Multiple Patterns of Reduplication in Nuuchahnulth: A Templatic Approach*

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Nuuchahnulth has very unique patterns of reduplication which raise many interesting questions. Reduplication occurs when certain suffixes attach to a stem. The form of the reduplicant ranges from CV to CVVCCC, depending on the attached suffix. Multiple patterns in Nuuchahnulth reduplication present problems for a-templatic approaches. The data in this study provide more complex patterns than those we are familiar with from previous work. In this paper, I provide a templatic solution to the problems raised by the case of Nuuchahnulth, and argue that we should employ templates to deal with at least some cases of reduplication.

Keywords: Nuuchahnulth, reduplication, a-templatic, reduplicant, suffix, foot, Optimality Theory

1. Introduction

Reduplication is an issue that has attracted very much attention from linguists, due to developments in phonological and morphological theory (McCarthy 1979; Marantz 1982; Kiparsky 1986; McCarthy & Prince 1986, 1994, 1995, 1999; Steriade 1988; Urbanczyk 1995, 1996; Spaelti 1997; Gafos 1998; Downing 1998, 2000, 2001, 2006; E-S Kim 2003a, b; Inkelas & Zoll 2005; Pulleyblank *to appear*). In particular, since McCarthy (1979), Marantz (1982), Kiparsky (1986) and McCarthy & Prince (1986), much theoretical interest has been given to partial reduplication. Under Templatic Prosodic Morphology, partial reduplication is performed to satisfy templatic requirements which are specified for a reduplicative morpheme. Recently, Downing (2000, 2001) has claimed that reduplication-specific prosodic constraints determine reduplicant size, from the perspective of Optimality Theory. On the other hand,

* Nuuchahnulth is spoken on the west coast of Vancouver Island from Barkley Sound north to Quatsino Sound and all the data in this paper, which are from my fieldwork conducted from 1998-2003, are the Ahousaht dialect, which is spoken in Flores Island. I would like to thank Laura Downing, Doug Pulleyblank, Pat Shaw, Joe Stemberger, John Stonham, and Suzanne Urbanczyk for their insightful suggestions and corrections, especially when I started this project at UBC, and to the three anonymous reviewers for their many useful comments.

Generalized Template Theory (McCarthy & Prince 1994, Urbanczyk 1995, Downing 2006) implements general phonological constraints which derive the shape of the reduplicant through indirect reference to morphological categories such as 'Affix'. Further, the A-templatic approach, favored in recent work, assumes systems where various patterns of reduplication cover the possible cross-linguistic range, and argues for the Emergence of the Unmarked effect (i.e. the reduplicant is formed as an unmarked structure although the language allows a marked structure as a whole), without reduplication-specific templates (Urbanczyk 1996, 1999; Spaelti 1997; Gafos 1998; McCarthy & Prince 1999).

Nuuchahnulth has very unique patterns of reduplication, in particular, patterns triggered by suffixes, which raises many interesting questions both analytically and theoretically. First, when reduplication is triggered by a suffix, the meaning of the suffix is added to the reduplicated form. Second, the form of the reduplicant, the copied part, varies depending on the triggering suffix, ranging from CV to CVVCCC. The reduplicant, at most one syllable, either has a coda or not, and its vowel is either long or short depending upon the triggering suffix. In total, there are seven patterns in Nuuchahnulth reduplication. Table (1) summarizes the patterns:

(1) Patterns of Nuuchahnulth reduplication

TYPE	Vowel length in		RED-BASE
	Reduplicant	Base	
Class I	Same as Base	Unaffected	CV(V)(C)-CV(V)(C)
Class II	Long	Unaffected	CVV-CV(V)(C)
Class III	Short	Unaffected	CV-CV(V)(C)
Class IV	Long	Affected; lengthened, if underlyingly short	CVV(C)-CVV(C)
Class V	Short	Affected; shortened, if underlyingly long	CV-CV(C)
Class VI	Long	Affected; shortened, if underlyingly long	CVV-CV(C)
ClassVII	Short	Affected; lengthened, if underlyingly short	CV(C)-CVV(C)

Very interestingly, exhibiting the full range of possible interactions, each two of the 7 main types constitutes a pair within the system, in terms of the interaction between the base and the reduplicant in vowel length: except for Class I, for which, logically, constituting a pair is not possible. In each pair, classes II-III, classes IV-V, and classes VI-VII, one of every pair has a reduplicant with a long vowel and the other a reduplicant with a short vowel. Also, with the pairs of classes IV-V, and of classes VI- VII, the interaction between the base and the reduplicant exhibit different properties. In the pair of classes IV-V, the base and the reduplicant have the same vowel length, while in the pair of classes VI-VII, the base and the reduplicant exhibit different vowel lengths.

In this paper, I provide a templatic solution to the problems raised by multiple patterns of reduplication in Nuuchahnulth and show that the templatic approach can treat the patterns of reduplication in the language straightforwardly.

2. Data

I start with the phonemic distribution of the language as shown in Table (2).

(2) Nuuchahnulth consonant inventory

	Labial	Alveolar	Lateral	Alveo-palatal	Velar	Labio-velar	Uvular	Labio-uvular	Pharyn-geal	Glottal
Stops	p	t			k	kʷ	q	qʷ		
Glottalized	p'	t'			k'	k'ʷ			ʕ	ʔ
Affricates		ts	tɬ	tʃ						
Glottalized		ts'	tɬ'	tʃ'						
Fricatives		s	ɬ	ʃ	x	xʷ	χ	χʷ	ħ	h
Sonorants	m	n		j		w				
Glottalized	m'	n'		j'		w'				

Consonants show extensive contrasts in place of articulation. The language does not have voiced obstruents, each stop, affricate, and sonorant has a glottalized counterpart, whereas a fricative does not, and velar and uvular obstruents exhibit a labial contrast.

I provide each case of the seven patterns of reduplication in the following sections.

2.1. Class I: Red=σμ(μ); Base unaffected

Three suffixes belong to this type: *-ʃ* 'once in a while/continually', *-ʔaɬuk* 'to look after' and *-ħta* 'foot'. Of these, *-ʔaɬuk*, and *-ħta* do not allow a coda in the reduplicant, while *-ʃ* does. The reduplicant has a long or short vowel depending upon the base, the root of the stem the reduplicant attaches to. There is no change in the base. I exemplify each suffix in (3-5), respectively; the reduplicant is underlined:

(3) -ʃ 'continually'

a. tuuħtuuħʃʔiʃʔaɬ t'at'n'aʔis
RED-tuuħ-ʃ-ʔiʃʔaɬ t'at'n'a-ʔis
RED-to get frightened-continually-3pl/IND children-DIM
'the children get frightened continually (e.g. by thunder)'

b. watqwatqʃʔiʃ ʔiʃts'iip Kyle.
RED-watq-ʃ-ʔiʃ ʔiʃts'iip Kyle
RED-to swallow-continually-3sg/IND gum Kyle
'Kyle keeps swallowing gum'

c. kakamatqʃtsitɬ'atɬukʔiʃ t'an'aʔis.
RED-kamatq-ʃ-tsitɬ-ʔatɬ-uk-ʔiʃ t'an'a-ʔis
RED-to run-continually-MOM-SEQ-POSS-3sg/IND child-DIM
'her/his child keeps running'

