

## The Metrical Structure of Yindjibarndi— Lenition, Trochees, and Vowel Coalescence\*

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Yindjibarndi, a Ngarluma language spoken in northwestern Australia, displays an intriguing pattern of stress in which all long vowels may be pronounced as a sequence of two short vowels. Previous analyses (Wordick 1982, Kager 1993) have treated this as vowel breaking, but I show that the language's morphology, historical and synchronic phonology, and metrical structure support an analysis in which identical adjacent short vowels coalesce into a single long vowel, but only where they can serve as the head of a foot. I construct an Optimality Theoretic account of these facts, drawing on numerous well-established constraint types including correspondence constraints (McCarthy & Prince 1995), positional faithfulness constraints (Beckman 1997), prosodic constraints (McCarthy & Prince 1993), and a version of the Weight to Stress Principle (Prince 1990). Additionally, I motivate a sociolinguistic constraint, \*RUDE, which forces consonant lenition. In addition to accounting for the interactions of consonant loss, vowel length, and metrical structure without appealing to levels or rules that look ahead, Optimality Theory offers a vocabulary for the interaction of sociolinguistic and phonological constraints.

### 1 Introduction

Yindjibarndi, a Ngarluma language of northwestern Australia, displays an intriguing pattern of stress as Wordick (1982:17)<sup>1</sup> describes:

*All long vowels may be pronounced with audible medial breaking, that is, as if they were a sequence of two identical short vowels, ordinarily with a volume decrease or trough separating them, but rarely with an intervening glottal catch.*

Beyond the perhaps perceptually difficult volume decrease between the halves of a broken vowel, breaking can be diagnosed by the number of feet in a word as evidenced by the stress pattern. "Breaking" is illustrated in (1) below, with the vowels of interest underlined.

(1)	Input	Long Vowel	Broken Vowel	Gloss
a	/waara/	(wá <u>á</u> .ra) <sup>2</sup>	(wá. <u>á</u> )(rà)	'to track down, hunt'
b	/wuunju/	(wú <u>u</u> .nju)	(wú. <u>u</u> )(nju)	'social class'
c	/punaaju/	pu(ná <u>á</u> .nju)	(pú.na)( <u>á</u> .nju)	'bloodwood'
d	/wiruu/	wi(rú <u>u</u> )	(wí.ru)( <u>ù</u> )	'different, wrong'

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<sup>1</sup>FJF Wordick's 1982 grammar, *The Yindjibarndi Language*, is the source of all data.

<sup>2</sup>Primary stress is indicated by an acute accent, secondary stress by a grave accent, syllable boundaries by a period. Parentheses enclose metrical feet.

Two output forms—one with a long vowel and one with a broken vowel—are presented for each of the apparent input forms, which represent the important subcases of this phenomenon. (1a-b) illustrate long vowels in stress position which can be left as long or broken. (1c-d) illustrate long vowels in non-stress position. To keep the vowels long in these cases, the initial light syllable must be omitted from the footing so that the long vowel is in stress position.

Wordick (1982:1) warns readers of *The Yindjibarndi Language* that:

*Stress is not constant, but is predictably placed. Long vowels are a disturbing factor. Syllable structure is not simple.*

Wordick is referring to the prosodic alternations of interest here, those induced by surface heavy syllables—usually in non-stress position, that is, the weak half of a metrical foot. This paper examines the complicated metrical structure of Yindjibarndi and provides an analysis of the phenomenon not as a process of breaking, as previously posited, but as a process of coalescence. Close examination of the language reveals that the long vowels are a mirage. Intervocalic consonants frequently delete, giving rise to apparent long vowels. Thus, each half of a long vowel actually comes from a separate syllable. The issue, then, is not one of splitting but rather one of *coalescence*. This paper develops an Optimality account of the conditions under which identical adjacent short vowels fuse into single, long nuclei.

Wordick (1982) and Kager (1993) both treat this phenomenon as the splitting of long vowels. In a pre-Optimality Theory treatment, Kager determines the conditions for long vowel splitting and builds metrical structure accordingly.<sup>3</sup> I will present a range of evidence from the morphology and history of the language, however, that shows the vowel splitting approach to be flawed. If we assume that two identical short vowels represent two separate syllables unless specific circumstances obtain, a more tractable and intuitive analysis of the language emerges.

Evidence from many aspects of the language are drawn on to motivate the proposed prosodic structure. Section 2 introduces the segments of Yindjibarndi, syllable structure, and stress. Section 3 covers synchronic and diachronic consonant lenition. Section 4 introduces and motivates the constraints that yield the consonant behavior. Section 5 resumes the discussion of stress assignment and motivates the constraints on prosodic structure. Section 6 provides a final example, interleaving the segmental and prosodic constraints and discusses conclusions that may be drawn from this study.

<sup>3</sup>I am greatly indebted to Kager for the generalizations he derived from Wordick's descriptions.

## 2 Segment inventory, syllable structure, and stress

Yindjibarndi's consonant inventory, shown in (2), is typically Australian: a wide range of places of articulation (including abundant coronals), absence of fricatives, and lack of phonemic voicing (Dixon 1980). Although Wordick (1982), like many Australianists, represents the laminal and apical sets with digraphs, here they are converted to IPA symbols so that the language does not appear to have more consonant clusters than it actually does.

(2) Consonants	Peripheral		Laminal		Apical	
	bilabial	velar	interdental	palatal	alveolar	retroflex
Stop	p	k	$\text{t̪}$	$\text{tʃ}$	t	ɭ
Nasal	m	ŋ	$\text{n̪}$	$\text{nʃ}$	n	ɺ
Glide	w		$\text{j̪}$	j	r	ɽ
Lateral					l	ɭ

The vowel inventory, shown in (3), is also typically Australian with just three vowels (Dixon 1980).

(3) Vowels	i	u
	a	

Although Wordick's phoneme inventory includes both long and short vowels, the long vowels—which can *always* be pronounced as a sequence of two shorts—are marginal and thus have not been included in (3). Of approximately 2300 entries in Wordick's glossary, which includes morphologically complex words, only 270 contained long vowels (28 *ii*, 40 *uu*, 202 *aa*). Wordick's main evidence for phonemic long vowels is that *ua* sequences sometimes coalesce to *oo* but *oo* can never be realized as a sequence of short *o*'s. With the exception of about five native words, the only possible underlying long vowels occur in English borrowings.

The possible syllable shapes appear below in (4) and (5). The syllable of interest is underlined in each sample word. The syllables illustrated in (4) are light while those in (5) are heavy.

