REDUPLICANT AND OUTPUT TETU IN KWAKWALA*

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Introduction

Kwakwala[1] shows a reduplicative pattern in which a general requirement on output forms sometimes forces the reduplicant to be more faithful to the input root than is the base, while at other times it forces the base to be more faithful. Assuming Correspondence Theory (McCarthy and Prince, 1995) in Optimality Theory (Prince and Smolensky, 1993), I will show that this reduplicative pattern requires a single Input-Output correspondence relation, holding between the input and the entire output, including both base and reduplicant. Constraints governing this relation are satisfied if an element in the input has a correspondent in either the base or the reduplicant, or both. In other words, this 'Broad Input-Output Faithfulness' unites the Input-Base and Input-Reduplicant relations of the Full Model of Correspondence (McCarthy and Prince, 1995; henceforward 'MP95'), shown below:

(1) *Full Model of Correspondence (MP95)*

input:		/Af$_{RED}$ + Stem/		
	I-R faithfulness	↕ ↕	*I-B Faithfulness* *(I-O Faithfulness)*	
output:		Reduplicant ↔ Base		
		B-R Identity		

Broad Input-Output Correspondence is one of two reconceptualized faithfulness relations proposed in this paper. The second is Root Faithfulness, which shares important similarities with the Input-Base relation of the Full Model, but should not be equated with the broader Input-Output relation. Together with Base-Reduplicant Identity, these faithfulness relations form the revised model of correspondence that is proposed in this paper:

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[1] Kwakwala is a Wakashan language spoken by the Kwakiutl of British Columbia. All data are taken from Boas 1947.

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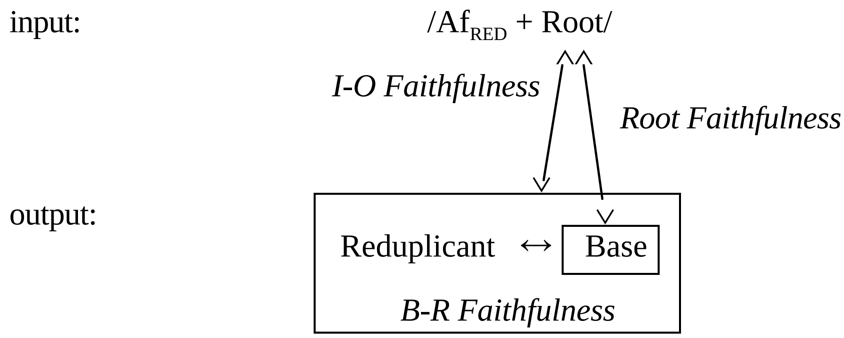
(2) *Reconceptualized model of correspondence*



The difference between the two models is crucial in The Emergence of the Unmarked (TETU, McCarthy and Prince, 1994a), in which a markedness constraint is inactive in unreduplicated words, (hence these forms include marked elements), while it is active in reduplicated words, such that unmarked elements emerge in these forms. In the Full Model of Correspondence (MP95), reduplicants can alternate in TETU, but bases cannot undergo phonological changes without allowing alternations in the unreduplicated form. This results from the fact that bases in reduplicated words and monomorphemic, unreduplicated words are governed by the same faithfulness relation: Input-Base Correspondence (dubbed 'Input-Output' Correspondence in unreduplicated forms).

The model proposed here allows bases to alternate in TETU. With dominant Broad Input-Output constraints each element in the input must surface in the output, hence non-reduplicative forms must surface faithfully. In reduplicated words, elements in the input have two chances to surface in the output, namely in the base and the reduplicant. Thus, a lower ranked markedness constraint can force an alternation in one member of the base-reduplicant pair without incurring a violation of higher-ranked I-O constraints. Broad I-O Faithfulness constraints do not indicate a preference for faithful parsing in the base or the reduplicant. However, sometimes the markedness constraint indicates a preference for the location of the alternation. If no such preference exists, Root Faithfulness ensures that the reduplicant alternates, rather than the base.

Arguments for the new model of correspondence will be illustrated by a certain class of Kwakwala reduplication, some aspects of which have been previously analyzed by Zec (1988). In this type of reduplication a prefixal reduplicant and a lexically specified suffixal morpheme co-occur with a root[2].

The shape of both the reduplicant and the base is determined by general constraints on the entire surface form (especially Broad Input-Output constraints and a markedness constraint against stress clash), rather than by a template for the

[2] Two different lexical morphemes participate in this pattern: /-mu:t/ 'useless refuse' and /-(g)i:sawe:ʔ/ 'left over'. Examples will be restricted to forms containing the former morpheme, but both classes of words pattern in the same way (Struijke, 1998).

reduplicant alone. Depending on the shape of the input root, sometimes the reduplicant alternates, while at other times the base does.

In Kwakwala, only unglottalized sonorants contribute to weight (i.e. are moraic) in coda position (Zec, 1988). Taking this into account, consider the data in (3)[3]. The base-initial syllable lightens when the root ends in a laryngeally unmarked segment (i.e. an unglottalized sonorant or voiceless obstruent) (type A). However, the reduplicant syllable lightens when the root ends in a laryngeally marked segment (i.e. a glottalized segment, or voiced obstruent) (type B). It will be shown that a markedness constraint on stress clash determines whether the base or the reduplicant undergoes alternations in this instance of TETU.

(3) *a. Type A reduplication*

xəw	xóː-xə-muːt	‘refuse of splitting wood’
kən	kə́n-kə-muːt	‘what is left after scooping up’
qəns	qə́n-qas-m’uːt	‘chips’
qaːs	qáː-qas-m’uːt	‘tracks’
b. Type B reduplication		
k^{w}’əml’	k^{w}’ə-k^{w}’ə́ml’ə-muːt	‘remains of burning’
məndz	mə-mə́ndzə-muːt	‘leavings after cutting kindling wood’
q^{w}aːl’	qw’ə-q^{w}’áːl’ə-muːt	‘embers’
saːq^{w}’	sə-saːq^{w}’ə-mu:t	‘peelings’

Also note that unglottalized sonorants are the only consonants appearing in reduplicant codas, regardless of the reduplication type involved. In other words, non-moraic segments are not copied into reduplicants. It will be shown that Root Faithfulness constraints ensure that the reduplicant alternates in this instance of TETU, rather than the base.

1 Alternations in either the Base or the Reduplicant

This section analyzes lightening of base and reduplicant syllables in Kwakwala ‘mu:t’-reduplication, and identifies clash avoidance as the determinant of base and reduplicant shapes.

This section abstracts away from the fact that reduplicants never exceed a syllable. Generalized Template Theory (McCarthy and Prince, 1994b) holds that reduplicative morphemes are specified for morphological category (i.e. affix or root) and are subject to morphology-prosody interface constraints specifying the prosodic correlate of each morpheme category. The canonical shape of an output affix is maximally a syllable (by the interface constraint Afx≤σ). Since the Kwakwala ‘mu:t’-reduplicant is an affix, it does not exceed a syllable.

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[3] Reduplicants are underlined. For reasons of space I will forcus on bimoraic roots. An account of monomoraic roots is given in Struijke (1998). These do not influence the present account of Faithfulness and TETU.

1.1 Pattern A: Reduplication with Roots Ending in a Laryngeally Unmarked Segment

In reduplication pattern A the reduplicative morpheme and /-muːt/ are concatenated with a bimoraic root ending in a laryngeally unmarked segment. The roots contain a diphthong (4a), a short vowel followed by a sonorant (4b), a short vowel followed by a sonorant and an obstruent (4c), or a long vowel followed by an obstruent (4d). As can be seen in the data below, this heavy syllable lightens in the base of the reduplicative form through deletion of the moraic coda sonorant or shortening of the long vowel or diphthong. Obstruents (i.e. non-moraic coda consonants) are not deleted. Even though the base contains the lightened syllable, the reduplicant is a heavy syllable, retaining the long vowel or coda sonorant[4].