(4) *-ʔaɬuk* 'to look after'[1]

a. tataʔiɬʔaɬuk
RED-taʔiɬ-ʔaɬuk
RED-sick-to look after
'to look after someone sick'

b. tʃatʃapχʔaɬuk
RED-tʃapχ-ʔaɬuk
RED-man-to look after
'to look after a man/husband'

c. nuunuuk^{w}'aɬuk
RED-nuuk^{w}-ʔaɬuk
RED-song-to look after
'to look after songs (in a sense as a care-taker)'

(5) *-ħta* 'foot'

a. m'am'aɬħta
RED-m'aɬ-ħta
RED-cold-foot
'cold feet'

b. tatakinisħta
RED-takinis-ħta
RED-socks-foot
'to wear socks'

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[1] *-ʔaɬuk* is a glottalizing suffix as well, as shown in (4c), which causes a stem-final plain stop or affricate to be a glottalized counterpart. (See E-S Kim (2003b), Kim and Pulleyblank *to appear* for a detailed discussion.)

c. ʔuuʔuuʃħtatʃipʔiʃ Lois ʃuwis.
RED-ʔuuʃ-ħta-tʃip-ʔiʃ Lois ʃuwis
RED-some-foot-?-3sg/IND Lois shoes
'Lois is wearing someone else's shoes'

2.2. Class II: Red=σμμ; Base unaffected

One suffix is found for this type: *-ƛiik* 'someone who is always doing something (habitually)'. The reduplicant is always long, whether the base vowel is long or short; there is no change in the base, but coda is not allowed in the reduplicant with the suffix. However, we would expect cases that allow codas to appear with some other suffixes, but I have not found such cases.

(6) *-ƛiik* 'some who always does something'
a. naanaʔataħʔiik
RED-naʔataħ-ʔiik
RED-to listen-someone who always does something
'someone who always listens a lot'
b. ʔuuʔuuwaʔiik
RED-ʔuuwa-ʔiik
RED-to complain- someone who always does something
'someone who always complains a lot'
c. jaajaqtɬst'aɬʔiik
RED-jaqtɬ-st'aɬ-ƛiik
RED-disliking-each other- someone who always does something
'someone who always dislikes another'

2.3. Class III: Red=σμ; Base unaffected

Two suffixes belong to this class: *-juk*^{w} 'to cry', and *-ƛiħ* 'to hunt for, fish'. The reduplicant is always short, whether the base vowel is long or short; there is no change in the base, but the coda is consistently not found in the reduplicant in all cases. I exemplify each suffix in (7-8), respectively.

(7) *-juk*^{w} 'to cry'
a. ʔaʔaqijukħ[2]
RED-ʔaqi-juk^{w}-ħ
RED-what-to cry-3sg/INT
'what is she crying for'

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[2] The labiality of the suffix is deleted when preceding a consonant (see Stonham 1999, E-S Kim 2003b).

b. wiwikjukʔiʃ
RED-wik-juk^{w}-ʔiʃ
RED-NEG-to cry-3sg/IND
's/he is crying for nothing'

c. ʔuʔuuʃjuk'^{w}ap'atɬ'i
RED-ʔuuʃ-juk^{w}-ʔap-ʔatɬ-ʔi
RED-some-to cry-CAUS-SEQ-3sg/IMP
'make her cry for something'

d. tataanaqajukʔiʃ
RED-taana-qa-juk^{w}-ʔiʃ
RED-money-for-to cry-3sg/IND
's/he is pouting for money.'

(8) *-ʔiiħ* 'to hunt for/try to get/collect/fish'

a. k'ik'iɬatʔiiħ
RED-k'iɬa(nus)-t-ʔiiħ
RED-sea lion-PL-to hunt for
'hunting for seals'

b. ʔuʔuuskaʔiiħ
RED-ʔuuska-ʔiiħ
RED-?-to hunt for
'taking a chance'

c. sisikt'iiħ
RED-sikt-ʔiiħ
RED-egg of head lice-collect
'picking eggs of head lice'

2.4. Class IV: Red=σμμ; Base=σμμ

Two suffixes belong to this class: *-ja* 'continuously', *-ʃitɬ* 'to start'. The reduplicant is always long, and the base is also long (or the first syllable of the base, if it consists of more than one syllable). If, therefore, the vowel of the base is short, then it is lengthened. Reduplication of this type forces the coda of the base to be copied.[3] (9-10) illustrate each suffix (the glide /j/ of *-ja* is deleted after a consonant, which is another process beyond my discussion here):

[3] With the suffix *-(j)a* the reduplicant has a coda /tɬ/ on the surface. It appears only when the base is monosyllabic and ends with a vowel (see E-S Kim (2003b) for a detailed discussion).

(9) *-(j)a* 'continuously'

a. w'aaw'aasaqaʔiʃ
RED-w'asaq-(j)a-ʔiʃ
RED-to cough-continuously-3sg/IND
'she is continuously coughing'

b. tsuutstsuutsaʔiʃ
RED-tsuts-(j)a-ʔiʃ
RED-to scratch-continuously-3sg/IND
's/he is continuously scratching'

c. miitxmiitxaʔiʃ
RED-mitx-(j)a-ʔiʃ
RED-to spin-continuously-3sg/IND
's/he spins continuously'

d. t'iitskt'iitska
RED-t'iitsk-(j)a
RED-the sound of thunder-continuously
'thunder'

(10) *-ʃitɬ* 'to start to ...'

a. tuuxtuuxʃitɬ
RED-tux-ʃitɬ
RED-to jump-to start to
'starting to jump'

b. w'aaw'aasaqʃitɬ
RED-w'asaq-ʃitɬ
RED-to cough-to start to
'starting to cough'

c. ts'uusts'uusʃitɬ
RED-ts'us-ʃitɬ
RED-to dig-to start to
'starting to dig (a hole)'

d. ʕiiħʕiiħʃiʔatɬukʔiʃ naj'aqak
RED-ʕiiħ-ʃitɬ-ʔatɬ-uk-ʔiʃ naj'aqak
RED-to cry-to start to-SEQ-POSS-3sg/IND baby
'her baby starts to cry.'

2.5. Class V: Red=σμ; Base=σμ

Two suffixes belong to this type: *-k'uk*^{w} 'to resemble', and *-(tʃ)ink* 'together, side by side'. The reduplicant has a short vowel and (the first syllable of) the base is also short. If, therefore, the vowel of the base is long, then it is shortened. The coda of the base is not copied with this class of suffix. (11-12) exemplify each suffix.

(11) *-k'uk*^{w} 'to resemble'

a. ʔuʔusumk'ukʔiʃ
RED-ʔusum-k'uk^{w}-ʔiʃ
RED-to need/want-to resemble-3sg/IND
's/he appears to need (something)'

b. mimiɬk'ukʔitʃuuʃ
RED-miɬ-k'uk^{w}-ʔitʃuuʃ
RED-same-to resemble-2pl/IND
'both of you look alike'

c. tɬ'itɬ'ix^{w}ak'uk
RED-tɬ'iix^{w}-(a)a-k'uk^{w}
RED-to smile/laugh-DUR-to resemble
'smirk'

d. q^{w}iq^{w}iqk'uk^{w}ii
RED-q^{w}ii-q-k'uk^{w}-ii
RED-what-EXIS-to resemble-3sg/REL
'what appears to be (pl), something unusual'

(12) *-(ts)ink* 'to converse with/together/side by side'

a. ts'ats'atʃink
RED-ts'aa-tʃink
RED-swiftly moving water-side by side
'going against the tide of swift current'

b. huhuʔatʃinksapʔiʃ muna
RED-huʔa-tʃink-sap-ʔiʃ muna
RED-to put together-side by side-MOMCAUS-3sg/IND engine
'he puts engine back together.'

c. tsitsiqinkʔiʃ
RED-tsiq-(tʃ)ink-ʔiʃ
RED-to speak-to converse
's/he is praying.'