(4)	a	V	káma <u>ù</u> ma	'man who has lost a child'
	b	CV	<u>kú</u> lu	'louse'
	c	CVC	pí <u>lin</u>	'flat bedrock'
(5)	a	VV	pí <u>à</u> aa	'like a flat thing'
	b	CVV	<u>táa</u> ta	'hollow'
	c	CVVC	ŋú <u>ur</u>	'snort, snarl, grunt'

Each Yindjibarndi vowel bears a mora, but consonants do not contribute to syllable weight. A minimal word in Yindjibarndi consists of two moras; there are no freestanding CVC words. (6) and (7) compare words with open and closed syllables to illustrate that they function the same way with respect to the language's weight-sensitive stress pattern. The CVV syllable in (6a) and the CVVC syllable in (6b) have the same stress pattern.

- |     |   |      |      |                       |
|-----|---|------|------|-----------------------|
| (6) | a | CVV  | píi  | 'flat'                |
|     | b | CVVC | ṇúur | 'snort, snarl, grunt' |

A word consisting of two CV syllables as in (7a) and one consisting of two CVC syllables as in (7b) also have the same stress pattern.

- |     |   |         |                      |   |
|-----|---|---------|----------------------|---|
| (7) | a | CV.CV   | kú.ri                | 'young girl getting ready for marriage' |
|     | b | CVC.CVC | kúr.win <sup>j</sup> | 'darter bird'                           |

Light syllables contain one vowel and therefore one mora. A light syllable may occur either stressed or unstressed. Heavy syllables contain two vowels and therefore two moras. Heavy syllables are usually stressed although an unstressed heavy syllable is marginally possible but only if balanced by a stressed heavy syllable in the other half of the foot.

Yindjibarndi words frequently contain sequences of different vowels in hiatus, as illustrated in (8). While we might expect such sequences to be realized as diphthongs to avoid an onsetless syllable, Yindjibarndi does not require word-internal syllables to have onsets. Adjacent non-identical vowels thus do not coalesce; instead they remain in separate syllables and are pronounced accordingly.<sup>4</sup> The stress pattern, covered in more detail later, confirms that the vowels are in hiatus. In (8), *u* is stressed, clearly indicating that it is not the second half of a rising diphthong.

- |     |            |                            |
|-----|------------|----------------------------|
| (8) | ká.ma.ù.ma | 'man who has lost a child' |
|-----|------------|----------------------------|

Sequences of identical vowels in hiatus also appear frequently, as in (9) below.

- |     |         |           |
|-----|---------|-----------|
| (9) | pí.ja.à | 'thirsty' |
|-----|---------|-----------|

The sequences of identical vowels make the language particularly interesting from a prosodic point of view. According to Wordick, when two identical short vowels meet directly or after lenition of an intervening consonant, they may be pronounced, as I've said, either as a long vowel or as a sequence of two short vowels. Pronounced as a long vowel, there might be a slight volume decrease between the two halves, but never a glottal stop. Long vowels are always tense, but short vowels have a centralized and lax pronunciation before the segments in (10), which include the peripheral oral and nasal stops, the

<sup>4</sup>Some sequences of non-identical vowels may assimilate in quality, but the assimilation is not a focus here.



interdentals, the alveolar stop and nasal, and the retroflex glide and lateral. If two identical high vowels preceding one of the consonants in (10) is actually a long vowel, it will be tense throughout.

(10) Consonants which induce laxing in a preceding short vowel

	Peripheral		Laminal		Apical	
	bilabial	velar	interdental	(palatal)	alveolar	retroflex
Stop	p	k	t̪		t	
Nasal	m	ŋ	ɳ		n	
Glide			j̪			ɽ
Lateral						ɭ

If the vowels are a sequence of two shorts, the second will have the lax pronunciation. The centralized realization of the high vowels thus serves as a helpful diagnostic for vowel length. Wordick notes that this diagnostic does not work for *a* because there is no variant pronunciation.

Yindjibarndi's compact vowel inventory, particularly the high incidence of *a*, makes it quite likely that vowels which become adjacent when intervening consonants delete will be identical. This means that there are a large number of identical vowels in adjacent syllables that may coalesce. And some sequences of non-identical vowels assimilate in quality, further increasing the number of identical adjacent vowels.

The basic workings of Yindjibarndi stress are fairly straightforward. Wordick reports that stress and pitch combine to form three degrees of accent—primary, secondary, and weak or unstressed. I represent the stresses marked by Wordick as ´ for primary stress, ` for secondary stress and leave the unstressed syllables unmarked. Primary stress is always the leftmost stress, with secondary stresses on every other syllable to the end of the word with final syllables eligible for stress or perhaps just final lengthening. Consonant lenition and adjacent identical vowels cause what seems to be a lot of variability in the system. Putting aside the complications for a moment, we examine the most clearcut cases, forms with all light syllables, presented in (11). The patterns show that the language is parsed into trochees. The syllables underlined in the syllable weight column are stressed (L=light, H=heavy).

		Syllable Weight	Stress	Gloss
(11)	a	<u>LLL</u>	(ŋá.ma)(jì.u)	'tobacco, obj.'
	b	<u>LLLL</u>	(má.ɽu)(lìm.pi)(lì)	'midnight'

Following Hayes (1995), we can capture the patterns of (11) stating that the stress is peak first, left to right, with alternating secondary stresses to the end of the word. The trochees

are aligned to the left with End Rule Left, so that the primary stress is on the leftmost syllable. From (11b), it looks as if degenerate feet are allowed at the right edge since they seem to bear stress there. Such final stresses may actually be an instance of final lengthening rather than stress on degenerate feet but Wordick does not provide explicit data on this point.

Sequences of vowels—potential heavy syllables—make the parsing more complex than shown in (11). When a word contains identical adjacent vowels, they may coalesce into a long vowel but coalescence only occurs if the resulting long vowel would be in a stress position—the head of a foot. In (12), two short *a*'s (which came historically from separate syllables and which I argue are in separate syllables underlyingly) merged into a long *aa*. This is licit because the long *aa* bears stress in the output.

	Weight	Input	Output	Gloss
(12)	<u>HL</u>	/t̪a.a̪a/	(t̪áa.t̪a)	'hollow'

Words with heavy syllables in non-stress position cause divergence from the unmarked pattern because they are disfavored.<sup>5</sup> (13) lists the possible and impossible stress patterns of 'thirsty' to clarify the generalization about coalescence of identical adjacent vowels. The impossibility of a stressed light syllable followed by an unstressed heavy syllable in (13a) illustrates that adjacency is insufficient for coalescence; the vowels must be in the head of the foot as well. The vowels cannot coalesce in (13b) because they would not be the head of a foot since the initial light syllable bears primary stress. The vowels can coalesce in (13c) because the light initial syllable has been skipped and the vowels can be the head of a foot.

