such a process is involved in the Latin phenomenon known as *Brevis Brevians*, whereby in a disyllabic form consisting of a short open syllable followed by a long syllable, the long syllable shortens, e.g. *ego*: -> *ego*, *cito*: -> *cito*, etc. Prince argues convincingly that this is a consequence of the loss of final extrametricality and incorporation of the final syllable in a moraic trochee when the foot would otherwise be subminimal.

(5) x x
 (x) <x> (x x)
 e go: -> ego

It will be argued below that analogous processes affect extrametricality when it is assigned at the edge of a foot.

A final property of extrametricality is that syllables are invisible with respect to rules of rhythm and destressing. It will be shown in the following that the English Rhythm Rule is considerably simplified on the assumption that extrametrical material is invisible to rules of rhythm and destressing.

Consider the following facts concerning the English Rhythm Rule. As noted by Hammond (1984/1988), forms like the following readily undergo a shift of stress.

(6) Tènnessée Ténnessèe Tím
 Kàngaróo Kángaròo CárI

Hayes (1984) notes the following contrast. The forms in (7a) undergo rhythm much more readily than the forms in (7b).

(7) a. Míssissíppi Míssissìppi Mábel
 àanalytic àanalytic thóught
 Pàssamaquóddy the Pàssamaquòddy vérb
 b. Mínnèápolis ?Mínnèápolis Míke
 àanalytical ?àanalytical thóught
 Pòtawátomi ?the Pòtawàtomí vérb

The contrast falls out automatically given that extrametrical syllables are invisible to metrical structure and that the shift of stress is triggered by clash. Representative input representations to the Rhythm Rule are given in (8) where clashes are marked with hyphens. (A clash exists at some

level n of the representation if columns are adjacent at level n and level n-1.) Notice that the cases where rhythm is more likely are characterized by having more clashes.⁶

- (8)
- | | |
|---|---|
| <p style="text-align: center;">x---x</p> <p>(x x) - (x)</p> <p>(x x) (x) (x)</p> <p>Tennessee Tim</p> | <p style="text-align: center;">x-----x</p> <p>(x x) --- (x)</p> <p>(x x) (x) <x> (x) <x></p> <p>Mississippi Ma bel</p> |
| <p style="text-align: center;">x-----x</p> <p>(x x) (x)</p> <p>(x x) (x x) <x> (x)</p> <p>Minne apo lis Mike</p> | |
- but:

This line of explanation requires the uncontroversial assumption that word-edge extrametricality is not lost when words are concatenated syntactically.

Hayes deals with this by maintaining that the shift of stress is caused by a rule that endeavors to place stresses at four-syllable intervals--"the Quadrisyllabic Rule". Shifting stress in the cases in (6) alters the interval between primary stresses from one to three syllables. In (7a), the interval shifts from two to four syllables. In (7b), however, the interval shifts from three to five syllables bringing it no closer to the desired interval of four syllables. In support of this approach, Hayes cites the following contrasts where rhythm is preferred in (9a), but less likely in (9b).

- (9)
- | | | |
|----|----------|-------------------------------|
| a. | Alabáma | Alabàma rélatives |
| | Européan | Europèan hístory |
| | Oklahóma | Oklahòma cóngressman |
| b. | Alabáma | ?Alabàma connéctions |
| | Européan | ?Europèan hístórian |
| | Oklahóma | ?Oklahòma congréssional dist. |

There are three problems with Hayes' proposal. First, there is an alternative analysis available for the dispreference of rhythm in the forms in (9b). These forms have all undergone initial destressing which would presumably leave a stranded 'x' which would interrupt the lower-level clash, which renders the forms in (9b) analogous to the forms in (7b).

- (10)
- | | |
|---|---|
| <p style="text-align: center;">x-----x</p> <p>(x x) (x)</p> <p>(x x) (x) <x> x (x) <x></p> <p>Ala ba ma connections</p> | <p style="text-align: center;">x-----x</p> <p>(x x) (x)</p> <p>(x x) (x x) <x> (x)</p> <p>Minne apo lis Mike</p> |
|---|---|

The second problem for Hayes is that there is a contrast in the following forms as well. Rhythm is also dispreferred in (11b).

- (11)
- | | | |
|----|-----------|--------------------------------|
| a. | Kàngaróo | Kángaròo Kím |
| | Tènnessée | Ténnessèe Tím |
| b. | Kàngaróo | ?Kángaròo connéctions |
| | Tènnessée | ?Ténnessèe congréssional dist. |

⁶Myers (1987) and Halle and Vergnaud (1987) maintain that the adjectival suffix *-ic* is an exception to extrametricality. This accounts for the fact that the preceding syllable attracts stress and undergoes Trisyllabic Laxing, e.g. *phone/phoníc*. If this were so, it would predict that adjectives with *-ic* should pattern like (7b). This does not seem to be the case. Phrases like *philòsòphíc Fréd* undergo rhythm readily. There are, however, other analysis of this phenomenon that do not require that *-ic* be an exception to extrametricality, e.g. Yip (1987). Yip proposes that the vowel of *-ic* is underlyingly absent and that shortening with *-ic* is an instance of closed syllable shortening.

By the Quadrisyllabic Rule, the shift of stress in (11b) should actually be preferred to the shift in (11a). In (11a), the shift alters the distance from one to three syllables. In (11b), the shift would alter the distance from two to four syllables, the optimal target by the Quadrisyllabic Rule.

Finally, the Quadrisyllabic Rule is to be avoided on theoretical grounds. It has generally been assumed that grammatical principles do not count past two. If there is a reasonable alternative, as has been shown above, the Quadrisyllabic Rule is to be eschewed.

Summarizing, extrametricality is subject to peripherality with respect to a stipulated domain. In addition, it exhibits three other properties. First, it can be blocked from applying to heavy syllables (English right-edge syllable extrametricality). Second, it can be lost to make a minimal foot (Latin). Third, extrametrical elements are invisible with respect to clash (English rhythm).

There is a paradox brewing here in terms of how extrametricality affects the representation. Extrametrical elements must be available for metrification to account for the Latin facts, but extrametrical elements are not available in the computation of what constitutes a clash environment. This problem disappears, however, if a different representation of extrametricality is adopted. Rather than marking it "positively" with angled brackets, assume that it is marked "negatively" by the absence of an 'x' on line 1 of the grid. A word like *Minnesota* is then represented as in (12).

(12)	Halle & Vergnaud:	<pre> x x (x x) (x) <x> Minne so ta </pre>	proposed here:	<pre> x x (x x) (x) x x x x Minne sota </pre>
------	-------------------	--	----------------	--

Such a representation provides an account for why extrametrical elements are visible for *Brevis Brevians*, but not visible for English rhythm. Rhythm depends on clash and clash depends on adjacency at two levels of the grid (Lieberman & Prince 1977). Extrametrical elements are not represented at a sufficiently high level of the grid to matter for the determination of clash. The new representation of *Mississippi Mabel* is given in (13).

(13)	<pre> x x-----x (x x) (x) (x) x x x x x x Mississippi Mabel </pre>
------	--

This new representation will be used in the following sections (except when discussing previous work).

Four languages are now considered: Cayuvava, Chugach, Winnebago, and Estonian. It is argued that each of these is more explanatorily treated in terms of foot-edge extrametricality.

3. Cayuvava

The relevance of Cayuvava to metrical theory was first noted by Levin (1988). The data are from Key (1961, 1967). Stress in Cayuvava falls on every third vowel counting from the right end of the word (Levin 1988; p.101-2).

(14)	<pre> a. dáru éne néA </pre>	<pre> 'hand' 'leaf' 'still' </pre>
------	---	------------------------------------

b.	sákahe ríbera óene úhia báau	'stomach' 'leg' 'capywara' 'you (sg.) go' 'Brazil nut'
c.	kihíBere takáasi soísoi	'I ran' 'old man' 'good spirits'
d.	arikájahi Bariékimi ariúuca	'he has already fallen' 'seed of squash' 'he came already'
e.	pópohecéBaka Bádacaóai ráibirínapu	'inside of cow' 'my younger brother' 'dampened manioc flour'
f.	aBáericákaA maráhahaéiki hiBújuruéine	'palate (Px)' 'their blankets' 'I burn it also again'
g.	ikitáparerépeha tiBiBíoaíine iepetiBiBóai	'the water is clean' 'she spank me again' 'they not spank me'
h.	caádiróboBurúruce (caadáirobóirohúine) (Bururuce) medárucecéirohúine	'ninety-nine' 'fifteen each'

The most direct way to accommodate these facts would be to build dactylic feet from right to left (Spring 1989). Dactyls are ternary feet where the head falls on the left.

(15)

		x		x
x x x x x x		(x x x)		(x x x)
popoheceBaka	->	popohe		ceBaka

This fails to account for forms with other than 3xn syllables. For example, this analysis would produce the following derivation for a word like *ikitáparerépeha*, incorrectly predicting initial stress.

(16)

		x		x		x
x x x x x x x x		(x x)		(x x x)		(x x x)
ikitaparerepeha	->	*íki		tápare		répeha

To deal with these, the dactylic analysis needs a special rule to remove nonmaximal feet (feet with less than three terminals) in words with more than one stress.

(17) Dactylic Destressing
Remove a nonmaximal foot in a word with more than one stress.

The derivation in (16) would then continue as in (18).

(18) x x x x x
 (x x) (x x x) (x x x) x x(x x x) (x x x)
 iki tapare repeha -> ikitapare repeha

Levin (1988) rejects this analysis. She proposes instead that the final syllable is extrametrical and that amphibrachs are constructed from right to left. Halle and Vergnaud (1987) adopt this analysis as well.

(19) x x x
 x x x x x x x x (x) (x x x) (x x x) <x>
 ikitaparerepeha -> *í kitápa rerépe ha

Again, a special rule is needed to remove degenerate feet (feet with only a single terminal) in words with more than one stress.⁷

(20) Amphibrachic Destressing
 Remove a degenerate foot in a word with more than one stress.

A problem for both analyses is the unnatural destressing rules (17) and (20) which do not remove clashes. Hammond (1984/1988) argues that all destressing rules remove clashes.

This problem for the dactylic and amphibrachic analyses of Cayuvava is solved if it is assumed that superficial dactylic feet are derived via foot-edge extrametricality. Cayuvava actually involves trochaic footing, but a stray syllable is licensed at the right edge of each foot.

(Extrametrical elements must be at the right periphery of a foot.) In (21), a sample derivation is given that can be compared with (16) and (19) above.

(21) x x
 (x x) (x x)
 x x x x x x x x x x x x
 popoheceBaka -> popoheceBaka

This approach to ternarity solves the destressing problem above. The destressing rule can now be treated as a straightforward rule of destressing under clash. An initial binary foot under the primitive dactyl analysis is an initial monosyllabic foot in a clash environment under the derived dactyl analysis presented here. A sample partial derivation is given in (22).

(22) x---x x
 (x) (x x) (x x)
 x x x x x x x x x x x x x x x x
 ikitaparerepeha -> ikitaparerepeha

Cayuvava is thus best analyzed in terms of trochaic feet plus extrametricality, where peripherality is relativized to the foot. This accounts for destressing in a natural way. While this analysis requires a weakening of the traditional Peripherality Condition, it is in conformity with the general principle that extrametrical elements, relativized or not, are invisible to operations sensitive to clash.⁸

Notice that if foot-edge extrametricality is assigned on the fly in Cayuvava, then relativized peripherality is not satisfied until the next foot to the left is constructed. This is a general property

⁷Levin proposes a special rule; Halle & Vergnaud propose their recoverability condition.

⁸Suggestive support for this analysis comes from the prosodic morphology of Cayuvava where there is support for a disyllabic foot. First, the minimal word is disyllabic. Second, Key (1967) cites instances of disyllabic reduplication, but no cases of trisyllabic reduplication have been found anywhere in the data.

of extrametricality, however, and not specific to this extension of peripherality. Compare the analyses of English adjectival suffixes (Hayes 1981) and the Yawelmani suffix *-xoo* (Archangeli 1984-1985). In both cases, extrametricality is in place early in the derivation, but peripherality is not checked until later in the derivation.

4. Chugach

Let us now consider the complex facts of Chugach, a dialect of Eskimo. The data are from Leer (1985). There are recent metrical descriptions by Rice (1988, 1990a), and Halle (1989). Word-initial closed syllables and all syllables containing long vowels count as heavy. In a word with all light syllables, stress falls on the second syllable from the left and every third syllable thereafter. Rice (1988) cites the following forms.

(23)	pa.lá.yaq	'rectangular skiff'
	qe.ná.wik	'hospital'
	qa.yá.kun	'by boat'
	a.tún.'ir.túq	'he stopped singing'
	ta.qú.ma.lu.ní	'apparently getting done'
	qa.ngá.te.ra.mék	'from a porcupine'
	a.kú.tar.tu.nír.tuq	'he stopped eating akutaq'
	sa.rá.ni.wa.kár.tuq	'he is too sleepy'

Heavy syllables interrupt this pattern in two ways. First, heavy syllables always receive stress. In (24) are examples of long vowels receiving stress; in (25) are some examples of initial closed syllables receiving stress. Noninitial closed syllables do not count as heavy. In the following examples, heavy syllables are underlined.

(24)	<u>taá</u> .ta.qá	'my father'
	<u>taá.taá</u>	'her father'
	mu.lúk.' <u>uút</u>	'milks' (noun plural)
	<u>naá</u> .'uq	'it's burning'
	<u>naá</u> .qu.ma.lú.ku	'apparently reading it'
	mu.lú. <u>kuút</u>	'if you take a long time'
	pa.lát. <u>kaáq</u>	'tent'
	pi.lú. <u>liá</u> .qa	'the fish pie I'm making'
(25)	<u>ú</u> l.'uq	'it flooded'
	<u>ú</u> l.luá	'its tongue'
	<u>án</u> .ci.quá	'I'll go out'
	<u>án</u> .ci.qu.kút	'we'll go out'
	íq.l <u>lu</u> .nir.túq	'he stopped lying'
	qá.y. <u>yaá</u> .kun	'by his boat'
	<u>úm</u> .yuár.te.qu.té.ka.qá	'I am thinking about it'

Second, a light syllable following a light syllable and preceding a heavy syllable receives stress. (The relevant syllables are marked with double underlining.)