2.6. Class VI: Red=σμμ; Base=$_{1}$σμ

Two suffixes belong to this type: *-itʃ ak* 'afraid/fear', and *-(k)tʃastʃi* 'to play on someone's side'. The reduplicant is always long, but (the first syllable of) the base is short. If, therefore, the vowel of the base is long, then it is shortened. The coda of the base is not copied with this class of suffix. (13-14) exemplify each suffix.

(13) *-itj ak* 'afraid/fear'

a. wiiwikitj'ak
RED-wik-itj'ak
RED-NEG-afraid/fear
'not afraid of anything'

b. siisitsitj'aksiʃ
RED-siits-itj'ak-siʃ
RED-maggot-afraid/fear
'I am afraid of maggots'

c. ts'iits'iʃxitj'ak
RED-ts'iʃx-itj'ak
RED-dirty-afraid/fear
'afraid of something dirty'

d. ħiiħijitj'ak
RED-ħiji-itj'ak
RED-snake-afraid/fear
'fearing snakes'

(14) *-(k)tʃastʃi* 'to play on someone's side'

a. wiiwiktʃastʃi
RED-wik-(k)tʃastʃi
RED-NEG-to play (on someone's side)
'not participating...'

b. ʔuuʔuʃtʃastʃi
RED-ʔuuʃ-(k)tʃastʃi
RED-some-to play (on someone's side)
's/he is on someone's side in a team'

c. ʔaaʔajastʃi
RED-ʔaja-(k)tʃastʃi
RED-many-to play (on someone's side)
'many on someone's side'

2.7. Class VII: Red=σμ; Base=σμμ

Three suffixes belong to this class: *-sapi* 'to depend on', *-n'uk* 'on the hand', and *-suɬ* 'on the eyes'. The process is exactly opposite to Class VI reduplication: the reduplicant is always short, but if (the first syllable of) the base is underlyingly short, then it is lengthened as in (15). Of these three suffixes, *-sapi* does not allow coda reduplication.

(15) *-sapi* 'to depend on'

a. wiwiiksapiʔiʃ
RED-wik-sapi-ʔiʃ
RED-NEG-to depend on-3sg/IND
's/he is depending on nothing'

b. ʔuʔuuʃsapiʔiʃ
RED-ʔuuʃ-sapi-ʔiʃ
RED-some-to depend on-3sg/IND
's/he is depending on someone'

c.

ʔaʔaaqisapiħsuu	waałak	mituuni
RED-ʔaqi-sapi-ħsuu	wał-ak	mituuni
RED-what-to depend-2pl/INT	to go-DUR	Victoria

'what are you depending on to go to Victoria'

(16) *-n'uk* 'on the hand'

a. ħitsħiitsn'uk
RED-ħits-n'uk
RED-feces-on the hand
'feces on the hand'

b. tupktuupkn'uk
RED-tupk-n'uk
RED-black-on the hand
'black hand (e.g. from grease)'

c. tʃ'isχtʃ'iisχn'uk
RED-tʃ'isχ-n'uk
RED-dirty-on the hand
'dirty hands'

d. tɬ'aqtɬ'aaqn'uk
RED-tɬ'aaq-n'uk
RED-grease/lard-on the hand
'lard on the hand'

e. nanaawinkn'uk
RED-naawink-n'uk
RED-slow-on the hand
'(working) slow using hands'

2.8. Summary

We have seen all the patterns of reduplication in Nuuchahnulth and the processes can be summarized as follows. Both the reduplicant and the base exhibit multiple patterns in terms of vowel length, with nine patterns represented. The size of the reduplicant is consistently one syllable, but the exact shape of the reduplicant varies depending upon the triggering suffix. Moreover, the reduplicants with some classes of triggering suffixes are codaless, while those with some others have codas. These observations raise the following questions:

I. How to define the identity of the reduplicant?
II. How to determine the size of the reduplicant?
III. How to analyze variation in reduplicant forms in terms of vowel length and coda?
IV. How to analyze modification of base forms in terms of vowel length?
V. How to analyze the nine reduplicative types within a unitary system?

I will discuss in Section 3 how these problems can be treated templatically.

3. Analysis

I will discuss how we can solve all the problems raised above in this section. First, I propose that in Nuuchahnulth the reduplicant shape emerges from prosodic requirements manifested in some suffixes (for the first and second problems) and that the surface shapes of both reduplicant and base are determined by metrical requirements, which are also specified for each triggering suffix (for the third and fourth problems). In addition, I suggest that lexically indexed faithfulness constraints cause variation between the nine patterns in terms of the presence/absence of reduplicant coda and modification of the base vowel length (for the third, fourth, and fifth problems). The following three subsections discuss each argument, and the last section illustrates each case by tableaux.

3.1. Prosodic Characterization of Reduplicants

Adapting Marantz (1982), McCarthy & Prince (1986), Downing (2000, 2001), and Pulleyblank (*to appear*), I suggest that each reduplication-triggering suffix manifests prosodic requirements to be satisfied on the surface as seen in (17).[4]

[4] They could be called circumfixes, where the prefix part consists only of a prosodic element and the suffix consists of both prosodic and melodic elements. It is still controversial whether this kind of affixation should be called as circumfixation, i.e. a single morpheme whose constituents are discontinuous, or whether it consists simply of a suffix and a concomitant prefix. The typical counter-example against the 'circumfix' approach is the German past participle, *ge...t* as in *gewandert* 'wandered', which has a phonetically identical form to the past tense, /t/. However, in the Nuuchahnulth case, the suffixes in question are not used as an independent morpheme unlike the German past participle (see Spencer (1991) for more discussion). To discuss the morphological aspects of circumfixation is beyond the scope of this paper; hence, I do not develop more arguments for circumfixation.

(17) σ...-*ʃ* (for example)

Such requirements on each suffix, specified as a prosodic unit in the input, induce a reduplicative prefix on the surface in a way to be examined shortly. This templatic approach is the same as, in particular, Downing (2000, 2001). However, Downing treats the issue of the reduplicant size grammatically, i.e., using a constraint which defines the size of the reduplicant, while my approach tries to solve the problem lexically, i.e. with lexically-specified prosodic requirements. These two approaches apparently achieve the same goal, but I will show later that the lexical approach has an advantage in dealing with the issue of reduplicant shape, at least in Nuuchahnulth.

Prosodic requirements manifested as a cooccurring monosyllabic prefix define the identity of the reduplicant, both prosodically and morphologically, and its size. However, as we saw above, the reduplicant and the base vary in vowel length. Vowels in reduplicative prefixes surface as long with class I, II, IV, and VI suffixes, while surfacing as short with class I, III, V, and VII suffixes. Moreover, the base form is modified with class IV-VII suffixes. To treat these problems, I propose that variation of reduplicant forms and modification of base forms are due to metrical requirements specified for each triggering suffix and to the interaction between domain-specified faithfulness constraints and a constraint regulating foot-structures.