	Weight	Stress	Gloss
(13) a	* <u>L</u> H	*(pí.jaa)	'thirsty'
b	<u>LL</u>	(pí.ja)(à)	
c	<u>H</u>	pi(jáa)	

While there are a few more complications based on vowel height, we will put our discussion of stress on hold, saving the finer details for Section 5 where the OT analysis is developed, as we move into the details of consonant lenition, the source of the apparent long vowels.

<sup>5</sup>Other languages, such as Fijian (Hayes 1995), when faced with such a situation, employ trochaic shortening and shorten the long vowel in weak position.

### 3 Consonant lenition

Consonant lenition—both synchronic and diachronic—has a significant impact on Yindjibarndi metrical structure. Both types of lenition delete consonants and the loss of a consonant is almost always behind the appearance of surface long vowels. Synchronic lenition can be identified on the basis of morpheme alternation and diachronic lenition on the basis of corresponding forms in sister languages. The types of lenition cannot be collapsed because of differences in morphological environments, targeted segments, and recoverability. The diachronic weakening targeted fewer segments and yielded some different changes than the synchronic weakening. Diachronic lenition took place within roots while the synchronic lenition occurs only between morphemes. This section covers both types of lenition and mentions some of the issues Yindjibarndi presents for a theory of lenition.

#### 3.1 Synchronic lenition

While Wordick states that lenition is always optional, most of the forms he lists in his glossary display the effects of lenition. Perhaps the most striking feature of Yindjibarndi lenition is its social motivation: to be polite, speakers must be muted and sonorous. Wordick (1982: 44-45) states: "Crisp, clear diction is interpreted as an overt indication of hostility, especially when it is combined with a loud voice. However, fortis pronunciation alone is often enough to make an Aborigine grimace." So speakers lenite their consonants to avoid being rude. Seldom do we find politeness figuring so prominently in phonology. Rule-based theories do not easily account for socially-motivated phonology. While not explicitly a theory of pragmatics, Optimality Theory offers the vocabulary to posit a language-specific social constraint and rank it in the hierarchy, to indicate its relative importance in determining the output form. The social constraint requiring output forms to have lost some of the input consonants belongs in the phonology, rather than the phonetics, because it is categorical in that it selects a whole segment as its domain of operation (Keating 1996).

In a suffix, any non-apical Yindjibarndi stop or *r* is potentially lenitable to a glide or to zero intervocalically. Interestingly, the apicals (except *ɾ*) resist the intervocalic lenition to which other consonants succumb.<sup>6</sup> The consonants that resist synchronic lenition appear in (14).

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<sup>6</sup>Perhaps the frequently-lenited stops have a different representation than those that remain. For instance, the laminals, which delete very frequently, might lack a root node. This issue is not taken up here.

## (14) Non-Leniting Consonants

	Apical	
	alveolars	retroflexes
Stop	t	ɽ
Nasal	n	ɳ
Glide	r	
Lateral	l	ɭ

Lenition can also occur if the final segment of a root is *r*, but I will continue to refer to the lenition environments as intervocalic since the *r* cases are fairly uncommon. The intervocalic environments are created through morpheme concatenation. Like most Australian languages, Yindjibarndi suffixes derivational and inflectional morphemes. Since many roots end in vowels and most suffixes begin with consonants, V+CV sequences frequently arise. The intervocalic consonant is eligible for lenition.<sup>7</sup> (15) schematizes a situation in which the suffix-initial consonant from the input fails to appear in the output because of lenition. The lenition leaves the vowels in hiatus, though; they are not strictly a long vowel.

## (15) Root + Suffix

CVCV + CV	kaɽa + ɽiri	→	kaɽairi
'rock outcropping'	bottom + stick out		

(16) illustrates lenition that occurs between a root-final *r* and a suffix vowel.

## (16) Root + Suffix

CVCr + CV	ɲawur + kaɽaa	→	ɲawuraɽaa
'beer'	bubble + having		

(17) illustrates the deletion of *k* from the form *murukuju*, leaving *muruuju*. (18) illustrates the deletion of *p* from *nʲinkupuraa*, leaving *nʲinkuura*.

(17) 'backwards'	muruk + ju	→	mú.ru.ù.ju
	back + side		

(18) 'in your direction'	nʲinku + puraa	→	nʲín.ku.ù.ra.à
	to/for you + allative case		

In (19) a consonant deletes from each of the suffixes so that both *r* and *k* are lost, resulting in a sequence of three vowels, which is not uncommon in Yindjibarndi.

<sup>7</sup>One might ask if a root-final consonant lenites before a suffix-initial vowel. In fact, this situation does not occur as various aspects of the language conspire to prevent it. Stem-final consonants are always apicals or nasals, which do not lenite. There are very few vowel-initial suffixes and for those that exist, a non-deleting coronal consonant morpheme separator can be inserted before the suffix.

- (19) 'match, stick'      piri + ri + ku      →      pí.ri.ì.u  
slender + nominaliz. + obj.

(20) through (22) illustrate a suffix-initial stop weakening to a glide. In (20) *p* weakens to *w*. Normally *k* weakens to zero, but following *u*, it weakens to the glide *w* as shown in (21). In (22) *tʃ* weakens to *j*.

- (20) 'pancreas'      ka[ɭi + piri      →      ká.ɭi.wì.ri  
boomerang + "ish"

- (21) 'initiand'      piɽu +ka + ŋu      →      pí.ɽu.wà.ŋu  
abduct + derivational suffixes

- (22) 'stove'      kampa + tʃ + aŋɽu      →      kám.pa.jàn.ɽu  
cook + deriv. suffix + genitive

The lenition shown in (17) through (22) represents the pattern that occurs throughout the language. (23) summarizes the synchronic lenition attested in Wordick's grammar. No apicals, except *ɽ*, appear in (17) through (22) because they do not weaken. The steadfast resistance to lenition of the apicals is quite interesting and awaits explanation in further work.

(23)	stop to glide	glide to zero	stop to zero
peripherals	p > w	w > ∅	p > ∅
	k > w/u_	w > ∅	k > ∅
laminals	ɽ > ɽ̣	ɽ̣ > ∅	ɽ > ∅
	tʃ > j	j > ∅	tʃ > ∅
apicals		ɽ > ∅	

From this chart and from examples (17), (18), and (19), it may seem that lenition, in some way, applies doubly to some forms, first weakening stops to glides (*p* > *w*) then deleting the glides (*w* > ∅). Approached derivationally, one rule that applied twice or two different rules would be needed to carry out basically the same weakening process. In Optimality Theory, the apparent double application is easily accounted for as degrees of constraint violation, a point developed below in the actual analysis.

