Kwak'wala *m'ut* reduplication without RED

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The stem expansion effects associated with *-m'ut* offer insight into the morphophonology of Kwak'wala. Building on the work of Rodier (1989) and Struijke (2000), I use the framework of Minimalist Reduplication (Saba Kirchner forthcoming) to offer an analysis of the distribution of the three expansion effects attested with *-m'ut* (epenthesis, lengthening and reduplication) and the attested subpatterns of reduplication. This analysis is more theoretically parsimonious and more empirically successful than alternative theories can achieve. It also yields interesting predictions and avenues for research in the morphophonology of Kwak'wala and of the Wakashan family.

1. Introduction

Like all Wakashan languages, Kwak'wala has a rich morphophonological system, characterized by an extensive and complex set of affixes. Among these are many suffixes which induce phonological changes in the stems to which they affix. These changes may include fortition or lenition of a stem-final consonant, or expansion of the stem through lengthening, reduplication, and epenthesis.[1]

In this paper I analyze the suffix *-m'ut*, which is associated with all of those expansion effects in certain contexts.[2] In particular I focus on the reduplication triggered by *-m'ut*, which has two properties that are puzzling for standard analyses of reduplication. Reduplication fails to occur with some classes of stems, with which it should be compatible. And some input material surfaces in the "reduplicant" while being absent in the "base"

I present an analysis of *-m'ut* stem expansion in the framework of Minimalist Reduplication (Saba Kirchner forthcoming). MR attempts to derive reduplicative behavior from independently motivated phonological processes, without resorting to reduplication-specific theoretical machinery. This framework rejects standard assumptions about reduplication such as the existence of RED, "base"

My understanding of Kwak'wala would be much poorer were it not for a field methods course at InField 2008. I offer many thanks to our informants Daisy Sewid-Smith and Beverly Lagis, to our instructor Pat Shaw, and to my classmates. Similar gratitude is owed to many linguists at UC Santa Cruz and at WSCLA 14 who gave feedback on various incarnations of this work.

[1] These generalizations about Kwak'wala are due to Boas (1947). Other important work on Kwak'wala phonology includes Grubb (1977), Wilson (1986) and Zec (1994).

[2] Work on *-m'ut* has a long history as well; see Rodier (1989), Struijke (1998), Struijke (2000) and Saba Kirchner (2006).

and "reduplicant," and (in Optimality Theory) FAITH-BR constraints. As I show below, a theory which eschews these theoretical devices yields a simpler and more successful account of *-m'ut* reduplication, as well as providing a useful orientation for the further exploration of Kwak'wala stem-expanding suffixes.

2. Data

2.1. Sketch of Kwak'wala prosody

The main diagnostic for syllable weight is stress placement. Kwak'wala exhibits quantity-sensitive default-to-opposite stress assignment. Primary stress falls on the leftmost heavy syllable if any heavy syllable is present; otherwise it falls on the rightmost syllable (Bach 1975). Secondary stress also occurs; its assignment is not as clear, but it generally falls on alternating syllables following the primary stress (Wilson 1986). Zec (1994) analyzes the metrical system as quantity-sensitive iambic footing, with the first foot laid down at the first heavy syllable when possible, otherwise on the final syllable.

Two facts about syllable weight are significant for our purposes: first, that different types of coda consonants differ in their contribution to syllable weight; and second, that three levels of weight are found.

2.1.1 Sonority and coda weight

As in all quantity-sensitive languages with a phonemic vowel length distinction, syllables with long vowels are treated as heavy and syllables with short vowels are not. The weight contribution of codas, however, is variable, and depends on the sonority of the coda consonant in question (Bach 1975). Unglottalized sonorant codas do yield heavy syllables, thus attracting stress:[3]

(1) Sonorant codas attract stress:

m'ə́n.sa	'to measure'	218
də́l.xa	'damp'	218
tə́l.q^{w}a	'soft'	218

But obstruent codas and glottalized sonorant codas do not contribute to syllable weight, as shown by the failure of syllables with such codas to attract stress in (2):

(2) Obstruent codas and glottalized sonorants do not attract stress:

c'ət.xá	'to squirt'	218
təɬ.c'á	'to warm oneself'	217
gəm'.χá	'to use the left hand'	219

This division between obstruent and (unglottalized) sonorant codas will prove crucial to explain some of the subpatterns of reduplication found with *-m'ut*.