3.2. Metrical Requirements of the Foot

To discuss how to implement metrical requirements to treat the multiple patterns, I start with examining possible foot structure both cross-linguistically and in Nuuchahnulth, which is closely related to the process under discussion.

Crowhurst (1991b) suggests that the inventory of primitive foot structures provided by Universal Grammar is as follows:

(18) Inventory of primitive foot structures: Crowhurst (1991b: 54)

#[5]	Name	Prosodic Shape
1	Disyllabic	[σ σ]
2	Bimoraic	[μ μ]
3	Left-heavy	[μμ μ]
4	Right-heavy	[μ μμ]
5	Heavy	[σμμ σμμ]

According to Crowhurst, all these foot structures are observed cross-

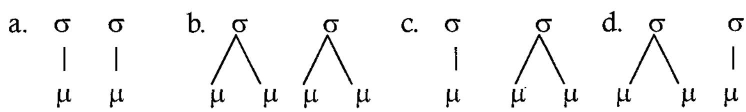
[5] I replaced the original column with this column to simplify the exposition.

linguistically, citing Hayes (1987, 1995), Prince & Smolensky (1991), McCarthy & Prince (1986, 1990), Hammond (1990), Ishihara (1990), Crowhurst (1991a), Dresher & Lahiri (1991), and Rice (1991) (in particular, see Ishihara 1990 (Okinawan Japanese), Hammond 1990 (Lenakel) for the existence of a foot with two heavy syllables, #5).

When it comes to Nuuchahnulth foot structure, (18-1) is the relevant category. The foot is built based on syllables not moras. There are many phonological processes which occur in the foot which consists of the first two syllables of the word. For example, stress and variable-length vowels are diagnostic for presence of the foot. Stress falls on the first syllable of the word, unless it is light and the second is heavy, in which case stress falls on the second syllable: there is no secondary stress (Sapir & Swadesh 1939; Wilson 1986; Stonham 1994, 1999; E-S Kim 2003b, 2004).

Some vowels are variable in length: if they are in the first or second syllable, then they are long, but if not, they are short. That is, variable vowels are long within the foot and short outside of the foot. Moreover, the domain for the processes of vowel lengthening and shortening is the first and second syllables.

When the foot consists of two syllables, the following foot forms would be possible on the surface.

(19)


Recall from (1) that Nuuchahnulth reduplication triggered by suffixes has 7 types in terms of vowel length. Each type can be interpreted by the metrical structures in (20) as below.

(20) Metrical structures of each class

TYPE	RED-BASE	Foot form
Class I	σ σ	No specification for both RED and Base; (19a-d) are all possible on the surface, depending of the base forms.
Class II	σ σ μ μ	No specification for Base, hence (19b,d) are possible surface foot forms.
Class III	σ σ μ	No specification for Base, hence (19a,c) are possible surface foot forms.
Class IV	σ σ μ μ μ μ	Specified for both RED and BASE, hence (19b)

Class V	σ σ | | μ μ	Specified for both RED and BASE, hence (19a)
Class VI	σ σ /\ | μ μ μ	Specified for both RED and BASE, hence (19d)
Class VII	σ σ | /\ μ μ μ	Specified for both RED and BASE, hence (19c)

I suggest that metrical requirements manifested in some suffixes, expressed as primitive foot structures as seen in (20), are related to modification of some roots/stems in vowel length, and derivation of multiple forms of the reduplicant. Hence, I propose that each suffix (except for class I) is specified for one of these foot forms as in (21-26). Note that with class I suffixes, RED or the base form an independent structure, while with class II-VII suffixes, RED forms either a trochaic or iambic foot WITH the base. Because the syllables of each foot have to maintain specific number of mora for both the base and reduplicant, we must specify which syllable(s) of the foot are heavy or not.

(21) FootFormI: two light syllables (σ σ)φ (for Class V)
| |
μ μ

(22) FootFormII: two syllables with 1st heavy (σ σ)φ (for Class II)
/\
μ μ

(23) FootFormIII: two syllables with 1st heavy, 2nd light (σ σ)φ (for Class VI)
/\ |
μ μ μ

(24) FootFormIV: two heavy syllables (σ σ)φ (for Class IV)
/\ /\
μ μ μ μ

(25) FootFormV: two syllables with 1st light: (σ σ)φ (for Class III)
|
μ

(26) FootFormVI: two syllables with 1st light, 2nd heavy: (σ σ)φ (for Class VII)
| /\
μ μ μ

For the existence of the foot with two heavy syllables in Nuuchahnulth as in (24), there are supporting arguments as follows. First, as mentioned in Crowhurst (1991b), there is cross-linguistic evidence that some languages have such foot forms, although it is rare. Second, the Nuuchahnulth foot is bisyllabic; thus if we try to treat the case of (24) as a foot based on moras, not syllables, then it will cause a conflict with a general principle in Nuuchahnulth prosody. Third, in Nuuchahnulth, when two syllables with a long vowel like (24) or short vowel like (21) come together, stress can be assigned on either the first or the second syllable (Stonham 1999, Thorp 2004). In particular, in the case of (24), if the two syllables together do not constitute a foot, it could fail to explain such an alternation in terms of stress assignment. That is, if stress alternation is due to the existence of two feet, then how can we treat such alternation occurring also in a foot with two short syllables as in (21). Moreover, when stress falls on the second foot, it would violate a general constraint that stress be assigned at the left edge of the word, which is the first foot of the prosodic word. On the other hand, if we treat two heavy syllables as a single foot, then whether stress is assigned on the first or second syllable, it still occurs in the domain of the first foot. In addition, if we try to make use of extrametricality for the first heavy syllable to explain the case of the second syllable stressed, it should lead to another problem. In the language, both iambic and trochaic foot forms are possible as we saw above. Also the first heavy syllables are ones to which preference is given in terms of stress assignment. There are, therefore, no phonological reasons to have the first heavy syllable extrametrical (see Stonham 1999 for more detail concerning stress). In sum, such different specifications of foot structure as those given above drive the multiple patterns both in the reduplicant and the base.

One might ask how a foot form specified in the input, which is lexically required by a specific suffix, is realized on the surface, in particular in the initial position of the word. Before leaving this section, I will provide the answer. Recall that Nuuchahnulth assigns stress on either of the first two syllables of the word, i.e., the first foot, and the weight of the syllable are crucial factors in determining the position of stress in the foot. Then each prosodic word (PW) consists of a single foot, which stands in the initial position of the word. This is derived by the following constraints, (27), and their language-specific ranking as in (28), where ⇩ symbolizes the ranking between constraints: constraints on the upper side are ranked higher than constraints on the under side.

(27) a. ALIGN-L=Align(Ft, L, PrWd, L): The left edge of each foot must align with the left edge of a prosodic word.
b. FT-BIN: Feet must be binary in terms of syllable.
c. PARSE-SYLL: All syllables must be parsed into feet.