### 3.2 Diachronic lenition

Some surface long vowels, though, do not occur just at morpheme boundaries and seem to be underlying. Examining Yindjibarndi's language family reveals that these vowels nearly all arose through historical lenition from the proto language. Consonants from the proto language may have come into Yindjibarndi either intact, lenited to glides, or deleted. VV sequences in Yindjibarndi roots are cognate to VCV sequences in sister

languages. Given Yindjibarndi's tolerance of vowel hiatus, we can posit that the synchronic input does not contain a vestigial consonant, instead just the two vowels in hiatus. Sequences of identical short vowels from historical lenition behave like those that result from morpheme concatenation and lenition. If the vowels are in the appropriate stressable position, they may merge into a long vowel, but not necessarily.

I illustrate diachronic lenition with a sample of cognate root words, all of which come from Wordick (1982). (24) shows the word for 'mouth' or 'beak' which is *ɬaa* in Yindjibarndi. The sister languages Pandjima and Ngarla have *ɬaɬa* and *ɬaya* and the proto language has been reconstructed with a consonant.

(24) Lenition to Zero

a	<i>ɬa.a</i>	Yindjibarndi	'mouth, beak'
b	<i>ɬaɬa</i>	Pandjima	
c	<i>ɬaja</i>	Ngarla	

Although there are no alternating forms in Yindjibarndi itself from which to recover the historical consonant, the vowel behavior and sister languages indicate the historical presence of a consonant. The deletion of the proto language segment left two short vowels in hiatus, not one long vowel. In the examples which have undergone diachronic lenition, I indicate an empty onset between the short vowels with a period to represent the syllable boundary that I take to be present.

(25) shows that 'plump' is *kuɬu.uɬu* in Yindjibarndi but *kuɬukuɬu* in the sister language Pandjima, indicating the presence of a medial consonant at an earlier stage of the language. If this had been a case of synchronic lenition, the output would have been *kuɬuwuɬu* because synchronically *k* weakens to *w* after *u*.

(25)	a	<i>kuɬu.uɬu</i>	Yindjibarndi	'fat and round, plump'
	b	<i>kuɬukuɬu</i>	Pandjima	

(26) illustrates lenition from a stop to a sonorant, based on the segments in the sister language Pandjima.

(26) Lenition to Sonorant

a	<i>wirwi</i>	Yindjibarndi	'wind'
b	<i>wirpi</i>	Pandjima	

(27) summarizes examples of diachronic weakening in Wordick's grammar. In addition to the weakenings listed in (27), there were various exchanges with laterals and nasals that are not considered here.

(27)		stop to glide	glide to zero	stop to zero
	peripherals	p > w		
		k > w		k > ∅
	laminals	t <sub>h</sub> > j		
		tʰ > j	j > ∅	tʰ > ∅
		tʰ > j		
	apicals		ɾ > ∅	

The chief differences to note between the synchronic and diachronic weakenings deal with *p*, the glides, and the interchange between the two sets in the laminal series. These differences render the changes unpredictable and synchronically unrecoverable. Historically, *p* does not delete completely; it just lenites to *w*. The glides *j* and *w* do not delete, either. Another difference between the synchronic and diachronic lenition is that some instances of intervocalic *ɾ* deleted on the way from the proto language, but others did not. In (28a), an intervocalic *ɾ* is deleted from the proto language, but in (28b), it is maintained.

(28)	a	minɿi.i minɿiri	Yindjibarndi Ngarluma	'wart, small growth' 'fingernail'
	b	tʰajira tʰatʰira	Yindjibarndi Ngarluma	'12-14 year old boy'

Diachronic lenition, in stark contrast to synchronic, included some weakening in root-initial position, as shown in (29).

(29)	a	waŋa	Yindjibarndi	'that, near'
	b	paŋa	Nyangumarda	

This comparison of the synchronic and diachronic lenition demonstrates that, although similar, the two must be considered separately.

The weakenings in Yindjibarndi do not follow the pattern of lenition seen in many of the world's languages, and often discussed in historical linguistics (e.g. Arlotto 1972). Lenition, originally defined as a historical process, refers to a consonant's path on its way to zero. Notably, Hock's (1991) hierarchy of lenition processes includes fricatives and voiced variants as important intermediate steps in lenition; he shows no examples of lenition from a stop directly to a glide or from a stop directly to zero. Since Yindjibarndi has no fricatives or contrastive voicing, it may reveal the dynamics of lenition in the absence of some of the segments.

We now have seen evidence from the history and the morphology of the language for the heterosyllabic origins of long vowels. Simply working with output forms of morphologically complex words gives an incorrect impression of the status of long vowels. Either the historical source or the morphological input nearly always demonstrates that the vowels did not originate in the same syllable, but were separated by a consonant at some point. The results of diachronic lenition are very important to the synchronic phonology because many sequences of identical vowels derive from VCV sequences in the proto language. Long vowels appear because *an intervening consonant has been lost*—either synchronically or diachronically—and two short vowels have coalesced across the void when they were in a position to bear stress.

#### 4 Constraints on consonants

This section develops the constraints needed to select the correct output forms with respect to consonants. This analysis within Optimality/Correspondence theory (McCarthy and Prince 1995) employs positional faithfulness constraints (Beckman 1997) that highly value the input of the root, especially the initial consonant. The consonants in suffixes are less highly valued and may be left out of the output, yielding lenition. Among the consonants, the apicals are highly valued and the output must maintain them, so that there is very little lenition of apicals. A constraint \*RUDE requires that some oral consonants or degrees of closure be omitted to be polite

The first two constraints that narrow the set of possible outputs are IDENTINIT and MAXROOT, both of which require the root input to be included in the output. Following McCarthy & Prince (1995), I have used IDENT for the constraint requiring faithful parsing of *features* and MAX for the constraint requiring faithful parsing of entire segments.

(30) IDENTINIT: Word-initial input segments must be in perfect featural correspondence with the output.

IDENTINIT is a positional faithfulness constraint which requires that the initial segment of a word's output form be identical to the input form. All Yindjibarndi words begin with a consonant, usually a peripheral stop, *j* or *w*, and this consonant may never be deleted or weakened. Lombardi (1995) motivates and employs a positional constraint, IDONS (Identity of Onset), similar to IDENTINIT in requiring syllable onsets to be in exact featural correspondence with the input. Beckman (1997) also motivates and employs positional faithfulness constraints. Positional constraints rely on alignment and syllable structure for



their environments. They are motivated by cross-linguistic evidence that some prosodic positions, such as word initial position, are more salient than others.

(31) MAXROOT: All input segments must appear in the output.