(26)	<u>naá</u> .ma. <u>cí</u> .quá	'I will suffice'
	ág.ku. <u>tár</u> . <u>tuá</u> .nga	'I'm going to go'
	ág. <u>nguá</u> .qu. <u>tár</u> . <u>tuá</u> .nga	'I'm going to dance'

This pattern is accounted for directly on the analysis presented here. First, following Hayes (in progress), the fact that only word-initial closed syllables count as heavy is accounted for by

(36)	<pre> x x (x x) (x) x x x a.lí.+káa </pre>	<pre> x x (x) (x) x x x án.ci.+quá </pre>
	<pre> x x (x) (x x) x x x x án.ci.+qu.kút </pre>	<pre> x x (x x) (x x) x x x x a.kú.+ta.mék </pre>

Under previous approaches, ad hoc readjustment rules were required so as to alter the feet required for stress to produce appropriate foot structure for fortition. On the analysis presented here, no such machinery is required. The pattern of fortition is an automatic consequence of the feet constructed, the distribution of relativized extrametricality, and the independently required adjunction process.

Basic amphibrachic feet would fail on a number of fronts. Halle (1990) proposes an analysis of Chugach that includes amphibrachic feet and the following machinery. First, heavy syllables must be marked so that they occur at the left edge of a foot (a left square bracket). Second, heavy syllables must be treated as bipositional so that the head of the amphibrach falls on the heavy syllable (two asterisks at line 0). Finally, there is a special rule that readjusts foot boundaries to get fortition to work out correctly:

$$(37) \quad \text{line 0: } x x(x) \rightarrow x(x x)$$

A sample derivation is given below.

$$(38) \quad \begin{array}{cccc} & & x & x & & x & x \\ & & [xx & x & x & [xx & x) & (x) & & [xx) & (x & x) \\ \text{maa.ma.qa} & \rightarrow & \text{maa.ma.qa} & \rightarrow & \text{maa.ma.qa} & \rightarrow & \text{maa.ma.qa} \end{array}$$

This analysis is undesirable for a number of reasons. First, it requires a number of supplementary devices to get stress in the correct place. The derived ternarity analysis requires only adjunction (31), which is analogous to machinery independently required in Latin. The amphibrach analysis requires idiosyncratic boundaries and bipositionality, which are otherwise unnecessary. Halle cites Cairene Arabic, but as shown by Hayes (1987), no such device is necessary if moraic trochees are adopted. Moreover, enriching the theory by including bipositionality and idiosyncratic boundaries predicts that the two devices should be able to operate independently of each other, yet no cases of this sort occur. Including these two devices in the theory would also predict that they should be able to cooccur with the more orthodox accent rules of Halle and Vergnaud (1987). Again, they do not.

Second, the amphibrach analysis requires the rule (37) solely to get the fortition facts to work out. On the analysis presented here, the fortition facts follow automatically. Finally, the amphibrach analysis fails to account for the fundamental binary aspect of the Chugach system. The representation of heavy syllables is enriched because they must attract the heads of ternary constituents. Rule (37) is also required because the constituents are ternary. As argued above, with basic binary constituents, far less machinery is required.

Notice that Chugach makes the distribution of relativized extrametricality more symmetric in two respects. First, while relativized extrametricality in Cayuvava occurs at the right edge of a foot built from right to left, in Chugach, relativized extrametricality occurs at the right edge of a foot built from left to right. Foot-edge extrametricality does not correlate with the direction of iteration. Moreover, while the feet in Cayuvava are syllabic trochees, the feet in Chugach are iambs.

5. Winnebago

Winnebago (Hale and White Eagle 1980) provides an example of foot-edge extrametricality at the left edge of the foot. Main stress in Winnebago falls on the third syllable from the left. Secondary stresses fall on alternating syllables to the right of the primary stress.

- | | | |
|------|-----------------|-------------------------|
| (39) | wajé | 'dress' |
| | wjúk | 'cat' |
| | hochichínik | 'boy' |
| | hakirújikshàna | 'he pulls it taut' |
| | haakítujìk | 'I pull it taut'(plain) |
| | haakítujìkshanà | I pull it taut'(decl.) |

This system requires word-initial extrametricality and iterative iambic footing. A sample derivation of the analysis so far is given below.

- (40)
- | | | | | | |
|--|----------------|--------|----------------|-------|-----|
| | | | x x x | x x | |
| | x x x x | x x | x x x x | x x | |
| | hakirujikshana | -> | hakirujikshana | -> | |
| | | | x | x x | |
| | | | (x x) | (x x) | (x) |
| | | | x x x | x x | |
| | -> | hakiru | jiksha | na | |

Winnebago is also subject to a rule of destressing which removes the final degenerate foot in a stress clash.

Winnebago exhibits a process of epenthesis which has long posed a problem for metrical theorists. In fact, under the derived ternarity analysis to be presented here, the facts of epenthesis in Winnebago require nothing special. Rather, they confirm the analysis presented so far. The epenthesis rule breaks up obstruant-sonorant clusters by inserting a copy of the immediately following vowel. Halle and Vergnaud (1987; p.31) formalize the rule as in (41).

- (41) [-son] $\left[\begin{array}{l} -syl \\ +son \end{array} \right] V$
- | | | | | | | | |
|---|---|---|----|---|---|---|---|
| 1 | 2 | 3 | -> | 1 | 3 | 2 | 3 |
|---|---|---|----|---|---|---|---|

In the following forms, epenthetic vowels are underlined.

- | | | |
|------|----------------------------------|----------------------|
| (42) | hosh <u>aw</u> azhá | 'you are ill' |
| | harakísh <u>u</u> rujìkshànà | 'you pull taut' |
| | maashá <u>r</u> ach | 'you promise' |
| | wakìrip <u>á</u> ras | 'flat bug' |
| | hirakó <u>r</u> ohò | 'you dress, prepare' |
| | wakìrip <u>ó</u> rop <u>ò</u> ro | 'spherical bug' |

What is crucial here is the effect epenthesis has on metrical structure. Sometimes the epenthetic vowel behaves as if it were inserted before stress assignment, as in [hirakóroho], and sometimes it behaves as if it were inserted after stress assignment, as in [hoshawazhá]. This apparent paradox prompted Halle and Vergnaud to posit an otherwise unmotivated principle to account for these facts: the Domino Condition. The Domino Condition is global in that it requires the metrical structure of the entire string to be rebuilt under specified circumstances. In contrast, the analysis below relies only on independently required machinery.

Let us assume simply that epenthesis precedes stress assignment and that epenthetic vowels are marked as foot-extrametrical (i.e. subject to relativized peripherality).⁹ As such, they are invisible to footing and must ultimately occur at the (left) periphery of feet. If, in the course of footing, epenthetic vowels end up in the right place, nothing happens. If, on the other hand, an epenthetic vowel should end up in an illegitimate position, then extrametricality marking on the relevant syllable is not interpreted.¹⁰

Here are some sample derivations showing how this works. In (43), epenthesis applies inserting vowels marked as extrametrical. Next, initial extrametricality applies removing the first syllable from the domain of the scansion. Iambs are then built.

(43)

x x x	x x	x	x x x	x x	x
harakishrujukshna			-> harakishurujukshana ->		
			x	x	x
x x	x x	x	(x x)	(x x)	(x)
x x x	x x x	x x	x x x	x x x	x x
-> harakishurujukshana			-> harakishurujukshana		

Notice that unlike in Cayuvava, a relativized extrametrical syllable does not seem to be transparent for the determination of clash. To get this result without stipulating that extrametricality is only occasionally invisible, it is proposed that destressing is preceded by Left-Adjunction.

(44) Left-Adjunction

(x)	->	(x x)
x x		x x

Notice that (44) has no direct effect on the distribution of stresses. Additional support for (44) comes from a process of Right-Adjunction to be motivated below.

The derivation in (43) is then completed as follows.

(45)

x	x	x	x	x	x
(x x)	(x x)	(x)	(x x)	(x x)	(x x)
x x x	x x x	x x	x x x	x x x	x x
harakishurujukshana			-> harakishurujukshana		

The derivation in (46) shows that there must be an additional adjunction.

(46)

x x	x x	x x	x	x x								
x x	x x	x x x x x	x x x x x	x x x x x								
hirakroho		-> hirakoroho		-> hirakoroho ->								
<table style="border: none; margin-left: 40px;"> <tr> <td style="padding-right: 20px;">x</td> <td style="padding-right: 20px;">x</td> </tr> <tr> <td style="padding-right: 20px;">(x x)</td> <td style="padding-right: 20px;">(x x)</td> </tr> <tr> <td style="padding-right: 20px;">x x x x x</td> <td></td> </tr> <tr> <td colspan="2">-> *hirakoroho</td> </tr> </table>					x	x	(x x)	(x x)	x x x x x		-> *hirakoroho	
x	x											
(x x)	(x x)											
x x x x x												
-> *hirakoroho												

This is termed Right-Adjunction and precedes Left-Adjunction (44).

⁹This idea can be implemented by assuming that the rule responsible for epenthetic vowels inserts vowels specifically marked as extrametrical or that epenthesis is followed by a rule marking empty morae as foot-edge extrametrical.

¹⁰Cf. the interpretation of extrametricality in Yawelmani (Archangeli, 1984-1985).

(47) Right-Adjunction

$$\begin{array}{ccc} (x) & \rightarrow & (x\ x) \\ x\ x & & x\ x \end{array}$$

Since feet are right-headed, (47) does shift stress to the right.

Derivation (48) shows a complex case involving multiple instances of Right-Adjunction and destressing in clash.

(48)

$$\begin{array}{ccccccc} & & x & x & x & x & & & x & x & x \\ x & x & x & x & & & & & x & x & x & x & x & x \\ \text{wakrip} & \text{pro} & \rightarrow & \text{wakirip} & \text{oporoporo} & \rightarrow & \text{wakirip} & \text{oporoporo} & \rightarrow & & & & & \\ & & x & x & x & & & & x & x & x \\ & & (x) & (x) & (x) & & & & (x\ x) & (x\ x) & (x) \\ x & x & x & x & x & x & x & & x & x & x & x & x \\ \rightarrow & \text{wakirip} & \text{oporoporo} & \rightarrow & \text{wakiripo} & \text{ropo} & \text{ro} & \rightarrow & & & & & & \\ & & x & & x & & & & & & & & & \\ & & (x\ x) & (x\ x) & x & & & & & & & & & \\ x & x & x & x & x & x & x & & & & & & & \\ \rightarrow & \text{wakiripo} & \text{roporo} & & & & & & & & & & & \end{array}$$

This analysis needs no new mechanisms. It requires only that extrametricality be marked before footing. Left-Adjunction and Right-Adjunction are of a form that has been seen in the analyses of Latin and Chugach already. In contrast to Halle and Vergnaud's analysis, no global reapplication of footing must take place halfway through the derivation.

Halle and Vergnaud formalize the Domino Condition as follows.

(49) Domino Condition
 The introduction of an additional position inside a bounded constituent destroys that constituent and all constituents to its right if the Constituent Construction rule applied from left to right, and all constituents to its left if the Constituent Construction rule applied from right to left. Constituent structure is reimposed on the affected substring by a subsequent reapplication of the Constituent Construction rule.

This produces derivations as follows. Derivation (50) shows what happens when epenthesis does not intrude in a foot.

(50)

$$\begin{array}{ccccccc} & & & & x & & x \\ x & x & x & <x> & (x\ x) & <x> & x(x\ x) \\ \text{hoshwazha} & \rightarrow & \text{hoshwazha} & \rightarrow & \text{hoshawazha} & & \end{array}$$

Derivation (51) shows what happens when epenthesis does intrude in a foot.

(51)

$$\begin{array}{ccccccc} & & & & x & & x \\ x & x & x & <x> & (x\ x) & <x> & x(x\ x\ x) \\ \text{wakripras} & \rightarrow & \text{wakripras} & \rightarrow & \text{wakiriparas} & \rightarrow & \\ & & & & x & x & & & x \\ <x> & x(x\ x\ x) & <x> & x(x\ x)(x) & <x> & x(x\ x)x \\ \rightarrow & \text{wakiriparas} & \rightarrow & \text{wakiriparas} & \rightarrow & \text{wakiriparas} & \end{array}$$

There are two problems with this analysis. First, it is devastatingly global. Intrusion into a foot entails the destruction of that foot and all feet to the right. In addition, feet must be subsequently reassigned.¹¹

A second problem with the Domino Condition is that it is empirically inadequate. Miner (1990) cites data showing that epenthesis applies in initial syllables as well. This epenthesis does not interrupt a foot, but must apparently trigger the Domino Condition.

(52)	shawazhókji	'you mash hard'
	kerejúsep	'Black Hawk'
	paragúchge	'in formation'
	xorojike	'hollow'

A sample derivation showing how the Domino Condition fails is given in (53).

(53)	x x	
	<x> (x x) x x (x x)	
	shwazhokji -> *shawazhokjí	

Under the analysis presented here, these cases are straightforward. The epenthetic vowel is inserted and marked as extrametrical. Word-edge extrametricality applies vacuously (since the leftmost syllable is already extrametrical), feet are built, and adjunction is inapplicable.

(54)		x x
		(x x) (x)
	x x x x x x x x x x x	
	shwazhokji -> shawazhokji -> shawazhokji	

Thus the analysis in terms of derived ternarity is preferred to the analysis incorporating the Domino Condition.

6. Estonian

Finally, consider stress in Estonian. Estonian further instantiates the system of derived ternarity developed here. The analysis to be presented here basically recasts the analysis of Prince (1980) into the terms of this framework. Main stress falls on the first syllable of the word. Secondary stresses fall on every second or third syllable thereafter. Prince (1980; p. 518) cites the following data.

¹¹Rice (1990b) proposes an analysis in which the Domino Condition is argued to follow from other principles. This analysis too is subject to the same objection of globality, however.