(28) Ranking: ALIGN-L, FT-BIN >> PARSE-SYLL

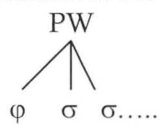
According to ALIGN-L, every foot except the initial foot of a prosodic word must violate it. Violations of ALIGN-L are counted in terms of syllables. FT-BIN requires that each foot have two syllables for Nuuchahnulth. PARSE-SYLL disallows any syllable unlinked to a foot. (29) illustrates the implication of the ranking.

(29) Tableau (σ stands for syllable; φ foot; PW prosodic word)

σ σ σ σ	ALIGN-L	FT-BIN	PARSE-SYLL
☞ a. $\{(\sigma\ \sigma)_{\varphi}\sigma\ \sigma\}_{PW}$			**
b. $\{(\sigma\ \sigma)_{\varphi}\ (\sigma\ \sigma)\varphi\}_{PW}$	*!*		
c. σ σ σ σ			***!*
d. $\{(\sigma\ )_{\varphi}\sigma\ \sigma\ \sigma\}_{PW}$		*!	***
e. $\{(\sigma\sigma\sigma\sigma)_{\varphi}\}_{PW}$		*!	
f. $\{\sigma(\sigma\sigma)_{\varphi}\sigma\}_{PW}$	*!		**

The prosodic restriction can lead a foot form to be trochaic or iambic. That is, (28) requires a prosodic word to have a single foot, which is bisyllabic, but the optimal foot can be trochaic or iambic depending on the weight of the syllables within the foot. Unstressed syllables link directly to PW as shown in (30; 29a), rather than to φ, which leads to a violation of FT-BIN (as in 29e).

(30) Internal structure of the Nuuchahnulth Prosodic Word



To conclude, an input foot form is realized in the initial position of each prosodic word in the output and thus this mechanism determines the surface forms of the reduplicant and the base, both of which occupy the initial position of the word, in terms of vowel length.

3.3. Indexation of Faithfulness Constraints

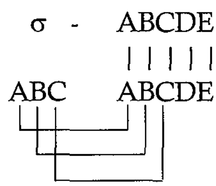
Patterns of reduplication in Nuuchahnulth exhibit variation between reduplicant forms in terms of the presence/absence of a coda as well as variation in vowel length as we discussed above. To treat the problem, I adopt the proposal of Itô & Mester (1999). Lexical/stratal variation is due to the ranking of faithfulness constraints.[6] The reduplicants of class II, III, and V-VI, and some of class I and VII suffixes are codaless, while the base consistently maintains its coda. I propose that this is due to a different ranking status between indexed faithfulness constraints with respect to the markedness constraint NOCODA.

First, the following input-output faithfulness constraints, which are domain-specified, ensure the identity between the input and output correspondents.

(31) Input-Output faithfulness: δ = all phonological or morphological classes
  a. MAXIO$_\delta$: Every segment of the input in the domain of δ has a correspondent in the output.
  b. DEPIO$_\delta$: Every element in the output in the domain of δ has a correspondent in the input.

Second, following Spaelti (1997), Struijke (1998), and Pulleyblank (*to appear*), I interpret the identity relationship between the reduplicative prefix and the base by transitivity as in (32). The input-reduplicant correspondence is indirectly related via the base; thus, a constraint is needed which requires the prosodic prefix to have featural content, rather than a constraint which requires the input-output faithfulness relationship such as DEPIO. The relevant constraint is INTEGRITY (33) (see McCarthy & Prince 1995).

(32) Input:



(33) INTEGRITY: No segment of the input has multiple correspondents in the output.

(32) violates (33), because ABC of the input each have the two identical output elements on the surface. However, this constraint is violable, when higher-ranked constraints are at stake. That is, the violations of INTEGRITY result in order to satisfy the requirement that the base have a correspondent in the reduplicant and vice versa. The relevant constraints are MAXBR and DEPBR as defined in (34), which are morphological domain-specified. Moreover, they play a crucial role in determining the shape of the reduplicant in terms of the

[6] Also see Buckley (1996), Smith (1998, 2001), Odden (1998) for discussion of constraints subject to morphological/lexical domains.

presence/absence of a coda, as we will see below.[7]

(34) Base-Reduplicant Faithfulness: δ = all morphological classes
  a. MAXBR$_{\delta}$: Every element of the base in the domain of δ has a cor respondent in the reduplicant.
  b. DEPBR$_{\delta}$: Every element of the reduplicant in the domain of δ has a correspondent in the base.

As will be clearer when I discuss the relevant cases, the identity between the reduplicant and the base in the domain of class I-1, IV and VII-1 is crucial with respect to the coda, forcing a violation of NOCODA, while one in the domain of class I-2, II, III, V, VI, and VII-2 can be suppressed to obey the higher-ranked NOCODA. Also, the interaction between the MAX/DEPIO and MAX/DEPBR constraints, subject to both phonological and lexical domains which are indicated on them, and one between MAXIOFoot and the faithfulness constraints lead to variation in both bases and reduplicants.

(35) shows the language-specific ranking status of all the constraints to be used in the process under discussion.

(35) MAX/DEPIO(SEG), MAXIO(μ)$_{[\text{I-IV,VIII}]}$, DEPIO(μ)$_{[\text{I-III, V-VI}]}$ >> MAXIOFoot >> MAXIO(μ)$_{[\text{V,VI}],}$ DEPIO(μ)$_{[\text{IV,VIII}]}$ >> MAX/DEPBR$_{[\text{I-1,IV, VII-1}]}$ >> NOCODA >> MAX/DEPBR$_{[\text{I-2,II,III,V, VI, VII-2}]}$ >> INTEGRITY

3.4. Illustrations by Tableaux

In this section we will see how the constraints proposed above and their language-specific ranking work to create the surface forms in the reduplication context. In the following tableaux, I indicate the base via underlining and the reduplicant via brackets. For the present purposes, I simply consider the base as the root morpheme of the stem to which the reduplicant affixes, following general practice (McCarthy & Prince 1993, Spaelti 1997). I do not count each triggering-suffix as part of the base. As seen in many cases, a triggering suffix does not have to be immediately adjacent to a root morpheme. It is possible that there are one or more other suffixes intervening between the root and a triggering suffix. The suffix just causes (part of) a root morpheme to be reduplicated, but does not include itself as part of the base.

I will start with Class I suffixes, with which the reduplicant is completely identical with the base in vowel length: the reduplicant is short/long if the base

[7] While Pulleyblank (to appear) claims that reduplication-specific constraints such as FAITHBR constraints are not necessary in the case of Yoruba reduplication, my analysis must make use of the constraints to treat modification of the base forms in Nuuchahnulth, which will be made explicit throughout the discussion.

is short/long. I subdivide this class into two groups, depending on whether the base coda is copied or not. (36) is a case where the base coda is copied (Class I-1); (41) below is a case where the base coda is not copied (Class II-2).

