

Washo Morphophonology: Hiatus resolution at the edges –or-
Let them be vowels

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Hiatuses that arise due to VV contact across morpheme boundaries in Washo are resolved in one of two ways. Between stems and non-final suffixes an epenthetic glide resolves the hiatus. Hiatuses due to affixation elsewhere are resolved by the elision of the stem vowel. This V₂ elision is likely not coalescence in a formal sense as we will see and must be governed by another factor. This paper argues that a possible solution for the V₂ elision observed in Washo is vowel dominance, where sonority determines dominance.

The original analysis of this phenomenon by Jacobsen (1964) argues that rather than hiatus resolution by elision, vowel quality shifts due to the affixation of a CV prefix to a VC stem (e.g., *i* > *e*, *u* > *o*) are the result of vowel coloring morphophonemes. These morphophonemes are represented by superscripted vowels (/^e, ^ε, ^u, ^a, ⁱ, ^ɨ, E/) that when preceding a V initial stem behave similarly to floating features that can effect the resulting surface vowel. This paper rejects Jacobsen's vowel coloring hypothesis and argues instead that these superscripted vowels are actually surface vowels. Section 1 outlines the basics of the Washo language. Section 2 lays out the original analysis of vowel quality shifts in detail. Section 3 concludes and narrows down the vowel quality shifts to those that are relevant to the vowel hiatus resolution. Section 4 advances the argument that these vowel coloring morphophonemes are actual surface vowels. In Section 5, I will present evidence that in addition to /y/ epenthesis to resolve hiatus (between stems and suffixes), there is a second hiatus resolution strategy between CV prefixes and vowel initial stems—vowel elision due to vowel dominance by sonority. Section 6 is the conclusion.

1. Some Basics of the Washo Language

The Washo language is a severely moribund language spoken in east-central California and Nevada around the area surrounding Lake Tahoe. Traditionally, Washo is considered a member of the Hokan family, however, this genetic relationship has been called into question. In her 1999 book, Mithun reports that Washo is an isolate.

The major resources for Washo forms are William H. Jacobsen's 1964 University of California: Berkeley dissertation *A Grammar of the Washo Language* and his 1996 *Beginning Washo*.

In (1) and (2) you'll find the surface consonant and vowel inventories of Washo:

(1)	p	t		k	ʔ
	b	d	z	g	
	p'	t'	c'	k'	
		s	ʃ		h
	M[m̥]			N[n̥]	
	m	n		ŋ	
	W[w̥]	L[l̥]		Y[j̥]	
	w			y[j]	

(2)	i, i:	ɪ, ɪ:	u, u:
	e, e:		o, o:
		a, a:	

Stress in Washo is regular being primarily restricted to stems and on the penultimate syllable. Washo has six verb classes from which three cross-cutting groups can be found. The first group contains independent verb stems to which pronominal prefixes can be affixed to create verb forms. The second group contains both dependent and neutral verb stems, which cannot be directly inflected for person or number but take a class of prefixes that derive transitivity. Within in this second group, almost all the verb stems begin with /a/ or /i/ while /e/ is rare. The third group is auxiliary verbs, which precede independent verb stems (Jacobsen 1964: 393). My primary concerns in this paper are groups two and three. Washo does not tolerate VV sequences. Washo also has a process of pretonic regressive vowel harmony where an /a/ or /o/ in a stressed position will condition /a/ in preceding vowels. In the absence of a /á/ or /ó/ the pretonic vowels surface normally (discussed further in Section 3.1).