(4) *Bimoraic roots ending in a laryngeally unmarked segment*[5]

	root	*reduplicated form*	*gloss*
a.	dəy	déː-də-muːt	‘refuse of wiping’
	xəw	xóː-xə-muːt	‘refuse of splitting wood’
b.	wən	wə́n-wə-muːt	‘refuse of drilling’
	kən	kə́n-kə-muːt	‘what is left after scooping up’
c.	yənt	yə́n-yat-m’uːt	‘gnawings of a large animal’
	qəns	qə́n-qas-m’uːt	‘chips’
d.	kaːx^w	k’ā́ː-k’ax^w -m’uːt	‘shavings’
	qaːs	qā́ː-qas-m’uːt	‘tracks’

Syllable lightening in the base creates reduplicative forms that contain a light syllable flanked by two heavy syllables, rather than a more faithful form consisting of three consecutive heavy syllables. The actual surface word is less marked, because it avoids clash. Clash arises when heads of different feet are adjacent in a string, a state of affairs that is dispreferred cross-linguistically[6]. Kwakwala is an iambic language (Zec, 1988) and therefore allows the following right-headed feet (L stands for a light syllable, H for a heavy syllable; syllables that form the head of the foot are in bold):

(5) *Iambic foot types (McCarthy and Prince, 1986 et seq.; Hayes 1987)*

(L**H**) (L**L**) (**H**)

The reduplicative forms in (4) have a (**H**)(L**H**) foot structure: (wə́**n**)-(wə-muːt). They do not involve clash, since the head syllable of the initial foot is not adjacent to

[4] Obstruents are never copied in the reduplicant. This fact is explained in section 3.2

[5] All data containing the suffix /-mu:t/ are taken from pages 339-340 of Boas’ grammar. The suffix comes in two allomorphs: [mu:t] follows vowel final stems; [m’u:t], with a glottalized nasal, follows consonant final stems.

[6] Some evidence for clash and lapse patterns in languages comes from secondary stress. Unfortunately, Boas does not indicate secondary stress in his data. Bach (1975) suggests that ‘[f]urther work remains to be done especially on the behavior of [Kwakwala] stress in many types of stem extensions’, but ‘long, morphemically complex items ... sometimes seem to have secondary stresses’ (p. 17).

the head syllable of the second foot. However, if both the base and the reduplicant surfaced (faithfully) as heavy syllables, each syllable would project to a (**H**) foot, and the reduplicative form would consist of three such feet: (**H**)(**H**)(**H**): *(wə́**n**)-(**w**ən)-(muːt). This form would include two instances of clash, and hence violates the following OT constraint twice:

(6) *CLASH: Adjacent heads of feet are prohibited
(cf. Hung's (1994) RHYTHM constraint)

This markedness constraint interacts with faithfulness constraints. In Correspondence Theory (McCarthy and Prince, 1995) two basic types of faithfulness constraints are recognized. The first type regulate the relation between lexically specified morphemes in the input, and their associates in the output (i.e. Input-Base and Input-Reduplicant constraints), while Base-Reduplicant constraints determine the relation between output base and reduplicant. I will first focus on the interaction of *CLASH and B-R Faithfulness. The relevant B-R constraint is DEPμ-BR[7]:

(7) DEPμ-BR: Every mora in the reduplicant has a correspondent in the base

The tableau in (8) gives the ranking argument for these constraints. The input root in this tableau contains a long vowel, but other bimoraic roots of type A behave similarly with respect to the constraints at hand. In candidate 1 both the base and the reduplicant retain the long vowel. Hence, this reduplicative form contains three heavy syllables, each projecting to a (**H**) foot. The heads of these three (**H**) feet are adjacent, and *CLASH is violated twice. The optimal candidate (number 2) has lightened its base by means of vowel shortening. This results in a reduplicative form that contains (**H**)(L**H**) feet. Since the heads of these feet are not adjacent, high-ranking *CLASH is not violated. However, the base and the reduplicant are not identical (the base contains one mora, while the reduplicant contains two), hence low-ranking DEPμ-BR is violated[8].

(8) *Lightening of the base to avoid clash: vowel shortening*

/RED- + dəy+ -muːt/	*CLASH	DEPμ-BR
1. (deː)-(deː)-(muːt) (**H**) (**H**) (**H**)	**!	
2. ☞ (deː)-(də-muːt) (**H**) (L**H**)		*

[7] The present analysis is specific to one type of Kwakwala reduplication only (those involving the morphemes /-muːt/ or /-(g)iːsaweːʔ/). If other types of reduplication pattern differently, the BR-constraints used here must be specified for type of reduplicative morpheme.

[8] Only candidates satisfying FOOTBINARITY and PARSEσ are considered. All reduplicative forms in the 'muːt'-paradigm satisfy these constraints.

Tableau (10) below considers a heavy syllable root containing a short vowel and a sonorant, rather than a long vowel. When *CLASH forces a mora in the base to delete, the sonorant with which it would be associated is deleted also. As will be shown in section 3.2 this follows from the idea that sonorants cannot surface without an associated mora. Since both a mora and a sonorant segment are deleted in the base, both DEPseg-BR and DEPμ-BR are violated in these reduplicative forms.

(9) DEPseg-BR: Every segment in the output has a correspondent in the input (McCarthy and Prince, 1995)

(10) *Lightening of the base to avoid clash: deletion of sonorants*

/RED- +wən + -mu:t/	*CLASH	DEPseg-BR	DEPμ-BR
1. (wən)-(wən)-(mu:t) (**H**) (**H**) (**H**)	**!		
2. ☞ (wən)-(wə-mu:t) (**H**) (L**H**)		*	*

Lightening of syllables in bases not only avoids clash, it also results in less marked foot structures. In iambic systems, (**H**) and (L**L**) feet are more marked than (L**H**) feet (Prince, 1990). This markedness relation can be implemented in Optimality Theory by the following universal constraint ranking:

(11) *Iambic foot form constraint ranking:*
*(**H**), *(L**L**) >> *(L**H**)

(12) *(**H**): Feet consisting of a heavy syllable are not allowed

(13) *(L**L**): Feet consisting of two light syllables are not allowed

(14) *(L**H**): Feet consisting of a light and a heavy syllable are not allowed

A (**H**)(L**H**) word exhibits a less marked foot form than a (**H**)(**H**)(**H**) word, because (L**H**) feet are less marked than (**H**) feet. Even though markedness constraints on iambic foot form could explain why syllables lighten, they cannot explain *which* syllable is lightened. Only *CLASH favors the form (**H**)(L**H**) over (L**H**)(**H**). Thus, in tableau (15) faithful candidate 1 is suboptimal because it violates *CLASH twice and *(**H**) three times. Candidate 2 lightens the reduplicant, and thereby creates a word containing less marked foot forms than the faithful candidate. However, note that it violates *CLASH: the heads of the feet (L**H**) and (**H**) are adjacent. Candidate 3 contains the same foot forms as candidate 2. However, it avoids clash by lightening the base: the heads of the (**H**) and (L**H**) feet are not adjacent.

(15) **CLASH determines location of lightened syllable, not foot form requirements*

/RED + wən + mu:t/	*CLASH	*(**H**)	*(L**L**)	*(L**H**)
1. (<u>wən</u>)-(wən)-(mu:t) (**H**) (**H**) (**H**)	** !	***		
2. (<u>wə</u>-wən)-(mu:t) (L**H**) (**H**)	* !	*		*
3. ☞ (<u>wən</u>)-(wə-mu:t) (**H**) (L**H**)		*		*

1.2 Pattern B: Reduplication with Roots Ending in a Laryngeally Marked Segment

Reduplicative pattern B involves bimoraic roots whose final consonant is either a glottalized segment or a voiced obstruent. Glottalization is marked in general, and voicing is marked in obstruents. Therefore they are prohibited in codas of many languages (Lombardi, 1991), including Kwakwala (Wilson, 1978). Boas points out that 'glottalized consonants seem to require a voiced release before all classes of following consonants' (p. 217). Voiced stops also 'cannot be followed by a [consonant] without having an [[ə]] or [a] following, that is to say, the voicing [or] glottalization are continued as a vocalic vibration of the vocal cords after the consonantic closure' (p. 209). In other words, wordmedially, both voiced stops (i.e. voiced obstruents) and glottalized segments must be followed by a vowel. In the event that the input does not supply a vowel, one is epenthesized[9]. Vowel epenthesis creates a new syllable, and allows the marked consonant to surface in onset position, where laryngeal features are licensed[10].

In pattern B, the Kwakwala morphemes /RED-/ and /-mu:t/ are combined with a disyllabic stem, consisting of a heavy syllable (most of the root), followed by a light syllable (headed by the epenthesized vowel). Thus, the reduplicative forms are quadrisyllabic: the stem consists of two syllables, and the reduplicant and the final morpheme each form one syllable. In these quadrisyllabic forms, it is the *reduplicant* that lightens, rather than the base. That is, it does not copy a coda sonorant present in the base, or it shortens the long vowel.

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[9] Boas does not always transcribe these epenthesized vowels in unreduplicated words. However, except for one case, Boas does transcribe the epenthesized vowels in the relevant reduplicative forms.

[10] Lombardi (1995) argues that such a repair does not occur with respect to laryngeal features (i.e. it is limited to segments whose *place* features are prohibited in coda position). One might assume that phonological epenthesis does not truly take place. Instead, a vowellike element might be phonetically realized, without it being part of the phonological form. In other words, the laryngeally marked segment would either surface in coda position, or form a minor syllable of its own. In the latter case the present analysis of the reduplicative patterns seems to hold. In the former case, a principled account of reduplicative patterns cannot be given (Struijke, 1998).

