

## Prosodically-governed Segmental Fission in Washo\*

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### 0. Introduction

Stress-sensitive quantity alternation is commonplace in Scandinavian languages (Elert 1964; Eliasson 1985; Kiparsky, to appear; van Leyden 2002), but few reports have detailed similar types of alternation in Native American languages. This paper will offer both phonetic and phonological evidence for a case of segmental quantity alternation in Washo. It is argued that the segmental alternations observed are motivated by a previously unnoticed requirement in the language to keep the stressed syllable heavy. The paper begins with a brief overview of the phonological system of Washo (Section 1), and phonetic and phonological evidence will be presented demonstrating the existence of stress-sensitive segmental length and fission alternations (Section 2). Finally, a formal analysis couched within Optimality Theory is given in Section 3.

### 1. An Overview of Washo Phonology

Washo, traditionally considered a member of the Hokan family, is a severely moribund language spoken in an area around Lake Tahoe, California, and Nevada. The principal source of data for this study is William Jacobsen's 1964 University of California, Berkeley dissertation on the grammar of Washo, and examples from this source are cited with the code "J64:XXX," where "XXX" indicates a page number. Additional data are based on my own fieldwork. Examples cited in the paper follow Jacobsen's orthographic convention (1964, 1996).

The surface consonant inventory of Washo is shown in (1). Following Jacobsen (1964), this paper assumes a three-way laryngeal contrast on stops in Washo. However, while Jacobsen observed a voicing contrast, here it will be analyzed as an aspiration contrast since voiceless stops (i.e. orthographic *p*, *t*, *k*) are always aspirated, while the so-called "voiced" or "plain" stops (i.e.

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\* I would like to thank Sharon Inkelas, Yuni Kim, and the audience at BLS for their comments and suggestions. Special thanks go to Steven James and Eleanor Smokey. Much of this research would not be possible without their generous support and patience. I would also like to thank Professor William Jacobsen for granting me access to his field recordings from the 1950s.

orthographic *b, d, g*) are phonetically voiceless unaspirated in word-initial position, but may be partially voiced in intervocalic position. In the coda position, the three-way laryngeal contrast neutralizes to the aspirated.

(1)	p	t		k	ʔ
	b	d	z	g	
	pʰ	tʰ	cʰ	kʰ	
		s	š		h
	M[m̥]			N[n̥]	
	m	n		ŋ	
	W[w̥]	L[l̥]		Y[j̥]	
	w	l		y[j]	

The surface vowel inventory is given in (2) (Jacobsen 1964, 1996). Washo has the five standard peripheral vowels plus a central vowel [ɨ].

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

Stress is assigned generally to stems and is predominantly on the penultimate syllable. Long vowels are found only in stressed syllables. Jacobsen (1964) argues for phonemic vowel length in Washo, although the distribution of long vowels is largely predictable. We shall return to this issue in Section 4. In the next section, we consider the stress-sensitive segmental alternations in Washo.

## 2. Three Stress-sensitive Segmental Alternations

Three alternations concerning the interaction of stress and intervocalic segments are found in Washo. First, post-tonic /s, š, m, n, ŋ, y, l, w/ are lengthened intervocalically (3) even though geminates are not contrastive in Washo.

(3)	<p>a. SINGLETONS AFTER A LONG STRESSED VOWEL</p> <p>yá:saʔ [já:saʔ] ‘again’</p> <p>wá:šiw [wá:šiw] ‘Washo’</p> <p>bá:muš [pá:muʃ] ‘muskrat’</p> <p>ʔá:ni [ʔá:ni] ‘red ant’</p> <p>k’á:ŋi [k’á:ŋi] ‘it’s roaring’</p> <p>wá:laš [wá:laš] ‘bread’</p> <p>p’á:wa [p’á:wa] ‘in the valley’</p> <p>dimlá:yaʔ [timlá:jaʔ] ‘my wife’</p>	<p>b. GEMINATES AFTER A SHORT STRESSED VOWEL</p> <p>yásaŋi [jás:aŋi] ‘it’s hot’</p> <p>dášaŋ [táš:aŋ] ‘blood’</p> <p>dámuʔ [tám:uʔ] ‘skirt’</p> <p>tániw [tʰán:iw] ‘Miwok’</p> <p>káŋa [kʰáŋ:a] ‘cave’</p> <p>šálaʔ [šál:a] ‘pitch’</p> <p>dáwal [táw:al] ‘buckberry’</p> <p>ʔáyis [ʔáj:is] ‘antelope’</p>
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An acoustic study was conducted to confirm the phonetic reality of these alternations. (CV)CV(:)CV(C) words where the intervocalic consonant is *s*, *ʃ*, *m*, *n*, *ŋ*, *y*, *l*, or *w* were extracted from Jacobsen’s field recordings in the 1950s and my own field recordings. The durations of the intervocalic consonants and the stressed vowels were measured. No information about Jacobsen’s speaker, JW, is available. Our consultant, SJ, is a Washo speaker in his 70s with no speech impediment.