2. Vowel Coloring in Washo

The affixation of certain CV- certain lexical and inflectional prefixes to vowel initial stems result in vowel quality shifts. Jacobsen represents the V in the prefixes as a superscripted vowel (and for illustrative purposes in this section here we will maintain that convention). Consider the data in (3):

(3)	l ^ɪ - í:bu 1nom-Nr 'nape of neck'	lé:bu 'my nape'	(JA96: 7)
	Ø- h ^a - í?iʃ -i 3per-Pi 'to rain'-Vd 'to have come'-imp	há?ʃi 'it's raining'	(JA64: 291)

Ø- h ^u - ámad –ug –i 3per-Pi ‘wind to blow’-Vd ‘to the south, from the north-hence-imp ‘wind is blowing from the north’	hómadugi g ^e é?ew ‘eat!’	(JA64: 289) (JA64: 303)
g ^e - í?iw IMP-Vt ‘to eat’	g ^e é?ew ‘eat!’	(JA64: 303)
? ^u - ílsil Pi ‘texture, density’-thin	? ^u ílsil ‘(cloth) to be thin, fine’	(JA80: 90)

The data above illustrate some of the vowel quality shifts that occur due to CV prefixes attaching to V-initial stems; we see that {/u/, /e/} + /i/ yields /e/, /a/ + /i/ yields /a/, and /u/ + /a/ yields /o/. The entire pattern of vowel coloring morphemes and their effect on following surface vowels can be seen in the table reproduced from Jacobsen 1964 as (4):

(4)

vowel coloring	following vowel					
	<i>a</i>	<i>e</i>	<i>i</i>	<i>í</i>	<i>o</i>	<i>u</i>
~	a		i			
<i>e</i>	a	e	e			e
ˇ	a		e			
<i>ε</i>	a		e			
<i>u</i>	o	u	u	í		
<i>a</i>			a		a	
<i>i</i>	i	i	i			
<i>í</i>			í			
<i>E</i>	e					

The above table shows all the vowel coloring morphophonemes (/^e, ^ε, ^u, ^a, ⁱ, ^í, E, ~, ˇ/) on the y-axis and the following surface vowel on the x-axis. Gaps in the table represent sequences that do not occur.

The convention of superscripted vowels is Jacobsen’s pre-generative phonology way of describing the abundance of Washo allomorphy. It also accounts for vowel shifts that occur without needing to rely on hiatus resolution. Suffixally, VV sequences are resolved by glide epenthesis (more on this in section 5). The necessity of this convention is suspect since there is a 1-to-1 correspondence before consonant initial stems between vowel coloring morphophonemes and their surface representation (/a/ according to the rules of vowel harmony). The majority of the proof for Jacobsen’s convention is the presence of the vowel coloring morphophonemes in allomorphs of the reduplicated plural marker.

From here I will proceed through the chart one by one to fully elucidate the range of vowel shifts that occur. Then I will advance the argument that the superscripted vowels are really surface vowels with proof from affixation to consonant initial stems and the rules of vowel harmony. The lengthener /˘/ and shortener /˘/ will also be dealt with in this section. Their status as independent vowel coloring morphemes is interesting. The shortener has neither a phonemic representation nor a coloring effect on following vowels while the

lengthener has the same phonemic representation as raised /^e/ but also lengthens immediately following short vowels.

2.1 The /^e/ coloring

Among the vowel coloring morphophonemes /^e/ is the most common. In addition to being the most numerous in instrumental prefixes, only /^e/ occurs in prevocalic allomorphs of inflectional prefixes (l^e- first person/possessive and g^e- imperative) (Jacobsen 1964: 285). From the chart we find that /^e/ is dominant over /i/ and /u/ when they two come together and is dominated by /a/ when the two come together. /^e/ before /e/ is vacuous. See (5):