[3]Plain page numbers refer to Boas (1947). Page numbers with label BD refer to Boas (1948).

2.1.2 Three syllable weights

Assigning all syllables to one of two classes – "heavy" or "light" – proves insufficient to account for the full range of facts. If we observe the behavior of syllables according to our stress diagnostic, we find that there are actually three classes: *stress-accepting* syllables, *stress-attracting* syllables, and *stress-rejecting* syllables.

Stress-accepting syllables are basic light syllables. A light syllable in the middle of a word will not bear primary stress, but it will bear secondary stress if it sits in an appropriate location (i.e. an even number of syllables after the primary-stressed syllable). A word-final light syllable will accept stress if there is no heavy syllable in the word. By contrast, stress-attracting syllables are the heavy syllables. They have a long vowel or a sonorant coda – but never both – and the first one in a word will always bear stress.[4] The contrast between these syllable types is shown in (3):

(3) Stress-accepting syllables (ə as nucleus and obstruent-only coda):

həm'xdə́m'ʔs	'favorite place for eating outside'	366
təɬc'əbə́s	'warming himself'	336
təχ^{w}t'əq'^{w}ə́s	'cinquefoil plant in ground'	BD 173

(4) Stress-attracting syllables (full vowel or plain sonorant coda):

d^{z}ə́mbətəls	'to bury in hole in ground'	218
k'əq'^{w}əχsdə́ndalap'a	'to stick through at both ends'	218
ƛ'áːy'aɬa	'to be transformed'	219

The interesting third class of syllables are those that reject stress. These are syllables with an epenthetic nucleus (invariably ə). These syllables never bear secondary stress, even when they sit an appropriate distance from the primary stressed syllable. Instead, stress assignment seems to ignore these syllables entirely; if the first or second syllable after the primary stress has an epenthetic nucleus, secondary stress will fall three syllables later instead of two, and so on. (Boas 1947, Wilson 1986) Some examples are shown in (5).[5]

(5) Stress-rejecting syllables (with epenthetic ə, underlined below; 219):

/d^{z}ax^w + =ad + !iːnuːχ^w/ → d^{z}áːwadəʔìːnuːχ^w
'people of Knight Inlet'

/qaːk + =k^w + !ə + =aːs/ → qáːgək'^{w}əʔàːs
'place where skulls are hung up on rock'

/x^{w}aː + =əm + iː/ → x^{w}áːx^{w}ag^{w}əmìː
'that small canoe'

I adopt moraic theory to analyze this three-way contrast (Hyman 1985, Morén

[4] A very small number of words do have a long vowel nucleus and sonorant coda, e.g. *ʔuːmp* 'father' (BD 33). I ignore these exceptional words here.

[5] Following the conventions of Boas (1947), morphological classes of suffixes known as "hardening" and "weakening" are indicated orthographically through the symbols ! and = respectively, e.g. *!iːnuːχ^w* and *=aːs* below.

1999). Syllable weight is a measure of the number of moras dominated by a given syllable. A syllable with two or more moras is heavy and, in Kwak'wala, stress-attracting. One-mora syllables are stress-accepting. I claim that stress-rejecting syllables contain no moras.[6] Because these syllables always have epenthetic nuclei, we can arrive at this result by prohibiting the insertion of a mora dominating any vowel with no input correspondent. We can represent each of these syllable types visually as Σ (heavy, 2 moras), σ (light, 1 mora) and ς (weightless, 0 moras).