(16) *Bimoraic roots ending in laryngeally marked consonants*

Root	*reduplicative form*	*gloss*
kʷ'əml'	kʷ'ə-kʷ'ə́ml'ə-muːt	'remains of burning'[11]
məndz	mə-mə́ndzə-muːt	'leavings after cutting kindling wood'
qʷaːl'	qw'ə-qʷ'áːl'ə-muːt	'embers'
saːqʷ'	sə-saːqʷ'ə-muːt	'peelings[12]'

Again, syllable lightening has taken place to avoid a *CLASH violation. Consider tableau (18), which deals with a long vowelled root. In candidate 1 the bimoraicity of the root is retained in both the base and the reduplicant. This results in forms with a (**H**)(**H**)(L**H**) foot structure, and *CLASH is fatally violated. In candidate 2 the reduplicant has lightened, and forms a (L**H**) foot with the base-initial heavy syllable. This foot is followed by a foot of the same shape, containing the light syllable with the epenthesized vowel and the heavy syllable containing the final morpheme. This (L**H**)(L**H**) form is optimal because it avoids *CLASH violations. However, lightening disrupts base-reduplicant identity, and B-R faithfulness suffers.

(17) MAXμ-BR: Every mora in the base has a correspondent in the reduplicant[13]

(18) *Lightening of the reduplicant to avoid clash: shortening of vowel*

/RED- + qʷaːl' + -muːt/	*CLASH	MAXμ-BR
1. (qʷaː)-(qʷaː)(l'ə-muːt) (**H**)(**H**)(L**H**)	* !	
2. ☞ (qʷ'ə-qʷ'aː)(l'ə-muːt) (L**H**)(L**H**)		*

Reduplicative forms involving a root with a short vowel and moraic sonorant incur an extra violation: *CLASH not only forces non-copying of the second base mora, it also causes non-copying of the sonorant with which it is associated.

(19) MAXseg-BR: Every segment in the input has a correspondent in the output (McCarthy and Prince, 1995)

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[11] Boas transcribes this form as [kʷ'əkʷ'ə́ml'muːt], without the epenthesized vowel. However, I assume that schwa is epenthesized, since glottalized segments are always followed by an (epenthesized) vowel.

[12] Taken from Boas, 1948. Thanks to Stephen Anderson for making this dictionary available to me.

[13] For reasons of exposition I abstract away from the 'mu:t' morpheme in the evaluations of the B-R constraints

(20) *Lightening of reduplicant to avoid clash: deletion of a sonorant*

/RED- + mə́ndz + -mu:t/	*CLASH	MAXseg-BR	MAXμ-BR
1. (mən)-(mə́n)(dzə-mu:t) (**H**) (**H**) (L**H**)	* !		
2. ☞ (mə-mə́n)(dzə-mu:t) (L**H**)(L**H**)		*	*

Again, lightening of the reduplicant syllable not only avoids clash, it also creates a less marked foot structure (in fact, both *CLASH and constraints on foot form demand the *reduplicant* to alternate).

1.3 Summary

Reduplicative patterns A and B show that the shape of the reduplicant in 'mu:t'-words varies: it is either a heavy or a light syllable. This fact cannot be captured by reference to templates (McCarthy 1979, Maranz 1982, McCarthy and Prince 1986), because they determine a fixed shape of the reduplicant. Reduplicant shape is rather a function of constraint interaction. In fact, high-ranking of a constraint penalizing stress clash not only determines the varying shape of the reduplicant, it also determines the shape of the base. A syllable lightens either in the base or the reduplicant, depending on whether a bimoraic root ends in a laryngeally marked or unmarked segment. More precisely, it depends on whether vowel epenthesis takes place and creates an extra syllable in the output. Since foot structure depends on the syllabic structure of the word and *CLASH evaluates foot structure, the markedness constraint exhibits different demands for tri- and quadrisyllabic forms.

Since only one member of the reduplicant-base pair alternates, base-reduplicant identity is lost. Hence, B-R Faithfulness constraints rank below the markedness constraint driving the alternation:

(21) *CLASH >> DEPμ-BR, MAXμ-BR, DEPseg-BR, MAXseg-BR,

In the next section reduplicated words are compared to unreduplicated words with respect to stress clash. A difference between the two creates an argument for Broad Input-Output Correspondence.

2 Faithfulness Asymmetries and Broad Input-Output Correspondence

Even though clash is avoided in reduplicative contexts by lightening of syllables, in non-reduplicative environments such a repair is not found. It seems that unreduplicated words are more faithful to underlying material than bases and reduplicants in reduplicative forms. It is shown in this section that the Full Model of Correspondence as proposed in McCarthy and Prince (1995) cannot account for this asymmetry. In that model bases in reduplicated and roots in unreduplicated words are expected to surface equally faithfully, because they are governed by a single Faithfulness relation (section 2.1). The new model of correspondence can account for such a state of affairs, because it includes the faithfulness relation Broad

Input-Output Correspondence. Constraints governing this relation demand faithful parsing of the root in an unreduplicated form, but allow bases in reduplicated forms to be unfaithful, as long as the reduplicant surfaces faithfully (and vice versa). In other words, one but not both members of the base-reduplicant pair are allowed to alternate (section 2.2).

2.1 Reduplicative and Non-Reduplicative Contexts Compared

Many non-reduplicative Kwakwala words surface with adjacent (**H**) feet, and hence involve stress clash:

(22) *No lightening to avoid clash in non-reduplicative contexts*

*(a) (**H**)(**H**)(**H**), rather than (**H**)(L**H**)*			
(n’e:)(q-o:)(g^{w}i:l)	‘to intend to say’	*(n’e:)(q-ə g^{w}i:l)	p. 333
(gəlt)-(k’o:)(di:ɬ)	‘longer one side’	*(gəlt)-(k’ədi:ɬ)	p. 359
(ts’o:)(l’-əm)(y’a:)	‘black cheek’	*(ts’o:)(l’-əy’a:)	p. 303
*(b) (**H**)(**H**)(**H**)(**H**), rather than (L**H**)(L**H**)*			
(he:)(ɬ-o:)(m’a:)(la:)	‘to be in time’	*(həɬ-o:)(m’ala:)	p. 332
(te:)(n-o:s)(ta:)(la:)	‘to pole up river’	*(tən-o:s)(tala:)	p. 333

Apparently, syllable lightening through shortening of a long vowel or deletion of a moraic consonant is not allowed in non-reduplicative contexts (at least not to resolve clash). It appears that Kwakwala places more importance on being faithful to the input than on avoiding stress clash. However, we have seen above that base syllables in reduplicative forms can lighten in order to achieve this goal. That is, the base *can* be unfaithful to the input material. Hence, bases in reduplicative forms and non-reduplicative forms behave differently with respect to faithfulness requirements.

However, in the Full Model of Correspondence Theory (MP95), Input-Output Faithfulness in non-reduplicative environments is equated with Input-Base Faithfulness in reduplicative contexts. The Full Model, depicted below, contains three types of faithfulness relations. In unreduplicated words, the input root is in correspondence with the output root through I-O Faithfulness. In reduplicated words, the input root stands in a correspondence relation with the output base. This relation is seen as identical to I-O correspondence of unreduplicated words, but is dubbed ‘Input-Base correspondence’ when it involves reduplicative forms. A separate relation links the input root to the output reduplicant (I-R Faithfulness). The reduplicant also stands in correspondence with the base (B-R Faithfulness).

(23) *Full Model of Correspondence*

input: /Af$_{RED}$ + Stem/

I-R faithfulness ↕ ↕ *I-B Faithfulness*
(I-O Faithfulness)

output: Reduplicant ↔ Base
B-R Identity

The ranking paradox for Kwakwala within this model of correspondence can be seen in the tableaux below. Tableau (24) gives the ranking argument for Maxμ-IO and *CLASH in a non-reduplicative word. The faithful candidate (number 1) violates *CLASH. Candidate 2 shortens the vowel of the medial syllable, thereby avoiding a *CLASH violation. However, by doing so this candidate violates MAXμ-IO. Since candidate 1 surfaces, MAXμ-IO must outrank *CLASH.

(24) *Ranking of MAXμ-IO in a non-reduplicative context*

/(n'e:)(q-o:)(gʷiːl)/	MAXμ-IO/B	*CLASH
1. ☞ (n'e:)(q-o:)(gʷiːl) (**H**) (**H**) (**H**)		**
2. (n'e:)(q-ogʷiːl) (**H**) (L**H**)	*!	