MAXROOT is another positional faithfulness constraint, forbidding deletion within the root. The MAX family of constraints, introduced in McCarthy & Prince (1995), requires that all segments in the input be included faithfully in the output. With respect to the root, MAXROOT requires words to include all segments of the root input in the output, thus assuring greater fidelity to the root than to suffixes.

(32) IDENTINIT » MAXROOT

pali + t̪iri 'blue tongue lizard' dark colored + has quality	IDENTINIT	MAXROOT
a. pá.li.ɬ.ri		
b. wá.li.ɬ.ri	*	
c. pá.i.ɬ.ri		*
d. wá.i.ɬ.ri	*	*

A few scattered words violate fidelity to the root but absolutely no words violate fidelity to the initial segment, demonstrating that IDENTINIT outranks MAXROOT.

(33) \*RUDE: Be as sonorous as possible; avoid full closure.

Recall from the discussion of vowels that word-internally, syllables do not require onsets; in fact, lenition is preferred, so the next constraint I propose is \*RUDE or DON'T BE RUDE which expresses the strong preference for sonorous articulation. This sociolinguistic constraint quantifies the impact of this aspect of aboriginal culture on the phonology. \*RUDE requires speakers to be as sonorous as possible. In so doing, they omit segments whose absence impacts the prosodic structure. The violations of \*RUDE by segment type are listed in (34). A sonorant incurs one violation of \*RUDE but a stop incurs two. I assume broad categories of sonority following Zec (1988).

(34) Violations of \*RUDE Illustrated

	*RUDE
zero	
sonorant	*
oral stop	**

Oral consonants, especially stops, must be weakened or deleted; each step away from zero is one violation of \*RUDE. Nasal consonants do not weaken; apparently nasality is polite enough. I record no marks for nasals and laterals for violations of \*RUDE because they do not lenite.

In many tableaux, violations of \*RUDE per word are indicated in columns by syllable. This does not imply a separate constraint for each syllable, but is meant to facilitate computing violations. Tableau (35) illustrates that IDENTINIT outranks \*RUDE. Even though (35e) and (35f) have fewer violations of \*RUDE in the first syllable, they both fatally violate IDENTINIT.

(35) IDENTINIT » \*RUDE

piri + ɾi + ku 'match, stick' slender + suffix + acc	IDENTINIT	*RUDE (by syllable)			
		1	2	3	4
a. (pí.ri)(î.u)		**	*		
b. (pí.ri)(î.wu)		**	*		*
c. (pí.ri)(î.ku)		**	*		**
d. (pí.ri)(ɾi.ku)		**	*	*	**
e. (wí.ri)(ɾi.ku)	*!	*	*	*	**
f. (î.i)(î.u)	*!				

Tableau (36) illustrates that fidelity to the root is more important than being polite. Although the winner, (36a), actually violates \*RUDE three times, it is still the best choice; the other candidates either have more violations of \*RUDE (36d) or they fatally violate MAXROOT (36b, c).

(36) MAXROOT » \*RUDE

piri + ɾi + ku 'match, stick' slender + suffix + acc	MAXROOT	*RUDE (by syllable)			
		1	2	3	4
a. (pí.ri)(î.u)		**	*		
b. (pí.î)(î.u)	*	**			
c. (î.î)(î.u)	**				
d. (pí.ri)(ɾi.ku)		**	*	*	**

Tableau (37) shows the ranking of the three constraints developed thus far. IDENTINIT and MAXROOT are both needed so we can distinguish (37b) which is absolutely impossible and (37c) which is marginally acceptable and indicated in the tableau with the pointing hand followed by a right parenthesis.

(37) IDENTINIT » MAXROOT » \*RUDE

jara 'shield'	IDENTINIT	MAXROOT	*RUDE	
			1	2
a. (já.ra)			*	*
b. (á.ra)	*	*	*	
c. (já.a)		*		*
d. (á.a)	*	**		

(38) IDENT<sub>TIP</sub>

Apical coronals resist lenition more than any other consonants. We can express this resistance with the featural faithfulness constraint IDENT<sub>TIP</sub>, which requires that apicals from the input stay as they are in the output. McCarthy and Prince (1995), Lombardi (1995), and Padgett (1995) all employ constraints requiring correspondence of features from input to output. \*RUDE does not eliminate candidates that maintain apical stops so IDENT<sub>TIP</sub> must outrank \*RUDE. Padgett (1995) discusses partial class behavior which is similar to this partial class behavior of coronals with respect to the tip or blade of the tongue.

(39) IDENT<sub>TIP</sub> » \*RUDE

kampa + tʃ + anʃu 'stove' heat + suffix + genitive	IDENT <sub>TIP</sub>	*RUDE (by syllable)			
		1	2	3	4
a. (kám.pa)(jàn.ʃu)		**	**	*	**
b. (kám.pa)(jà.ʃu)	*	**	**	*	**
c. (kám.pa)(jàn.u)	*	**	**	*	
d. (kám.pa)(jà.u)	**	**	**	*	
e. (kám.pa)(tʃan.ʃu)		**	**	**	**

In (40) I summarize the ranking of the constraints developed so far to account for the consonants and present a summary tableau.

## (40) Summary Ranking

IDENT<sub>INIT</sub> » IDENT<sub>TIP</sub> » \*RUDE  
MAX<sub>ROOT</sub>

kampa + tʃ + anʃu 'stove' heat + suffix + genitive	IDENT <sub>INIT</sub>	IDENT <sub>TIP</sub>	MAX <sub>ROOT</sub>	*RUDE (by syllable)			
				1	2	3	4
a. (kám.pa)(jàn.ʃu)				**	**	*	**
b. (kám.pa)(jà.ʃu)		*		**	**	*	**
c. (kám.pa)(jàn.u)		*		**	**	*	
d. (kám.pa)(jà.u)		**		**	**	*	
e. (kám.a)(jà.u)		**	*				
f. (kám.wa)(jà.u)			*	**	*	*	

Because a word-initial segment is never altered, IDENT<sub>INIT</sub> is the highest ranking consonantal constraint. Since the root is almost always maintained with consonants intact and since the apical consonants do not delete, these constraints are the next highest ranking. \*RUDE, whose effects may be seen irregularly, is the lowest ranked of these important consonantal constraints. We can now move on to the prosodic structure and the constraints that yield it.

## 5 Constraints on prosodic structure

As seen above, Yindjibarndi's stress system presents a variety of complications. Despite these complications, the stress system can be insightfully accounted for in Optimality Theory. The logically possible trochees appear in (41) and (42). A check marks each foot attested in Yindjibarndi.