- (55) a. kinnast 'glove' part. sg.
pálatt 'piece' part. sg.
pímestav 'blinding'
kávalátt 'cunning' part. sg.
páhemáit 'worse' part. sg.
rételíle 'ladder' all. sg.
pímestávale-pímestavále
'blinding' ill. sg.
pímestávasse-pímestavásse
'blinding' ill. sg.
hílisémattéle-hílisemáttele
'later' all. pl.
- b. áa:s:tátt 'year' part. sg.
káu:kéle-káu:kele 'far away'
júl:kése 'bold' ill. sg.
jál:kétest-jál:ketést 'track' el. pl.
tóö:s:tústesse-tóö:s:tustésse
'industry' ill. pl.
téo:t:táttuttéltt 'supporter' abl. pl.

The stress pattern of Estonian is intimately tied up with quantity. There are three degrees of quantity in Estonian: Q1, Q2, and Q3. Prince schematizes them as follows.

(56)	Q1	Q2	Q3
	CV	CVV	CVV:
		CVVC	CVV:C:
		CVC	CVC:

If word-final consonants are extrametrical, the distribution of stress with respect to quantity can be characterized as follows. Column (57a) shows the distribution of quantity when stresses fall three syllables apart. ('X' stands for a syllable of any weight.) Notice how while the first two syllables can be either Q1 or Q2, the third syllable must be Q1. Column (57b) shows what happens when the two stresses are two syllables apart. Here there are basically two cases. The first four possibilities are a mirror of the first four possibilities of (57a) for the first two syllables. The last two cases involve Q3 on the first syllable and Q1 or Q2 on the second. Column (57c) only gives one possibility with Q3.

(57)

a.	b.	c.
x x	x x	x x
x x x x	x x x	x x
Q1 Q1 Q1 X	Q1 Q1 X	Q3 X
Q2 Q1 Q1 X	Q2 Q1 X	
Q1 Q2 Q1 X	Q1 Q2 X	
Q2 Q2 Q1 X	Q2 Q2 X	
	Q3 Q1 X	
	Q3 Q2 X	

This analysis is conceptually close to Prince's, but is cast in terms of the theory developed here. Word-final consonants are extrametrical. Left-headed binary feet are built from left to right. That stress recurs on every second or third syllable is captured by allowing any foot to be either a syllabic or moraic trochee. A light syllable is optionally licensed as extrametrical at the right edge of the foot. Q3 results in a nonfinal degenerate foot. Some sample derivations are given below.

- (58) a.
- | | | | |
|-------|---------|-----|---------|
| | | x | |
| | | x x | (x x) |
| | | x x | x x |
| Q2 Q2 | kinnast | -> | kínnast |
- b.
- | | | | |
|-------|---------|-----|----------------------|
| | | | x x |
| | | x x | (x) (x) |
| | | x x | x x |
| Q2 Q2 | aastatt | -> | aastatt -> áa:s:tátt |
- c.
- | | | | |
|----------|----------|-------|-----------|
| | | | x |
| | | x x x | (x x) |
| | | x x x | x x x |
| Q1 Q1 Q1 | pimestav | -> | pí mestav |
- d.
- | | | | |
|----------|---------|-------|---------------------|
| | | | x x |
| | | x x x | (x) (x x) |
| | | x x x | x x x |
| Q2 Q1 Q1 | kaukele | -> | kaukele -> káu:kéle |
- e.
- | | | | |
|----------------|--------------|-----------|---------------|
| | | | x x |
| | | x x x x x | (x x) (x x) |
| | | x x x x x | x x x x x |
| Q1 Q2 Q1 Q2 Q1 | pimestavasse | -> | pí mestávasse |
- f.
- | | | | |
|----------------|--------------|-----------|---------------|
| | | | x x |
| | | x x x x x | (x x) (x x) |
| | | x x x x x | x x x x x |
| Q1 Q2 Q1 Q2 Q1 | pimestavasse | -> | pí mestávasse |

There is an additional glitch involving heavy syllables after Q3 medially. In contrast to the normal case, a heavy Q2 syllable can occur after a Q3 syllable if it is medial.

(59)	töö:s <u>tustésse</u>	'industry' ill. pl.
	áu:s <u>attéle</u>	'honest' all. pl.
	vát: <u>mett</u> éka	'key' com. pl.
	töö:k: <u>kailéki</u>	'hardworking' all. pl.

This can be accounted for if it is assumed that Q3 can optionally be assigned in a medial binary foot.

(60) $x \rightarrow Q3 / _ x$

Estonian provides an argument for the system proposed here because the restrictions on the relativized extrametrical syllable are different from the restrictions on the weak position in the trochaic foot (57). If Estonian were analyzed with a dactylic or amphibrachic foot, this fact would be much more difficult to account for. If the foot imposed no requirements on the weight of the first two syllables, then it should impose no requirements on the weight of the third syllable. This is not true as is apparent from (57a).

7. Summary

To summarize, analyses of four systems exhibiting superficial ternary iteration have been presented: Cayuvava, Chugach, Winnebago, and Estonian. All four of these were shown to be more perspicuously analyzed in terms of foot-edge extrametricality.

A theory of extrametricality emerges which includes the following criterial properties. First, extrametricality can occur at the edge of a word-medial foot. Second, extrametrical elements are invisible to rhythm and destressing rules. Third, extrametricality may be lost to augment feet.

8. Appendix: Weak Local Parsing

Hayes (in progress) develops a system that is similar in some senses to the system proposed here. He suggests that languages can stipulate whether iteratively constructed feet are adjacent or are separated by a greater distance. These options are Local Parsing and Weak Local Parsing. For a language like Cayuvava, syllabic trochees would be constructed weak-locally.

(61)

		x	x	x
x	x	x	x	x
x	x	(x)	x	(x x)
x	x	x	(x	x)
x	x	x	x	x

ikitaparerepeha -> *íkitáparerépeha

Notice that this allows a straightforward treatment of the destressing problem in Cayuvava.

While it is difficult to consider in detail work that it is still in progress, it is perhaps appropriate to indicate how the approach presented here differs from the Weak Local Parsing idea.

First, relativized extrametricality, as argued by Rubach and Booij (1990), is independently required to treat syllabification. Weak Local Parsing is not independently required.

Second, relativized extrametricality can appear at either end of a foot. For example, in Cayuvava and Winnebago, the extrametrical syllable appears closer to the origin of iteration, while in Chugach and Estonian, the extrametrical syllable appears on the far side of the foot from the origin of iteration. The latter is not a possibility for Weak Local Parsing.

Third, Weak Local Parsing is a property of the scansion, not a property of syllables. Hence the analysis of Winnebago presented here would not be possible because relativized extrametricality is marked on syllables before the scansion.

Thus, it appears that relativized extrametricality is distinct from Weak Local Parsing and superior to it in explanatory and descriptive terms.

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"PRO Analysis" for Subject-Oriented Secondary Predicates*

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0. Introduction

The central aim of this paper is to argue that subject-oriented (depictive) secondary predicates¹ such as those in the sentences in (1) have PRO as their subjects, contrary to the prevailing "non-PRO analyses" in recent literature (Williams 1980, Rothstein 1983, Chomsky 1986, McNulty 1988, Roberts 1988, Nakajima 1991, Koizumi 1992, and others), which do not consider the predicate phrase to be constituted as a Small Clause².

- (1) a. John married *young*.
b. John left the hospital *healthy*.
c. They left the medical school *doctors*.

In this paper, I will endeavor to show both empirical and theoretical reasons that we should adopt a "PRO analysis." The governing idea is that the relationship between the matrix subject NPs and their predicates is not theta-marking, but control.

Regarding the structure of the predicate phrase (Small Clause), I will present the possibility that the predicate phrase is AgrP, based on the phenomenon of agreement in English and Spanish. I will also deal with the inevitable question of how PRO is licensed.

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¹In this paper, we will deal only with the subject-oriented (depictive) secondary predicates. The term "secondary predicate" stems from its adjuncthood. The italicized predicates below are adjuncts that are not selected by any head.

- i) subject-oriented depictive
a) John left *angry*.
b) They left the medical school *doctors*.
ii) object-oriented depictive
a) John ate the meat *rare*.

²To the best of my knowledge, there is little literature on a PRO-analysis for the Small Clause (Chomsky 1981, Stowell 1981, and Hornstein and Lightfoot 1987, etc.), and only a small part of that literature focuses on secondary predicates. Hoshi (1992) is one of the exceptions.

The paper is organized as follows. Section 1 provides a brief review of previous studies based on theta-role assignment, with special emphasis on McNulty (1988). In section 2, I will first present the data and will then show that these data cannot be accounted for by a theta-marking analysis. Also I will present major reasons to choose a PRO analysis over theta-marking analysis in the light of the VP-Internal Hypothesis. In section 3, I will consider what structure should be given to the predicate phrase (Small Clause) under my analysis. I will also try to delineate a mechanism of licensing PRO within Chomsky's (1992) framework. I use negation data in both English and Spanish to support and develop my hypothesis. In the final section, the remaining problems with the predicate NP will be discussed.

1. Theta-marking Analysis — McNulty 1988

According to McNulty (1988), "predicate of" is understood to mean "theta-role assignment by an XP". That is, "B is predicated of A" is understood as B assigns a theta role to A, where B=XP. Consider the sentence in (2).

(2) John left angry.

Since the predicate *left* assigns a theta-role to *John*, *left* is a predicate of *John*. This relationship is called primary predication and *left* is the primary predicate. By contrast, *angry* in (2) is termed the secondary predicate because (2) would be a grammatical string even if the AP (*angry*) were eliminated. This is not the case with, for instance, VP, a primary predicate.

McNulty applies the above type of theta-role assignment requirement to secondary predication as well. In her theory, the AP *angry* is required to assign theta-role to *John* to establish a predication relationship.

McNulty elaborates her theta-marking analysis and proposes the following condition governing the distribution of secondary predicates.

(3) Locality Condition on XP Theta Role Assignment (LCXP)

A assigns a theta-role to B iff A mutually m-commands B and there is no Z such that Z mutually m-commands A, where A, Z = theta-assigning XP

(McNulty 1988)

Notice that in McNulty's framework the maximal projection XP assigns a theta-role to its subject. The AP *angry* can assign the theta-role to *John* with no violation of her LCXP³. (see

³As we will see in 2.2.1., McNulty (1988) assumes that the subject-secondary predicate is adjoined to the VP node. Consider the configuration she gives in McNulty (1988). Since she accepts Theta-Criterion (Chomsky 1986a) (and does not adopt the VP-Internal Hypothesis), the AP *angry* meets LCXP. Also notice that she has to take the definition of "m-command" in (ii) below to meet her LCXP, following the basic idea of May (1985) and Chomsky (1986b).

McNulty 1988 for more details.) If we were to consider the theta-assigner to be X^0 (or X'), the mutual m-command relations between the predicate and the subject would break down under the configuration McNulty assumes (See note 3), and LCXP might become a meaningless condition. We will also refer to this problem in 2.2.1.

2. Arguments for PRO analysis

2.1. Data

In this section we will look at sentences that cannot be explained by a theta-marking analysis.

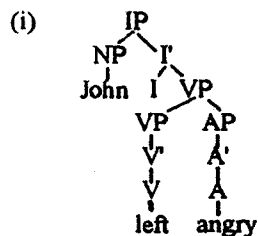
2.1.1. Raising Adjectives

It is striking that raising adjectives such as *likely* or *certain (sure)* can occur as secondary predicates. According to my consultants, the following sentences are perfectly normal as regular predicates, with no commas before the predicates. Consider the following sentences;

- (4) John left the room likely to find his mother.
 (5) John left the room certain/sure to win a race.

As we have seen in section 1, theta-marking analyses assume that the whole sentences in (4) and (5) constitute one unit. Thus, *likely* is required to assign a theta-role to *John* in (4) and *certain/sure* is required to assign a theta-role to *John* in (5). However, these raising adjectives are one-place predicates which take a clausal complement. The subject position is not assigned a theta role. *John* has no thematic relation with the adjective *likely* in (4) and with *certain (sure)* in (5). This means that such raising adjectives cannot assign any external theta-roles; *John* cannot be theta-marked by *likely* in (4) or by *certain (sure)* in (5). Theta-marking analyses cannot provide any explanation for the above data.

The issue we have to consider is whether adjuncts have a PRO subject or not. The data I raise here is one of the strongest pieces of evidence that this type of secondary predicate actually has a subject position, as is discussed below. We have to assume that the above sentences have the structures shown in (6) and (7), that is, the PRO subject is generated as an argument of *find* in



(ii) M-command

A m-commands B iff no segment of A dominates B and no segment of B dominates A and every G (=maximal projection) that dominates A dominates B.

(6), and that it is generated as an argument of *win* in (7). In (6) and (7), PRO has no thematic relation with the adjectives *likely* and *certain (sure)*, respectively, but it certainly occupies the subject position of the infinitival complement.

(6) John left the room [likely PRO to find his mother].

(7) John left the room [certain/sure PRO to win a race].

I claim that PRO in the above sentences is controlled by the matrix subject *John*.

2.1.2. *Implicit Argument*

Roeper (1987) raises the examples below as grammatical sentences;⁴

(8) The game was played drunk/nude/sober/angry.

This kind of sentence is problematic for a theta-marking analysis, because the predicates (*drunk, nude, sober, angry*) do not assign a theta-role to the non-agentive subject (*the game*). Therefore, an explanation based on a theta-marking analysis does not work here. Notice that the following sentence is impossible.

(9) *The game was drunk/nude/sober/angry.

Roeper uses the example in (8) to show that predicate adjectives allow control by "implicit agents." This is similar to the arguments that Manzini (1983) referred to as "phonologically null agents." Roeper's assumption is that predicate adjectives, adverbial participial clauses, and rationale clauses all share a common property: a PRO subject. His examples are as follows;

(10) a. <the predicate adjective>

The game was played [PRO drunk].

b. <the adverbial participial clause>

The game was played [PRO wearing no shoes].

c. <the rationale clause>

The boat was sunk [PRO to collect the insurance].

Roeper (1987) argues that PRO (including "PRO-*arb*"⁵) can be controlled by implicit arguments⁶. However, he does not delve into clarifying the structure of secondary predicate constructions.