2.2. Phonotactics

A few other significant points about Kwak'wala phonotactics should be mentioned. Superheavy syllables (i.e. those with more than two moras) are always prohibited in Kwak'wala, and they are actively avoided. There are also a number of variations in vowel quality which intersect with vowel lengthening and shortening. In particular, the full range of vocalic contrasts is only maintained by long vowels. When *iː* or *uː* shorten, they surface as *ə*. When *ə* lengthens, it typically surfaces as *aː*. I follow Bach (1975) in taking *iː* and *uː* to be (usually) derived from /əy/ and /əw/, and *eː* and *oː* from /əyə/ and /əwə/.

We have already seen some examples of the epenthesis which is active in the language. Word internally, schwa epenthesis relieves three types of marked codas: clusters that violate the Sonority Sequencing Principle, voiced obstruents, and glottalized consonants (*laryngeally-marked consonants*; Lombardi (1991), Lombardi (1995)), e.g. /g^{w}əd + xʔiːd/ → [g^{w}ədəxʔiːt] 'to begin to untie' (Boas (1947): 211).

Word-final epenthesis does not occur. Word-final voiced obstruents devoice, while glottalized consonants surface faithfully. (For a more complete analysis of this pattern and its typological implications, see Davenport (2007).)

2.3. *-m'ut* affixation

2.3.1 The suffix

Boas (1947) glosses -*m'ut* as "useless, refuse." (339) More specifically, -*m'ut* words refer to the useless byproduct of an action, such as sawdust or inedible food scraps left after cooking.[7] There are two allomorphs for the suffix itself. Glottalized [m'uːt] occurs with consonant-final stems. Unglottalized [muːt] occurs with vowel-final stems, including all epenthetic forms.

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[6]Literature on semisyllables and nonmoraic syllables includes Gafos (1996), Cho and King (1999) and Nuger (2006). cf. the analysis of Bach *et al*. (2005), claiming that all schwas in Kwak'wala are weightless.

[7]The existence of the suffix *-(g)iːsaweːʔ*, *-(g)iːsoːla* should also be noted here. This suffix, glossed as 'left over, to leave over', triggers stem expansion similar to *-m'ut*. Boas (1947) is inconsistent in classifying the patterns as identical or merely similar (235, 353). The similarity in semantics and the morphophonology is striking. However, other suffixes with comparable semantics do not exhibit any of the same stem expansion effects; e.g. *-!ay'aweːʔ*, *-!ay'oːla* 'left over'. I do not explore this issue any further here.

I do not provide an analysis of this allomorphy here, but I touch on it again in §5. In the tableaux in §3 I simplify representations by only listing *m'uːt* as the underlying form, and only considering forms that choose the correct allomorph.

2.3.2 Stem expansion

The surface form of a stem with -*m'ut* depends entirely on the underlying shape of the stem. (6) shows the changes in the eleven classes of stem shape attested in Boas (1947):[8]

(6) Stem changes with -*m'ut*:

Class	*Root*	*Suffixed*	*Change*	*E.g.*	*With suffix*
A1	CəT	CaːT	l	t'əs	t'aːsm'uːt
A2	CəR	CəRCə	r	kən	kənkəmuːt
A3	CəY	CəYCə	r	dəy	diːdəmuːt
A4	CəD	CaːDə	l, e	g^{w}əd	g^{w}aːdəmuːt
A5	CəC'	CəCəT'ə	r, e	c'əm'	c'əc'əm'əmuːt
B1	CVːT	CVːCəT	r	χ^{w}aːƛ	χ^{w}aːχ^{w}əɬm'uːt
B5	CVːT'	CəCVːT'ə	r, e	siːq'	səsiːq'əmuːt
C1	CəRT	CəRCəT	r	qəns	qənqəsm'uːt
C4	CəRD	CəCəRDə	r, e	mənd$^{\text{z}}$	məmənd$^{\text{z}}$əmuːt
C5	CəRC'	CəCəRT'	r	k'$^{\text{w}}$əml'	k'$^{\text{w}}$ək'$^{\text{w}}$əml'muːt
D	CəTT	CaːTTə	l, e	k'$^{\text{w}}$əsx	k'$^{\text{w}}$aːsxəmuːt