(5) a.	l ^e - í:biʔ 1per-Nr 'bone'	lé:biʔ 'my bone'	(JA64: 286)
	Ø- d ^e - íʔiʃ -i 3per-Pi 'to snow'-Vd empty stem-imp	déʔʃi 'it's snowing'	(JA64: 286)
	g ^e - í:bikʔ -ha IMP-Vi 'to be cooked, ripened'-caus	gé:bikʔha 'cook it!, ripen it!'	(JA64: 270)
b.	g ^e - áyad IMP-Vi 'to spend the night'	gáyat 'spend the night'	(JA64: 269)
	l ^e - áŋal 1per-N 'house'	láŋal 'my house'	(JA64: 284)
	Ø- s ^e - áhad -i 3per-Pi 'to wade'-Vd 'across'-imp	sáhadi 'he's wading across'	(JA64: 286)
c.	l ^e - émlé 1per-Nr 'heart'	lémlé 'my heart'	(JA64: 261)
	g ^e - émcʔi IMP-Vi 'to awaken, to be awake'	gémcʔi 'wake up!'	(JA64: 261)
	l ^e - émlu-tiʔ -i - ^o - -g -í 1per-Vi 'to eat'-int. fut.-imp-TJ-3subj-pro. stem	lémlutiʔgi 'I'm going to eat'	(JA64: 306)

Above in 5a-c we see the distribution of /^e/ before /i, a, e/. The chart also shows that when /^e/ precedes /u/ the resulting surface vowel is /u/. However the sequence /^eu/ occurs in only one allomorph of the reduplicated plural marker shown in (6):

(6)	g ^e - í:gi -uw ^e - dúwe -giʃ -aʔ IMP-Vt, Vd 'to see, sense'-plural-Va, Vt 'to try to, to want to, to look for'-motion-aorist	gi:gidúweweʔgiʃaʔ 'go along looking for them!'	(JA64: 286)
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It may not be clear from (6) where the /^eu/ sequence occurs because the plural marker -uw^e- is infixed into the stressed syllable of the stem e.g., ...**d-uw^e-úwe**... The -uw^e- plural marker is just one of many allomorphs of the reduplicated plural marker.

The analysis of reduplication in Washo is another interesting question and the analyses of Urbanczyk 1993 and Yu 2005 present evidence that the abstract vowel coloring morphophonemes are not present in these reduplicated forms because the size and shape of the reduplicant is predictable, unlike the one allomorph for each stem, stipulated analysis of Jacobsen (Yu, 2005). Reduplication will be revisited in Section 3.

(9)	Ø- m ^u - émlu-i	múmluyi	(JA64: 289)
	3per-plural-Vi, N 'to eat, food'-imp	'they're eating	
	-et ^u - nént'uf -u	net'únt'ufu	(JA64: 289)
	plural-Vi, 'to be an old woman'-nominalizing	'old women'	
	-ch ^u - mé:hu	mehú:hu	(JA64:289)
	plural-Vi, N 'to be a boy, boy'	'boys'	

This vowel coloring morphophoneme, more than any other, presents an argument for vowel coalescence, which at first seems entirely plausible. Evidence from reduplication will show that Washo does not conform to the rules of vowel coalescence. Moreover I will show that vowel dominance/elision is the correct mechanism for hiatus resolution and that underlying representations of /u/ and the presence of vowel harmony that provide better answers to this problem.

2.4 The /^a/ coloring

The /^a/ coloring occurs only in the instrumental prefixes h^a- *to rain* and ŋ^a *descriptive of the belly*. It also is part of two plural markers, -oy^a- and -is^a-. Data is shown in (10):

(10) a.	Ø- h ^a - í:bi? -i	há:b?i	(JA64: 291)
	3per-Pi 'to rain'-Vd 'to have come'-imp	'rain has gotten here'	
	Ø- ŋ ^a - í:bug -i	ŋá:bugi	(JA64: 291)
	3per-Pi descriptive of belly-Vd 'bloated'-imp	'he's bloated in the stomach'	
b.	di- -is ^a - ?í:sa	di?isá:sa	(JA64: 291)
	1per-plural-Np, 'older sister'	'my older sister'	
	d ^c - -oy ^a - móya	damoyáya	(JA64: 291)
	3per unexpressed-plural-N 'shoulder'	'their shoulders'	

As we can see from 10a, /a/ dominates /i/ and is only found in this sequence. The sequence /^ao/ (10b) only appears in the allomorphs of the reduplicated plural marker.