⁴Some of my consultants state that the present tense is more comfortable, as in the following examples.

(i) The game is played drunk/nude/sober.

cf. (ii) The game is played wearing no shoes.

⁵PRO that has an arbitrary reference is often called "PRO-*arb*" in the literature.

⁶Implicit arguments have been much discussed in recent literature (e.g., Jaeggli 1986, Safir 1987, Williams 1987, Baker, Johnson and Roberts 1989).

What I would like to point out in this section is that in order to explain the sentences in (8) we have to posit that secondary predicates have PRO as their subject.

2.1.3. Parallelism with Adverbial Participial Construction

Unlike 2.1.1. and 2.1.2, this subsection will not provide new, direct evidence for a PRO analysis. Rather, it serves to support the discussions in 2.1.1. and 2.1.2.

Let us consider what categories are allowed as secondary predicates. We will deal with this question in section 4. However, I will point out here that verbs cannot occur in bare infinitival form as secondary predicates. Consider the following sentences.

- (11) *The boy came *run* out of the house.
- (12) *Father sat *read* the newspaper.
- (13) *They stood *look* at the exciting game.

If the italicized verbs are replaced with their participial (V-ing) forms, the sentences become grammatical as in (14)-(16).

- (14) The boy came *running* out of the house.
- (15) Father sat *reading* the newspaper.
- (16) They stood *looking* at the exciting game.

This construction has not been discussed in detail in generative grammar to date⁷. At present we must say that it is not clear what explanation should be given to the construction. However, it would be possible that this construction is also regarded as a VP secondary predicate, because X'-theory predicts that all categories can occur as secondary predicates, as long as an independent principle does not block it. The V-ing form in (14)-(16) is not NP but VP, as is clear from the following data.

- (17) *The boy came the running out of the house.
- (18) a. *Father sat the reading the newspaper.
b. *Father sat the reading of the newspaper.
- (19) *They stood the looking at the exciting game.

I propose that the adverbial participial clause is a Small Clause having the structure, roughly, [PRO [VP]]. If this is the case, my secondary-predicate analysis can explain Roeper's example (10b). If one claims that the participle in question is a kind of secondary predicate, we can view the examples below as raising/unaccusative-verb secondary predicates. As is well known, raising/unaccusative-verbs have only one theta-role to assign, namely, an internal-theta role. The raising predicate *seeming* cannot assign an 'external' theta-role to *John* in (20) and neither can the unaccusative *arriving* in (21). Theta-marking analyses break down when it comes to this type of sentences, as they do with the examples given in 2.1.1.

⁷Williams (1975) is one of the exceptions. He refers to the participial clause as Small Clause, which is smaller than the "that" clause or the infinitival clause in that it does not include a S' node.

(20) John left the room seeming to be sick.

(21) John felt embarrassed arriving late.

Of course, we have to consider why this VP must be a V-ing form, and why it does not work as a bare V-infinitival form or other inflected form (e.g., PAST-form). And we have to delineate the exact structure of the Small Clause.

2.2. *VP-Internal Hypothesis and Theta-Role Assignment Capability*

In this section, I will discuss the VP-Internal Hypothesis and theta-role assignment. The VP-Internal Hypothesis (supported by Kitagawa (1986), Koopman and Sportiche (1988), Kuroda (1988), and others) proposes that subjects are base-generated VP-internally — namely, within the VP-node⁸. I will show that a PRO analysis for secondary predicates is compatible with the VP-Internal Hypothesis, while a theta-marking analysis is not. If one theory is compatible with a VP-Internal Hypothesis and another theory is not, then the compatible theory would definitely be preferred theory.

Taking this step further, if a PRO analysis is proved to be valid for secondary predicates, then this will support the VP-Internal Hypothesis. (The empirical data discussed above make a strong case for the advantages of a PRO analysis.) Once the VP-Internal Hypothesis is adopted, it seems clear that a PRO analysis must also be adopted. Many of the theta-marking analyses have incorporated the VP-Internal Hypothesis. However, these attempts are vulnerable in terms of category neutrality and theta-role assignment capability.

Let us begin by discussing whether theta-assignment can be done properly in a theta-marking analysis. A theta-marking analysis ought to show that the Theta-Criterion is met between the predicates and their subject (the matrix subject) because, under this view, the whole sentence is considered to be one unit. It proves useful to examine theta-assignment under both a theta-marking analysis and a PRO analysis.

2.2.1. *Theta-Criterion*

As is well known, Chomsky's Theta-Criterion actually has two versions. Let us discuss the earlier version first.

(22) Theta-Criterion

Each argument bears one and only one theta-role, and each theta-role is assigned to one and only one argument.

(Chomsky 1981, 36)

The Theta-Criterion of this version rules out the sentence in (2), as long as secondary predication is considered to be licensed by theta-marking. I will repeat (2) here as (23).

⁸The VP-Internal Hypothesis successfully explains various properties of languages, such as the behavior of floating quantifiers and word-order parameters. (See Koopman and Sportiche (1988).)

(23) John left angry.

By definition, *angry* assigns the theta-role to *John*, and *left* also assigns the agent theta-role to *John*. As a result, *John* receives two theta-roles in this sentence. This is clearly a Theta-Criterion violation, and there is no way to avoid it, unless we either consider a very different mechanism from theta-marking to establish the predication relationship (as in Williams 1980), or posit that the secondary predicate *angry* assigns the theta-role to PRO, which the matrix subject *John* controls.

Now we will consider the later version of Theta-Criterion, a weaker version than (22).

(24) Theta-Criterion

Each argument α appears in a chain containing a unique visible theta-position P,
and each theta-position P is visible in a chain containing a unique argument α

(Chomsky 1986a, 97)

Notice that (24) allows an argument to receive more than one theta-role. This formulation requires that every chain contain one and only one argument and one and only one theta-marked position.

If we adopt the (1986a) version of the Theta-Criterion and do not take the VP-Internal Hypothesis, then the following sentence can be ruled grammatical.

(25) John left the room angry.

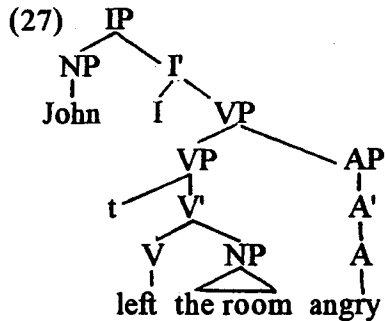
John is a single member chain. *John* can be assigned two theta-roles — one by *left* and one by *angry* — with no violation at all, because the chain contains only one argument and only one theta-marked position. The sentence in (25) clearly satisfies the Theta-Criterion (1986a). Whether or not this is a clever solution will not be discussed here. In either case, the problem is resolved.

If we take the VP-Internal Hypothesis (and consider it to be category-specific only for the sake of this discussion), complicated problems may arise.

(26) [John_i [_{VP} t_i [_{VP} [_V left the room]] [_{AP} angry]]]

In (26), *left* theta-marks *t* with no problems, and *angry* must theta-mark *t* to establish secondary predication. The chain (John, *t*) contains one theta-marked position: the position of *t*.

If this theta-assignment were done properly, there would be no problems. If we take McNulty's LCXP, and assume that AP is the theta-assigner, we see that AP *angry* can assign the theta-role to *t* in her framework, because the AP *angry* mutually m-commands *t*. McNulty assumes that *angry* is adjoined to the VP. The structure in question is as follows:



However, under the VP-Internal Hypothesis, if we consider A^0 (or A') (*angry*) to be a theta-assigner to t , then *angry* cannot theta-mark t because the A^0 *angry* does not mutually m-command t .

A PRO analysis does not face these problems under either version of the Theta-Criterion. This is another strong argument for a PRO analysis. And most importantly, if we adopt the VP-Internal Hypothesis, it becomes essential that we also adopt a PRO analysis, as I will explain in the next subsection. The VP-Internal Hypothesis and a theta-marking analysis have been used together in the literature (e.g., Hasegawa 1991), but this combination seems problematic. In the next subsection, I will explain in detail why the VP-Internal Hypothesis requires a PRO analysis, and how a PRO analysis supports the VP-Internal Hypothesis.

2.2.2. Category Neutrality

Stowell (1981, 1983) argues for structural uniformity across categories in terms of the "X'-theory," which was originally proposed in Chomsky (1970) and later elaborated upon in Chomsky (1981). Stowell proposes that all major syntactic categories contain a structural subject position, conforming to a general pattern determined by principles of X'- theory.

In the VP-Internal Hypothesis theta-role assignment of both the subject and the object is done uniformly within the V-projection. Committing the specifier of the VP guarantees the null hypothesis that all categories have their own specifier positions. It follows that the verb assigns the 'external' theta-role to the subject in [Spec VP], and that the adjective assigns the 'external' theta-role to the subject in [Spec AP].

That is, an adjective assigns the theta-role AP-internally within this hypothesis. More generally, all theta-marking by X is done within the projection of X. The VP-Internal Hypothesis is not category-specific but category-neutral.

Consider the following sentence. I will repeat (26) here as (28).

(28) [John_i [_{VP} t_i [_{VP} [_V left the room]] [_{AP} angry]]]

In (28) *angry* cannot assign the theta-role to *John* (or its trace), which is outside the AP. Instead *angry* must assign the theta-role to the Spec of AP. This is only compatible with a PRO analysis. This idea is fully compatible with Chomsky's recent framework⁹ (e.g., Chomsky 1992),

⁹Chomsky and Lasnik (1991) adopt the VP-Internal Hypothesis. According to their assumption, in a sentence such as "John met Bill.", *John* is considered to be generated in [SPEC, VP], and raises to [SPEC, IP] to receive

because, informally speaking, the subjects are too far away from A (A-projection) (A^0 , A' , AP) to be theta-marked, as long as we subscribe to the notion of highly-differentiated functional categories, such as Agr_sP , TP, and Agr_oP . The category neutrality of the VP-Internal Hypothesis is a strong argument for PRO analysis. And PRO analysis for secondary predicates can be a contribution to establish VP-Internal hypothesis:

3. The Predicate Phrase as AgrP

We now turn to two related questions. First, what is the exact internal structure of these predicates? And what licenses PRO?

3.1. Why AgrP?

In this section, I will argue that the predicate phrase (Small Clause) is AgrP.

The empirical evidence for this proposal is that the predicate must agree with the PRO, which is controlled by the matrix subject. Consider the following sentences. (29) is from Spanish, and (30) is from English.

(29) Thomas y Pedro se fueron [PRO enfadados]

Tom and Peter left angry
(+plural, +masculine)

(30) They left the medical school [PRO doctors/*a doctor].

In (29) the matrix subject, *Thomas y Pedro*, is [+plural, +masculine] and the secondary predicate adjective, *enfadados*, is also [+plural, +masculine]. The agreement is fully realized morphologically. English does not have such a rich inflectional system. However, (30) shows that even in English the secondary predicate noun agrees with the matrix subject in number.

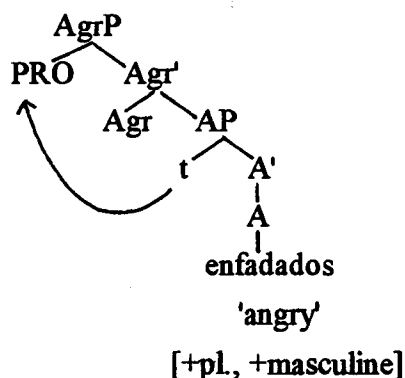
These facts tell us that the predicate has to get agreement within its clause. This means we have to assume that the predicate clause includes an agreement mechanism within itself. Although Small Clauses have been broadly analyzed as a [-Tense], the possibility that they are [+Agr] has been explored in the literature¹⁰.

For the present purpose, I will tentatively propose the following internal structure for the secondary predicate phrase. The tree in (31) is for (29).

Case and produce a visible chain.

¹⁰Belletti (1990) analyzes Small Clauses as AgrP based on Italian data.

(31) [PRO enfadados]



PRO is base-generated in Spec AP in (31). The Spec AP is the subject position of the Small Clause. This is derived from the VP-Internal hypothesis. The next step is that PRO moves to Spec AgrP. The question that arises is why PRO can't stay in its base-generated position. If PRO moves to Spec AgrP, is PRO properly licensed in this configuration? This question will be dealt with in detail in the next subsection.

Notice that the movement of PRO also triggers subject-predicate agreement. The predicates (*enfadados* in (31)) must get agreement in the given structure. We have to consider the mechanism of this agreement. I propose that, (presumably) at LF, the predicates (e.g., the A in (31)) raise to Agr solely for agreement, not for Case or other requirements. (However, I will not go into the further discussion at present.)

3.2. How is PRO Licensed?

3.2.1. The Ungovernment Requirement

In Chomsky's (1981) theory, the PRO theorem requires that PRO be ungoverned. In D-structure, *enfadados* governs PRO in (31). So we are forced to conclude that PRO moves to an ungoverned higher position, namely, the Spec position of the (closest) XP (maximal projection phrase) distinct from its own projection. In the case of secondary predicates, we must consider the XP to be the AgrP, as was proposed in section 3.1. Thus, PRO is motivated to move to Spec AgrP in order to be ungoverned. However, a problem arises. The head Agr is generally taken to be a governor for PRO; PRO is governed by Agr in this movement. In Chomsky's (1981) theory, there must be a non-governing head. This requirement is hard to meet in the configurations I proposed.

Also, in the Pre-Minimalist theory, we have to consider the possibility that PRO is governed from outside of the Small Clause (AgrP). Since the Small Clause in question is an adjunct, it may be an island. In fact, by the definition of Cinque (1990, 42)¹¹, AgrP is a barrier that prevents PRO from being governed from outside.

¹¹Cinque defines a barrier for government as follows:

Every maximal projection that fails to be directly selected by a category nondistinct from [+V] is a barrier for government.