Patterns begin to emerge when we consider the epenthetic cases:

(7) Changes in epenthetic stems:

Class	*Root*	*Suffixed*	*Change*	*E.g.*	*With suffix*
A4	CəD	CaːDə	l, e	g^{w}əd	g^{w}aːdəmuːt
B5	CVːT'	CəCVːT'ə	r, e	siːq'	səsiːq'əmuːt
C4	CəRD	CəCəRDə	r, e	mənd$^{\text{z}}$	məmənd$^{\text{z}}$əmuːt
D	CəTT	CaːTTə	l, e	k'$^{\text{w}}$əsx	k'$^{\text{w}}$aːsxəmuːt

In all of these forms, epenthesis is independently motivated. We can hypothesize therefore that epenthesis is not triggered by -*m'ut* (beyond the fact that epenthesis is an automatic phonological consequence when a consonant-initial suffix follows a morpheme with a final consonant which cannot surface as a coda). That leaves lengthening and reduplication as the stem expansion only manifestations of the

[8]Class names correspond to those in Boas (1947). The Root and Suffixed columns show schematically the changes undergone by the stems, according to the folowing key: C = consonant. V = vowel. T = plain voiceless obstruent. D = voiced obstruent. Y = glide. R = sonorant. The type of change is given at a glance in the Change column, stating whether a stem of the class in question undergoes lengthening, reduplication or epenthesis.
Active phonological rules include $\partial y]_\sigma \rightarrow$ [iː] and $ƛ]_\sigma \rightarrow$ [ɬ]. Some polysyllabic stems are also attested with -*m'ut*; their expansion appears to be irregular.
Classes A5 and C5, having two and one attested forms respectively, are not analyzed here because of the absence of reliable data. Patterns A4, A5, B5, C4 and C5 are all very rare.

suffix in the stem.

When we compare all stems that reduplicate with those that lengthen, ignoring the question of epenthesis, we see a clear difference between the two classes:

(8) *-m'ut* words grouped by type of stem change:

Class	*Root*	*Suffixed*	*E.g.*	*With suffix*
Lengthening				
A1	CəT	CaːT	t'əs	t'aːsm'uːt
A4	CəD	CaːDə	gʷəd	gʷaːdəmuːt
D	CəTT	CaːTTə	k'ʷəsx	k'ʷaːsxəmuːt
Reduplication				
A2	CəR	CəRCə	kən	kənkəmuːt
A3	CəY	CəYCə	dəy	diːdəmuːt
B1	CVːT	CVːCəT	χʷaːƛ	χʷaːχʷəɬm'uːt
B5	CVːT'	CəCVːT'ə	siːq'	səsiːq'əmuːt
C1	CəRT	CəRCəT	qəns	qənqəsm'uːt
C4	CəRD	CəCəRDə	məndᶻ	məməndᶻəmuːt

All the roots that lengthen would constitute a light syllable on their own, while all the roots that reduplicate would constitute a heavy syllable on their own. Those reduplicating forms, in which the bare root would form a heavy syllable, are the forms which could not undergo vowel lengthening under any circumstances, because the result would be a superheavy syllable (something always forbidden in Kwak'wala). Therefore I follow Rodier (1989) in arguing that when *-m'ut* is added, stems lengthen when possible; when lengthening would create an illegal superheavy syllable, stems reduplicate instead.

Reduplication always creates a stem with one heavy and one light syllable. (Epenthetic syllables also co-occur with reduplication). However, roots can differ in the reduplicative stem to which they expand in terms of the order of the heavy and light syllables, and in the location in which root-final consonants (if any) surface in the stem.