(36) Class I-1
tuuħtuuħʃʔiʃʔał t'atn'aʔis
RED-tuuħ-ʃ-ʔiʃʔał t'atn'a-ʔis
RED-to get frightened-continually-3pl/IND children-DIM
'the children get frightened continually (e.g. by thunder) '

(37) Tableau[8]

/σ-tuuħ-ʃ/	MAXIO	DEPIO	**MAXBR I-1**	**DEPBR I-1**	NO CODA
☞ a. $_{\sigma}$[tuuħ]tuuħ					**
b. $_{\sigma}$[tuu]tuu	*!(ħ)				
c. $_{\sigma}$[tuu]tuuħ			*!(ħ)		*
d. $_{\sigma}$[tuuħ]tuu	*!(ħ)			*	*
e. $_{\sigma}$[tuħ]tuuħ			*!(μ)		**
f. $_{\sigma}$[ ]tuuħ			*!***		*

Candidates **b** and **e** are ruled out by violating the high-ranked constraints MAXIO: the input stem-final consonant /ħ/ does not surface. Recall that the reduplicant does not cause a DEPIO violation, but rather an INTEGRITY violation. It must be violated to satisfy MAXBR, which outranks INTEGRITY. Candidates **c, e,** and **f** violate MAXBR, which is higher-ranked than NOCODA in the domain of class I-1. The reduplicant does not copy the base-final consonant /ħ/ in these candidates. Candidate **a**, which obeys all these high-ranked constraints, is selected as an optimal output. MAXIOFoot is not relevant in reduplication triggered by class I suffixes, because the suffixes do not impose a metrical structure to be realized on the surface. Note that reduplication is limited to a single syllable. As suggested above, it is due to the underlying single-syllabic prefix (without featural content).

Consider the following example, which has a bisyllabic base:

(38) tatamis-tła
RED-tamis-tła
RED-to drift-again
'to keep drifting'

[8] To simplify the exposition, I omit the triggering suffixes in the candidates and also show crucial constraints only in the tableaux henceforth.

This case can have candidates such as (39g, 39i), in addition to candidates of the types found in (37b-f).

(39) Tableau

/σ-tamis-tła/	MAXIO	DEPIO	INTEGRITY (σ)	MAX BRσ-STRUC	**MAX BRI-1**	**DEP BR I-1**	NO CODA
☞ a. $_\sigma$[ta]<u>tamis</u>					***		*
			:				
g. $_\sigma$[ta]$_\sigma$[mis]<u>tamis</u>			*!				**
i. $_\sigma$[tam]<u>tamis</u>				*!	**		**

To prevent these candidates from appearing as surface forms, we need the following two constraints.

(40) a. INTEGRITY(σ): The input syllable must not have multiple correspondents in the output.
b. MAXBRσ-STRUC: The constituents of the reduplicant must match with the counterparts in the base in terms of syllabic structure.

Violation of INTEGRITY(σ) is fatal, while having multiple correspondents of the input segments is tolerated as the ranking shows. Therefore, candidate **g** is ruled out, with the consequence that reduplication is limited only to a single syllable. To observe (40b), the reduplicant has the same syllabic structure as the counterpart of the base. (See parallel syllable structure conditions in work on language production such as Nooteboom (1969), Stemberger (1985: ch. 6)). In candidate **i**, the coda of the monosyllabic reduplicant /m/ is an onset of the second syllable of the base, violating MAXBRσ-STRUC. Although the reduplicant must copy the base maximally to observe MAXBR, a requirement to maintain a faithful relationship between the base and reduplicant in terms of syllable structure has priority over the constraint. In sum, with class I-1 suffixes, the reduplicant can have a coda, but only if (the first syllable of) the base must have a coda as well.

Class I-2 suffixes have the same pattern as I-1 suffixes except for the fact that the coda of the base is not copied. This difference is due to different ranking status among domain-specified MAXBR constraints. To obtain the no-coda effect in the reduplicant, the ranking of MAXBRI-2 with respect to NOCODA must be NOCODA >> MAXBR, which is reflected in tableau (42) with the relevant example (41).

(41) Class I-2
tʃatʃapχʔaɬuk
RED-tʃapχ-ʔaɬuk
RED-man-to look after
'to look after a man/husband'

(42) Tableau

/σ-tʃapχ-ʔaɬuk/	MAXIO	**DEPIO**	**NO** CODA	**MAXBR I-2**	**DEPBR** I-2
☞a. $_{\sigma}$[tʃa]tʃapχ			*	**(pχ)	
b. $_{\sigma}$[tʃapχ]tʃapχ			**!		
c. $_{\sigma}$[tʃa]tʃa	*!*				
d. $_{\sigma}$[tʃa]tʃaapχ		*!(μ)	*	** (pχ) * (μ)	
e. $_{\sigma}$[ ]tʃapχ			*	***!* (tʃapχ)	

As shown in tableau (42), candidates **c** and **d** are ruled out by violating the high-ranked constraints MAXIO and DEPIO, respectively, by deleting the coda consonants in **c** and by inserting a mora in **d**. Candidates **a** and **b** tie in these constraints. Note that the MAX/DEPBR constraint in the domain of class I-2 is lower-ranked than NOCODA. Consequently, candidate **a** is selected as an optimal form.

With class II suffixes, the reduplicant always has a long vowel but the base is not affected. Recall that class II suffixes are specified for the following metrical requirement, (43).

(43) Class II: FFII-two syllables with 1st heavy (σ σ)$_{\varphi}$
μ μ

In order to treat the output footing pattern, we need faithfulness constraints as shown in (44)

(44) a. MAXIOFoot: Every foot in the input has a correspondent in the output.
b. DepIOFoot: Every foot in the output has a correspondent in the input.

(45) and (46) are a relevant example and its tableau (the input with Classes II-VII, includes metical requirements specified on each triggering suffix as well as

the input syllable to reduplication).

(45) Class II
jaajaqtɬst'aɬʔiik
RED-jaqtɬ-st'aɬ-ʔiik
RED-disliking-each other- someone who always does something
'someone who always dislikes another'

(46) Tableau

/σ-jaqtɬ-ʔiik (σ σ)$_{\varphi}$/ μ μ	MAX IO	DEP IO	MAX IO Foot	NO CODA	**MAX BRII**	DEP BRII
☞a. $\{_{\sigma}$[jaa]jaqtɬ$\}_{\varphi}$				*	**(qtɬ)	*(μ)
b. $\{_{\sigma}$[ja]jaqtɬ$\}_{\varphi}$			*!	*	**(qtɬ)	
c. $\{_{\sigma}$[jaqtɬ]jaqtɬ$\}_{\varphi}$			*!	**		
d. $\{_{\sigma}$[jaaqtɬ]jaaqtɬ$\}_{\varphi}$		*! (μ)		**		
e. $\{_{\sigma}$[jaa]jaaqtɬ$\}_{\varphi}$		*! (μ)		*	**(qtɬ)	
f. $\{_{\sigma}$[jaa]ja$\}_{\varphi}$	*!* (qtɬ)					*(μ)
g. $\{_{\sigma}$[jaaqtɬ]jaqtɬ$\}_{\varphi}$				**!		*(μ)

In tableau (46), candidates **d**, **e**, and **f** fail to maintain the correspondence between the input and the output by deleting the input consonants in **f**, and by inserting a mora on the stem (i.e. base) in **d** and **e**. Note that the identity relationship between reduplicant and input element is transitive. Whether the reduplicant is long or short, this does not cause MAX/DEPIO violation, although it may cause MAX/DEPBR violation. Candidates **b** and **c** do not obey the metrical requirement that is specified for the suffix: a foot with two moras on the 1st syllable. This leads to a fatal violation of MAXIOFoot. Candidate **g** is ruled out by fatally violating NOCODA. Candidate **a**, which is the only candidate obeying or incurring fewer violations of the high-ranked constraints, is chosen as an optimal output. I do not include candidates where the input foot is realised in positions other than the initial position of the word to simplify the exposition (see section 3.2. for the relevant discussion).