Tableau (25) deals with a reduplicative form, whose input root contains a long vowel (reduplication type A). We have seen above that candidate 2, in which the base lightens, surfaces. However, given the ranking established in tableau (24) this candidate fatally violates high-ranking MAXμ-IB. According to this ranking, faithful candidate 1, which incurs two *CLASH violations, surfaces.

(25) *High-ranking of MAXμ-IB in a reduplicative context*

/RED- + dəy+ -muːt/	MAXμ-IO/B	*CLASH
1. ✗ (deː)-(deː)-(muːt) (**H**) (**H**) (**H**)		**
2. (deː)-(də-muːt) (**H**) (L**H**)	*!	

Summarizing, in the Full Model of correspondence (MP95), unreduplicated words and bases in reduplicated words should behave the same with respect to markedness requirements, because they are governed by the same faithfulness relation. However, the Kwakwala data contradict this prediction: in unreduplicated words I-O/B Faithfulness constraints need to dominate *CLASH, but in reduplicative words the opposite ranking is needed to arrive at the surface form. In the next section it is therefore proposed that I-O Correspondence should be redefined.

2.2 Broad Input-Output Correspondence

In order to explain the faithfulness asymmetry between reduplicative and non-reduplicative environments, seen with respect to *CLASH above, I argue that Input-

Output Correspondence should be seen as relating elements in the input to elements in the output as a whole, not distinguishing base and reduplicant[14]:

(26) *Broad Input-Output Faithfulness:*

input: /Af_{RED} + Root/

↕ *I-O Faithfulness*

output: | Reduplicant ↔ Base |

'Broad Input-Output Faithfulness' requires an element in the input to have a correspondent in the output. In a reduplicative environment this means that an element in the input has two chances to surface in the output: one chance in the base, and one chance in the reduplicant. However, in a non-copying environment an element in the input has just one chance to surface in the output[15].

(27) I-O FAITHFULNESS (broad): Every element of the input has a correspondent in the output

Consider tableau (28), which deals with an unreduplicated word. Candidate 1 deletes a sonorant in the medial syllable to avoid a *CLASH violation, but by doing so it violates MAXμ-IO and MAXseg-IO: a mora and a sonorant in the input are not present in the output. This candidate is not optimal because *CLASH is ranked below MAXμ-IO and MAXseg-IO: it is better to be faithful to the input, than to avoid clash. Hence candidate 2, which retains the moraic sonorant, is the optimal non-reduplicative candidate. Thus, in unreduplicated words it is irrelevant whether Broad I-O constraints are used or the I-O/B constraints of the Full Model: in both cases the faithful candidate is optimal (cf. tableau (24)).

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[14] Similar proposals have been made independently by Cole (1998), Raimy and Idsardi (1997), Spaelti (1997), and Yip (1998).

[15] For present purpses I assume that a multiple correspondence relation is always established between input elements and both copies in the reduplicative output. One could argue that the B-R Faithfulness relation is mostly redundant under this assumption (it would only be needed in over- and underapplication, but not as a *general* means to establish the copying relation between base and reduplicant). An alternative account would establish a one-to-one relation between elements in the input and the broad output, and copied material would be in a base-reduplicant relation. Possibly the choice between the two is made on a language particular basis by means of constraint ranking (in which the ranking of DEP-IO and UNIFORMITY play a crucial role; the latter being violated in the present assumption, and the former in the alternative assumption). I leave this issue for further research.

(28) *Broad IO in a non-reduplicative environment*

/ts'o:l'-əmy'a:/	MAXμ-IO (broad)	MAXseg-IO (broad)	*CLASH
1. (ts'o:)(l'-əy'a:) (**H**) (L**H**)	*!	*	
2. ☞ (ts'o:)(l'-əm)(y'a:) (**H**) (**H**) (**H**)			**

In tableau (29), however, we are dealing with a reduplicative form, and candidate 1, which deletes the moraic sonorant of the medial syllable, is optimal. Although the base fails to contain both a mora and a segment present in the input, they are faithfully parsed into the reduplicant, and for this reason MAXμ-IO and MAXseg-IO are satisfied. In addition, *CLASH is satisfied, because the lightened base syllable forms a (L**H**) foot with the morpheme [mu:t], and the head of this foot is not adjacent to the head of the initial (**H**) foot (containing the reduplicant syllable). The second candidate in tableau (29) also satisfies MAXμ-IO and MAXseg-IO (the moraic sonorant is parsed in the output twice), however, it violates *CLASH, because it contains three consecutive (**H**) feet. Thus, the winning candidate of this tableau is the actual surface form of Kwakwala, and the introduction of Broad I-O Faithfulness resolves the ranking paradox laid out above.

(29) *Broad I-O in a reduplicative environment*

/RED- +wən + -mu:t/	MAXμ-IO (broad)	MAXseg-IO (broad)	*CLASH
1. ☞ (wən)-(wə-mu:t) (**H**) (L**H**)			
2. (wən)-(wən)-(mu:t) (**H**) (**H**) (**H**)			**!

Broad Input-Output Correspondence unifies the Input-Base and Input-Reduplicant faithfulness relations of the Full Model of correspondence (MP95). The difference between the two approaches can be seen most clearly in forms like those below, in which the base contains material present in the input, but absent in the reduplicant, while at the same time the reduplicant supplies output correspondents for material that is absent in the base[16].

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[16] These cases can be seen as supporting the assumption that reduplicants are prefixal rather than infixal. In deciding whether the initial or the second syllable is the reduplicant, one might argue that the more faithful one is the base, and the less faithful one is the reduplicant (so that one does not have to appeal to Input-Reduplicant or broad IO relations). This would entail that the Kwakwala reduplicant is sometimes prefixal, and at other times infixal. Conceptually this seems unsatisfying, and the argument loses force in the cases at hand, where one syllable is not more faithful to the input than the other (rather both are equally unfaithful, but along different dimensions). Thus, I assume that there is nothing in the grammar that forces

(30)	yənt	yən-yat-m’uːt	‘gnawings of a large animal’
	▲▲	▲ ▲	
	qəns	qən-qas-m’uːt	‘chips’
	▲▲	▲ ▲	
(31)	k’a$^{\mu\mu}$x^{w}	k’a$^{\mu\mu}$-k’a$^{\mu}$x^{w}-m’uːt	‘shavings’
	▲▲	▲ ▲	
	qa$^{\mu\mu}$s	qa$^{\mu\mu}$-qa$^{\mu}$s-m’uːt	‘tracks’
	▲▲	▲ ▲	

Consider the roots in (30), which contain both a sonorant and a obstruent coda consonant. In the reduplicated output the moraic sonorant is deleted in the base in order to avoid clash, but the obstruent can be parsed, because it does not contribute to weight. The reduplicant is a heavy syllable, and can therefore contain the moraic sonorant, even though it is absent in the base[17]. For this reason we have to assume that elements in the reduplicant are not only in correspondence with the base, but also directly with elements in the input.

In McCarthy and Prince’s Full Model of correspondence, it is assumed that the relation between input and reduplicant material is governed by a separate set of Input-Reduplicant constraints, distinct from Input-Base constraints. I-B constraints evaluate the relation between the segmentally specified input (usually the input root) and the base, and I-R constraints evaluate the relation between the same input and the reduplicant. So in a form like [yən-yat-m’uːt] both types of faithfulness constraints are violated. I-R Faithfulness is violated because the obstruent in the input does not surface in the reduplicant, and I-B Faithfulness is violated because sonorant of the input is not parsed in the base.

With Broad Input-Output correspondence, elements in the input are also in correspondence with elements in the reduplicant, but this relation is not seen as separate from the relation between input and base elements. Broad I-O Faithfulness constraints are not violated in [yən-yat-m’uːt], because all elements in the input surface in the output and vice-versa. In other words, it is completely irrelevant to these faithfulness constraints whether the base or the reduplicant surfaces faithfully. The difference in constraint violations with the different faithfulness relations is summarized in table (32).

(32) *Violations in the two correspondence models compared*

/RED- + yənt + -muːt/	I-B Faith	I-R Faith	I-O Faith (broad)
☞ (yən)-(yat-m’uːt) (**H**) (L**H**)	* ([n])	* ([t])	✓

violations of L-ANCHOR (which demands the reduplicant to be prefixal). The fact that obstruent codas cannot surface in the initial syllable, but do in the peninitial syllable strengthens the argument (see section below on The Emergence of the Unmarked).

[17] The obstruent cannot surface in the reduplicant. This is explained in section 3.2.

We have seen above that only undifferentiated IO-correspondence can account for the empirical asymmetry between reduplicative and non-reduplicative contexts found in Kwakwala. Moreover, it can explain why sometimes the base lightens, and at other times the reduplicant. It is simply irrelevant to Broad I-O constraints where deletion takes place, and it is left to the markedness constraint *CLASH to decide which member of the reduplicant-base pair alternates.