Syllable ordering in terms of weight correlates to the presence or absence of epenthesis. Non-epenthetic forms have a $\Sigma\ \sigma$ pattern, while epenthetic forms exhibit a $\sigma\ \Sigma$ pattern:

(9) Reduplication patterns by weight:

$\Sigma\ \sigma\ \Sigma$ e.g. *kənkəmuːt*

$\sigma\ \Sigma\ \varsigma\ \Sigma$ e.g. *məməndᶻəmuːt*

Note that both patterns are consistent with the creation of good iambs: $(\Sigma)\ (\sigma\ \Sigma)$ and $(\sigma\ \Sigma)\ \varsigma\ (\Sigma)$.

In terms of root-final consonants, single obstruent codas always surface in the second syllable of the stem (or as the onset of the third syllable in epenthetic forms):

(10) Reduplication with single obstruent coda:
No epenthesis: /χ^{w}aːƛ/ → χ^{w}aːχ^{w}əɬm'uːt
With epenthesis: /siːq'/ → səsiːq'əmuːt

Single plain root-final sonorants surface in the first syllable:

(11) Reduplication with single sonorant coda:
/kən/ → *kənkəmuːt*

Root-final clusters surface contiguously if nonmoraic or if epenthesis occurs:

(12) Reduplicative coda clusters surface contiguously:
Root shape TT: /k'^{w}əsx/ → k'^{w}aːsxəmuːt
Cluster in epenthetic word /mənd^{z}/ → məmənd^{z}əmuːt

But just in the case where the root-final cluster has the shape RT, the cluster splits, with the sonorant member surfacing in the first syllable and the obstruent in the second syllable of the stem:

(13) Coda clusters split when they have the shape RT:
/qəns/ → qənqəsm'uːt

3. Analysis

I take the underlying form of the suffix to be /μ m'u$^{\mu\mu}$t/. The floating mora associated with this suffix needs to dock in the stem, where it lengthens the stem vowel when possible; when lengthening is not possible, reduplication is triggered instead (Rodier 1989).

The reduplicative subpatterns can be explained as TETU (McCarthy and Prince 1995) effects (Struijke 1998, 2000). Low-ranked markedness constraints choose between multiple forms which faithfully realize all input material.

The framework for this analysis is Minimalist Reduplication, which develops Rodier's idea into a general account of reduplication. MR views reduplication as an emergent phenomenon not tied to special morphological processes (such as templatic copying) or relationships (such as FAITH-BR). Reduplication is simply a repair process available for a language confronting marked structures, e.g. a floating mora, which may be chosen in all cases or only in certain contexts, depending on the ranking of INTEGRITY and other key constraints. MR crucially assumes that reduplication is minimal – it occurs to the extent needed to repair marked structures.

This stands in contrast with standard analyses of reduplication, which assume that reduplication *per se* is a goal. These analyses typically rely on special theoretical machinery such as a RED morpheme; special constituents called "base" and “reduplicant”; and a process of copying due to FAITH-BR constraints.

3.1. Lengthening, reduplication and epenthesis

Given the ranking {MAX-μ, DEP-seg, INTEGRITY} ≫ IDENT(length), we predict that a floating mora will surface by causing a stem vowel to lengthen. This is what happens with CəT roots, as shown in (14). In keeping with the principles of MR, a reduplicative segment violates INTEGRITY; BR correspondence and constraints are absent.[9]

(14) Lengthening with monomoraic stems:

təp + $\underline{\mu}$ m'u$^{\mu\mu}$t	MAX-μ	DEP-seg	INTEG	ID(length)
☞ a. ta$^{\mu\underline{\mu}}$pm'u$^{\mu\mu}$t				*
b. tə$^{\mu}$pm'u$^{\mu\mu}$t	*!			
c. ʔa$^{\underline{\mu}}$tə$^{\mu}$pm'u$^{\mu\mu}$t		*!*		
d. tə$^{\mu}$tə$^{\underline{\mu}}$pm'u$^{\mu\mu}$t			*!*	