In the Pre-Minimalist theory, the XP does not have to be AgrP for PRO to evade government. There is no restriction that states the XP should be a functional category, because the only condition for XP is that it be a barrier for the predicate (*enfadados* in (29) and *doctors* in (30)). However, in Chomsky's (1992) framework, PRO must be Case-checked via a head-Spec relation, and only a functional category can be a Case Checker. As a consequence, XP must be a functional category. In this respect, the argument in Minimalist theory is more constrained and restrictive, and, as a result, stronger than that in Pre-Minimalist theory.

For this reason, we do not further explore the "pre-Minimalist PRO licensing mechanism."

3.2.2. *The Case-Checking Requirement*

In this section, we consider how PRO is licensed — that is, how PRO is Case-checked — following Chomsky's recent works.

Chomsky and Lasnik (1991) claim that PRO has Case like other arguments, observing that PRO is forced to move from a non-Case position to a position where its Case can be checked. However, they assert, the Case that PRO bears is different from the familiar ones like nominative Case, accusative Case, etc. They regard PRO as a "minimal" NP argument, lacking independent phonetic, referential or other properties. Their proposal is that PRO has a minimal Case called "null Case," and is checked via a head-Spec relation. In their framework, nominative Case is checked by INFL, the head of IP, where I involves the features of tense and agreement, while null Case is checked by the minimal "INFL," where I lacks tense and agreement features. They assume that null Case is checked by the infinitival element (with null agreement) and the head ING of gerundive nominals, since PRO typically appears in such constructions as:

- (32) a. PRO to VP (to be sick)
- b. PRO ING VP (being sick)

However, even if this is the case, there is no independent reason to assume that only *to* and ING can be null Case Checkers. In the next subsection, I will explore the possibility that another functional head can Case-Check PRO under the Spec-head configuration.

3.2.3. *Proposal — Agr as a Null Case Checker*

As we have discussed in 3.1, PRO is generated in Spec AP in (31). This position is the subject position. Then PRO moves to Spec AgrP in order to be Case-Checked. For PRO to be licensed, this movement is obligatory.

Now we can say that the null Case Checker is the head Agr. Notice that Agr is the only possible Case-Checker within the predicate phrase. According to Chomsky (1992), only the functional category can check Case. As shown in (31), Agr meets the Case-Checking condition from the viewpoint of syntactic configuration. It would be desirable to analyze the predicate phrase as AgrP, since this would provide a way for PRO to do its Case-Checking without stipulation.

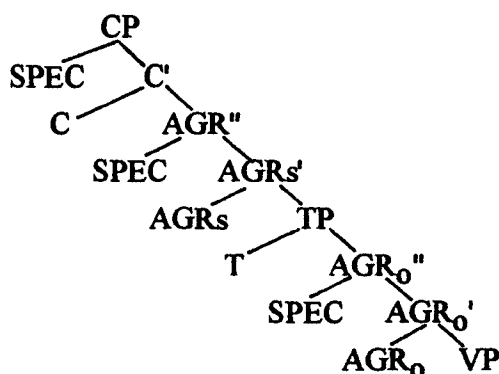
3.2.4. *Is a TP Node needed?*

As is well known, the Small Clause has no overt Tense manifestation. Thus, we have two logical possibilities available regarding the Tense Phrase: 1) the predicate phrase (AgrP) contains

a Tense node, and 2) it does not¹².

First, we will explore the possibility that the predicate phrase contains a Tense node. According to Chomsky (1992) (and Lasnik (1993)), nominative Case is licensed via the head-Spec relation with the functional head AGRs-Tense complex created by the raising of Tense to AGRs. Nominative Case is checked by the N-feature of T [+Tense]. In a similar way, accusative Case is licensed by the AGR_o-V complex created by the raising of the Verb to AGR_o. Chomsky assumes the following basic structure:

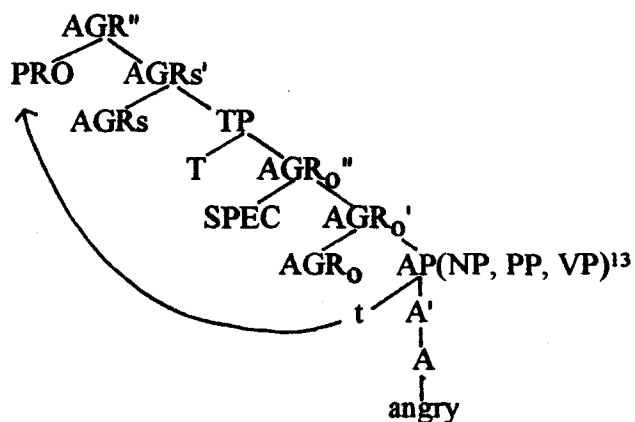
(33)



The assumption is that the Case properties depend on characteristics of T and the V head of VP.

Following Chomsky's view, it is possible to assume that null Case can be checked by the N-feature of T [-Tense]. Thus, we might have the following structure for a predicate phrase having the [-Tense] feature. Consider, for example, the sentence *John left angry*.

(34)



I propose, for the time being, that the N-feature of T [-Tense] triggers null Case Checking.

¹²Bellelli (1990) and Grimshaw (1991) take the latter position.

¹³The question of what categories are allowed as secondary predicates will be discussed in section 4.

This proposal is consistent with cases where PRO appears in other configurations. Consider the typical occurrence of PRO: the subject of the infinitival clause and that of gerundive nominals.

In the next subsection, we will observe negation data from Spanish and English, and then consider whether this data supports our hypothesis. The relevant questions here are 1) whether the negation data proves the hypothesis that the predicate phrase is AgrP, and 2) whether the negation data suggests the existence or absence of the Tense node in Small Clauses. The significant issue here is whether the TP node is actually needed in the predicate phrase.

3.3. Negation

In this section, we will consider the interaction of negation and AgrP. Consider the sentences below. (35) is from English, and (35') is from Spanish.

- (35) a. John left the room not angry.
b. ? John married not young.
c. They parted not good friends.
- (35') a. * Juan salio de la habitación no enfadado
John got out of the room not angry
b. * Juan se casó no joven.
John married not young

According to my consultants, the English sentences in (35) are grammatical, or at least acceptable, while the Spanish sentences in (35') are not.

How can we explain this difference in grammaticality between Spanish and English? Why can English secondary predicate phrases be negated, while those in Spanish cannot?¹⁴

According to Laka (1990), Spanish NegP has the structure shown in (36), while English has the structure shown in (37) (Pollock (1989)). (For the sake of convenience, the structures are simplified.)

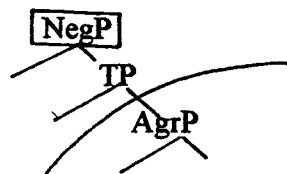
¹⁴The examples in (35) and (35') seem to be sentence negation rather than constituent negation. It may be more appropriate to use sentences of the following type to show that the examples truly are sentence negation.

- i) John left the room not convinced that he'd done the right thing.

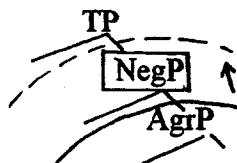
The following examples can be regarded as constituent negation. When regarded as constituent negation, the sentences are more acceptable in Spanish, according to my consultants.

- (ii) a. John left the room not very angry.
b. John married not very young.
(ii') a. ?? Juan salio de la habitación no muy enfadado.
b. ?? Juan se casó no muy joven.
- (iii) John married not particularly far into his thirties.
(iii') Juan se casó no muy entrado en los treinta.

(36) [Spanish]



(37) [English]

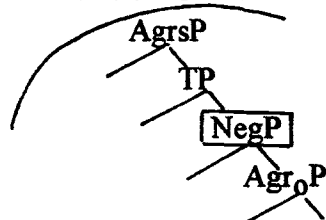


In Spanish, NegP occupies the highest position in the structure (Laka 1990). In English, on the other hand, NegP is located between TP and AgrP. Notice that TP dominates AgrP. That is, TP is higher than AgrP in Pollock's theory¹⁵. I will adopt this analysis.

If we postulate that the AgrP does not dominate a Tense node, the following straightforward explanation is possible: In Spanish, the predicate phrase (AgrP) cannot include Neg beyond TP, but in English it can. This seems plausible.

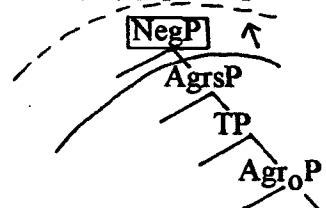
If we assume that AgrP dominates a Tense node, following Chomsky's (1992) basic idea, we must consider another configuration. In Chomsky's framework, the two functional roles of AGR — Agr_sP and Agr_oP — are distinguished. In Chomsky (1992), NegP is located between TP and Agr_oP in English in the following way:

(38) [English]



The Spanish structure is arguably the following:

(39) [Spanish]



In (38), NegP is evidently located under Agr_sP, which accounts for the fact that secondary predicates can be negated in English. The Spanish case is more complicated. In (39), NegP is

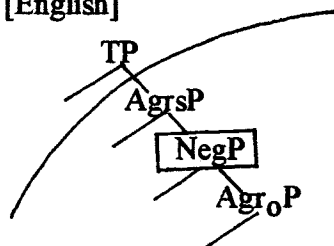
John got married not very entered in his thirties.

¹⁵Note, however, that Belletti (1990) argues that AgrP dominates TP.

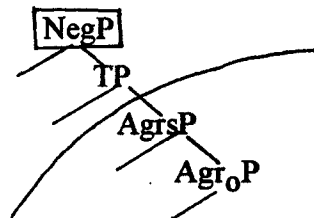
still in the highest position. However, if AgrP can incorporate the higher NegP as a constituent — just as we assumed in explaining the English data in the configuration (37) — Neg must occur within Agrp. This prediction contradicts the fact that Spanish does not allow negation within the predicate phrase. This shows that Chomsky's (1992) Case-checking mechanism using Tense features (or the clause structure he assumes) does not work as it is in secondary predicate phrases. As long as we use Tense features to check the null Case, we must have the structures shown in (38) and (39), and as we have seen, these structures are problematic for Spanish.

To explain the Spanish data, I will not take the configuration in (39). Instead, I will assume that TP dominates AgrP, namely, that TP is higher than AgrP. I will apply Pollock's analysis to recent models of functional categories — highly differentiated Agr phrase configurations. Thus, I will propose the structures shown below. Note that I am turning to the position that the predicate phrase (AgrP) does not dominate a Tense node.

(40) [English]



(41) [Spanish]



In (40), since NegP is lower than AgrsP, the predicate phrase can include Neg. This explains the fact that, in English, the predicate phrase can be negated. In (41), TP intervenes between NegP and AgrsP. For this reason, AgrsP cannot incorporate NegP beyond TP. This explanation agrees perfectly with the Spanish data.

To conclude, the predicate phrase is AgrP, and it has no Tense node¹⁶. The assumption is

¹⁶If we assume that the secondary predicate phrase (AgrP) has no Tense node, there is a possibility that we can explain the semantic constraint in subject-oriented secondary predicates.

The constraint is that secondary predicates must be stage-level predicates (cf. Carlson (1978) and Kratzer (1989)). Consider the sentence below:

(i) John came to the party blue-eyed.

The predicate *blue-eyed* is normally an individual-level predicate. However, in this construction, we have to interpret the predicate as a state-level predicate. Therefore, the interpretation is that John came to the party wearing blue contact lenses (in order to surprise the guests).

According to Diesing (1992), in the case of individual-level predicates, the subjects are base-generated in [Spec, IP], and the subjects of stage-level predicates are base-generated in [Spec, VP]. If we interpret Diesing's IP

that TP dominates AgrP. This idea comes originally from Pollock (1989), and is developed for Romance in Laka (1990).

4. Primary Predication and Secondary Predication

In the rest of the paper, I will deal with the difference between primary predication and secondary predication. I will first address the question of what categories are allowed as secondary predicates.

4.1. What categories are allowed as Secondary Predicates?

What categories are allowed as secondary predicates? McNulty (1988) observes that English has AP, NP, and PP secondary predicates, as in the following sentences.

- (42) John left the hospital healthy. [AP]
- (43) John left the hospital a healthy man. [NP]
- (44) John left the hospital in good health. [PP]

If we add a VP to the above categories, we can have a more complete paradigm. The X'-schema predicts the occurrence of every category. Thus, if we are faced with the absence of a category, it follows that we must filter it out by certain independent principle(s).

McNulty (1988) points out that NP secondary predicates do not exist in Spanish, but she does not provide any explanation for it. Some languages seem to allow NP secondary predicates, while others do not. The reason is worth exploring. Notice that the NP predicate is allowed in primary predication universally, but not in secondary predication. In theory, we should expect a NP to occur as a secondary predicate, as long as the NP is licensed. Are there any crucial differences between primary predication and secondary predication? We will discuss this problem in the next subsection.

4.2. Identificational *be* and Predicational *be*

Now let us consider the differences between primary predication and secondary predication. Descriptively speaking, we can say that primary predication includes a copula *be* at least in some languages like English, while secondary predication does not.

However, I propose that both primary and secondary predication include a copula *be*. I suggest that *be* in primary predication is overt, while *be* in secondary predication is covert. Observe the following examples:

- (45) a. John left the hospital *healthy*. [AP]
- b. John left the hospital *a healthy man*. [NP]
- c. John left the hospital *in good health*. [PP]

to be TP and not AgrP, the explanation might be possible. The predicate phrase (AgrP) has no TP. Thus, individual-level predicates (base-generated in [Spec TP]) cannot occur as secondary predicates, while stage-level predicates (base-generated in [Spec, VP]) can occur within the AgrP. This possibility is left for further research.

- d. John came *running out of the house*. [VP: V-ing]
- (46) a. John is healthy.
 b. John is a healthy man.
 c. John is in good health.
 d. John is running out of the house.

The secondary predicates in (45) are all forms that can appear in the post-*be* position in primary predication, as in (46). I will further discuss the "covert *be* hypothesis" in section 4.3.

Given the hypothesis that both primary and secondary predication include a copula *be*, we can compare the characteristics of *be* in these two types of predication.

In primary predication there are at least two kinds of *be*: the identificational *be* and the predicational *be*¹⁷. Consider the examples below.