So far we have evidence for the following constraint ranking:

(33) MAXμ-IO, MAXseg-IO
>> *CLASH
>> DEPseg-BR, DEPμ-BR, MAXseg-BR, MAXμ-BR

This ranking conforms to the Emergence of the Unmarked ranking schema I-O Faith >> M >> B-R Faith (McCarthy and Prince, 1994a), a topic that is addressed in the next section.

3 The New Faithfulness Model and The Emergence of the Unmarked

McCarthy and Prince (1994a) introduce the notion Emergence of the Unmarked by showing that reduplicants often contain less marked material than bases and unreduplicated words. In their Full Model of Correspondence this is achieved through the following constraint ranking:

(34) I-O/B Faith >> Markedness constraint M >> B-R Faith, I-R Faith

This ranking ensures that bases and unreduplicated words admit greater contrasts than reduplicants (i.e. it ensures that that the inventory of elements occurring in reduplicants is a subset of the elements surfacing in bases or unreduplicated words). Bases and unreduplicated words are faithful to the underlying input, and contain marked material, at the expense of markedness constraint M (I-O/B Faithfulness >> M). Reduplicants are not faithful to the marked material present in the base and input, because Input-Reduplicant Faithfulness and Base-Reduplicant Identity are less important than avoidance of the marked material (M >> I-R Faith, B-R Faith). McCarthy and Prince (1995) propose the universal ranking I-B Faith >> I-R Faith, in order to capture the idea that bases tend to be more faithful than reduplicants. More precisely, it prevents marked material from emerging in reduplicants, cross-linguistically.

The new model of correspondence aims to account for exactly this generalization, while at the same time allowing languages in which bases are less faithful to the input than reduplicants, without allowing alternations in unreduplicated words (as in Kwakwala syllable lightening discussed above). In both cases we are dealing with The Emergence of the Unmarked, in the sense that reduplicated words contain less marked material than unreduplicated words. There are two distinct types of The Emergence of the Unmarked. The type described by McCarthy and Prince, in which only the reduplicant undergoes alternations, I call ‘Reduplicant TETU’. In the second type either the base *or* the reduplicant undergoes phonological changes. I call this ‘Output TETU’.

High-ranking of Broad Input-Output constraints ensures faithful parsing in unreduplicated words, but allows one member of the base-reduplicant pair to alternate. In other words, a lower ranked M can force alternations in either copy (i.e. can force TETU). Broad I-O constraints do not indicate a preference for faithful parsing in either copy, hence, in TETU, other constraints must decide which alternates and which surfaces faithfully. Under certain circumstances the markedness constraint involved indicates such a preference. That is, it demands an alternation in one but not the other member of the reduplicant-base pair. Thus, in these cases it is the markedness constraint that determines the locus of emergent unmarkedness within the reduplicative output. This is Output TETU.

In most circumstances, however, markedness constraints demand phonological alternations in both copies, and hence these constraints cannot decide on a single locus of alternations. Both Broad Input-Output constraints and M are thus indifferent as to where the unmarked emerges. Root Faithfulness constraints ensure that bases are faithful and reduplicants change.

(35) ROOT FAITHFULNESS: Every element in the input root has a correspondent in the output root (i.e. the base in a reduplicated word)

Root Faithfulness was introduced by McCarthy and Prince (1995), who call it 'Input-Base Faithfulness' in reduplicated words. Root Faithfulness in the new model is conceptually similar to Root Faithfulness in the Full Model, because both relate the input root to the output base of the reduplicated word ('which is a root or a root-containing stem' MP95, p. 116). However, they relate differently to other faithfulness relations in the relevant models of correspondence.

The Full Model (MP95) contains complementary faithfulness relations relating the input to the base (I-B Faithfulness/Root Faithfulness) and the reduplicant (I-R Faithfulness). As mentioned above, I-B Faithfulness must be universally ranked above I-R Faithfulness in order to capture the generalization that bases are often more faithful to the input than reduplicants.

In the new model of Correspondence, Root Faithfulness and Broad Input-Output Faithfulness are in a subset relation. When Root Faithfulness constraints are satisfied, I-O constraints are automatically satisfied also (i.e. when the base surfaces faithfully, but the reduplicant alternates, both Root Faithfulness and I-O Faithfulness are established). However, the reverse implication does not hold. Thus, if markedness constraints do not indicate a preference for alternations in one member of the base-reduplicant pair, alternations take place in the reduplicant, because they incur a subset of the violations incurred for changing the base. In these cases, emergence of the unmarked in the base is occulted by emergence of the unmarked in the reduplicant. The subset relation between Input-Output Faithfulness and Root Faithfulness accounts for the tendency of bases to be more faithful than reduplicants. Thus, a fixed ranking of faithfulness constraints, as in the Full Model of correspondence, does not need to be stipulated.

3.1 Output TETU

In sections 2 and 3 above, we saw that Kwakwala unreduplicated words are marked in the sense that they allow stress clash. No alternations take place to repair clash; words rather surface faithfully. This fact is achieved through dominance of Broad I-O constraints over the markedness constraint penalizing clash. Since Broad Input-Output constraints are satisfied in reduplicated words when only one member of the base-reduplicant pair surfaces faithfully, the other member is forced to alternate by *CLASH.

This markedness constraint evaluates a domain that includes material from both the base and the reduplicant. For this reason base and reduplicant do not need to satisfy it individually. In fact, *CLASH only demands one of the output copies to alternate: if both do it is not better satisfied. This is illustrated in the tableaux below. Tableau (36) involves a reduplicated word of type A, with trisyllabic candidates. Candidate 1 reminds us that faithful parsing of the bimoraic root into both base and reduplicant results in an ungrammatical form, because it involves clash. The optimal candidate (number 2) lightens the base-initial syllable only, and clash is resolved. Lightening of only the reduplicant, as in candidate 3, does not resolve clash. Candidate 4 shows that lightening of both the base and the reduplicant syllable is even worse. The reduplicant and base initial syllables combine to form a (L**L**) foot, whose head is adjacent to the head of the second foot. Hence, this form does not avoid clash. Moreover, it violates a higher-ranked I-O constraint.

(36) *M prefers an alternation in bases of trisyllabic forms*

/RED + wən + mu:t/	MAX-IO	*CLASH
1. (wən)-(wən)-(m'u:t) (**H**) (**H**) (**H**)		* * !
2. ☞ (wən)-(wə-m'u:t) (**H**) (L**H**)		
3. (wə-wən)-(m'u:t) (L**H**) (**H**)		* !
4. (wə-wə)-(m'u:t) (L**L**) (**H**)	* !	*

Tableau (37) considers reduplication type B, with quadrisyllabic candidates. In candidate 1 the long root vowel is retained in both base and reduplicant. As a result two (**H**) feet are adjacent and *CLASH is violated. Candidate 2 avoids such a violation, because it lightens the reduplicant syllable. Lightening of only the base-initial syllable does not prevent clash (candidate 3). Lightening of both the base and reduplicant, as in candidate 4 does prevent clash, however, this form does not better satisfy *CLASH than candidate 2, and, more importantly, it does worse on the I-O constraint.

(37) *M prefers and alternation in reduplicants of quadrisyllabic forms*

/RED + qw'aː l' + muːt/	MAX-IO	*CLASH
1. (qw'aː)-(qʷ'aː)(l'ə-muːt) (**H**) (**H**) (L**H**)		* !
2. ☞ (qw'ə-qʷ'aː)(l'ə-muːt) (L**H**) (L**H**)		
3. (qw'aː)-(qʷ'əl'ə)-(muːt) (**H**) (L**L**) (**H**)		* !
4. (qw'ə-qʷ'ə)(l'ə-muːt) (L**L**) (L**H**)	* !	

These forms show that *CLASH does not conflict with Broad I-O constraints in Kwakwala 'muːt'-reduplication. Both are satisfied if one member of the base-reduplicant pair surfaces faithfully. It is decided solely by *CLASH which is parsed unfaithfully with the repair. The constraint does not exhibit a fixed preference for the locus of alternations: in quadrisyllabic forms it demands reduplicant syllables to lighten, but in trisyllabic forms it demands bases to alternate.

Since base-reduplicant identity is disrupted, and the base is sometimes unfaithful to the input, B-R and Root Faithfulness constraints must rank below *CLASH. This is illustrated in the tableaux below.

