



The Citation form is the speech register used in traditional songs and for clarification.<sup>3</sup> Gegeo and Watson-Gegeo (1986) write that these forms are also used in alternation in calling out routines (a ritualized, songlike speech style).

### 1.3 Reasons for a Synchronic Analysis

**Robustness of the Paradigm.** Every word, including morphologically related words, has a pronunciation in the Normal and Citation form.

	Citation	Normal		Citation	Normal
a.			b.		
c.			d.		

**Loanwords.** Loanwords also have undergone this transformation, which indicates that CV metathesis is productive.

	Citation	Normal		Citation	Normal
a.			b.		
c.			d.		

**Richness of the Base.** There are no C<sub>1</sub>V<sub>1</sub>C<sub>2</sub>V<sub>2</sub> sequences in Normal surface forms. The grammar must transform underlying forms like /C<sub>1</sub>V<sub>1</sub>C<sub>2</sub>V<sub>2</sub>/ into legal surface forms.

## 2 Analysis

### 2.1 The Grid

I follow previous researchers in maintaining that the stress pattern holds the key to the locations of CV metathesis (Laycock 1982, Blevins and Garrett 1998, Norquest 2001, Baird 2002).

The Normal form speech register is quantity-sensitive.

CV and GV syllables are light; everything else is heavy.

(5)	Final Syllable	Normal		(cf. Citation)
a.	CV		pity her, him or it	
b.	GVC		pity them	
c.	CGVC		cheek	
d.	CVGC		thinking	
e.	CVVC		goosebumps	
f.	CGV		crazy	

We can abstract away from the heavy light distinction by representing stress using the metrical grid (Liberman and Prince 1977, Prince 1983, Gordon 2003).

<sup>3</sup>The Citation form has also been called the long form (Sohn 1980), historical form (Simons 1977, Blevins and Garrett 1998), or underlying form (Sohn 1980, Gegeo and Watson-Gegeo 1986).

Light syllables project one mora; heavy syllables project two. This distinction is based on the total sonority of the syllable (Prince 1983, Gordon 2002).

Crucially, stressed heavy syllables cannot bear stress on the weak mora of the syllable i.e. stressed heavy syllables should always be represented in the grid as  $\overset{x}{xx}$  as shown in (6), not as  $\overset{x}{x}$  as shown in (7), nor as  $\overset{xx}{xx}$  as shown in (8) (Prince 1983).

Examples are from the Normal [li] and Citation [li] of. Citation [li].

(6)	$\begin{array}{c c} 2 & x \\ 1 & x \quad x \\ 0 & x \quad x \quad x \\ \hline & li \end{array}$	(7)	$\begin{array}{c c} * & 2 \\ 1 & x \quad x \\ 0 & x \quad x \quad x \\ \hline & li \end{array}$	(8)	$\begin{array}{c c} * & 2 \\ 1 & x \quad x \quad x \\ 0 & x \quad x \quad x \\ \hline & li \end{array}$
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## 2.2 The Stress Pattern of the Normal Form

### 2.2.1 Grid Profiles and the Locations of CV Metathesis

With the above framework in place, we can see the grid profiles of Kwaraa words, where 2 indicates a X2 gridmark (primary stress), 1 a X1 gridmark (secondary stress), and 0 a X0 gridmark (no stress).

(9)	Citation	C. Grid	Normal	N. Grid
a.	[li]	2.0	[li]	2.0
b.	[li]	0.2.0	[li]	2.1.0
c.	[li]	2.0.1.0	[li]	2.0.1.0
d.	[li]	0.2.0.1.0	[li]	2.0.0.1.0
e.	[li]	0.2.0.1.0	[li]	2.0.0.1.0
f.	[li]	2.0.1.0.1.0	[li]	2.0.1.0.1.0

The stress patterns of the Normal and Citation forms are both cross-linguistically well-attested,<sup>4</sup> but recognizably different in words with an odd number of moras.

**Citation Form Stress:** secondary stress on the penultimate mora and alternating moras to its left, primary stress on the leftmost secondary stressed mora.<sup>5</sup>

**Normal Form Stress:** main stress on the initial mora, secondary stress on the penultimate mora and alternating moras to the left, with a lapse following the initial syllable in words with an odd number of moras greater than four.<sup>6</sup>

The Normal stress pattern is one that can be generated without metrical feet using the constraint system presented in Gordon (2003) (as is the basic Citation pattern).