But lengthening is impossible when the stem already constitutes a heavy syllable, because of the absolute ban on superheavy syllables in Kwak'wala. This ban is formalized through the undominated position of the constraint *3MORA (cf. Morén 1999). Since the preferred repair strategy is ruled out, the next-best repair strategy must be chosen instead. The ranking DEP-seg ≫ INTEGRITY ensures that reduplication is preferred as a segment-adding strategy rather than epenthesis. In (15) we see a CəR stem /kən/ undergoing suffixation. High-ranking constraints rule out the lengthening candidate [kaːnm'uːt] and the epenthetic candidate [kəntamuːt], leaving the reduplicative candidate [kənkəmuːt] as the winner.

(15) Reduplication with bimoraic stems:

kən + $\underline{\mu}$ m'u$^{\mu\mu}$t	*3MORA	DEP-seg	INTEG	CONTG
☞ a. kə$^{\mu}$n$^{\mu}$.kə$^{\underline{\mu}}$.mu$^{\mu\mu}$t			**	**
b. ka$^{\mu\underline{\mu}}$n$^{\mu}$.m'u$^{\mu\mu}$t	*!			
c. kə$^{\mu}$n$^{\mu}$.ta$^{\underline{\mu}}$.mu$^{\mu\mu}$t		*!*		
d. kə$^{\mu}$n$^{\mu}$.kə$^{\underline{\mu}}$n$^{\mu}$.mu$^{\mu\mu}$t			***!	*

[9] Definitions of all constraints used in this paper are gien in an appendix below.
Note that this analysis relies on some further assumptions which can only be touched on here. To show that vowel lengthening shows the influence of a floating mora, we need to make certain assumptions about floating supersegmentals in general and moras in particular. See Wolf (2006) on floating elements in general (though especially floating features), and Pater (2003) on floating moras. On the drive for this floating mora to dock in the stem rather than in the suffix or somewhere else, see Saba Kirchner (2007). We need to rule out a candidate [tə$^{\underline{\mu}}$pm'u$^{\mu\mu}$t], in which the floating mora anchors in the stem in place of a default mora. Doing this requires fleshing out the general morification mechanism in more detail; see e.g. Morén (1999). For reasons of space, I do not investigate these issues further here, but see Saba Kirchner (forthcoming).

As we have seen, the epenthesis that occurs with *-m'ut* suffixation is orthogonal to the stem expansion process triggered by the floating morpheme. Given a high-ranked constraint to prohibit the morification of epenthetic vowels, this falls out directly. I take this constraint to be [DEP-seg $\&_{seg}$ DEPLINKMORA], ranked as shown in (16):[10]

(16) Lengthening with monomoraic epenthetic stem:

g^wəd + $\underline{\mu}$ m'u$^{\mu\mu}$t	*LAR]$_\sigma$	DEP-seg $\&_{seg}$ DEPLINKMORA	INTEG
☞ a. g^wa$^{\mu\underline{\mu}}$dəmu$^{\mu\mu}$t			
b. g^wa$^{\mu\underline{\mu}}$dmu$^{\mu\mu}$t	*!		
c. g^wə$^{\mu}$də$^{\underline{\mu}}$mu$^{\mu\mu}$t		*!	
d. g^wə$^{\mu}$$g^w$ə$^{\underline{\mu}}$dəmu$^{\mu\mu}$t			*!*

3.2. Subpatterns of reduplication

Having motivated the selection of reduplication or lengthening for a given stem, it remains to analyze the various reduplicative subpatterns that occur. First we have cases where a CəR root yields a $\Sigma\ \sigma$ reduplicated stem pattern. This is due to the force of *CLASH, which seeks to avoid adjacent foot heads (as e.g. *kən* and *m'uːt*), even at the cost of disaligning the stem and root right edges (Struijke (1998)):

(17) $\Sigma\ \sigma$ reduplication:

kən + μ m'uːt	INTEGRITY	*CLASH	ALIGN-R (Root, Stem)
☞ a. (kən)(kəmuːt)	**		*
b. (kəkən)(muːt)	**	*!	