(38) MAXμ-Rt: Every mora in the input root has a correspondent in the output base

(39) *TETU-ranking: I-O Faith >> M >> B-R Faith: deletion in the reduplicant*

/RED- + qʷaːl' + -muːt/	MAXμ-IO	*CLASH	MAXμ-BR	DEPμ-BR	MAXμ-Rt
1. (qʷaː)-(qʷaː)(l'ə-muːt) (**H**) (**H**) (L**H**)	✓	*!			
☞ 2. (qʷ'ə-qʷ'aː)(l'ə-muːt) (L**H**) (L**H**)	✓		*		
3. (qʷaː)-(qʷəl'ə)-(muːt) (**H**) (L**L**) (**H**)	✓	*!		*	*

(40)*TETU-ranking: I-O Faith >> M >> B-R Faith: deletion in the base*

/RED- + wən + muːt/	MAXμ-IO	*CLASH	MAXμ-BR	DEPμ-BR	MAXμ-Rt
1. (wən)-(wən)-(muːt) (**H**) (**H**) (**H**)	✓	*!			
2. (wə-wən)-(muːt) (L**H**) (**H**)	✓	*!	*		
☞ 3. (wən)-(wə-muːt) (**H**) (L**H**)	✓			*	*

Concluding, Output TETU is achieved whenever a markedness constraint is active in reduplicated forms, demanding *one* Base-Reduplicant copy to change, while it is inert in unreduplicated words. There are several circumstances in which a markedness constraint indicates a preference for alternations in either the base or the reduplicant copy. Firstly, the configuration or element marked by M might be found in only one, because base and reduplicant are structurally different. Secondly, the environment for M can be created by the concatenation of base and reduplicant, and often only one of them is forced to alternate in order to satisfy M. In the case of Kwakwala just discussed, the marked configuration is not created by reduplication, but includes material of both base and reduplicant copies, and a change in one satisfies M[18].

3.2 Reduplicant TETU

Reduplicant TETU also plays a role in Kwakwala 'mu:t'-reduplication, and is related to Zec's (1988) finding that unglottalized sonorants always contribute to weight, but other coda consonants do not. As a result this section does not only illustrate TETU, it also sheds light on the encoding of consonant weight in Kwakwala.

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[18] Within the present model of correspondence, reduplicants can be more faithful than bases outside the scope of TETU. Consider Kwakwala prime, in which *CLASH is active in both unreduplicated and reduplicated contexts (i.e. normal application: alternations take place whenever the conditioning context for the constraint is found). This is achieved when *CLASH dominates all relevant faithfulness constraints. As we have seen, *CLASH only forces one member of the base-reduplicant pair to alternate. The sub-ranking I-O Faith >> B-R Faith ensures that the unaffected member faithfully reflects the input, rather than the changed member of the base-reduplicant pair. The ranking of Root Faith constraints with respect to the other faithfulness constraints is irrelevant: with the sub-ranking M >> Root Faith, it is M that determines whether the base alternates or not. Thus, the following rankings achieve normal application in the new model of correspondence:

(i) a. M >> I-O Faith , Root Faith >> B-R Faith
b. M >> I-O Faith >> B-R Faith >> Root Faith

In the Full Model (MP95), the ranking below achieves normal application:

(ii) M >> I-B Faith >> I-R Faith >> B-R Faith

The sub-ranking M >> I-B Faith >> I-R Faith allows alternations in unredulicated words, as well as bases and reduplicants of reduplicated words: M determines which alternate. The sub-ranking I-B Faith >> I-R Faith >> B-R Faith ensures that bases and reduplicants faithfully reflect the input, rather than the changed member of the base-reduplicant pair. McCarthy and Prince (1995) argue for this ranking to account for Klamath, in which reduplicants can be more faithful than bases (cf. Cole (1998), who argues that the relevant alternations in Klamath are only found in redupication; in terms of the present proposal this means that Klamath exhibits Output TETU rather than normal application, as implied by MP95)).

Recall that Reduplicant TETU comes about in a situation where a markedness constraint demands alternations in both the base and the reduplicant copies. In Kwakwala, the markedness constraint WEIGHTbyPOSITION is such a constraint.

(41) WEIGHTbyPOSITION (WxP): Coda consonants must be moraic (Hayes, 1989)

This constraint evaluates coda consonants in any output syllable. Since the 'mu:t'-reduplicant consists of a syllable, it is subject to this constraint, just like base syllables.

WEIGHTbyPOSITION is partially inactive in non-reduplicative forms of Kwakwala, because obstruents surface in coda without being associated to a mora. However, the constraint is more active in reduplicative forms, where it ensures that non-moraic segments cannot be parsed in codas of reduplicants.

WEIGHTbyPOSITION conflicts with markedness constraints against the association of segments and moras (Morén, 1997; cf. Peak and Margin Hierarchy, Prince and Smolensky, 1993):

(42) *OBSTR/μ: obstruents are non-moraic (shorthand for *t/μ >> *v/μ, etc.)
*SON/μ: sonorants are non-moraic (shorthand for *m/μ >> *r/μ, etc.)
*VOWEL/μ: vowels are non-moraic (shorthand for *i/μ >> *a/μ, etc.)

These constraints are ranked universally to implement Zec's (1988) finding that the more sonorous a segment the more likely it is moraic in coda:

(43) *OBSTRUENT/μ >> *SONORANT/μ >> *VOWEL/μ

In unreduplicated words of Kwakwala, input final sonorants surface faithfully, while contributing to weight (as evidenced by syllable structure and stress facts[19]). This indicates that *SONORANT/μ is low-ranking in the language. This is illustrated in tableau (44), candidate 1. Non-moraic sonorants cannot surface in coda, because they fatally violate higher-ranked WEIGHTbyPOSITION (candidate 2). Both of these constraints would be vacuously satisfied if the sonorant were deleted, as in candidate 3, but such a deletion is ruled out by dominance of MAXseg-IO.

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[19] Sonorant codas can only be preceded by a short vowel, obstruent codas can be preceded by both long and short vowels. Apparently, syllables can be at most bimoraic (Struijke, 1998)

Heavy syllables attract stress. Short vowelled syllables closed by a sonorant attract stress, but those closed by an obstruent do not. Only when a obstruent is preceded by a long vowel, can the syllable attract stress (Zec, 1988).

(44) *Sonorants are obligatorily moraic in a non-reduplicative context*

/CV$^{\mu}$S/	MAXseg-IO	WxP	*μ/son
1. ☞ CV$^{\mu}$S$^{\mu}$			*
2. CV$^{\mu}$S		* !	
3. CV$^{\mu}$	* !		

Turning to sonorants in reduplicated words, recall that *CLASH often forces moras and associated sonorants to delete:

(45) *Deletion of moras and associated sonorants*

wə$^{\mu}$n$^{\mu}$	(wə$^{\mu}$n$^{\mu}$-)(wə$^{\mu}$-mu$^{\mu\mu}$t) ▲	'refuse of drilling'
k^{w}'ə$^{\mu}$ m$^{\mu}$l'	(k^{w}'ə$^{\mu}$-k^{w}'ə$^{\mu}$m$^{\mu}$)(l'ə$^{\mu}$-mu$^{\mu\mu}$t) ▲	'remains of burning'

The question of interest is why sonorants must delete when the associated mora is forced to delete. In other words, what prevents sonorants from surfacing without contributing to weight? Here, WEIGHTbyPOSITION comes into play. Consider tableau (46) below. Candidate 1 reminds us that a moraic sonorant cannot surface in the initial syllable, because it induces a *CLASH violation. The more relevant candidates are 2 and 3. Candidate 2 avoids a *CLASH violation by deleting the second mora in the initial syllable. The sonorant is stranded without a mora, and WEIGHTbyPOSITION is fatally violated. Candidate 3 is optimal, because it avoids violations on these two constraints through deletion of both the mora and the sonorant.

(46) *Coda sonorants must be moraic, or else deletion*

/RED + k^{w}'ə$^{\mu}$ m$^{\mu}$l'+ mu$^{\mu\mu}$t/	MAX μ-IO	MAX seg-IO	*CLASH	WxP	*μ/son
(k^{w}'ə$^{\mu}$m$^{\mu}$)-(k^{w}'ə$^{\mu}$m$^{\mu}$)(l'ə$^{\mu}$-mu$^{\mu\mu}$t) 1. (**H**) (**H**) (L**H**)	✓		*!		**
(k^{w}'ə$^{\mu}$m-k^{w}'ə$^{\mu}$m$^{\mu}$)(l'ə$^{\mu}$-mu$^{\mu\mu}$t) 2. (L**H**) (L**H**)	✓			*!	*
(k^{w}'ə$^{\mu}$-k^{w}'ə$^{\mu}$m$^{\mu}$)(l'ə$^{\mu}$-mu$^{\mu\mu}$t) 3.☞ (L**H**) (L**H**)	✓				*

As argued earlier, deletion is possible in the reduplicant because the input sonorant has a correspondent in the output, namely the base, and therefore no marks are incurred on broad I-O Faithfulness constraints[20].