Graphical summaries of the results are given in Figures 1 and 2 for Subject JW and Figures 3 and 4 for Subject SJ.

**Speaker JW (in the 1950s)**

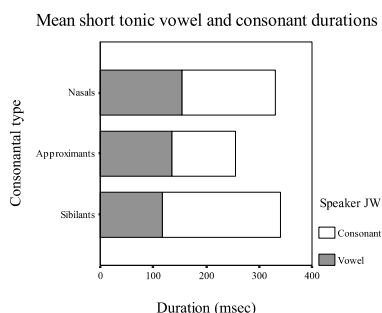


Figure 1: Mean duration of short tonic vowels and the post-tonic consonants.

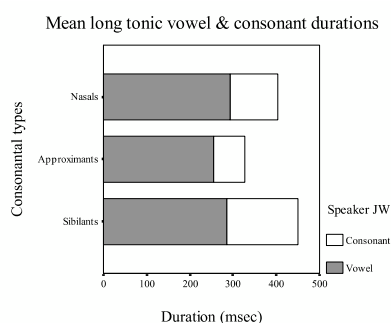


Figure 2: Mean duration of long tonic vowels and the post-tonic consonants.

**Speaker SJ (in 2004)**

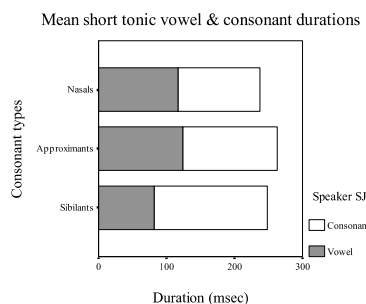


Figure 3: Mean duration of short tonic vowels and the post-tonic consonants.

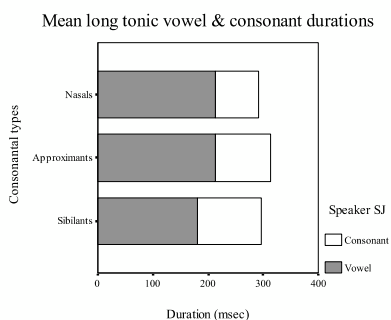


Figure 4: Mean duration of long tonic vowels and the post-tonic consonants.

The results show that there are strong negative correlations between vowel length and consonant length (Subject JW:  $r = -0.59$ ,  $p < 0.01$ ; Subject SJ:  $r = -0.6$ ,  $p < 0.01$ ). A series of ANOVA shows that there are significant differences between

long and short vowels for both subjects (Subject JW:  $F(1, 26) = 89.17, p < 0.01$ ; Subject SJ:  $F(1, 82) = 167.61, p < 0.01$ ).

Table 1: Significances of difference between long and short consonants across speakers. (\* =  $p < 0.05$ , \*\* =  $p < 0.01$ )

Speaker	Consonants	F	Sig.
JW	Approximants	(1, 6) = 3	.155
	Nasals	(1, 11) = 10	.011*
	Sibilants	(1, 7) = 5	.069
SJ	Approximants	(1, 17) = 13	.002**
	Nasals	(1, 23) = 20	.000**
	Sibilants	(1, 23) = 46	.000**

As shown in Table 1, the results for consonantal length vary a bit. For subject SJ, there are significant differences between all three classes of consonants, but subject JW shows only a significant difference with the nasals. The lack of significant effect with JW's approximants and sibilants might be attributed to the relatively small samples. Additional data for JW might show more robust differences.