(41) Possible Syllabic Trochees (weight insensitive)	(42) Possible Moraic Trochees (weight sensitive)
HL $(\sigma_{\mu\mu} \sigma_{\mu})$ ✓	
HH $(\sigma_{\mu\mu} \sigma_{\mu\mu})$ ✓ (rare)	H $(\sigma_{\mu\mu})$ ✓
LL $(\sigma_{\mu} \sigma_{\mu})$ ✓	LL $(\sigma_{\mu} \sigma_{\mu})$ ✓
LH $(\sigma_{\mu} \sigma_{\mu\mu})$	

Syllabic trochees, shown in (41), are weight insensitive; that is, only the number of syllables per foot matters, not whether the syllables are light (L) or heavy (H). Moraic trochees, shown in (42), on the other hand, are weight sensitive. A moraic trochee consists of two moras, whether from one heavy syllable or two light syllables. Languages normally choose either the syllabic or the moraic trochee as their parsing unit, but Yindjibarndi constitutes an unusual case by using some of both trochees, indicating a degree of weight sensitivity. It is the incorporation of both trochees and weight sensitivity in a single system that has been referred to in the literature as the generalized trochee (Prince 1980, Kager 1993), that made Yindjibarndi an appropriate test case for Kager. Within the generalized trochee, the only trochee completely outlawed is the LH (light heavy) trochee, a fact that figures prominently in the Optimality analysis.

To explain the parsing of Yindjibarndi and a number of other trochaic languages in "Shapes of the Generalized Trochee," Kager (1993) builds a two-layered model of parsing used by some languages to avoid clashes (adjacent stressed units) at both the moraic and syllabic levels. Kager describes generalized trochee systems such as Yindjibarndi as combining an underlying distinction of syllable quantity and syllable-based rhythm. Based on my own investigation, this does not actually extend to Yindjibarndi because it lacks an underlying distinction of syllable quantity. Instead, the long vowels are a function of their prosodic position. Kager followed Wordick (1982) in assuming phonemic long vowels, but, as argued above, Wordick's evidence for phonemic long vowels is not compelling.

Kager's system needs two layers to allow access to moraic rhythm in syllable parsing. This access is essential because the parsing needs to react if a long vowel threatens to land in the weak half of a foot. For Kager, "breaking" occurs where otherwise a syllable clash

would arise from mora layer parsing or from the juxtaposition of two long vowels. The breaking is a way of avoiding unstressed heavy syllables by breaking up long vowels into two light syllables.

Kager captures the crucial insight into why Yindjibarndi cannot be parsed simply with a linear, rule-based approach—the breaking must occur *in tandem with foot parsing*. Kager (1993: 303) even suggested that in Prince & Smolensky's Harmonic Theory, a constraint that heavy syllables are stressed is subordinated to that of foot bisyllabicity.<sup>8</sup> Had Optimality Theory been in wider use at the time, Kager would probably have formalized his analysis with constraints rather than rules. Even in Optimality Theory, though, Kager's approach would not precisely capture the situation because he follows Wordick in assuming vowel breaking. Under my approach, the input forms are quite close to the output forms; even the non-merged output is acceptable because it is always possible to have the vowels in separate syllables,

OT allows us to formalize the conflicting constraints on the system and represent the degree of weight sensitivity as a result of constraint interaction, eliminating the need to assign stress with a powerful linear process that can look ahead. Additionally, OT accounts easily for the variability that will be seen in some aspects of the stress pattern. From either set of assumptions, OT best handles the conflicting demands on the system.

At the end of section 2, I presented the basics of the stress system. Here I will present the constraints needed to account for both the clear cut and the complicated patterns. To begin with, we must account for the high degree of faithfulness to moras from the input. In contrast to the low regard in which Yindjibarndi holds most consonants, it highly values all moras and includes almost every input vowel in the output. That indicates that a constraint requiring fidelity to the vocalic input is very highly ranked. Since most syllables are included in the foot structure, a constraint requiring that all syllables be parsed into the output is also important. To select candidates whose footing begins at the proper (left) edge, we need a constraint that requires left alignment. A constraint that requires merged or coalesced vowels is also needed. Coalescence must, however, be prevented if a vowel is not in stress position. The tension between constraints to avoid heavy unstressed syllables and those to require coalesced vowels and parsing of syllables result in the language's strategies to handle syllable weight and stress. I introduce the specific constraints as I build up the analysis case by case, first the core cases, then the further intricacies.

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<sup>8</sup>We will see later that Kager's insight is codified in my analysis as the higher ranking of the constraint that merges sequences of identical adjacent vowels over the constraint requiring binary feet.

When all vowels in a word are short, the pattern is simple and predictable, as shown below in (43) with words from two to seven light syllables. As we saw earlier, the primary stress is on the initial syllable. Secondary stresses appear on odd syllables to the end of the word, including the final syllable, in words with an odd number of syllables. The words with even numbers of syllables, (43 a, c, and e), show that the pattern is trochaic and not iambic.

		Descriptive Generalization	Footing	Gloss
(43)	a	<u>LL</u>	(kú.lu)	'louse'
	b	<u>LLL</u>	(pú.la)(jì)	'round thing, obj.'
	c	<u>LLLL</u>	(ŋá.ma)(jì.u)	'tobacco, obj.'
	d	<u>LLLLL</u>	(má.tu)(lìm.pi)(lì)	'midnight'
	e	<u>LLLLLL</u>	(mí.lì)(mì.lì)(mà.ja)	'post office'
	f	<u>LLLLLLL</u>	(wí.lu)(kù.ru)(mì.ʔa)(jì)	'gravy'

In words of all light syllables, all vowels—the only moraic segments of the language—are included in the foot structure. This can be formalized with the constraint MAXMORA.

(44) MAXMORA: All moras from the input must be maintained in the output.

MAXMORA (McCarthy & Prince 1993) is very highly ranked in Yindjibarndi. It requires faithfulness to all of the moras in the input; that is, all moras from the input form must be maintained in the output.<sup>9</sup> This constraint interacts with FOOTBIN (45) to select candidates that have feet with two moras.

(45) FOOTBIN: Feet have two moras.

The constraint FOOTBIN (McCarthy & Prince 1993) requires that all feet, in this case, trochees, have *two moras*. A degenerate foot with just one mora violates FOOTBIN as does a HL foot with three moras. Tableau (46) shows the interaction of MAXMORA and FOOTBIN. The winner, candidate (46a), has a final degenerate foot indicating that MAXMORA is ranked higher than FOOTBIN.

<sup>9</sup>There are a few exceptions in which a sequence of three input vowels reduces to two vowels. These are quite rare and do not play a major role here, though they do suggest a constraint against superheavy syllables.

(46) MAX $\mu$  » FOOTBIN

wila + ra 'moon'	MAX $\mu$	FOOTBIN
a. (wí.la)(rà)		*
b. (wí.la)r	*	
c. (wí.lra)	*	

To achieve footing from the left edge, we employ the constraint ALLFOOTLEFT.