Reduplicative forms in which epenthesis also occurs behave differently. The presence of an epenthetic vowel between the root and the suffix is already sufficient to avoid a prosodic clash, so a $\sigma\ \Sigma$ reduplicative stem emerges as optimal:

[10] Note that this constraint would not rule out a candidate in which the "epenthetic" vowel is really reduplicative. More needs to be said to eliminate this possibility as well; I do not address this issue here. Note though that ultimately this analysis only relies on the fact that epenthetic vowels never bear moras – something that is independently motivated in Kwak'wala.

(18) $\sigma\ \Sigma\ \varsigma$ reduplication:

siːq' + μ m'uːt	FOOT FORM	*CLASH	AL-R (Rt, St)	CONTG
☞ a. (səsiː)q'ə(muːt)	*		*	*
b. (siː)q'ə(səmuːt)	*		*	**!
c. (siː)səq'ə(muːt)	**!		*	**
d. (siːsə)q'ə(muːt)	**!		*	*
e. (siː)(sə)q'ə(muːt)	**!		*	*

CVːT roots also must reduplicate to avoid having a superheavy syllable, but in these roots unlike the CəR roots, it is the root vowel and not the coda which contributes to syllable weight. Therefore a compromise emerges to satisfy both *CLASH and ALIGN-R(Root, Stem): the long vowel of the root surfaces in the first syllable, while the coda surfaces in the second. This is shown in (19).

(19) Reduplication with single obstruent coda:

χʷaːƛ + μ m'uːt	FOOT FORM	*CL	AL-R (Rt, St)	CONTIG
☞ a. (χʷaː)(χʷəɬm'uːt)				*
b. (χʷaːɬ)(χʷəmuːt)			*!	**
c. (χʷə)(χʷaːɬ)(m'uːt)		*!		*
d. (χʷəɬ)(χʷaː)(muːt)		*!	*	**

CəRD forms are a different case, because these forms also involve epenthesis. With *CLASH and ALIGN-R(Root, Stem) remaining agnostic between a $\sigma\ \Sigma$ stem and a $\Sigma\ \sigma$ stem, it falls to the constraint enforcing iambic footing to choose the best candidate. That candidate is the one with a $\sigma\ \Sigma$ stem, producing two good iambic feet.[11]

(20) Reduplication and epenthesis with RD clusters:

məndᶻ + μ m'uːt	FOOT FORM	*CL	AL-R (Rt, St)	CONTG
☞ a. (məmən)dᶻə(muːt)	*		*	*
b. (mən)dᶻə(məmuːt)	*		*	**!
c. (mən)mədᶻə(muːt)	**!		*	**
d. mədᶻə(mən)(muːt)	**!	*	*	***

[11] I assume naively that FOOTFORM is violated by any foot that is not a proper iamb, and by any unfooted syllable. In a fuller analysis, this constraint can be broken down into simpler well-motivated prosodic markedness constraints.

Finally we have the CəRT forms, in which the root cluster splits apart in the reduplicative stem. These forms fall out directly from what we have said so far; it is always the sonorant member of the cluster that surfaces in the first syllable (preventing a violation of *CLASH), while the obstruent portion of the coda surfaces in the second syllable to maintain proper alignment.

(21) RT clusters split in reduplication:

qəns + μ m'uːt	INTEG	*CL	AL-R (Rt, St)	CONTG
☞ a. (qən)(qəsm'uːt)	**			**
b. (qəsqən)(m'uːt)	**	*!	*	***
c. (qəns)(qəmuːt)	**		*!	**
d. (qəqəns)(m'uːt)	**	*!		**
e. (qəns)(qəns)(m'uːt)	***!	**		*

4. Conclusion and remaining issues

Previous attempts to account for the stem expansion patterns found in Kwak'wala with the suffix *-m'ut* have been unable to explain the full range of data. The Minimalist Reduplication analysis presented here was able to account for all the facts. The crucial difference about MR is that it allows reduplication to emerge as a repair process in just those circumstances where other repairs are blocked. This explains the distribution of reduplication and vowel lengthening when *-m'ut* is added to different roots. When reduplication does occur, the shape it takes is controlled by the ordinary constraints of the language, allowing us to explain the various attested subpatterns of reduplication.