Related to this alternation in consonantal length is the fact that short stressed vowels are lengthened before an intervocalic plain (i.e. voiceless unaspirated) stop (4) and word-finally (5). Thus, while differences in vowel length may occur in the stressed syllable, short vowels never occur before plain stops and word-finally.

- (4) **le:duŋ** 'like me'      *l-* (1<sup>st</sup> person) + *-í-* (pronoun stem) + *duŋ* 'like'  
**ʔí:daʔ** 'he said ...'      *ʔ-* (3<sup>rd</sup> person) + *íd* 'to say' + *-aʔ* (aorist)  
**wí:diw** 'these (pl.)'      *wí-* (near demonstrative stem) + *-di* (demonstrative formative) + *-w* (personal plural)
- (5) /mi/ 'you (sg.)'      Mí:  
 /da/ 'there, proximal'      dá:  
 /du/ 'there, distal'      dú:

According to Jacobsen, no comparable lengthening in short vowels is observed before aspirated stops and ejectives. However, it is unclear whether aspirated stops and ejectives would lengthen after a stressed short vowel, just like the resonants and the sibilants. An acoustic analysis was performed to examine the durational properties of intervocalic ejectives in SJ's data (a comparable study on aspirated stops was not yet possible due to insufficient material in the available corpus). The results are given in Figure 5.

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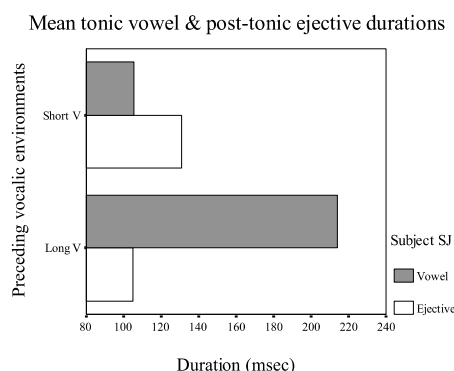


Figure 5: Mean durations of tonic vowels and the closure of the post-tonic ejectives based on SJ's speech.

The closure duration of an ejective is significantly shorter ( $F(1, 15) = 5.97; p < 0.05$ ) following a long stressed vowel (104.64 ms.) than a short stressed vowel (131.05 ms.). These results suggest that the duration allophony observed with the sonorants, sibilants and approximants is characteristic of ejectives as well. Given this result, it seems reasonable to hypothesize that aspirated stops would also pattern similarly, though further research is needed to substantiate this claim.

The final alternation involving stress concerns the behavior of the voiceless resonants ( $\bar{m}$ ,  $\bar{n}$ ,  $\bar{\eta}$ ,  $\bar{y}$ ,  $\bar{l}$ ,  $\bar{w}$ ). Jacobsen regards voiceless resonants as contrastive (i.e. underlying) in Washo, yet their distribution is more restricted than one would otherwise assume if they are indeed contrastive. Voiceless resonants are absent intervocally after a stressed short vowel or in word-final position. This distribution is complementary to that of the /h/ + resonant sequences; /h/ + resonant sequences are found only after a stressed short vowel (e.g. *láhla* 'in my leg', *wamáhmi* 'it's cloudy'). Moreover, /h/ does not occur in preconsonantal and final positions elsewhere.

Let us summarize our observations on these stress-sensitive segmental alternations in Washo. The restricted (i.e. only in and around the stressed syllable) and complementary distribution of (i) vowel and consonantal lengths on the one hand and (ii) the voiceless resonants and glottal fricative plus resonants on the other suggest that these two seemingly different sets of facts betray a deeper generalization that has eluded analysts until now. That is, these patterns are manifestations of a conspiracy in Washo to keep stressed syllables heavy (i.e. bimoraic). Accordingly, the next section will unify these alternations in an analysis couched within Optimality Theory.

### 3. The Significance of the Stress-to-Weight Principle in Washo

This section is divided into two parts. The first part will account for the duration allophony in vowels and consonants, and the second, for the voiceless resonants.