With class III suffixes, the reduplicant is always short, and the base is unaffected. (47) is the metrical requirement specified for the suffixes and (48) is one of the relevant examples with tableau (49).

(47) Class III: FFV: two syllables with first light: (σ σ)$_{\varphi}$
|
μ

(48) Class III
ʔuʔuuʃjukʷap'atɬ'i
RED-ʔuuʃ-jukʷ-ʔap-ʔatɬ-ʔi
RED-some-to cry-CAUS-SEQ-3sg/IMP
'make her cry for something'

(49) Tableau

/σ-ʔuuʃ-jukʷ(σ σ)$_{\varphi}$/ (first σ: μ)	MAX IO	DEP IO	DEP IO Foot	NO CODA	MAXBR III	DEPBR III
☞ a. {$_{\sigma}$[ʔu]ʔuuʃ}$_{\varphi}$				*	*(ʃ)*(μ)	
b. {$_{\sigma}$[ʔuu]ʔuuʃ}$_{\varphi}$			*!	*	*(ʃ)	
c. {$_{\sigma}$[ʔuuʃ]ʔuuʃ}$_{\varphi}$			*!	**		
d. {$_{\sigma}$[ʔuʃ]ʔuuʃ}$_{\varphi}$				**!	*(μ)	
e. {$_{\sigma}$[ʔuʃ]ʔuʃ}$_{\varphi}$	*!(μ)			**		
f. {$_{\sigma}$[ʔu]ʔuu}$_{\varphi}$	*!(ʃ)				*(μ)	

As with class II suffixes, the identity between the base and the reduplicant is not crucial with respect to the vowel length and coda. The only difference from class II is that reduplication-triggering suffixes from class III require the first syllable of the foot to be monomoraic on the surface. Candidates **b** and **c** do not obey this requirement, which leads to a violation of DEPIOFoot. The input foot has a light first syllable, but the output has a heavy syllable. Candidates **e**, and **f** also violate the high-ranked constraint: one of the input stem moras is deleted in **e**, and the stem-final consonant does not surface in **f**. Candidate **d** is ruled out by violating NOCODA, which is higher-ranked than MAX/DEPBR in the domain of class III. This results in the selection of candidate **a** as an optimal output, which trivially violates the latter.

With class IV suffixes, both the reduplicant and the base must be long, which sometimes leads to modification of the base in terms of vowel length. This is due to the following metrical requirement specified for the suffixes.

(50) Class IV: FFIV: two heavy syllables (σ σ)$_{\varphi}$
/\ /\
μ μ μ μ

Before we go to the tableau, recall that I mentioned that two IO Faithfulness constraints, MAXIO and DEPIO need to be ranked depending on phonological and morphological classes. Until now, the ranking was not crucial and thus I did not provide the detailed ranking status in the previous tableaux. However, we need to consider their ranking status subject to both phonological and morphological classes at this point. In the domain of class IV (in fact, class VII as well), DEPIO is lower-ranked than MAXIOFoot, which leads to lengthening of the base vowel.

(51) DEPIO$_{[I\text{-}III,\ V\text{-}VI]}$ >> FootForm >> DEPIO$_{[IV,\ VII]}$

(52) Class IV
tsuutstsuutsaʔiʃ
RED-tsuts-(j)a-ʔiʃ
RED-to scratch-continuously-3sg/IND
's/he is continuously scratching.'

(53) Tableau

/σ-tsuts-(j)a(σ σ)$_\varphi$/ (μ μ μ μ)	MAX IO	MAX IO Foot	DEPIO IV	**MAXBR** IV	**DEPBR IV**	NO CODA
☞ a. $\{_\sigma$[tsuuts]tsuu$\}_\varphi$tsa			*(μ)			*
b. $\{_\sigma$[tsuts]tsuu$\}_\varphi$tsa		*!	*(μ)	*(μ)		*
c. $\{_\sigma$[tsuts]tsu$\}_\varphi$tsa		*!				*
d. $\{_\sigma$[tsuuts]tsu$\}_\varphi$tsa		*!			*(μ)	*
e. $\{_\sigma$[tsuu]tsuu$\}_\varphi$tsa			*(μ)	*!(ts)		
f. $\{_\sigma$[tsuu]tsuu$\}_\varphi$ja	*!(ts)		*(μ)			

As seen in the tableau, candidate **f** is ruled out by deleting an input consonant /ts/, a violation of MAXIO. Candidates **b-d** do not obey MAXIOFoot. The identity between the base and the reduplicant is crucial in the domain of class IV, which forces trivial violation of NOCODA. Candidate **e** obeys NOCODA but thereby violates MAXBR fatally. Candidates a, b, e, and f violate DEPIO$_{IV}$ since the input root syllable is light, while the output syllable is heavy. However, their violation is non-crucial. Consequently, candidate **a** is chosen as an optimal output.

With class V suffixes, the reduplicant is always short and the base vowel is shortened, if it is underlyingly long. This means that MAXIO[μ] in the domain of class V is not crucially high-ranked. The MAXIO constraint is high-ranked in the domain of class I-IV & VII, whether the element of interest is moras or segments. On the other hand, in the domain of class V (in fact, also in the domain of VI), MAXIO[Seg.] and MAXIO[μ] are ranked differently. An input segment must surface, while an input mora can be suppressed when some other phonological requirements are at stake. In sum, the apparently complicated aspects regarding reduplication can be simplified as seen in the following ranking in (54).

(54) $\text{MAXIO}_{\text{I-IV,VII}}$, $\text{MAXIO[seg]}_{\text{V-VI}}$ >> $\text{MAXIO}[\mu]_{\text{V-VI}}$

(55) is the metrical structure required for class V suffixes.

(55) Class V: FFI: two light syllables (σ σ)$_\varphi$
| |
μ μ

Now, consider the relevant example, (56), with tableau, (57).

(56) Class V
tɬitɬix^{w}ak'uk
RED-tɬiix^w-(a)a-k'uk^w
RED-to smile/laugh-DUR-to resemble
'smirk'

(57) Tableau

/σ-tɬiix^w...k'uk / (σ σ)$_\varphi$ μ μ	MAX IO [Seg.]$_V$	DEP IO	DEP IO Foot	MAX IO [μ]$_V$	NO CODA	**MAX BRV**	**DEP BRV**
☞a. {$_\sigma$[tɬi]tɬi}$_\varphi$x^{w}a				*		*(x^w)	
b. {$_\sigma$[tɬii]tɬii}$_\varphi$x^{w}a			*!			*(x^w)	
c. {$_\sigma$[tɬi]tɬii}$_\varphi$x^{w}a			*!			*(x^w) *(μ)	
d. {$_\sigma$[tɬix^w]tɬi}$_\varphi$x^{w}a				*	*!		
e. {$_\sigma$[tɬi]tɬi}$_\varphi$a	*!(x^w)			*			
f. {$_\sigma$[tɬii]tɬi}$_\varphi$x^{w}a			*!	*		*(x^w) *(μ)	

Candidate **e** violates MAXIO[Seg], because the input stem-final consonant [x^w] is deleted. Candidates **b**, **c**, and **f** are ruled out by violating the high-ranked

DEPIOFoot constraint. The input foot consists of light syllables, but each candidate has one or more heavy syllables. Candidate **d** has a coda in the reduplicant, which causes a fatal violation of NOCODA. Candidate **a** does not achieve complete identity between the base and the reduplicant, in order to violate the markedness constraint less.