- (47) [Identificational *be*]
 a. Mary *is* my mother.
 a'. My mother *is* Mary.
 b. The morning star *is* the evening star.
 b'. The evening star *is* the morning star.
- (48) [Predicational *be*]
 a. Mary *is* a nurse
 a' * A nurse *is* Mary.
 b. The student *was* sick

The NPs in the identificational sentences must be [+specific]. The truth value in these sentences is not changed if the two NPs are exchanged as in (47 a-a') and (47 b-b'). By contrast, the predicational sentences do not have such properties, as is clear from (48).

I claim that *be* in secondary predication should be the predicational *be*, not the identificational *be*, while *be* in primary predication can be either type of *be*. This is the most significant difference between primary predication and secondary predication. Consider the following sentences.

- (49) [Secondary predication--Identificational *be*]
 a. * Mary left the school my mother.
 b. * The morning star disappeared the evening star.
- (50) [Secondary predication--Predicational *be*]
 a. Mary left the school a nurse.
 b. The student left the party sick.

The sentences in (49) are not allowed, while the sentences in (50) are possible. The ungrammaticality of (49) is due to the fact that *be* in secondary predication does not allow identificational interpretation.

¹⁷This kind of distinction is made in Akmajian (1970) and Higgins (1973).

4.3. Case and the covert *be*

According to my consultants, there are at least several languages which do not allow NP secondary predicates: Spanish, Dutch, and Persian. Japanese is also this type of language.

In this section, we will discuss 1) why primary predication allows NP predicates universally while secondary predication does not, and 2) why English allows NP secondary predicates and some other languages do not. Both of these questions will be discussed from the perspective of Case theory, because Case theory is a logically possible licensing condition for overt NPs.

Let us first consider the following question: Does the predicate NP (the adjunct NP) need Case?

Chomsky (1986) states that the visibility condition does not require Case assignment to an NP that is not theta-marked (unless this NP must transfer Case to an argument¹⁸).

(51) Visibility Condition

An element is visible for theta-marking only if it is assigned Case.

(Chomsky 1986, 95)

In the following sentences, the Case filter requires that Case be assigned to the bracketed NPs, but the visibility condition arguably does not.

(52) John is [a fine mathematician].

(53) [John], I consider [a fine mathematician]

(54) John did it [himself].

If we consider the visibility condition to be valid, the predicate NP does not need Case, because it is not an argument. Then, if we assume that predicate NPs do not need Case universally, and that the secondary predicate NP is not assigned any Case (or not Case-Checked) uniformly, how can we explain the difference that we have seen in this section (between English-type languages and Spanish-type languages)? Further, how can we explain the fact that NPs can occur as primary predicates universally, but not as secondary predicates?

I propose that, at the very least, the predicational NP needs Case. The hypothesis is as follows. In primary predication, the predicational NP is [-Specific] and the overt *be* can assign an inherent Case universally (arguably, a partitive Case in Belletti (1988) and Lasnik (1992)). The predicational NP in primary predication can be licensed in this way. On the one hand, in secondary predication, the covert *be* does not always assign an inherent Case. Thus, in English-type languages it does, but in Spanish-type languages it does not. In English-type languages the covert *be* seems to have the inherent Case assigning property to license NP secondary predicates, although such a mechanism would need further research.

One thing we have to bear in mind is that inherent Case must be related to theta

¹⁸Chomsky refers to Case Transmission in sentences such as:

(i) There is a man in the room.

assignment. In other words, a Case-marked NP has to be assigned a theta-role. The problem is that a predicate NP is not selected by a head. In order to solve this problem, and to elucidate the mechanism that licenses NP predicates, further research is required, especially on the relationship between morphological case and abstract Case cross-linguistically.

5. Conclusion

In this paper, I argued that a PRO analysis should be adopted over a theta-marking analysis for subject-oriented secondary predicates. I presented empirical evidence that the predicate phrase should have a PRO subject. The occurrence of raising adjectives as secondary predicates is one of the strongest pieces of evidence for this view. I also showed theoretical grounds in favor of a PRO analysis. PRO analysis supports a theory of UG: VP-Internal Hypothesis.

I claimed that the predicate phrase is AgrP because of agreement facts. In my analysis, I considered Agr to be a null Case checker for PRO. PRO has to be licensed within AgrP, and the head Agr meets the licensing condition for PRO under the Spec-head configuration. On the basis of some negation data in Spanish and English, I proposed that AgrP does not dominate the Tense node.

Finally, I dealt with the difference between primary predication and secondary predication, and pointed out that primary predicates can either be identificational or predicational, while secondary predicates must be predicational. I addressed the question of why NP predicates are allowed in primary predication universally, but not in secondary predication. I also suggested the possibility that the predicational NP as a secondary predicate might have inherent Case in languages such as English.

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Evidence from Modern Greek for Refinement of the OCP*

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1 Introduction

Modern Greek, like many languages, exhibits a phenomenon characterised by reference to the identity of adjacent elements. It is generally agreed that the Obligatory Contour Principle (OCP) (first proposed by Leben 1973, and first coined by Goldsmith 1976) is defined by identity and adjacency, and that these constraints are closely associated with the notion of the tier. The nature of this association, however, has received many various treatments.

In Modern Greek connected speech, one of two adjacent and identical vowels residing in different words is deleted. The problems presented by the data in section 2 to previous treatments of the OCP are threefold. First, adjacency is relevant within the moraic tier; previously, only non-prosodic tiers have been acknowledged as relevant to the OCP. Secondly, identity inheres in the place tier; that both the moraic and place tiers are scanned by the OCP is counter to proposals in which only a single tier is scanned. Thirdly, when words become connected, adjacent and identical vowels are not automatically fused. Vowel hiatus resolution operates in a stage after concatenation but before fusion in tier conflation, then, contrary to proposals that conflation is a single-phase process.

In this article, I propose that the tiers to be scanned by the OCP are specified by adjacency and identity functions resident in a language's grammar. The set of candidate tiers includes the moraic tier, and more than one tier may be relevant. Furthermore, when a language incorporates rules which resolve OCP violations in adjacency and identity, these rules preempt fusion during tier conflation.

1.1 The OCP Defined

The definition of the OCP has evolved since Leben's (1973) examination of tonal systems: "At the melodic level of the grammar, any two adjacent tonemes must be distinct." The principle's interaction in autosegmental phonology is more clearly recognised in Goldsmith's (1976) definition: "At the phonetic level, any contiguous identical (auto)segments must be collapsed into each other." This definition foreshadowed McCarthy's (1986:208) proposal for Tier Conflation across morpheme boundaries as one means for avoiding violations of the OCP. He defines the OCP: "At the melodic level, adjacent identical elements are prohibited." Further refinements have modified reference to the "melodic level" and have constrained adjacency to within a tier: "Adjacent identical elements on the same tier are prohibited" (Selkirk 1988, and similar definitions in Borowsky 1987, Mester 1988, Hume 1992, and Archangeli and Pulleyblank 1995).

1.2 Tier-Adjacency

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One consequence of the inclusion of the tier-adjacency constraint is that OCP effects have proven useful in arguments for specific feature geometries. Yip (1988:71) notes that constraining adjacency to a tier means that the OCP can refer only to constituents, and that "[o]nly constituents [nodes in the feature geometry] may constitute tiers."

The general argument is that when a language resolves an OCP violation, it is because the adjacent identical autosegments are on the same tier. It can be argued, for instance, that resolved violations in adjacent consonants and vowels provide evidence for a common set of features and their dominating nodes that are shared between consonants and vowels, since adjacency resides within the same tier (for example, see Hume 1992).

The number of tiers to which identity and adjacency refer varies according to different proposals. Hume (1992) argues that identity and adjacency are relevant within a single tier only. Yip (1988) allows identity and adjacency within multiple tiers at or below the segmental tier. Selkirk (1988) argues for identity within either adjacent roots or adjacent tiers below the root. Archangeli and Pulleyblank (1995), in arguments independent of OCP effects, motivate identity and adjacency in multiple tiers simultaneously, including root nodes and prosodic anchors. I show in section 3 that vowel hiatus resolution in Modern Greek, as motivated by the OCP, requires identity in one tier but adjacency in another.

If processes other than those motivated by the OCP are able to refer to adjacent constituents above the root node, the question that arises is whether OCP-motivated processes can do so, as well. If Yip's (1988:71) claim, that "superordinate nodes constitute tiers more often than the subordinate nodes...", is correct, then one prediction that can be made is that prosodic tiers should be primary candidates for scanning by the OCP. I argue in section 3 that the moraic tier must be scanned for adjacency in Modern Greek.

1.3 Tier Conflation

Tier-adjacency also requires that some type of tier conflation is operative after morphemes are concatenated (see, for example, McCarthy 1986 and Yip 1988). Assuming that tiers within one morpheme are distinct from those of another morpheme, then the tiers must be conflated after concatenation so that not only OCP effects, but also other processes like spreading may take place. There are, however, differing interpretations of conflation. McCarthy (1986) proposes tier conflation in a single phase, so that there are no derivational stages in which OCP violations exist. In his model, morphemes are on separate tiers after concatenation, but before conflation. During conflation, sequences of identical elements are automatically simplified.

Yip (1988), however, proposes a multiple-phase conflation: adjacency is created in one phase, and another phase results in automatic fusion. In her model, languages have the option of instantiating rules between phases. These rules, which must refer to adjacent elements in both morphemes, include such OCP effects as dissimilation across morpheme boundaries, and epenthesis into heteromorphemic, identical clusters. The analysis of Modern Greek vowel hiatus resolution in section 4 supports the multiple-phase interpretation of conflation.

1.4 Instantiation of the OCP

There are also opposing views of how the OCP is instantiated within a language. McCarthy (1986) claims that the OCP can act as either a morpheme structure constraint (MSC) or as an output filter during a derivation, with a blocking function on rule application. McCarthy (1986) provides examples in which syncope (in Afar) and metathesis (in Arabic) are blocked if they

would otherwise result in OCP violations. Yip (1988) argues that the OCP can also trigger rule application, and as a consequence, rules no longer need to be specified with identity conditions. By her account, any rule which involves removing identity or adjacency of a target and trigger pair is one triggered by the OCP. She cites a number of OCP-motivated processes in addition to syncope and metathesis: insertion (in Japanese Rendaku; Itô and Mester 1986), feature-changing (in English Spirantization; Borowsky 1986), degemination (in Seri Glottal Degemination), dissimilation (in Cantonese), and assimilation (in Berber). Modern Greek provides an example of vowel deletion triggered as a means of resolving OCP violations.

A number of accounts have been proposed which balance the universality of the OCP against language-particular effects. McCarthy (1986) states, for example, that MSCs prohibiting language-particular featural cooccurrence are motivated by the universal principle prohibiting adjacent identical elements. Odden (1986) argues against a universal principle in favor of language-specific rules on the grounds that there are ordering effects. He also claims that MSCs are not related to the OCP, but are language-particular cooccurrence constraints. Yip implicitly provides for parameterization of a universal principle in terms of which features or groups of features appear on a separate tier, and how OCP violations are alleviated (the latter through a combination of language-particular rules and multiple-phase conflation). Mester (1988) obtains language-particular effects via hierarchical tier orderings which vary between languages. In section 5, I propose instantiation of the universal OCP in terms of language-particular conditions, which specify what and how many tiers are relevant to identity and adjacency, and how OCP violations are to be alleviated.

2 Vowel Hiatus Resolution in Modern Greek

The vowels in the Modern Greek inventory are: [ε, i, a, ɔ, u]. A process labelled "Degemination" by Kaisse (1985) occurs when identical vowels in two different words become adjacent in connected (not necessarily casual or fast) speech. The first of the identical pair of vowels is at the end of the first word and the second begins the next word; the words in question may occur anywhere within a sentence (Kaisse 1985). One of the vowels is absent in connected speech where both are present when the words are spoken in isolation. Figure (1) illustrates.

Assuming that the isolated word most closely corresponds to the underlying representation, the general process must be one of deletion. That it is deletion is clear when the alternative is considered: insertion of a final vowel in a set of arbitrary words in isolated speech. No patterns for the set of relevant words or for the various vowel qualities are discernible under the insertion alternative. Therefore, hiatus of identical vowels between words in Modern Greek must be resolved through deletion. The process is not true degemination; the vowels do not share the same root node since they reside in different words.

Three observations can be made from this data. First, regardless of which vowel is stressed in the isolated words, stress is preserved when a vowel is deleted in connected speech (1a - 1e). Either a consistent direction of rule application is preserved, and stress is transferred to the remaining vowel where necessary, or only the stressless vowel deletes. Neither of these analyses are favored by this data alone. Secondly, the consonant preceding a sequence of round vowels in

¹Data was compiled from Eleftheriades (1985) and Kaisse (1985).

(1) Identical Vowel Elision

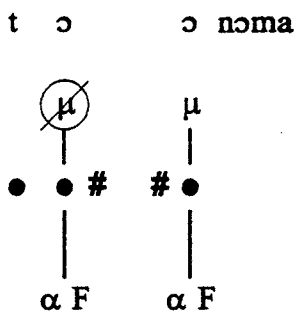
Isolated Words	Connected Speech	Gloss
(a) [sé̄ ɛ̄mena]	[sé̄mena]	'to me'
[θēorítɛ̄ ɛ̄mpístɔs]	[θēorítɛ̄mpístɔs]	'he is considered trustworthy'
(b) [tí̄ í̄nɛ̄]	[tí̄nɛ̄]	'What is it?'
[pósī í̄nɛ̄]	[pósīnɛ̄]	'How many?'
(c) [tá̄ alla]	[tá̄lla]	'the others'
[tā á̄lɔva]	[tá̄lɔva]	'the horses'
(d) [tɔ̄ ɔ̄nɔma]	[t ^w ɔ̄nɔma]	'the name'
[tɔ̄ ɔ̄nirɔ]	[t ^w ɔ̄nirɔ]	'the dream'
(e) [tú̄ ɹ̄ranú]	[t ^w ú̄ranú]	'of the sky'
[mɹ̄ ú̄ka]	[m ^w ú̄ka]	'my figs'
(f) [avórī ɛ̄rɣɛ̄tɛ̄]	[avórī ɛ̄rɣɛ̄tɛ̄]	'boy comes'
[mɛ̄válū ɛ̄láfyu]	[mɛ̄válū ɛ̄láfyu]	'big deer (gen. sg.)'

the elision environment becomes rounded, as in (1d) and (1e). Lastly, nonidentical vowels do not necessarily elide, as shown in (1f) by the presence of adjacent vowels in connected speech.