**3.1. Duration Allophony**

The data concerning duration allophony can be captured by the interaction of three constraints governing the distribution of syllable weight:

- (6) Stress-to-Weight Principle (Prince 1990): Stressed syllables must be heavy.
  - \*DEP-V<sub>μ</sub> An output mora associated with a vowel corresponds to an input mora (“don’t lengthen vowels”).
  - \*DEP-C<sub>μ</sub> An output mora associated with a consonant corresponds to an input mora (“don’t geminate consonants”).

The Stress-to-Weight Principle (SWP) is undominated in Washo since there is no surface exception, but the SWP can be satisfied in several ways. To this end, we adopt Morén’s theory of weight, which allows for the specification of sonority classes of segments with moraic faithfulness constraints (Morén 2001), due to the fact that the response to the SWP requirement varies depending on the context and the segments involved. For example, when the stressed vowel is underlyingly short (i.e. monomoraic), and the stressed syllable is underlyingly open (7), the most faithful candidate is always suboptimal. In such cases, Washo prefers to satisfy SWP by geminating the post-tonic consonant, as shown in (7), rather than lengthening the stressed vowel (7). This suggests that \*DEP-V<sub>μ</sub>, which penalizes the introduction of a vocalic mora in the output that has no input correspondent, must dominate \*DEP-C<sub>μ</sub>, which penalizes any epenthetic consonantal mora in the output. Note that the relative ranking between SWP and \*DEP-V<sub>μ</sub> cannot be determined at this juncture.

(7)

	v <sub>μ</sub> Nv <sub>μ</sub> <sup>1</sup>	SWP	*DEP-V <sub>μ</sub>	*DEP-C <sub>μ</sub>
a. $\mathcal{E}$	v <sub>μ</sub> N <sub>μ</sub> Nv <sub>μ</sub>			*
b.	v <sub>μμ</sub> Nv <sub>μ</sub>		*!	
c.	v <sub>μ</sub> Nv <sub>μ</sub>	*!		

Gratuitous post-tonic lengthening is predicted, however, when the input contains a stressed vowel that is underlyingly long.

(8)

	v <sub>μμ</sub> Nv <sub>μ</sub>	SWP	*DEP-V <sub>μ</sub>	*DEP-C <sub>μ</sub>
a. $\mathcal{E}$	v <sub>μμ</sub> Nv <sub>μ</sub>			
b. $\bullet$	v <sub>μ</sub> N <sub>μ</sub> Nv <sub>μ</sub>			

Here, candidate (8) is a serious contender because it does not violate \*DEP-C<sub>μ</sub> since the resonant-geminating mora is underlyingly present, albeit associated underlyingly with a vowel rather than a resonant. Thus, some mechanism must be

<sup>1</sup> N is a cover symbol for the (voiced) resonants (m, n, ŋ, y, l, w) and the sibilants (s, š); T for plain stops; T’ for ejectives.

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introduced to prevent post-tonic resonants from geminating willy-nilly such as in (8). In essence, our analysis must reflect that post-tonic gemination is only needed when the stressed syllable is not heavy enough.

One way to remedy this present conundrum is to assume that underlying mora-segment associations must be respected in the output, as captured by the constraint in (9). Thus, a mora associated with a specific sonority class of segments (e.g. vowels), cannot surface as a mora associated with some other classes of segment (e.g. resonants).

- (9) NO-FLOP-MORA (Morén 2001:27)  
 Let  $\mu^i$  be morae,  $\zeta_j$  be segments,  $S_k$  phonological representations,  $S_1 R S_2$ ,  
 $\mu^1$  and  $\zeta_1$  are elements of  $S_1$ ,  $\mu^2$  and  $\zeta_2$  are elements of  $S_2$ ,  
 $\mu^1 R \mu^2$  and  $\zeta_1 R \zeta_2$ ,  
 if  $\mu^1$  is associated with  $\zeta_1$ ,  
 then  $\mu^2$  is associated with  $\zeta_2$ .  
 “Assign a violation mark if the input segment-mora association is lost in the output.”