Some issues remain unresolved. The full implications of this analysis for the morphophonology of Kwak'wala need to be investigated. With regard to the allomorphy of the suffix, there is an important stress issue which was not discussed here. Vowels in the first syllable which are lengthened due to the addition of *-m'ut* do not bear stress. This contradicts the generalization given for stress assignment, but it seems closely related to a special rule about the effect of morphology on stress assignment:

> "All stems of the type cv̆c and cv̆m [*i.e. CəT and CəR–JSK*] if followed by a weakening or hardening suffix or one beginning with a glottal stop have the accent on the suffix." (Boas (1947): 218)

Although *-m'ut* is not a hardening or a weakening suffix, nor does it begin with a glottal stop, it does exhibit active allomorphy involving the glottalization of the first consonant. An account of the *-m'ut* stress facts should extend to account for those other classes as well. This will also require an analysis of hardening and weakening suffixes capable of accounting for their behavior as a natural class in this context.

Finally, it remains to analyze all the other stem-expanding suffixes of Kwak'wala. The MR account provides a framework for understanding those suffixes and predicting what kind of stem expansion effects can or cannot occur. This work can help confirm or disconfirm the constraint rankings and the general analysis put forth here with respect to *-m'ut*.

Appendix: Constraint definitions

ALIGN-R(Root, Stem) (McCarthy and Prince 1995): The right edge of every root coincides with the right edge of some stem.

*CLASH (Struijke 2000): Adjacent heads of feet are prohibited.

CONTIGUITY: $\forall\, xy \in \mathbb{O}(\mathbb{utput})\ \exists\, \alpha\beta \in \mathbb{I}(\mathbb{nput})$ s.t. $\alpha\ \mathfrak{R}\ x\ \&\ \beta\ \mathfrak{R}\ y$.

DEPLINKMORA (existential version; cf. Morén (1999)):
Let S_i be segments in corresponding phonological representations $\mathbb{I}(\mathbb{nput})$ and $\mathbb{O}(\mathbb{utput})$.
If $S_1 \in \mathbb{O}$ and S_1 is associated with a mora,
then $\exists\, S_2$ such that $S_2 \in \mathbb{I}$ and S_2 is associated with a mora and $S_1\ \mathfrak{R}\ S_2$.

DEP-seg (Mccarthy 1995)): Every segment in S_2 has a correspondent in S_1.

FOOTFORM: A cover for several constraints which combine to enforce iterative iambic footing. A violation is assigned for a foot which is not a good iamb, e.g. $(\Sigma\ \sigma)$; or for a syllable that does not belong to any foot. (cf. Cohn and McCarthy 1998, Eisner 1996)

IDENT(length) (Brennan 2006): The length specifications in the input match the length specifications in the output.

INTEGRITY (McCarthy and Prince 1995): Informally: No element of S_1 has multiple correspondents in S_2. Formally: For $x \in S_1$ and $w, z \in S_2$, if $x\ \mathfrak{R}\ w$ and $x\ \mathfrak{R}\ z$, then $w = z$.

*LAR$]_\sigma$ (Um 2001, Davenport 2007): Violated when a segment in coda position bears a laryngeal feature ([voice] [glottalized] [aspirated]).

MAX-μ (cf. McCarthy and Prince (1995)): Every mora in S_1 has a correspondent in S_2.

SYLL-μ (Morén 1999): A syllable must be minimally mono-moraic.

*3MORA (cf. Morén 1999): Trimoraic syllables are prohibited.

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