<sup>4</sup>The Citation stress pattern is similar to MalakMalak, and the Normal stress pattern is similar to Indonesian.

<sup>5</sup>This is really only true for words without diphthongs or long vowels which attract stress. In these cases, the stress pattern is only slightly more complicated.

<sup>6</sup>Unfortunately previous researchers have not found words longer than three heavy syllables, and neither have I, so it is not possible to verify this prediction at this time. However, this prediction is in line with the cross-linguistic study by Kager (1999), who argued that lapses occur near the rhythmic peak (main stress) in a word.

The table in (9) is repeated in (10), with the locations of metathesis underlined in each column (omitting subarches for readability).

(10)	Citation	C. Grid	Normal	N. Grid	
a.		2.0		20	<del>thin</del>
b.		0.2.0		2.10	<del>moon, month</del>
c.		2.0.1.0		20.10	<del>my height</del>
d.		0.2.0.1.0		20.0.10	<del>share them</del>
e.		0.20.1.0		2.00.10	<del>your (pl.) hands</del>
f.		2.0.1.0.1.0		20.10.10	<del>slopes</del>

## 2.2.2 Observations

The historical story must be more complicated than commonly assumed.

Blevins and Garrett (1998) argued, cross-linguistically, CV metathesis is a diachronic process of copy and deletion, caused by unstressed vowel weakening accompanied by extreme vowel to vowel coarticulation (Blevins and Garrett 1998).

(11)  $'C_1V_1C_2V_2 > 'C_1V_1V_2C_2V_2 > 'C_1V_1V_2C_2$

Counterexamples: the second syllable in (C)V.**CV**.CV.CV Citation forms is stressed, but metathesizes. E.g. the syllable [ ] in ~~share them~~ Since this syllable is stressed, the diachronic analysis must be more complex.

Looking only at the Normal form, only vowels associated with 0s that immediately follow a 1 or 2 are the ones which metathesize (with one exception: *limaumulu* ~~your hands~~

## 2.3 Stress to Weight Principle

Following Norquest (2001), the Stress to Weight Principle motivates CV metathesis in Kwará. Specifically, SWP Linearly.

Consequently, [ $'C_1V_1V_2C_2$ ]  $\rightarrow$  [ $'C_1V_1C_2V_2$ ] because it is more important for stressed syllables to be heavy on the surface than it is to be faithful to the linear order.

**SWP** incurs a violation for each stressed light syllable in the output (Kager 1999).



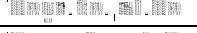


**Linearity** incurs a violation for each segment in the output that precedes a segment that it succeeded in the input and vice versa (McCarthy and Prince 1995, Hume 2001).<sup>7</sup>

	/  /	SWP	Linearity
(12) ♥ a.			
b.		!	

<sup>7</sup>This is the formal definition, but I will score violations by instances of metathesis. As in Hume (2001), if the metathesizing segments are not adjacent, further violations are scored.

The analysis extends easily to larger words, assuming the stress pattern is fixed.

(13)

	/ /	SWP	Linearity
♥ a.	 20.0.10		
b.	 2.00.10	!	
c.	 20.0.1.0	!	
d.	 2.0.0.10	!	
e.	 2.0.0.1.0	!	

### 3 Analyzing the Stress System

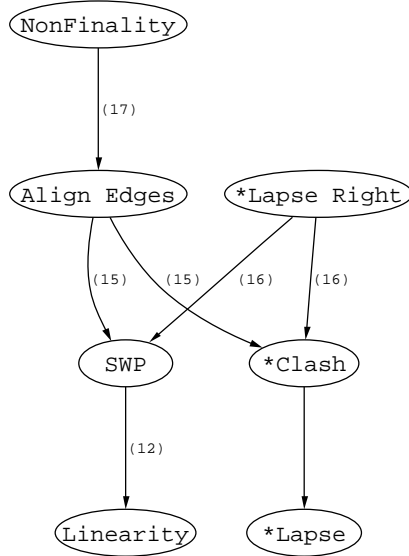
#### 3.1 The Constraints and their Rankings