The constraint ranking in (10) illustrates the basic skeleton of the formal analysis, which derives the correct candidate and properly rejects cases like (8b).

- (10) SWP, \*FLOP<sub>μ</sub>, \*DEP-V<sub>μ</sub> >> \*DEP-C<sub>μ</sub>

	$v_{\mu\mu} N v_{\mu}$	SWP	*FLOP <sub>μ</sub>	*DEP-V <sub>μ</sub>	*DEP-C <sub>μ</sub>
a. $\mathcal{C}$	$v_{\mu\mu} N v_{\mu}$				
b.	$v_{\mu} N_{\mu} N v_{\mu}$		*!		
c.	$v_{\mu} N v_{\mu}$	*!			

Before turning to the pattern of tonic vowel lengthening before plain stops, a brief discussion about the behavior of post-tonic ejectives and aspirated stops is in order. The phonetic data summarized in Figure 5 show that post-tonic ejectives are lengthened, just like the resonants and sibilants. We also hypothesized that similar lengthening is found with the post-tonic aspirated stops. The analysis in (10) readily captures this fact, as illustrated by the tableau in (11).

(11)

	$v_{\mu} T' v_{\mu}$	SWP	*FLOP <sub>μ</sub>	*DEP-V <sub>μ</sub>	*DEP-C <sub>μ</sub>
a. $\mathcal{C}$	$v_{\mu} T'_{\mu} T' v_{\mu}$				*
b.	$v_{\mu\mu} T' v_{\mu}$			*!	
c.	$v_{\mu} T' v_{\mu}$	*!			

We turn now to the pattern of tonic vowel lengthening before plain stops. Recall that short stressed vowels are lengthened before an intervocalic plain stop (i.e. voiceless unaspirated), since vowel length contrasts only in the stressed syllable

but never before plain stops. Why do the plain stops not lengthen like the other consonants? We hypothesize that it is due to the fact that the phonological grammar of Washo does not license moraic unaspirated stops. As a consequence, SWP can only be satisfied by lengthening the vowel since geminating a plain stop (13) would have fatally violated the high-ranking \*DEP-T<sub>μ</sub>, which penalizes moraic plain stops on the surface.<sup>2</sup> As shown in (10), Washo generally prefers to satisfy SWP by lengthening the post-tonic consonant, rather than the tonic vowel. The fact that the tonic vowel is lengthened when the post-tonic consonant is a plain stop suggest that \*DEP-T<sub>μ</sub> must dominate \*DEP-V<sub>μ</sub>.

- (12) \*DEP-T<sub>μ</sub> An output mora associated with a plain stop corresponds to an input mora (“don’t geminate plain stops”).

(13)

	v <sub>μ</sub> Tv <sub>μ</sub>	SWP	*FLOP <sub>μ</sub>	*DEP-T <sub>μ</sub>	*DEP-V <sub>μ</sub>	*DEP-C <sub>μ</sub>
a.	v <sub>μ</sub> Tv <sub>μ</sub>				*	*
b.	v <sub>μ</sub> T <sub>μ</sub> Tv <sub>μ</sub>			*!		*
c.	v <sub>μ</sub> Tv <sub>μ</sub>	*!				

The analysis arrived at in (13) illustrates the importance of relativizing moraic faithfulness constraints to sonority classes of segments. In Washo, the response to the pressure from SWP is not monolithic: depending on the context and the class of segments in question, the tonic vowel or the post-tonic consonant may lengthen. This variation is captured by allowing certain relativized moraic faithfulness constraints to dominate the others. In the next section, we show that SWP not only induces lengthening in Washo, it also has the effect of preserving certain phonetic contrasts.

### 3.2. Voiceless Resonant “Fission” Revisited

Recall that Jacobsen (1964) analyzes voiceless resonants as contrastive in Washo; in particular, he claims that voiceless resonants cannot be analyzed as derived from *h* + resonant (*hN*) sequences. However, the complementary distribution of voiceless resonants and *hN* sequences raises doubt about the validity of such an analysis. As noted earlier, voiceless resonants are found in all positions except after a stressed short vowel or syllable-finally (14) while *hN* sequences are found after a stressed short vowel only and nowhere else.