2.5 The /ⁱ/ coloring

The /ⁱ/ coloring is listed in the chart as occurring before /a/, /e/, and /i/. The table in (4) shows that /ⁱ/ dominates both /e/ and /a/ and that /ⁱ/ before /i/ is vacuous. The case of /ⁱ/ before /e/ and /a/ is shown in (11):

(11)	-af ⁱ - wá:fíw	wáfí:fíw	(JA64: 291)
	plural-N 'Washo'	'Washoes'	
	di- a?m ⁱ - ŋá?míŋ	diŋa?mí?míŋ	(JA64: 292)
	1per-plural-Vi, N 'to give birth; child'	'my children'	

The governing motivation for Jacobsen's system is that the change in quality of the surface vowel ought to match that of the superscripted vowel coloring morphophoneme. Reviewing the case of /ⁱ/ makes this claim entirely apparent. The only application of the /ⁱ/ before the

/e/ and /a/ is make sure that the reduplicated plurals surface correctly in Jacobsen’s system of reduplicated plurals.

The /ⁱ/ before /i/ is different from all previous cases of raised morphemes since it is not part of a CV (C^v in Jacobsen’s analysis) prefix but instead occurs on the stem before an initial /i/ to block the coloring effects of any previous vowel coloring morphophoneme. In other words, in sequences of these morphophonemes, it is the last morphophoneme that surfaces and in sequences of morphophonemes, /ⁱ/ is always last. The only sequences of this type are /^{ei}/ and /^{ei}/ as illustrated by the two forms in (12) one of which is reprinted from (8a):

- | | | | |
|------|--|---|-------------|
| (12) | l ^e - i:gi -i
1per-Vt, Vd ‘to see, sense’ | lí:giyi
I see it | (JA64: 293) |
| | Ø- kM ^u - áhad ^ε - ‘ ‘ i:k’íl -i
3per-Pi ‘to run’ (sg)-Vd ‘across’-AVF-TJ-Vd ‘back and forth’-imp | Móhadik’ili
‘he ran back and forth across’ | (JA64:293) |

2.6 The /ⁱ/ coloring

The /ⁱ/ coloring occurs in only one instrumental prefix and in regular allomorphs of the reduplicated plural marker. Moreover it only appears before /i/. Examples of the instrumental prefix and regular allomorphs are shown in (13):

- | | | | |
|------|---|--|-------------|
| (13) | di- hulb ⁱ - íps -i
1per-Pi ‘to pry, lift with long object’-Vd ‘up from the surface’-imp | dihulb ⁱ psi
‘I’m prying it up, lifting it with a long object’ | (JA64: 295) |
| | Ø- ?il- f ⁱ - if ⁱ f ⁱ -i? -i
3per-descriptive-plural-Vd ‘heavy’-AA-imp | ?ilf ⁱ f ⁱ i?i
‘it’s heavy’ | (JA64: 295) |
| | c’íl ^u - t ⁱ - ínt’in
Pi ‘descriptive of hips, tree trunks, roots’-plural-Vd ‘rough’ | c’ílut’ínt’in
‘carrots’ | (JA64: 295) |

2.0.7 The /E/ coloring

The /E/ also occurs in only one environment, before /a/, and occurs only in one form as “only as a possible alternative analysis” (Jacobsen 1964: 295). Moreover, /E/ is part of an allomorph of the reduplicated plural. The form Jacobsen includes is shown in (14):

- | | | | |
|------|------------------------------------|---------------------|-------------|
| (14) | -a?lE- bá?lew
plural-N ‘Paitue’ | ba?lélew
Paiutes | (JA64: 296) |
|------|------------------------------------|---------------------|-------------|