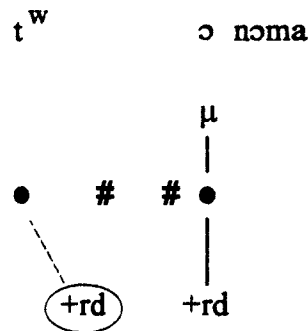
Because a vowel is deleted just in case it is identical to an adjacent vowel in another word, the process is likely motivated by the OCP. That consonants become rounded subsequent to deletion of round vowels will be crucial in arguments for identity and adjacency, and how these notions relate to the OCP. The processes of vowel deletion and consonant rounding are presented schematically in (2).²

(2) Schematics

(a) Delete vowel



(b) Link [+rd]



²I assume that the left-most vowel deletes; the assumption is not crucial to my arguments.

In the case of round vowels, [+rd] must remain available to the preceding consonant. The indication is that the mora is deleted, rather than the vowel's featural content. If only the features attached to the mora were deleted and the mora remained, either vowel lengthening or realization of the unspecified [ε] might be expected, but neither occurs (see Meador (1993) for arguments for vowels specifications in Modern Greek).

By virtue of the requirements of identity and adjacency, the OCP motivates the deletion rule. But therein lies the challenge to the OCP: the offending features are not removed. That is, identical and adjacent features remain after the rule has applied, a clear violation of the OCP if identity and adjacency inhere within a single tier.

3 The Single Tier vs. The Multiple Tier Hypotheses

A closer examination of the proposals for single- and multiple-tier adjacency is needed. The following questions become germane: Can adjacency and identity refer to more than one tier? In which tier(s) do adjacency and identity inhere? Should tiers above the root node be subject to the OCP?

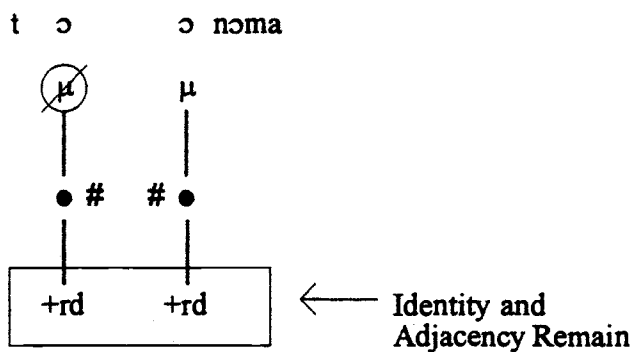
Hume (1992) maintains the strongest form of the single tier hypothesis in her argument that identity and adjacency inhere within one tier. The argument is based on her definition for adjacency, given in (3).

(3) Adjacency (Hume 1992:138)

The elements x and y are adjacent on tier n iff no element z on tier n intervenes.

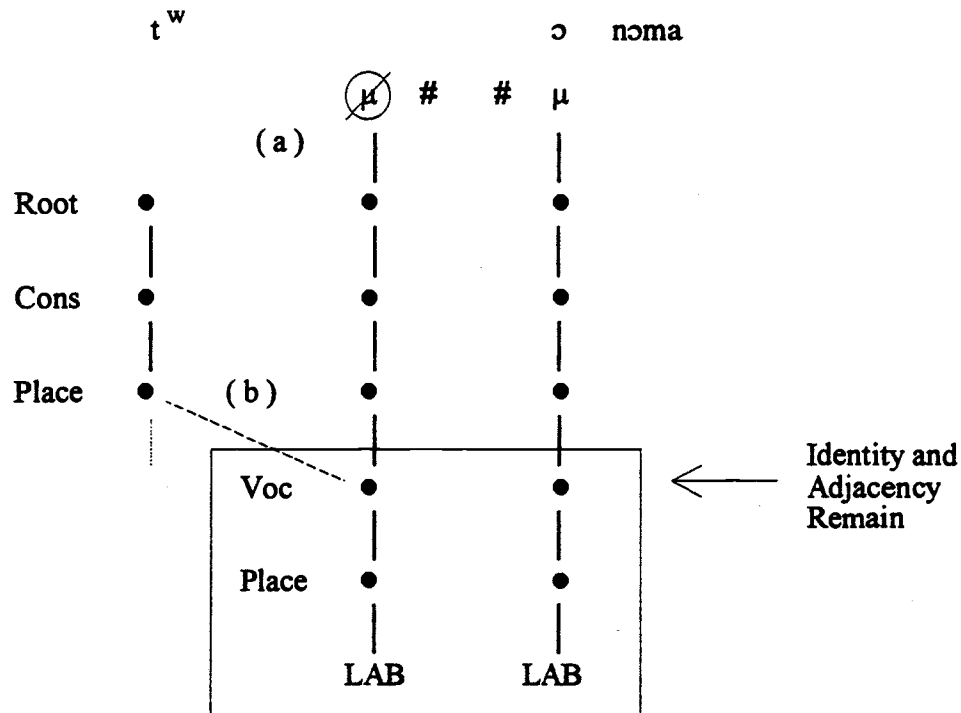
The OCP, according to this view, scans a tier for identical and adjacent elements. The implicit assumption is that the tiers to be scanned are below the root node. In Modern Greek, however, the OCP would not provide a motivation for vowel deletion, since adjacent identical elements remain on any of these tiers. One hypothesis might be that featural identity of adjacent vowels is the violating factor in Modern Greek. If so, then the OCP should scan the featural tier. After mora deletion, the features remain in violation, so this hypothesis is rejected. Figure (4) illustrates this.

(4) Identity in the Feature Tier



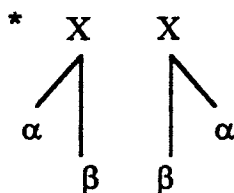
Assuming Hume's (1992) feature geometry, another hypothesis would require the OCP to scan the vocoid (VOC) tier. In her model, the VOC node, dominating [LAB], would spread from the vowel to the preceding consonant subsequent to the mora deletion posited here.³ Mora deletion is shown in (5a), and consonant rounding in (5b). This hypothesis must be rejected as well, since identity in adjacent VOC nodes remains after mora deletion.

(5) Identity in the VOC Tier



Yip (1988) proposes that adjacency can refer to multiple tiers. Implicit in her arguments is that these tiers are at or below the segmental (or C-V) tier. In her analysis of English epenthesis in the plural and past tense, for example, the OCP scans for adjacent, identical specifications for [continuant] and [strident], each of which resides on a different tier. The OCP violation incorporating a multiplicity of tiers is illustrated in the generic case in (6).

(6) Identity and Adjacency in Multiple Tiers



³Hume (1992) does not discuss elements above the root node.

Under this proposal, identity in Modern Greek might inhere in the segment tier, while adjacency refers to the vowel tier and all that it dominates: ROOT, PLACE, LABIAL, etc. In an examination of assimilation in Berber, Yip (1988) argues that one of two identical matrices is delinked, providing an empty slot as a target for spread. She recognizes the problem, similar to that in Modern Greek, of remaining identity and adjacency after delinking:

It is possible that the spreading itself alleviates the OCP violation, but this is not obviously so, since the offending matrix would still be present, albeit delinked. For this reason I have assumed it is first deleted by the OCP-triggered rule, and this then leaves it empty and available for a spreading rule.
[Yip 1988:78; fn. 13]

In Modern Greek, the matrix delinked from the deleted mora cannot itself be deleted in its entirety since its featural content must remain available for the consonant rounding rule.⁴

Selkirk (1988) also argues that adjacency refers to multiple tiers, but specifies these tiers in either roots or tiers below the root. Her definition for the tier is given in (7), followed by the definition for adjacency in (8).

(7) Tier (Selkirk 1988:6)

Def.: Identical features define a tier iff they are dependent on identical features (i.e. have identical heads)

(8) Adjacency (Selkirk 1988:8)

Two feature specifications are adjacent if they are either root-adjacent or tier-adjacent.

- a. Def. Two feature specifications are root-adjacent if they are dominated by adjacent root nodes.
- b. Def. Two feature specifications are tier-adjacent if they are adjacent on the same tier.

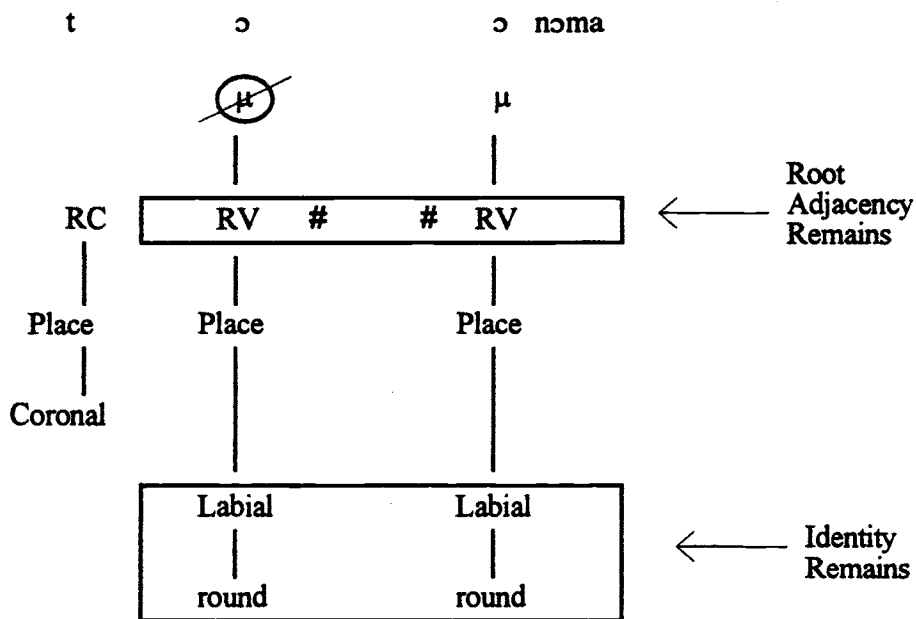
The hypothesis for identity and adjacency below the root was rejected on the basis of the argument that identity and adjacency of the offending features remain after mora deletion. The question of identity within adjacent roots raises two possibilities in Modern Greek: either the root which was dominated by the deleted mora remains, or it deletes as well. Assuming Selkirk's (1988) feature geometry and representations for primary and secondary articulations (the latter being in a dependency relation to the former), the first possibility is illustrated in (9). Mora deletion is shown in (9a), which should be motivated by identical features with adjacent roots in this model. If the root node does not delete, then the OCP violation remains. Figure (9b)

⁴It might then be argued that [+rd] spreads not from the delinked matrix, but from the remaining matrix of the word-initial vowel, in which case deletion of the delinked matrix is an adequate solution. Other cases of vowel hiatus resolution in Modern Greek (those involving nonidentical vowels) indicate that the featural content of the first vowel must remain for consonant rounding. For example, [a!lɔə₂ ɛ!rɣɛɛ] ('horse comes') in isolated speech corresponds to [a!lɔə^w ɛ!rɣɛɛ] in connected speech (Kaisse 1985). The only source for rounding in this case is the featural content of the deleted word-final vowel.

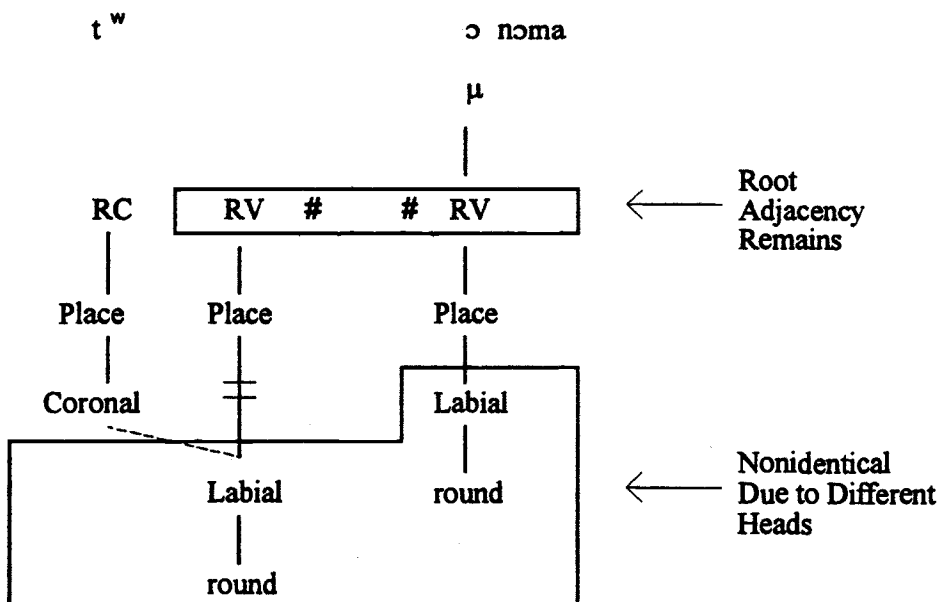
illustrates how subsequent consonant rounding, if any, alleviates the violation, since the instances of [round] have different heads. The result of mora deletion in the environment of non-round vowels is given in (9c), to show that when consonant rounding is not applicable, the violation remains.