- (14) a. Pre-tonic position
- |         |                                 |          |
|---------|---------------------------------|----------|
| diMá:š  | ‘my face’                       | (J64:84) |
| meLú:lu | ‘old men’                       | (J64:84) |
| diWá?i  | ‘I’m the one who’s doing it’    | (J64:84) |
| diYá:mi | ‘that’s what I’m talking about’ | (J64:85) |

<sup>2</sup> This might be related to the fact that coda stops are always aspirated in Washo, whether they are plain or ejective.

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- b. Post-tonic position  
 mé:Lu ‘old man’ (J64:86)  
 t’á:Yaŋi ‘he’s hunting’ (J64:86)
- c. Initial position  
 Múʔši ‘he’s running’ (J64:87)  
 Léʔi ‘I am’ (J64:87)  
 Wáʔi ‘he’s the one who’s doing it’ (J64:87)  
 Layá:m ‘tell me!’ (J64:87)  
 Weyúʔšiʔi ‘that’s the one that smells’ (J64:87)  
 Yá:mi ‘that’s what he’s talking about’ (J64:88)

The distribution of these two classes of sound and sound sequences are summarized in (15).

(15)

		Voiceless resonant	<i>h</i> + resonant
Pretonic		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Post-tonic	Post-long V	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Post-short V	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Word-initial		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Syllable-final		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Here we propose that voiceless resonants are indeed derived from *hN* sequences. Such sequences are only licensed after a stressed short vowel (16). They are otherwise realized as voiceless resonants (16).

- (16) a. Post-short tonic  
 /lahla/ lálhla ‘in my leg’  
 /wamahmi/ wamáhmi ‘it’s cloudy’
- b. Pre-tonic  
 /mehlu:lu/ meLú:lu ‘old men’  
 /dihya:mi/ diYá:mi ‘that’s what I’m talking about’
- Post-long tonic  
 /me:hlu/ mé:Lu ‘old man’  
 /t’a:hyani/ t’á:Ya i ‘he’s hunting’
- Initial  
 /hleʔi/ Léʔi ‘I am’  
 /hya:mi/ Yá:mi ‘that’s what he’s talking about’

This analysis has several advantages. First, it reduces the number of segmental contrasts in Washo. The glottal fricative /h/ is already independently recognized as a contrastive segment in the language since *h* is commonly found in syllable-initial position. Thus, all else being equal, the existence of *h* in coda

position is to be expected. The restricted licensing of laryngeals to the stressed and other phonetically salient positions (e.g. syllable onset) is not uncommon in the world's languages (e.g. Howe and Pulleyblank 2001, Blevins 2004, Steriade 1997). In particular, it has been argued that laryngeals are better supported phonetically in stressed position due to the extra intensity and energy afforded by the stressed vowel, which makes the breathiness of the laryngeal more salient and detectable.

The analysis developed thus far can readily be extended to account for this alternation. As shown in (17), when the input contains an intervocalic consonant sequence, pressure to satisfy SWP forces the coda consonant to be weight-bearing (17). As seen in the last section, all else being equal, the lengthening of the tonic vowel (e.g. (17) and (17c)) is never the optimal solution when the option to assign a mora to the post-tonic consonant is available.

(17)

	$v_{\mu}hNv_{\mu}$	SWP	*DEP- $V_{\mu}$	*DEP- $C_{\mu}$
a. $\mathcal{P}$	$v_{\mu}h_{\mu}.Nv_{\mu}$			*
b.	$v_{\mu\mu}h.Nv_{\mu}$		*!	
c.	$v_{\mu\mu}.Nv_{\mu}$		*!	
d.	$v_{\mu}h.Nv_{\mu}$	*!		

Therefore, what is crucial is not why  $hN$  sequences are found only after a stressed vowel, but why  $hN$  sequences are not found elsewhere. Several factors are involved. First, onset clusters are not allowed in Washo in general, and so it is not surprising that  $hN$  is absent in that position as well. Second,  $h$  is found only in post-tonic position and not elsewhere because it is licensed by its own mora, a requirement formalized as the constraint,  $*h]_{\sigma}$  which penalizes moraless  $h$  in coda position. A recent study has shown that moraic coda is licensed only in the stressed syllable in Washo (Yu 2003). Thus, coda  $h$  that appears anywhere other than after a stressed short vowel is not to be expected.