2.8 The lengthener /˘/ and the shortener /˘/

The inclusion of these items within the class of vowel coloring morphophonemes poses an interesting question. The lengthener has two effects on following vowels. With respect to vowel coloring, the lengthener behaves *exactly* like the /^e/ coloring from section 2.1. The lengthener also has a lengthening effect on any following short vowel (15a).ⁱⁱⁱ However, the environments where we observe the full effects of the lengthener are limited. The lengthening effect (but not the coloring effect) of the lengthener is blocked when the

lengthener precedes a vowel that is followed by a consonant cluster or a “guttural morphophoneme” like /ʔ/ or /h/ (15b). The lengthening effect (but again not the coloring effect) is also blocked when the lengthener precedes an already long vowel (15c). Also similarly to the /^e/ vowel coloring morphophoneme before a consonant, the lengthener surfaces as either /e/ or /a/ due to the rules of vowel harmony before a consonant. There is no evidence of a lengthening effect on either the harmonized vowel or is the following vowel (harmonizer) when the lengthener precedes a consonant initial stem. It should also be noted that all these forms are pluralized and are likely related to the reduplicated plurals mentioned in each of the above sections (15d).

The shortener has one duty only prescribed to it: shorten any immediately following long vowel unless said vowel is followed by a voiced stop—it has no phonemic representation and no effect on the shape of the surface vowel (15e). Examples of both the lengthener and shortener are found in (15a-e):

- | | | | |
|---------|---|---|-------------|
| (15) a. | ∅- d ^u l ^v - áŋa -i | malá:ŋaʔi | (JA64:307) |
| | 3per-Pi ‘with the hand’ Vd ‘on, upon’-imp | ‘he has his hand on it’ | |
| | ∅- m ^e l ^v - ítiʔ -i | melé:tiʔi | (JA64: 307) |
| | 3per-Pi ‘to jump’-Vd ‘down, downwards’-imp | ‘he’s jumping down’ | |
| b. | ∅- m ^e l ^v - áwd -i | maláwdi | (JA64: 307) |
| | 3per-Pi ‘to jump’-Vd ‘over the summit’-imp | ‘he’s jumping over’ | |
| | ∅- m ^e l ^v - íps -i | melépsi | (JA64: 308) |
| | 3per-Pi ‘to jump’-Vd ‘up from a surface’-imp | ‘he’s jumping up’ | |
| c. | ∅- d ^u l ^v - á:gal -am -i | dulá:galami | (JA64: 308) |
| | 3per-Pi ‘with the hand’-Vd ‘from the south’-‘away to’-imperfect | ‘he’s extending his hand towards the north’ | |
| | ∅- d ^u l ^v - í:kil -i | dulé:kili | (JA64:308) |
| | 3per-Pi ‘with the hand’-Vd ‘back and forth’-imp | ‘she’s cooking’ | |
| d. | ∅- d ^u l ^v - k- ákd -i | dulakákdi | (JA64: 297) |
| | 3per-Pi ‘with the hand’-plural-Vd ‘slowly’-imp | ‘he’s moving his hands slowly’ | |
| | ∅- m ^e l ^v - p ^e - íps -i | melepépsi | (JA64: 297) |
| | 3per-Pi ‘to jump’-plural-imp | ‘he’s jumping up and down’ | |
| e. | ∅- ʃ ^v - á:tʔi -weʔ -i | ʃátʔiweʔi | (JA64: 310) |
| | 3per-Pi (sg.per) to walk’-Vd ‘uphill, upstream, upwards’-imp | ‘he’s walking uphill, upstream’ | |
| | ∅- ʃ ^v - á:gal -am -i | ʃá:galami | (JA64: 310) |
| | 3per-Pi ‘to jump’-Vd ‘from the south’-‘away to’-imp | ‘he’s walking north’ | |

The observation that the lengthener behaves exactly like the /^e/ coloring leads me to believe that it is either closely related to /^e/ or that the lengthening effect is due to another phenomenon in the language. One solution, from Yu 2005 is that stressed syllables are naturally heavy on the surface and that the reason that the lengthening effect is blocked in 15b and 15c is due to the presence of already heavy syllables in the surface for. 15b shows the lengthener before a vowel in a closed syllable and a likely explanation is that coda

consonants are mora-bearing, thus blocking the lengthening of the vowel. In 15c the vowel is all ready long and thus the vowel already bears two morae. This explanation does explain why the vowel coloring morphophoneme still has an effect on the shape of the vowel but not on the length.