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[20] With Richness of the Base (Prince and Smolensky, 1993), the Kwakwala constraint ranking must also produce the surface form [wə$^{\mu}$n$^{\mu}$-wə$^{\mu}$-mu$^{\mu\mu}$t] when the input [n] is not associated with a mora (because consonant weight is predictable). Tableau (i) below (which only considers candidates satisfying *CLASH) shows that this result is

So far we have seen that WEIGHTbyPOSITION forces output sonorants to be moraic in both reduplicative and non-reduplicative environments. Reduplicant TETU only comes into play with respect to coda obstruents. In unreduplicated words they violate WEIGHTbyPOSITION and surface without contributing to weight, but in reduplicants this markedness constraint cannot be violated, and as a result non-moraic obstruents are not parsed into reduplicants.

The idea that obstruents surface in unreduplicated words without contributing to weight indicates that *μ/obstr is ranked high. Candidate 1 in tableau (47) contains a moraic obstruent, and hence fatally violates this constraint. The optimal candidate, number 2, contains a non-moraic obstruent, and therefore satisfies this constraint, and minimally violates WEIGHTbyPOSITION. In other words, the surfacing form is marked in the sense that it disobeys WxP. Violations on both of these constraints would be avoided if the obstruent were deleted (candidate 3). However, failing to parse the obstruent present in the input results in a fatal violation of high-ranking MAXseg-IO.

(47) *Obstruents are obligatorily non-moraic*

/CV$^{\mu}$O/	*μ/obstr	MAX seg-IO	WxP
1. CV$^{\mu}$O$^{\mu}$	*!		
2. ☞ CV$^{\mu}$O			*
3. CV		*!	

Even though obstruents surface in non-reduplicative words without contributing to weight, they do not surface at all in reduplicants.

(48) *obstruents are not allowed to surface in reduplicants*

kaːx^{w}	k'aː-k'ax^{w}-m'u:t	*k'a:x^{w}-k'ax^{w}-m'u:t	'shavings'
ts'a:s	ts'a:-ts'əs-m'u:t	*ts'a:s-ts'əs-m'u:t	'old eel-grass'
te:ɬ	te:-taɬ-m'u:t	*te:ɬ-taɬ-m'u:t	'remains of bait'
xəlt	xəl-xat- m'u:t	*xəlt-xat- m'u:t	'sawdust'

This fact seems surprising: if non-moraic obstruents were parsed into reduplicants, they would not influence syllable weight, and hence a prosodic

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achieved because the optimal candidate (1) incurs a subset of the violations of candidate 2. That is, candidate 1 violates DEPμ-IO, because the sonorant in the reduplicant is associated to a mora not present in the input. Candidate 2 incurs the same violation, for the exact same reason, but in addition it fatally violates WxP.
We know that WxP outranks DEPμ-IO, because in a non-reduplicative environment, a coda sonorant always bears weight (tableau (ii)) .

(i)

/RED + wə$^{\mu}$n+ mu$^{\mu\mu}$t/	WxP	DEPμ-IO
1. ☞ wə$^{\mu}$n$^{\mu}$-wə$^{\mu}$-mu$^{\mu\mu}$t		*
2. wə$^{\mu}$n$^{\mu}$-wə$^{\mu}$n-mu$^{\mu\mu}$t	*	*

(ii)

/CV$^{\mu}$S/	WxP	DEPμ-IO
1. CV$^{\mu}$S	* !	
2. ☞ CV$^{\mu}$S$^{\mu}$		*

requirement like the ban on clash could not force them to delete. Apparently reduplicants only allow moraic consonants (i.e. unglottalized sonorants) in coda position. That is, WEIGHTbyPOSITION must be satisfied in reduplicants. This is an instance of the Emergence of the Unmarked: WEIGHTbyPOSITION can be violated in non-reduplicative contexts, but must be satisfied in reduplicants.

Tableau (49) shows that reduplicants cannot contain non-moraic obstruents in coda. Both candidates parse the obstruent of the input root into the output base, thereby satisfying MAXseg-IO. Candidate 1 does not parse the obstruent in the reduplicant. It violates WEIGHTbyPOSITION twice, because it contains two coda obstruents in the base (this includes the obstruent present in the final morpheme [mu:t]). Candidate 2 violates it three times, because it also parses the obstruent in the reduplicant. Thus, candidate 1 is optimal, simply because it contains fewer obstruents in coda position[21].

(49) *Obstruents cannot be parsed in reduplicant codas*

/RED + ka$^{\mu\mu}$x^{w} + mu$^{\mu\mu}$t/	*μ/obstr	MAX seg-IO	WxP	MAXseg-BR
1.☞ k'a$^{\mu\mu}$-k'a$^{\mu}$x^{w}-m'u$^{\mu\mu}$t			**	****
2. k'a$^{\mu\mu}$x^{w}-k'a$^{\mu}$x^{w}-m'u$^{\mu\mu}$t			***!	***

High-ranking MAX-IO forces the root final obstruent to be parsed in the output, and WxP ensures that it appears only once. However, it is important to note that neither of these constraints indicate a preference for the location in which the obstruent is parsed. That is, they do not differentiate a candidate in which the obstruent is present in the reduplicant from a candidate in which it is present in the base. This is illustrated in tableau (50) below.

(50) *Broad I-O and local M do not indicate preference for unmarked in base or reduplicant*

/RED + ka$^{\mu\mu}$x^{w} + mu$^{\mu\mu}$t/	*μ/obstr	MAX seg-IO	WxP
1.☞ k'á$^{\mu\mu}$-k'a$^{\mu}$x^{w}-m'u$^{\mu\mu}$t	✓		**
2.☞ k'á$^{\mu\mu}$x^{w}-k'a$^{\mu}$-m'u$^{\mu\mu}$t	✓		**

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[21] With richness of the base we must also consider an input in which the obstruent is moraic. Since the obstruent surfaces as non-moraic *μ/obstr must dominate *MAX-IO-μ:

/RED + ka$^{\mu\mu}$x$^{w\mu}$ + mu$^{\mu\mu}$t/	*μ/obstr	MAXμ-IO	*CLASH
1. ☞ k'á$^{\mu\mu}$-k'a$^{\mu}$x^{w}-m'u$^{\mu\mu}$t		*	
2. k'á$^{\mu\mu}$-k'a$^{\mu}$x$^{w\mu}$-m'u$^{\mu\mu}$t	* !		*

The fact that both candidates in this tableau fare equally well results from the fact that WxP evaluates base and reduplicant syllables individually, and demands that both have moraic codas. In addition it follows from the idea that Broad Input-Output constraints evaluate the output as a whole, not differentiating base and reduplicant. Within the reconceptualized model of correspondence it is Root Faithfulness that differentiates the two candidates. Root Faithfulness constraints require the base to be faithful to the input root, and therefore the unmarked rather emerges in the reduplicant.

(51) MAXseg-Rt: Every segment in the input root has a correspondent in the output base

(52) *Emergence of the Unmarked in the reduplicant*

/RED + ka$^{\mu\mu}$x^{w} + mu$^{\mu\mu}$t/	*μ/obstr	MAXseg-IO	WxP	MAXseg-ROOT
1.☞ k’a$^{\mu\mu}$-k’a$^{\mu}$x^{w}-m’u$^{\mu\mu}$t	✓		**	
2. k’a$^{\mu\mu}$x^{w}-k’a$^{\mu}$-m’u$^{\mu\mu}$t	✓		**	*!

Optimal candidate 1 in tableau (52) incurs a subset of candidate 2’s violations. For this reason it is irrelevant where the Root Faithfulness constraint is ranked with respect to the constraints at hand (though recall from the previous section that it must rank below *CLASH)[22].

3.3 Summary

This section discussed the role of *CLASH and WEIGHTbyPOSITION in The Emergence of the Unmarked within Kwakwala. Because these markedness constraints crucially differ in domain size, they are involved in two different kinds of TETU. The domain of WxP is relatively local because it evaluates segments within a syllable, and the domain of *CLASH is less local, because it assesses the interaction between heads of feet, and as such evaluates a domain larger than the foot. This difference is important for Kwakwala, because the size of the reduplicant is a syllable. In other words, the size of the reduplicant coincides with the size of WxP’s domain. For this reason WxP evaluates the reduplicant independently from syllables in the base, and typically both the reduplicant syllable and syllables in the base must separately undergo alternations in order to satisfy it. When WxP is dominated by Broad I-O constraints, its demands for alternations are not fully granted: only one alternation can take place. It is irrelevant to WxP where the alternation or the faithful parsing takes place. Faithfulness constraints on roots do indicate a preference and

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[22] B-R constraints also differentiate the two candidates. That is, ranking of DEP-BR over MAX-BR would correctly cause the unmarked to surface in the reduplicant, rather than the base. However, we cannot assume this ranking in all instances of Reduplicant TETU, because it only accounts for those cases in which deletion takes place. It does not account for cases in which the reduplicant repairs a marked structure through epenthesis (i.e. the reverse ranking would be needed).

select as optimal those forms in which the base surfaces faithfully, and the reduplicant alternates.