## (47) ALLFOOTLEFT: All feet are aligned with the left edge of the prosodic word.

This can be stated in McCarthy & Prince's (1993) generalized alignment vocabulary as align the left edge of the foot to the left edge of the prosodic word or Align {L, Ft; L, PrWd}. The effects of ALLFOOTLEFT, however, have to be mitigated by FOOTBIN. If ALLFOOTLEFT dominated, a word would consist of a single foot, which is illustrated as the failed candidate (48b). With FOOTBIN and MAXMORA ranked higher, the feet should have two moras, but they must also be as closely aligned to the left edge as possible.

## (48) FOOTBIN » ALLFOOTLEFT

wila + ra 'moon'	FOOTBIN	ALLFTLEFT
a. (wí.la)(rà)		*
b. (wílara)	*	
c. (wí)lara	*	
d. wi(lá.ra)		*

The feet are clearly trochees, so we need a constraint that selects candidates with left-headed feet. This can be accomplished with FOOTFORMTROCHAIC (McCarthy & Prince 1993).

## (49) FOOTFORMTROCHAIC: Feet have initial prominence.

This constraint must be undominated as there are no iambic feet. A summary of the constraints needed to derive the least marked pattern of Yindjibarndi foot structure appears in (50). These constraints interact to yield the faithfulness to vowels and the basic trochaic structure.

## (50) Summary Ranking

PARSE $\mu$  » FOOTBIN » ALLFOOTLEFT  
FOOTFORMTROCHAIC

When two short vowels could be footed as a long vowel in stressable position, we need a constraint to select the candidate with the coalesced vowels. (51) lists some words of this pattern. (51a) and (b) have the possible long vowel at the very beginning of the word.

(51c) has the possible long vowel at the head of the second foot following a Light-Light trochee.

		Descriptive Generalization	Footing	Gloss
(51)	a	<u>HL</u>	(táa.ta) (jii.mit)	'hollow' 'itchy'
	b	<u>HLL</u>	(káaɾ.wanʲ)(t̪i) (wíi.ri)(ɾi)	'slip, slide' 'blue wren'
	c	<u>LLHL</u>	(ŋú.ɲuŋ)(kii.ɾi) (kán.t̪i)(ɾàa.ɾi)	'they' 'sneeze'

To account for long vowels, I propose the constraint MERGEV.V (hereafter simply MERGE).

(52) MERGEV.V: Sequences of identical vowels must merge into a long vowel.<sup>10</sup>

Tableau (53) shows that MERGE dominates FOOTBIN to get the HL trochees. If FOOTBIN dominated MERGE, MERGE would never have any effect. Since the language has many HL trochees, MERGE must play a role.

(53) MERGE » FOOTBIN

	kupitʰa + kari 'to shrink' small + become	MERGE	FOOTBIN
☞	a. (kú.pi)(t̪àa.ri)		*
	b. (kú.pi)(t̪à.a)(ɾi)	*	*

The constraint \*RUDE must be considered again at this point because of its involvement in sequences of identical short vowels: when \*RUDE is obeyed, there are sequences of vowels. Tableau (54) elucidates the ranking of MERGE and \*RUDE. In (54) the sequence of identical vowels arises because of lenition. In candidate (54b), MERGE cannot apply because \*RUDE has been violated and a consonant is in the way. Candidate (54b) fails, but is not as bad as (54c) which has violated \*RUDE in the fourth syllable. Violations of MERGE are sometimes acceptable, but violates of \*RUDE are not usually.

<sup>10</sup>MERGEV.V will eventually be replaced as the exact motivation for the merging becomes clear. Merging is probably the result of several other constraints whose exact ranking remains to be determined. ONSET might be responsible for the merging to eliminate an onset-less syllable but we have seen that Yindjibarndi tolerates many ONSET violations. The Obligatory Contour Principle might be responsible for the fact that identical vowels merge, but not different vowels. The OCP cannot be doing all of the work, though, because adjacent identical vowels certainly do occur.



## (54) \*RUDE » MERGE

	kupit'a + kari 'to shrink' small + become	*RUDE (by syllable)					MERGE
		1	2	3	4	5	
☞	a. (kú.pi)(t̪àa.ri)	**	**	**	*		
	b. (kú.pi)(t̪à.a)(rì)	**	**	**		*	*
	c. (kú.pi)(t̪à.ka)(rì)	**	**	**	**	*	*

As we have said, vowels are not always merged. Vowels do not merge if they cannot be stressed. So MERGE is sometimes violated, especially in cases where its satisfaction would favor a heavy but unstressed syllable. To insure the violation of MERGE in these cases, a higher ranked constraint, \*HEAVYNOSTRESS, based on Prince's (1990) Weight-to-Stress Principle, is needed.

## (55) \*HEAVYNOSTRESS: No heavy syllables are allowed in the weak half of a foot.

The Weight-to-Stress Principle states "If heavy, then stressed" and the contraposition states that "If unstressed, then light." Both the principle and its contraposition are true almost without exception in Yindjibarndi. Prince (1990) says that the converse of the Weight-to-Stress Principle, "If stressed, then heavy" does not hold and this is supported by Yindjibarndi. The constraint \*HEAVYNOSTRESS forbids a long vowel in the weak half of a foot, thus restricting MERGE's influence to the strong position of a foot. Tableau (56) shows that \*HEAVYNOSTRESS dominates MERGE.

## (56) \*HEAVYNOSTRESS » MERGE

	tumpu + ku 'buttocks, obj.'	*HVNOSTR	MERGE
☞	a. (túm.pu)(k̪>ù)		*
	b. (túm.pu<k>u)	*!	

Up to this point, I have treated all vowels as behaving the same to avoid unstressed heavy syllables. This is not, however, the case. The two vowel heights—high and low—each have a preferred behavior that the constraints must account for. The low vowel prefers to leave an immediately preceding light syllable unfooted violating PARSESYLL, while the components of possible long high vowels simply remain in separate syllables, violating MERGE.

When a sequence of identical adjacent high vowels (*ii* or *uu*) would appear in non-stress position, the vowels usually do not coalesce, instead remaining in separate syllables. This may account for the vastly greater frequency of *aa* than *ii/uu* mentioned earlier. Examples of this appear in (57a) through (d).