The shortener occurs in a highly restricted domain—only one morpheme contains it \int^- -Pi ‘(singular person) to walk’ and only with one stem ‘á:ti Vd ‘uphill, upstream, upwards.’

3.0 Interim conclusion on vowel coloring

Now we have fully illustrated the pattern of vowel quality shifts and the separated the data into two clear groups: those instances where the vowel-coloring morpheme is used in forms of Jacobsen’s stipulated and pre-listed allomorphs of the reduplicated plural and those where the vowel coloring morphemes are not. From here on out we will only be interested in those affixes that contain vowel coloring morphophonemes that are not used for reduplication. We will address this issue in the next section.

Below is a modified version of the table first presented in (4):

(16)

vowel coloring	following vowel					
	<i>a</i>	<i>e</i>	<i>i</i>	<i>ɨ</i>	<i>o</i>	<i>u</i>
<i>ʌ</i>	a		e			
<i>ɛ</i>	a	e	e			
<i>ɛ</i>	a		e			
<i>u</i>	o		u	i		
<i>a</i>			a			
<i>ɨ</i>			ɨ			

What we have done in (16) is to remove the vowel coloring morphophonemes used only in reduplication /ⁱ, E/ and the sequences that only occur in allomorphs of the reduplicated plural /^ue/, /^ao/. We have also removed the shortener /[~]/because it is only present in one morpheme and is only combined with one stem. The lengthener /[˘]/ will only be considered under the reasoning that it behaves exactly like /^e/ both before vowel initial stems and consonant initial stems. While /^ɛ/ has the same properties as /^e/ before vowel initial roots, the Ø allomorph before consonants is interesting and possibly problematic—the zero morph appears not only when /^ɛ/ part of instrumental prefixes but also when part of auxiliary verb formatives and instrumental prefix formatives. The question of whether the type of affix and the role /^ɛ/ vowel coloring morpheme plays in vowel shifts is part of ongoing research.

4. Let them be vowels

The reduced chart in (16) allows us to further advance the idea that there superscripted vowels are actually surface vowels. Jacobsen points out that there are four attested morphophonemes occurring before consonants: /^e, ^ʌ, ^ɛ, ^u/ (Jacobsen 1964: 296). Of these

four, three surface as themselves, with the lengthener patterning with /^e/. Please consider the data in (17):

(17)	g ^e - m- ími -we?	gemímwe?	(JA64: 283)
	IMP-Pt 'to throw, fell a tree'-Vd 'to the east, from the west'-hence	'throw it to the east!'	
	g ^e - s ^e b ^e -íl ^b ^é - ^ó -á?y -i	gesebélba?yi	(JA64: 287)
	3per-Pt 'to blow'-Vd 'to push, impel'-AVF-TJ-Vd 'away'-imp	'he's blowing it away'	
	d ^e - wg ⁱ - m- ámad	dewgumámat	(JA64: 299)
	Nom-Pi 'hole to occur'-plural-Vd 'in or into a tubular opening'	'macaroni: tubular holes'	
	d ^e - k'éteb	dek'étep	(JA64: 302)
	3nom N 'bottle'	'his bottle'	

As mentioned in Section 1, Washo has pretonic regressive vowel harmony. An /o/ or /a/ in the stressed position licenses regressive vowel harmony that shifts previous vowels in the word to /a/ as well. In this way all the vowel coloring morphemes that do surface before consonants behave precisely as regular surface vowels. The data in (18) show the interaction of vowel harmony and these vowel coloring morphemes:

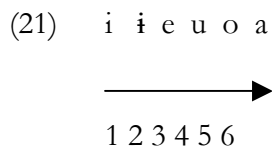
(18)	g ^e - c'ug ^e - á:gal -i	gac'ugá:gali	(JA64: 287)
	3per-Pt 'to carry, put small objects'-Vd 'into the mouth, down the throat'-imp	'he's putting them in his mouth'	
	d ^e - c'áŋa -'-' -é:s	dac'á?ŋa?é:s	(JA64: 272)
	Nom-N 'buttocks'-AA-neg	'a man's name, having no buttocks'	
	g ^e - sá?- lel	gasálel ~ gasál'el	(JA64: 76)
	IMP-'also'-transitory	'put it away for awhile!'	
	d ^e - tó?o	dató?o	(JA64: 301)
	3nom-N 'throat'	'his throat'	
	Ø- d ^u l ^u - k- ákd -i	dulakákdi	(JA64: 297)
	3per-Pi 'with the hand'-plural-Vd 'slowly'-imp	'he's moving his hands slowly'	

In (17) and (18) we observe two facts 1) the vowel coloring morphemes that occur before consonants surface as themselves before consonants and 2) that when they do surface they obey the same rules that regular surface vowels do, namely vowel harmony. Due to these two facts there is positive evidence to conclude that these vowel coloring morphemes are really surface vowels. From this observation I can begin to present the argument that vowel hiatuses that arise from affixation of a CV prefix (previously C^v in Jacobsen's analysis) are resolved by the invocation of the notion of vowel dominance expressed as sonority.

Jacobsen concedes the fact that the above vowel coloring morphophonemes surface as themselves preconsonantly. Moreover, the reanalysis of reduplication by both Urbanczyk 1993 and Yu 2005 gives us further reason to discard the vowel coloring morphophonemes. Yu further solidifies the argument that /i/ is underlyingly /e/ and surfaces as /i/ in onsetless monosyllabic stems and that /u/ is underlyingly /o/. A quick contrast of Jacobsen's analysis and Yu's analysis will clarify the point: Jacobsen relies on infixed

chart, /ɛ/, never precedes /e/, but again confirms the ordering, /u/ preceding /a/ surfaces as /o/, /u/ preceding /i/ surfaces as /u/, and /u/ before /ɨ/ surfaces as /ɨ/. If we assume that /u/ is underlying /o/ we run into one problem however. It appears that /u/ must be underlyingly both /o/ (preceding to /a/) and /u/ (elsewhere). This assumption is not fatal to the analysis and the results help us to fill out the rest of the strength hierarchy. This means then that the mid back rounded vowel /o/ appears to be almost as strong as /a/, while the high back rounded vowel /u/ is stronger than /e/ and /i/. The only tricky part to the analysis of /u/ is when it precedes /ɨ/ and /ɨ/ wins out. The /ɨ/ preceding /i/ also results in /ɨ/ hints at a special status for /ɨ/ within Washo.

Thus, a plausible strength hierarchy for Washo that we should consider is shown in (21):



In (21) the vowels are ranked by strength indicated by increasing number and the relative strength of the vowel determines whether it surfaces or not. The general layout of the modified chart supports this sketch of vowel dominance in Washo.

When the strength hierarchy is then applied the general rule (with few exceptions) would hold that the vowel with the highest number wins out, surfaces and the other is elided.

Furthermore this analysis is preferable to the alternative analysis of vowel coalescence between prefixes and stems. De Haas’s *A Formal Theory of Vowel Coalescence* formalizes the notion vowel coalescence so that languages either are VC (vowel coalescing) or not VC. De Haas at first argues that Washo is a formally VC language but that upon the vowel shifts due to infixation are also easily explainable by two vowel harmony rules and that if considered a true VC language would violate two of the diagnostics laid out in his theory. First, the reduplicated plural contains a CV syllable not present in the singular and second, the quality of output vowel is not a derivative of both the input vowels (de Haas 1988: 200). Essentially, the sometimes first, sometimes second, sometimes a little of both results I have seen throughout this paper do not add up to a vowel coalescence answer.