- (18)  $*h]_{\sigma}$  Moraless coda glottal fricative is not banned.  
 \*FUSION An output segment must have a unique corresponding input.

As illustrated in (19),<sup>3</sup> when the input contains a pretonic  $hN$  sequence, the phonology of Washo renders it impossible to preserve the pre-resonant  $h$ .

(19)

	$/di_{\mu}hya_{\mu\mu}mi_{\mu}/$	SWP	$*h]_{\sigma}$	*DEP- $V_{\mu}$	*DEP- $C_{\mu}$	*FUSION
a. $\mathcal{P}$	$di_{\mu}.Yá_{\mu\mu}.mi_{\mu}$					*
b.	$di_{\mu}h.yá_{\mu\mu}.mi_{\mu}$		*!			
c.	$di_{\mu}h_{\mu}.yá_{\mu\mu}.mi_{\mu}$				*!	

<sup>3</sup> Syllable boundaries are indicated by <.> in the candidate set.

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Assigning a mora to the *h* fatally violates \*DEP-C<sub>μ</sub> since there is no pressure to keep non-stressed syllable heavy (19). Leaving the morales *h* intact (19), however, fatally violates \*h]<sub>σ</sub>. Despite its violation of \*FUSION, candidate (19) prevails by fusing *h* with the resonant. The resultant voiceless resonant preserves the breathy quality of the *h* and the sonorant status of the resonant.

#### **4. Conclusions**

Three sets of stress-sensitive alternations in Washo were introduced in this paper: variable vowel and consonant durations and the characteristic behavior of voiceless resonants. These patterns were given a unified treatment by appealing to a simple conspiracy in Washo phonology that has eluded analysts until now: stressed syllables must be heavy. The observed alternations are thus the result of interplay between a set of constraints governing syllable weight distribution. A summary of the constraint ranking is given in (20).

(20) SWP, \*FLOP<sub>μ</sub>, \*h]<sub>σ</sub>, \*DEP-T<sub>μ</sub> >> \*DEP-V<sub>μ</sub> >> \*DEP-C<sub>μ</sub> >> \*FUSION

In sum, the pressure to maintain a heavy stressed syllable in Washo forces the assignment of an extra mora to the stressed syllable when the tonic vowel is underlyingly light. While post-tonic consonant lengthening is the preferred strategy, tonic vowel lengthening is also possible when the post-tonic consonant is a plain obstruent. The preference for post-tonic lengthening over tonic vowel lengthening might be due to pressure of contrastive maintenance (e.g., Flemming 1995). As noted earlier, vowel length is contrastive in Washo, albeit only in the stressed syllable, and lengthening a tonic short vowel would obliterate this contrast. It should be noted that despite the complementary distribution between consonantal and vocalic length, vocalic length is taken to be the primary contrast here. When compared to the distribution of vowel length, the distribution of consonantal length is more restrictive. For example, unlike many of the Scandinavian languages, tautosyllabic geminates are not found in Washo. However, in monosyllabic words that end in a consonant, a contrast in vowel length may be observed in Washo (e.g. *ɲám* ‘son’ vs. *mem* ‘out from.pl’).

As a final note, the results of the acoustic study not only demonstrate the phonetic reality of duration allophony between vowels and consonants in Washo, they also illustrate the importance of phonetic studies to endangered languages. Some scholars have suggested that a bilingual speaker of a threatened language in a language-contact situation will make fewer phonological distinctions in his or her use of the language than a fully competent (dominant or monolingual) speaker of the same language would (e.g., Andersen 1982). Yet while the Washo language is generally classified as severely moribund, the current generation of Washo speakers nonetheless retains subtle phonetic alternations, despite the fact that they mostly grew up bilingual, if not English-dominant, and their command of Washo phonology did not seem to have undergone severe attrition. Thus, it might be too

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strong to claim that bilingual speakers of endangered languages make fewer phonological distinctions than monolingual native speakers.

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