(9) Root Remains

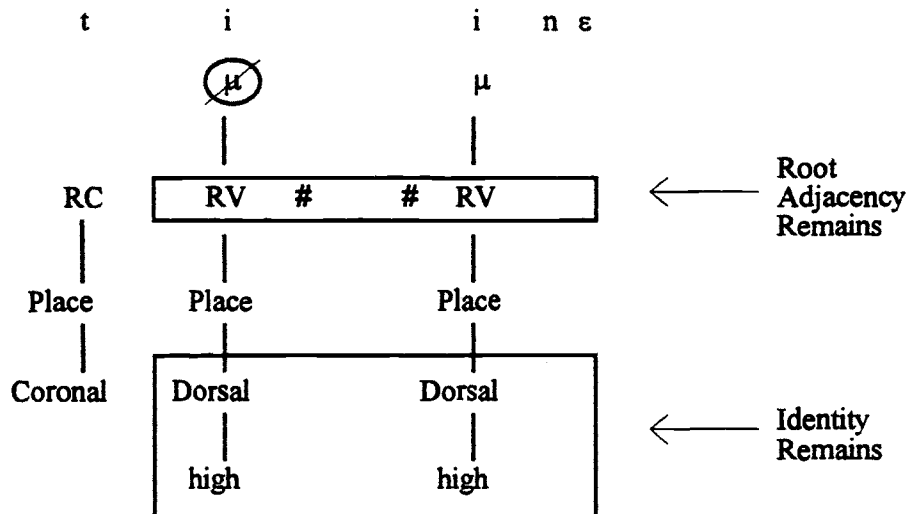
(a) Mora Deletion due to Root-Adjacency; Root Remains
 ("RC" = consonant root; "RV" = vowel root)



(b) Violation Alleviated through Labial Spread



(c) Violation Remains if Vowels are Nonround



Alternatively, extraneous structure, including both the root and place nodes, may be deleted after the dominating mora has been deleted. This alternative seems likely, since the mora, root, and place nodes are not subsequently filled (neither vowel lengthening or the default vowel [ɛ] appear). In this case, the root-adjacency violation would be alleviated, although identity and adjacency in the articulator tier would remain. If the head is indeed the root, this alternative would be a satisfactory solution; the root tier would be scanned by the OCP for adjacency while the articulator tier would be scanned for identity.

However, the model depends on specifying the root node as belonging to either a consonant or a vowel, which is informed, presumably, by the prosody. Furthermore, while deletion of the root to alleviate the adjacency violation would be motivated by the OCP, this account does not explain why it is the mora that deletes. These observations indicate that the mora, as the prosodic anchor, is the "head" instead. The implication is that the moraic tier is a candidate for scanning by the OCP in languages like Modern Greek. If so, then adjacency in the moraic tier should be relevant.

Archangeli and Pulleyblank (1995) argue for the relevance of moraic adjacency in processes independent of the OCP. For example, morae are often the prosodic anchors, or targets, in processes of vowel harmony. Any phonological process is, in their model, subject to the Locality Condition (Archangeli and Pulleyblank 1995:11), which states that "[p]honological relations respect Adjacency and Precedence." Adjacency is defined as in (10).

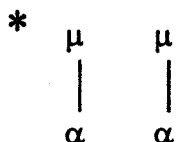
(10) Adjacency (Archangeli and Pulleyblank 1995:20)

α is structurally adjacent to β iff:

- (a) at least one of the two is unassociated, both are on the same tier, and no element intervenes between the two on that tier; or,
- (b) both α and β are associated to the same anchor tier and no anchor intervenes on that tier between the anchors to which α and β are associated.

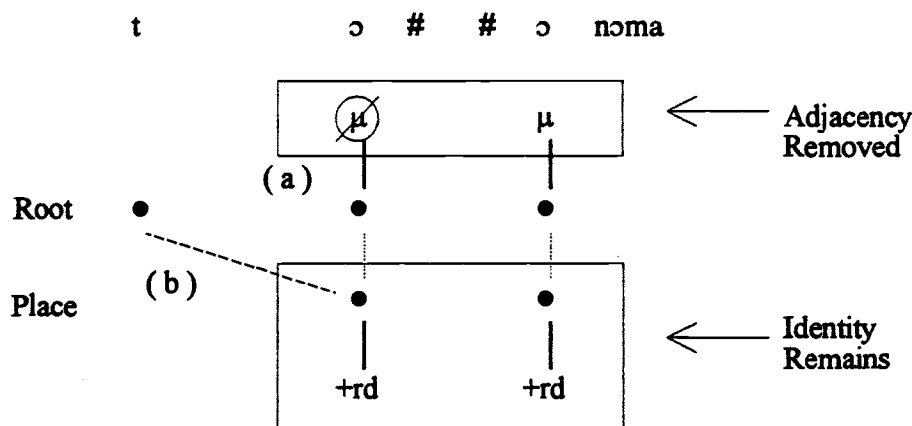
The argument for adjacency in the moraic tier in processes independent of the OCP can be extended to those which are motivated by the principle. For example, the configuration in (11) is ill-formed because "[t]wo identical autosegments are associated to adjacent prosodic anchors (Archangeli and Pulleyblank 1995:20)." Identity is relevant in the α tier, and adjacency is relevant in the moraic tier.

(11) Identity in one Tier, Adjacency in Another



This account differs from the single-tier hypothesis since more than one tier is scanned by the OCP. Unlike Yip's (1988) or Selkirk's (1988) model, violations may also occur on the moraic tier. Figure (12a) illustrates the alleviation of the OCP violation in Modern Greek through the removal of adjacency (morae are no longer adjacent when one is deleted), despite remaining identity in the place node and all that it dominates when [+rd] spreads (12b).

(12) Moraic Adjacency; Identity in Place



By this account, then, the OCP provides motivation for mora deletion. Adjacency and identity may refer to more than one tier, and the moraic tier should be included into the set of those scanned by the OCP.

4 Single- vs. Multiple-Phase Tier Conflation

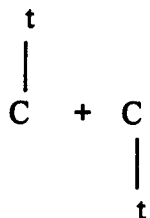
A problem remains concerning how two vowels become adjacent and create the environment for hiatus in Modern Greek, given that they reside in different words. In the definitions for adjacency given in (3), (8), and (10), no element may intervene between the two elements in question on a given tier. The vowels in hiatus are in different morphemes, but morphemes reside on distinct tiers (McCarthy 1986, Yip 1988). Therefore, the vowels cannot be adjacent unless a mechanism exists to align the tiers between morphemes.

McCarthy (1986) proposes a process of Tier Conflation to align the tiers. The single-phase process he describes, however, results in adjacency only of nonidentical elements. This proposal is problematic since vowel hiatus resolution in Modern Greek is motivated by adjacent identical elements. Modern Greek provides support for Yip's (1988) argument for a multiple-phase solution, in which adjacency of identical elements is possible in an intermediate stage. These proposals are examined below.

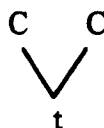
McCarthy (1986) argues that there is no derivational stage during conflation at which an OCP violation exists. After concatenation of two morphemes, but before conflation, the morphemic content resides on different tiers, as in (13a). Two identical elements are automatically fused during conflation in order to avoid an OCP violation, as in (13b).

(13) Single-Phase Tier Conflation (McCarthy 1986)

(a) After Concatenation



(b) During Conflation

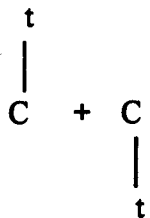


Because identical elements are never adjacent on the same tier, conflation does not cause OCP violations in this model. The prediction is that there should exist no rules motivated by the OCP, then, that are applicable when two morphemes or words become adjacent. For Modern Greek in particular, vowel lengthening would be expected instead of vowel deletion. Because vowel deletion is motivated by the OCP in the hiatus environment in connected speech, an alternative solution is required.

Yip (1988) proposes an alternative in which tier conflation has two stages, one at which adjacency is created. If a language has a specific rule to remove an OCP violation, that rule applies at this stage. If not, then fusion takes place. Figure (14) illustrates.

(14) Multiple-Phase Tier Conflation (Yip 1988)

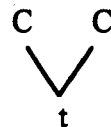
(a) After concatenation



(b) First stage



(c) Second stage

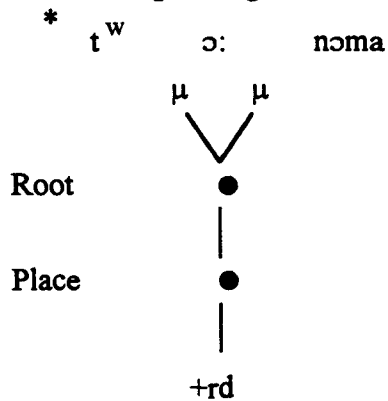


In her motivation for the first stage, Yip states that:

since heteromorphemic melodic elements can only be adjacent after Tier Conflation, any rule that needs access to both elements, and in which they are clearly distinct, is evidence against ... automatic fusion ... [1988:69].

She provides several examples, including dissimilation across morpheme boundaries and epenthesis into heteromorphemic identical clusters. As another example of dissimilation, vowel hiatus resolution in Modern Greek offers further support for multiple-phase tier conflation. It cannot be the case that vowels are fused, as in the proscribed case in (15), since vowels do not lengthen in connected speech.

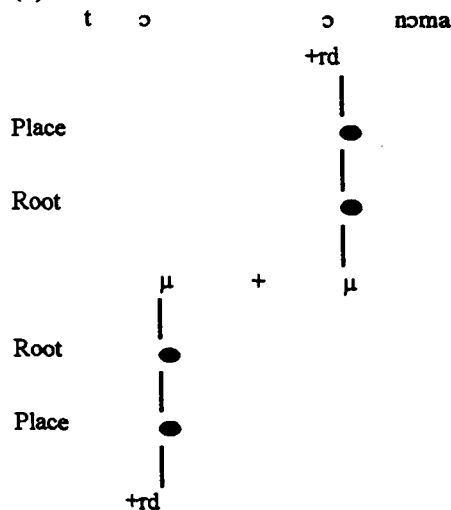
(15) Vowel Lengthening Proscribed



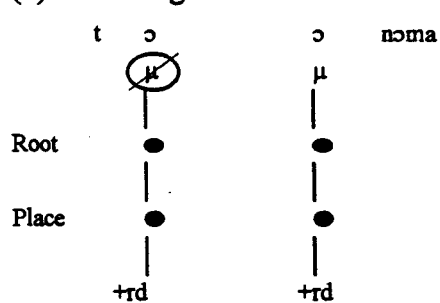
Given that mora deletion in Modern Greek is motivated by the OCP, adjacency must be introduced after words are concatenated in connected speech. Since fusion is preempted, hiatus resolution must take place in the first stage, as shown in (16).

(16) First Stage Hiatus Resolution

(a) Concatenation



(b) First Stage



5 Parameterization of a Universal Principle

The most prevalent assumption implicit to OCP arguments is that it is a universal principle, given the abundance of rules across languages which remove adjacency of identical elements.⁵ Yet configurations involving adjacent identical elements that are well-formed in one language may be ill-formed in another. Languages may differ according to which tiers are relevant for identity and adjacency, and whether or not only a single tier is scanned. For example, adjacent identical specifications for place and manner in English are ill-formed (Borowsky 1987); in Berber, adjacent coronals are prohibited (Yip 1988); Cantonese prohibits adjacent labials (Yip 1988, Hume 1992); root-adjacent labials in Berber are ill-formed (Selkirk 1988); and adjacent identical elements on the segment tier are prohibited in Semitic languages (McCarthy 1986).

Languages may also differ according to whether they provide rules alleviating OCP violations after concatenation of morphemes, or whether the violations are alleviated through fusion during conflation. The mora deletion rule in Modern Greek provides an example of the former, whereas the Semitic languages appear to employ fusion (McCarthy 1986).

Finally, the grammar of a language may include either constraints preventing OCP violations, such as the MSC in Cantonese prohibiting two labials within a single morpheme (Yip 1988, Hume 1992), or rules which alleviate violations arising through concatenation, as in Modern Greek. Of the languages which employ rules motivated by the OCP, some may utilise epenthesis, as in English past tense formation (Borowsky 1987), and others may incorporate deletion, as in Modern Greek.

Each of these language particular effects share a commonality: identity and adjacency. I propose, then, that the OCP is a parameterised universal. I follow Yip (1988), who implicitly provides for parameterization in terms of which tiers are scanned, and how OCP violations are resolved (whether through MSCs, or through language-particular rules, and therefore two-stage conflation, or both). If the values for these parameters are specified for a language, then the conditions for identity and adjacency need not be specified for the rules themselves (cf. Yip 1988, who argues that identity need not be specified in rules).

Along these lines, Hong (in preparation) has proposed that (for harmony systems at least) identity is a function taking as its arguments the trigger and target of a rule over a specific tier. For example, the Identity Condition on Yawelmani round spread is specified as:

(17) Identity Condition (Hong in preparation)

Identical (Argument, Target) <HIGH>

That is, [round] spreads from an argument (or trigger) to a target identical in height. This function is independent of the rule of round spread itself, since the rule does not specify height identity. Alpha notation (representing element identity) is therefore no longer necessary in rule formalizations.

The identity function, motivated independent of OCP effects, should also be available for reference by the OCP if it is stated in a language's grammar. The condition governing mora deletion in Modern Greek specifies identity in the place tier and all that it dominates. Since vowel

⁵See Odden (1986), however, for arguments that OCP effects are simply language-particular rules.

hiatus resolution in Modern Greek is an OCP effect, a value must also be set for an adjacency parameter. I propose that another function exists in Modern Greek which allows scanning of a tier other than that to which identity refers. The Adjacency Condition in Modern Greek, therefore, specifies the moraic tier. The conditions proposed for Modern Greek with their parameter values are shown in (18).⁶

(18) Modern Greek Identity and Adjacency Conditions

Identical (Argument, Target) <PLACE>
Adjacent (Argument, Target) <MORA>

Consequently, the rule which specifies only the deletion of a mora in a left-to-right direction of application (omitting alpha notation) will be applicable only if adjacent morae are specified with identical places of articulation.

6 Conclusions

Modern Greek offers several implications for the OCP. One is that distinct tiers may be available for adjacency and identity, which is counter to the single-tier hypothesis. Since mora deletion adheres to conditions of identity and adjacency, the prosodic tier must be a candidate for scanning by the OCP, in addition to tiers at the segmental tier or below. Because vowels in hiatus are not realized as one long vowel, they are not fused, which refutes the hypothesis that conflation is a single-phase process. Finally, if the condition of identity is specified for a language, but not within its rules, then the condition of adjacency should also hold for the language as a whole when more than one tier is relevant.

⁶The definition and role of arguments (or triggers) and targets is not entirely clear in deletion rules, and is left as a problem beyond the scope of this article.

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