The Normal form stress pattern can be analyzed without metrical feet using constraints from Gordon (2003).<sup>8</sup>

- AlignEdges** incurs a violation if either the initial or final mora has a stress level 0; if both, assign two (stress initial and final moras).
- Nonfinality** incurs a violation if the final mora has a stress level greater than 0. (do not stress final mora)
- \*Clash** incurs a violation for each pair of adjacent moras where both have a stress level greater than 0. (no moraic clash))
- \*Lapse** incurs a violation for each pair of adjacent moras where both have a stress level 0. (no moraic lapse)
- \*LapseRight** incurs a violation if the ultimate and penultimate moras both have a stress level 0. (stress one of the final two moras)

<sup>8</sup>Gordon's constraint system was designed to account for the stress systems found in quantity-insensitive languages, but I consider it a worthy project to try to apply (and extend where necessary) his constraints to account for the stress systems of quantity-sensitive languages. There are other constraints than the ones presented here; but these are sufficient to establish the basic pattern.

### 3.2 Constraint Rankings



### 3.3 Establishing Penultimate and Initial (moraic) Stress

AlignEdges is the constraint that ensures the initial mora is always stressed.

/ /		AlignEdges	*Clash	SWP
(14)	♥ a. ' 2.10			
	b. ' 2.1.0			!
	c. ' 0.20	!		

One of the two moras must be stressed since \*LapseRight is undominated.

/ /		*LapseRight	SWP	*Clash	*Lapse
(15)	♥ a. ' 2.1.0				
	b. ' 2.10		!		
	c. ' 20.0	!			

Therefore the ranking NonFinality > AlignEdges ensures that stress always falls on the penultimate mora and not the initial one.

/ /		NonFinality	AlignEdges	*Clash	SWP
(16)	♥ a. ' 2.10				
	b. ' 2.1.0				!
	c. ' 2.01	!			

The constraints \*LapseRight, NonFinality and AlignEdges are responsible for putting stress on the penultimate and initial moras. Since these constraints are ranked higher than \*Clash, a clash in trimoric words is unavoidable.

## 4 Refining the Analysis

At this point the analysis still overestimates the locations of CV metathesis in two cases.

### 4.1 Trimoriac forms and \*WeakMora=X1

Why does /limaku/ surface as [ˈli.mə.ku 2.10] and not \*[ˈli.mə.ku 21.0]?

		SWP	Linearity
(17)	⑥ a. ˈli.mə.ku 21.0		
	b. ˈli.mə.ku 2.10	!	

There is a prohibition on stressing the weak mora of a syllable which I encode as \*WeakMora=X1 (based on Prince (1983)).

- (18) \***WeakMora=X1** incurs a violation if the second mora of a heavy syllable has a stress level greater than 0. (do not stress weak mora of a heavy syllable)

		*WeakMora=X1	SWP	Linearity
(19)	♥ a. ˈli.mə.ku 2.10			
	b. ˈli.mə.ku 21.0	!		

### 4.2 Pentamoriac forms and VV-Contig

Why does /limaumu/ surface as [ˈli.mə.mu 2.00.10], and not \*[ˈli.mə.mu 20.0.10]?

		SWP	Linearity
(20)	⑥ a. ˈli.mə.mu 20.0.10		
	b. ˈli.mə.mu 2.00.10		

Unlike the previous problem, this candidate cannot be ruled out by markedness, since it is a legal surface form (cf. hypothetical /liamumu/). Therefore it must be ruled out by faithfulness.

CV metathesis may create vowel clusters, but it may not destroy them.

**V-V Contiguity** incurs a violation if a  $V_1$  immediately precedes  $V_2$  in the input, but the vowel corresponding to  $V_1$  in the output does not immediately precede the vowel corresponding to  $V_2$  in the output. Here, vowels are understood to be [-consonantal]. (Underlying vowel sequences must be present on the surface)

		VV-Contig	SWP	Linearity
(21)	♥ a. ˈli.mə.mu 2.00.10			
	b. ˈli.mə.mu 20.0.10	!		

## 5 Summary

There are two components to the analysis: a predictable stress pattern which sets up the environment, and a markedness constraint that acts on that environment.

½ In the Normal form, primary stress falls on the initial syllable, secondary stress falls on the penultimate, and alternating moras to the left.