6. Conclusion

This paper presents a plausible reanalysis of vowel quality shifts due to the affixation of inflectional and lexical prefixes to stems. While Jacobsen’s original analysis using vowel coloring morphophonemes was a novel approach, there is adequate proof that the vowel coloring morphophonemes are actually surface vowels. This is based on the 1-to-1 correspondences between vowel coloring morphophonemes and surface vowels before consonant initial stems, and their behavior under the rules of vowel harmony. Once it is established that the vowel coloring morphophonemes are surface vowels, then there is a need for a second repair strategy. It was clearly shown that vowel coalescence as a process is not present in Washo due to the unsystematic nature of the “derivative vowel.” What we are then left with is vowel elision based on vowel dominance. Moreover, the strength hierarchy

coincides with vowel shifts present in the affixation of CV prefixes to vowel initial stems, which, in turn, are consistent with the canonical sonority scale.

References:

- Casali, Roderic F. (1996) *Resolving Hiatus*. Ph.D dissertation University of California: Los Angeles.
- Clements, George N. (1990). The role of the sonority cycle in core syllabification. In John Kingston and Mary E. Beckman, eds., *Papers in Laboratory Phonology I: Between the Grammar and Physics of Speech*. Cambridge University Press, Cambridge. 283-325.
- De Haas, Wim. (1988). *A formal theory of vowel coalescence: A case study of Ancient Greek*. Dordrecht: Foris Publications.
- Gildea, Spike. (2005) Personal Communication
- Hopkins, Alice. (1987) *Vowel Dominance in Mohawk*. International Journal of American Linguistics 53:4, 445-459.
- Haspelmath, Martin. (2002). *Understanding Morphology*. London: Arnold.
- Jacobsen, William H. (1964). *A grammar of the Wasbo Language*. Ph.D dissertation University of California: Berkeley.
- Jacobsen, William H. (1980) *Wasbo bipartite verb stems*. In K. Klar, M. Langdon, and S. Silver (eds) *Trends in Linguistics: Studies and Monographs 16: American Indian and Indo-European Studies: Papers in Honor of Madison S. Beeler*. The Hague: Mouton. 85-99.
- Jacobsen, William H. (1996). *Beginning Wasbo*. Occasional Papers 5: Nevada State Museum.
- Mithun, Marianne. (1999). *The Languages of Native North America*. Cambridge University Press, Cambridge.
- Steriade, Donca. (1987). Redundant values. In A Bosch, B. Need & E. Schiller (eds.) *Papers from the parasession on metrical and autosegmental phonology*. Chicago: Chicago Linguistics Society. 339-362.
- Selkirk, Elisabeth O. 1984. On the major class features and syllable theory. In M. Aronoff and R.T. Oerhle, eds., *Language Sound Structure: Studies in Phonology Dedicated to Morris Halle by his Teacher and Students*. MIT Press, Cambridge. 107-113.
- Urbanczyk, Suzanne C. 1993. Infixing and moraic circumscription. In Tim Sherer (ed.) *Phonological representations*. UMOP 16: 319-357.
- Yu, Alan C.L (2005). *Quantity, stress, and reduplication in Wasbo*. Ms. University of Chicago

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ⁱⁱ Legend for abbreviations used in data citations: AA = Attributive Agentive AVF = auxiliary verb formative IMP = imperative imp = imperfect IPF = instrumental prefix formative N = (unrestricted) N (stem) Nap = attributed-possessed noun Np = possessed noun Nr = Restricted noun stem Pi = intransitive instrumental prefix Pt = transitive instrumental prefix TJ = Tactic Juncture Vd = dependent verb stem Vi = intransitive verb stem Vn = neutral verb stem Vt = transitive verb stem Vtt = ditransitive verb stem Va = auxiliary verb caus = causative

ⁱⁱⁱ On this Jacobsen 1964 further states “the rules for which [certain patterns of consonants following the vowel] have not yet fully worked out.” (307)