- |      |   |              |                      |                      |
|------|---|--------------|----------------------|----------------------|
| (57) | a | <u>LLL</u>   | (túm.pu)(ù)          | 'buttocks, obj.'     |
|      | b | <u>LLLL</u>  | (nǐ.in)(nǐ.in)       | 'giddiness'          |
|      | c | <u>LLL</u>   | (pú.ti)(ì.ti)        | 'spike bush'         |
|      | d | <u>LLLLL</u> | (wí.ru)(ù.la)(wà.ju) | 'several days later' |

When *aa* appears in a non-stress position, we find a different strategy at work. When *aa* would merge in the weak half of the foot, the preceding light syllable as shown in (58a) through (d) is left unfooted. By leaving that syllable unfooted, the long low vowel becomes the head of the foot. This strategy is also employed by Finnish to avoid a light-heavy trochee (Kager 1993).

- |      |   |             |                  |                      |
|------|---|-------------|------------------|----------------------|
| (58) | a | <u>LH</u>   | pi(láa)          | 'native pampa grass' |
|      | b | <u>LHL</u>  | pu(náa.ɲu)       | 'bloodwood'          |
|      | e | <u>LLLH</u> | (mán.t̪a)mi(ɾàa) | 'eel'                |
|      | f | <u>HLLH</u> | (t̪áa.ɾi)ar(làa) | 'female'             |

(59) illustrates the only case where a heavy syllable is allowed in the weak half of a foot: when the strong half is also a heavy syllable. Vowels can only coalesce in an even-numbered syllable if the vowels in the preceding odd-numbered syllable also coalesce. This situation yields a heavy even trochee which seems to be acceptable.

- |      |           |               |           |
|------|-----------|---------------|-----------|
| (59) | <u>HH</u> | (páa.ɲ.paa.ɲ) | 'halfwit' |
|------|-----------|---------------|-----------|

I propose that the difference between long *aa* and long *ii/uu* is actually one of onsets. The constraint ONSET, though highly ranked in many languages, has a lower rank in Yindjibarndi and makes itself known in non-standard ways, one of which is vowel coalescence. Yindjibarndi *a* has no inherent on-glide whereas Wordick reports that *i* and *u* each have an on-glide and could be represented as *<sup>j</sup>i* and *<sup>w</sup>u*. With these representations, the high vowels have their own, albeit minimal, onset but the low vowel has none. The brief gliding onset to the high vowels seems to be enough to satisfy ONSET, but the lack of on-glide violates ONSET for the low vowel and favors merging.

Tableaux (60) and (61) illustrate the ranking of \*HEAVYNOSTRESS, ONSET, MERGE, and PARSESYLL needed to get these possible parses. Again, the hand followed by the right parenthesis indicates an acceptable variant. (60a) is the optimal output in that it satisfies all constraints but PARSESYLL. (60b) is an acceptable variant which does not violate PARSESYLL but does violate ONSET.

(60) \*HEAVYNOSTRESS » ONSET » PARSESYLL (with *aa*)

	pampaa 'test, try'	*HVNOSTR	ONSET	PARSESYLL
☞	a. pam(páa)			*
☞	b. (pám.pa)(à)		*	
	c. (pámpaa)	*!		
	d. (pámpa)a			*

(61) \*HEAVYNOSTRESS » ONSET » PARSESYLL (with *uu*)

	tumpuu 'buttocks, obj.'	*HVNOSTR	ONSET	PARSESYLL
☞	a. tum(púu)			*
☞	b. (túm.pu)(ù)			
	c. (túm.puu)	*!		
	d. (túmpu)u			*

(61b) is the optimal output of tableau (61), violating none of the constraints listed. While it is structurally the same as (60b), it does not violate ONSET, as (60b) did, because of *u*'s inherent on-glide. (61a) is an acceptable variant that only violates PARSESYLL. These tableaux, with both the truly optimal candidate and the acceptable variant, account for the occasional switching of strategies.

While complicated, the behavior of the language is consistent with respect to height and stress. The Weight-to-Stress Principle, "if heavy, then stressed," works for the language. And "if unstressed, then light" also works except for a very small number of marginal cases of trochees with two heavy syllables. The heavy heavy trochee is allowed because it is even and trochees tend to prefer even weight distribution.

We have now seen all of the constraints needed to achieve the observable metrical structure of Yindjibarndi, and I will now provide a sample of a word interleaving the consonant and vowel constraints. All of the candidates in (62) satisfy the highly ranked constraint MAXMORA and the undominated constraint IDENTINIT. Violations of \*RUDE are only marked here for those suffixal consonants that could be lenited.

## (62) 'blue tongue lizard' (dark-color + possessing)

	pali + t̪iri	MAXRT	IDTIP	*RUDE	*HNO'	ONSET	MERGE	FTBIN
☞	a. (pá.li)(i.ri)			*				
☞	b. pa(líi.ri)			*				
	c. (pá.li)(j̪i.ri)			**				
	d. (pái)(i.ri)	*!		*				
	e. (pá.li)(i.i)		*!					
	f. (pá.li)(t̪i.ri)			***				
	g. (pá.lii)(ri)			*	*			*

## 6 Conclusions

I have reanalyzed Wordick (1982) and Kager's (1993) vowel breaking as selective coalescence with based on evidence from the language's morphology and history. Working from a coalescence position, I have accounted for Yindjibarndi's metrical structure by clarifying the interactions of consonant weakening, vowel coalescence, and weight in the stress system. OT offers a vocabulary for the conflicting pressures on the system which were difficult for Kager to express using rules. In this paper, I have integrated constraints of straight phonology with sociolinguistic demands on the phonology. Use of sociolinguistic constraints allows us to see OT as a theory that extends beyond phonology and into language use, thus accounting for more of the variation in speech.

Yindjibarndi is an excellent case for a sociolinguistic constraint because of the clear social motivation (dispreference for crisp articulation) and phonological repercussions. I have accounted for lenition with a combination of a socially-motivated constraint and greater faithfulness to roots than suffixes. The sociolinguistic constraint \*RUDE impacts the rest of the phonology. Since new phonology is often rooted in variation, we cannot exclude variation from influencing the optimal output. Just as faithfulness constraints impose the requirements of the lexicon on outputs, sociolinguistic constraints impose the requirements of culture. Yindjibarndi phonological lenition effectively deletes an entire segment (Keating 1996), forcing other adjustments to its absence.

This work has demonstrated that Yindjibarndi does not split vowels but instead merges sequences of identical short vowels. I have accounted for the greater frequency of long low vowels in terms of ONSET violations because *a* lacks the inherent on-glides of *i* and *u*. I have shown that in terms of fidelity to the input segments, vowels and consonants are treated very differently, illustrating that faithfulness need not work the same for all segment types. I have demonstrated that the long vowels are not underlying, but a result of merging in appropriate prosodic positions. I have also illustrated how the constraints working on lenition and weight to stress combine give the *illusion* of vowel breaking. Viewing the vowel behavior not as breaking, but instead as coalescence, allowed me to make sense of a system that at first glance seems unprincipled.

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