½ Stressed syllables should be heavy (SWP).

Two restrictions, \*WeakMora= X1 and VV-Cont ig, are needed to reign in overestimations on the locations of CV metathesis.

## 6 Predictions

### 6.1 Different stress yields a different metathesis pattern

Focus Final forms, exhibited in (25), are the last word of a clefted constituent as shown in (23); Kwará is typically SVO (22).

- (22) [3p make well the bed] [they skillfully built the bed].  
 the bed that they make well to  
 this is the bed that they skillfully built.

More examples

- | (24) | Citation | Normal | Normal] <sub>focus</sub> |                 |
|------|----------|--------|--------------------------|-----------------|
| a.   | [...]    | [...]  | [...]                    | can             |
| b.   | [...]    | [...]  | [...]                    | heavy           |
| c.   | [...]    | [...]  | [...]                    | bibiscus (bush) |
| d.   | [...]    | [...]  | [...]                    | star            |

These words exhibit a different stress pattern, as well as a different metathesis pattern.

### 6.2 Multiple ways to satisfy SWP

There are many ways to satisfy SWP; i.e. there are many ways to transform a /C<sub>1</sub>V<sub>1</sub>C<sub>2</sub>V<sub>2</sub>/ input so that its output is more harmonic than [C<sub>1</sub>V<sub>1</sub>C<sub>2</sub>V<sub>2</sub>], which violates the SWP.

½ The vowel V<sub>1</sub> may be lengthened

½ Consonantal material may be inserted after V<sub>1</sub>

½ V<sub>2</sub> may be elided.

Tonkawa is an extinct American Indian language from central Texas.

- (25) /ke-we-yamaxa-oo-ka/ [ke-we-yamaxa-oo-ka] you paint our faces

Gouskova (2003) uses SWP Max-V to account for syncope.

In Tonkawa and Kwará [... 'C<sub>1</sub>V<sub>1</sub>C<sub>2</sub>V<sub>2</sub>...] sequences are dispreferred. Tonkawa deletes V<sub>2</sub>, whereas Kwará metathesizes V<sub>2</sub>.



## 7 Alternatives to SWP

When we consider the reasons why  $[C_1V_1V_2C_2]$  sequence is more harmonic than  $[C_1V_1C_2V_2]$  (from underlying  $/C_1V_1C_2V_2/$ ), there are (at least) two other possible explanations:

**Syllable Economy.** Surface forms with fewer syllables are preferred.

**Unstressed Syllable Economy.** Surface forms with fewer unstressed syllables are preferred.

\*Syllable.  $[C_1V_1V_2C_2]$  has fewer syllables than  $[C_1V_1C_2V_2]$ , but cannot discriminate among candidates.

(26)		$/\text{[CVVCVC]}/$	*Syllable	Linearity
	a.	$\text{[CVVCVC]} \text{ 20.0.10}$		
	b.	$\text{[CVVCVC]} \text{ 2.00.10}$		

\*UnstressedSyllable.  $[C_1V_1V_2C_2]$  has fewer unstressed syllables than  $[C_1V_1C_2V_2]$ .

(27)		$/\text{[CVVCVC]}/$	*Syllable	Linearity
	⑥ b.	$\text{[CVVCVC]} \text{ 20.10.10}$		
	a.	$\text{[CVVCVC]} \text{ 20.0.10}$	!	

I chose SWP because it highlights the similarities not just between these languages, but between other languages that regularly make stressed syllables heavy, like Tonkawa.

½Kager (1999) invoked the Stress to Weight Principle to account for vowel lengthening in stressed syllables in Icelandic.

½Other languages such as the Argyllshire dialects of Scots Gaelic insert glottal stops in stressed syllables (unless they would be followed by an obstruent) that would otherwise be light (Hall 2003).

½See Hayes (1994) for other languages with iambic and trochaic lengthening.

## 8 Conclusion and Summary

The stress pattern conditions CV metathesis in Kwara'ang.

There is a non-stress related restriction on where CV metathesis may occur: it cannot destroy underlying vowel sequences.

CV metathesis in Kwara'ang is very similar to syncope in Tonkawa because both languages transform  $CVCV$  sequences into heavy syllables. This process is akin to other phonological processes which make stressed syllables heavy.

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