*CLASH evaluates a less local domain. In Kwakwala this domain includes material from both the base and the reduplicant. In other words, a string which includes base and reduplicant material can violate *CLASH as a whole, and an alternation in either can evade such a violation. This means that this constraint indicates a preference for the site of alternations: it is either the base or the reduplicant. Since the preferred alternation site is sometimes the base, relevant Root Faithfulness constraints must be dominated by the markedness constraint in order to see its effects.

The following TETU constraint rankings have been argued for in Kwakwala:

(53) *Ranking summary Kwakwala TETU*

*a. Output TETU: *CLASH is active in reduplicative output only*
MAX-IO (μ and seg) >> *CLASH >> B-R Faith, MAX-Rt (μ and seg)

b. Reduplicant TETU: WxP is active in reduplicants only
MAXseg-IO >> WxP >> MAXseg-BR // MAXseg-Rt

In more general terms the following ranking schema accounts for Output TETU in which either the base or the reduplicant alternates[23]:

(54) *Ranking schema Output TETU*
I-O Faith >> M >> B-R Faith, Root Faith

Recall that Output and Reduplicant TETU are defined in terms of the alternations demanded by the markedness constraint involved. When the markedness constraint demands a change in only one member of the base-reduplicant pair, we are dealing with Output TETU. *CLASH does not indicate a fixed preference for alternations in Kwakwala reduplicants or bases. However, markedness constraints will sometimes indicate a preference for the locus of alternation. For instance, in a hypothetical language where reduplicants are a prefixal syllable and stress in reduplicative forms must be initial, vowel lengthening might take place in the reduplicant syllable to make this initial syllable heavy. Thus a markedness constraint on stress always forces the reduplicant to alternate.

The rankings that account for Reduplicant TETU also account for those instances of Output TETU in which it is always the reduplicant that alternates.

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[23] In the following typology of The Emergence of the Unmarked the usual caveats for typologies hold: general names are used for the constraints at hand (e.g. I-O Faithfulness may indicate an IDENT constraint on a particular feature disfavored by the relevant markedness constraint). The sub-hierarchies shown are assumed to be responsible for the canonical case under discussion (that is, there are no higher-ranked constraints which nullify the crucial interaction).

(55) *Ranking schema Reduplicant TETU*

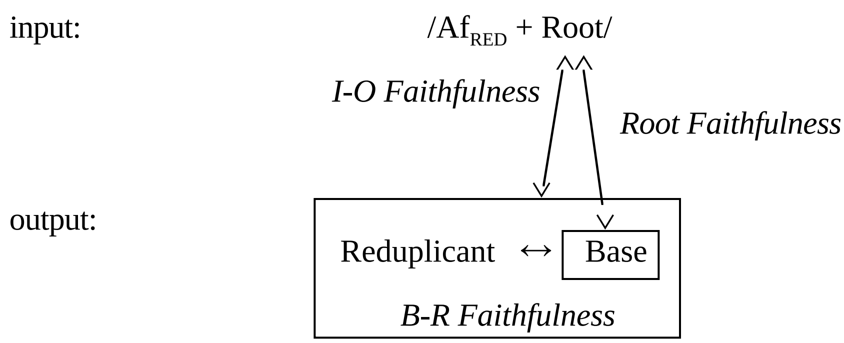
a. I-O Faith >> M >> B-R Faith (Root Faith irrelevant)
b. Root Faith >> M >> B-R Faith (I-O Faith irrelevant)

In Kwakwala we have seen Reduplicant TETU which is derived through a ranking along the lines of (55a). The ranking in (55b) is reminiscent of the one proposed in McCarthy and Prince (1994a). High-ranking Root Faith ensures that unreduplicated words and bases in reduplicated words surface faithfully, and M can only force phonological alternations in the reduplicant. Since bases are faithful to the input, Broad Input-Output constraints are satisfied automatically, and their ranking with respect to other constraints is irrelevant.

Conclusion

This paper introduced a new model of correspondence depicted below:

(56) *Reconceptualized model of Correspondence*



It contains a general faithfulness relation that links the input to the output as a whole, including base and reduplicant. The relation is established when an element in the input has one correspondent in the output; be it the unreduplicated form, or one of the copies in a reduplicated form. Hence, it allows one member of the base-reduplicant pair to be more faithful than the other. Moreover, it allows alternations in *either*, without allowing alternations in unreduplicated words (Output TETU). Similar correspondence relations have been proposed independently by Cole (1998), Raimy and Idsardi (1997) Spaelti (1997), and Yip (1998).

Raimy and Idsardi propose this relation for principles of minimalism (Chomsky 1995). They argue that phonology should exclusively involve phonological elements and hence Faithfulness relations should be defined in terms phonological entities only: they should not make reference to both morphological and phonological constructs. Thus, they claim that Input-Output Correspondence is conceptually superior to Input-Base and Input-Reduplicant correspondence, simply because it relates a phonological construct (the input) to another phonological construct (the output), rather than a ‘quasi-’morphological construct (the base or reduplicant).

Using examples from Bella Coola reduplication, they show that reconceptualized Input-Output Correspondence can account for cases in which certain processes can affect bases, but not unreduplicated forms. This is, of course, the same argument as the one put forward in this paper (i.e. this is a case of Output TETU).

Spaelti proposes the 'Reduplicate! Model of Correspondence', consisting of B-R and Broad Input-Output Faithfulness (which he calls 'Lexical form-Surface form Faithfulness'). He claims that all TETU predictions of the Full Model can be maintained by eliminating the Input-Reduplicant relation, and thereby also the universal ranking I-B Faith >> I-R Faith (MP95).

Contrary to Raimy and Idsardi (1997) and Spaelti (1997), this paper has shown that a model of correspondence containing Broad Input Output Correspondence needs to be implemented with Root Faithfulness. The fact that reduplicants often contain less marked material than roots follows from the idea that reduplicants are related to the input by general Input-Output correspondence only, while roots are subject to Root Faithfulness in addition to broad Input-Output correspondence. Thus, it is because there is a subset relation between violations of I-O and Root Faithfulness constraints that no fixed ranking of these constraints needs to be assumed. Since Root Faithfulness is not necessarily paramount in the new model, bases can be forced to be less faithful to the input than reduplicants.

Yip also argues that The Emergence of the Unmarked involves domination of Input-Output constraints that relate both base and reduplicant to the input. In addition, she also employs subset relations in faithfulness to ensure faithful parsing of one of the two copies, namely Positional Faithfulness relations of several kinds. However, she identifies prominent positions which are very specific, and sometimes seem difficult to motivate outside the scope of her data (such as onsets of syllables final in a syntactic phrase). In her model base and reduplicant copies are equal in status, and therefore she does not postulate a faithfulness relation between them. It is unclear how this proposal can account for over- and underapplication.

Cole (1998) points out that deletion in Klamath takes place only when the deleted element is recoverable elsewhere in the output (i.e. only in reduplication). Again, this argument is similar to the one put forward in the present paper. Rather than assuming Broad Input-Output constraints, however, she proposes a disjunctive constraint whose members are Input-Base and Input-Reduplicant constraints. It is satisfied when either of the 'member constraints' is satisfied. To restrict the theory she assumes that 'this particular disjunctive constraint is called for [only] by the special dual correspondence that occurs in reduplication structures, where an element from an underlying form is preserved twice in the surface form' (p. 27). Cole argues that positional faithfulness constraints determine whether the base or the reduplicant surfaces faithfully. Like Yip, Cole argues for some very specific faithfulness constraints.

The present proposal relies on only one type of Positional Faithfulness to account for faithfulness in The Emergence of the Unmarked: Root Faithfulness. It was argued for by Beckman (1996) to account for the fact that roots are more salient than other morphemes, and retain more contrast (the role of Root Faithfulness and Broad Input-Output Faithfulness in affixation outside reduplication is left for further research).

The present proposal makes a strong prediction not shared by the above mentioned accounts. In the new model of correspondence, bases can only be less faithful than reduplicants in TETU, when the markedness constraint involved demands *only* the base to alternate. If it demands *both* the base and the reduplicant to alternate, Root Faithfulness constraints ensure that the base is more faithful than the reduplicant.

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