The final pair, classes VI and VII, exhibits an opposite property from classes IV and V, showing moraic polarity. First, consider the following example from Class VI suffixes with which the reduplicant has a long vowel, but the base vowel is shortened, if it is underlyingly long. (58) is the metrical structure required for this class.

(58) Class VI: FFIII: two syllables with one heavy $(\sigma \quad \sigma)_\varphi$

$$\mu\ \mu \quad \mu$$

(59) is the relevant example with tableau (60).

(59) Class VI
siisitsitj'aksiʃ
sii-siits-itj'ak-siʃ
RED-maggot-afraid/fear
'I am afraid of maggots'

(60) Tableau

/σ-siits-itj'ak/(σ σ)$_\varphi$ μ μ μ	MAX IO [Seg.]$_{VI}$	DEP IO	MAX/ DEP IOFoot	MAX IO [μ]$_{VI}$	NO CODA	**MAX BRVI**	**DEP BRVI**
☞ a. {$_\sigma$[sii]si}$_\varphi$tsi				*		*(c)	*(μ)
b. {$_\sigma$[sii]sii}$_\varphi$tsi			*!			*(c)	
c. {$_\sigma$[si]si}$_\varphi$tsi			*!	*		*(c)	
d. {$_\sigma$[siic]sii}$_\varphi$tsi			*!		*		
e. {$_\sigma$[sii]si}$_\varphi$	*!(ts)			*			*(μ)
f. {$_\sigma$[sii]sii}$_\varphi$	*!(ts)		*				
g. {$_\sigma$[si]sii}$_\varphi$tsi			*!			*(ts) *(μ)	
h. {$_\sigma$[siits]si$_\varphi$tsi				*	*!		*(μ)

In tableau (60), what is notable are candidates **b**, **c**, **d**, and **g**. They are all ruled out by violating MAXIOFoot. With class VI suffixes, the first syllable of the foot must be heavy and the second light. Candidates **a** and **h** tie on these high-ranked constraints. NOCODA determines the optimal output, which is candidate **a**.

Finally, consider the final class, VII, which can be classified into VII-1 and -2 according to whether the coda of the base is copied or not. Both subsets exhibit moraic polarity as in class VI, but in an opposite way, which is due to the following metrical structure required for the class.

(61) Classes VII: FFVI: two syllables with second heavy: $(\sigma \quad \sigma)_{\varphi}$

μ μ μ

(62) is the relevant example and (63) illustrates the implication of the template and the constraints.

(62) Class VII-1
a. ħitsħiitsn'uk
RED-ħits-n'uk
RED-feces-on the hand
'feces on the hand'

(63) Tableau

/σ-ħits-n'uk (σ σ)$_{\varphi}$/ μ μ μ	MAXIO	MAX/ DEP IOFoot	DEPIO (μ)$_{VII}$	**MAXBR VII-1**	**DEPBR VII-1**	NO CODA
☞ a. $\{_{\sigma}$[ħits]ħiits$\}_{\varphi}$			*	*(μ)		**
b. $\{_{\sigma}$[ħii]ħiits$\}_{\varphi}$		*!	*	*(ts)		*
c. $\{_{\sigma}$[ħi]ħits$\}_{\varphi}$		*!		*(ts)		*
d. $\{_{\sigma}$[ħits]ħits$\}_{\varphi}$		*!				**
e. $\{_{\sigma}$[ħii]ħi$\}_{\varphi}$	*!(ts)	*			*(μ)	
f. $\{_{\sigma}$[ħii]ħii$\}_{\varphi}$	*!(ts)	*	*			
g. $\{_{\sigma}$[ħi]ħiits$\}_{\varphi}$			*	*(ts) *!(μ)		*
h. $\{_{\sigma}$[ħii]ħits$\}_{\varphi}$		*!		*(ts)	*(μ)	*

As seen in the tableau, candidates **b**, **c**, **d**, **f**, and **h** are ruled out by violating MAXIOFOOT. With class VII suffixes, the foot structure must have the first syllable light and the second heavy, but these candidates have different foot structure from the input form. Candidates **a** and **g** tie on these all high-ranked constraints and DEPIO. MAXBR determines the final winner, which is candidate **a** Note that NOCODA is lower ranked than MAXBR in the domain of class VII-1.

(64) is the case where the reduplicant does not have a coda, which is due to

NOCODA outranking MAX/DEPBR in the domain of VII-2 as illustrated in (65). The selection process is the same as VII-1.

(64) Class VII-2
wiwiiksapiʔiʃ
RED-wik-sapi-ʔiʃ
RED-NEG-to depend on-3sg/IND
's/he is depending on nothing.'

(65) Tableau

/σ-wik-sapi (σ σ)$_\varphi$/ μ μ μ	MAXIO	MAX/ DEPIO Foot	DEPIO $(\mu)_{VII}$	NO CODA	**MAX BR VII-2**	**DEP BR VII-2**
☞ a. $\{_\sigma[wi]wiik\}_\varphi$			*	*	*(k) *(μ)	
b. $\{_\sigma[wii]wiik\}_\varphi$		*!	*	*	*(k)	
c. $\{_\sigma[wi]wik\}_\varphi$		*!		*	*(k)	
d. $\{_\sigma[wik]wik\}_\varphi$		*!		**		
e. $\{_\sigma[wii]wi\}_\varphi$	*!(k)	*				*(μ)
f. $\{_\sigma[wii]wii\}_\varphi$	*!(k)	*	*			
g. $\{_\sigma[wik]wiik\}_\varphi$			*	**!	*(μ)	
h. $\{_\sigma[wii]wik\}_\varphi$		*!		*	*(k)	*(μ)

4. Conclusion

The interaction of prosodic/metrical requirements specified for some suffixes and domain-specified faithfulness and markedness constraints cause variation in both reduplicant and base forms. This treatment straightforwardly explains the complicated properties of Nuuchahnulth reduplication. The constraints used are universal in that they play a role in determining surface forms in other languages as well, such as NOCODA, while some of them still have language-specific properties: for example, phonological/morphological-domain-specified faithfulness constraints. One of the most notable aspects of Nuuchahnulth reduplication is that the reduplicative morpheme is specified as a prosodic element, which is σ. Moreover, metrical requirements specified for the suffix determine the surface reduplicant form, sometimes leading to modification of the base.

The last, but very important, question is whether the lexically-specified template approach taken here has better implications theoretically than other approaches. Since, whether the base is mono- or bi-syllabic, the reduplicant is always monosyllabic, one might suggest that the size of the reduplicant results from the emergence of the unmarked effect (for an A-templatic approach) or from a constraint which defines the size of the reduplicant: e.g. RED = σ, (for a (grammatically-specified) templatic approach). These two approaches might be able to be successful in dealing with the fixed size of the reduplicant, but they would need a number of artificial constraints to deal with the nine ways of deriving both the reduplicant and base forms, i.e. nine patterns of reduplication. Such constraints would fail to explain the systematic relation between the reduplicant and base forms in vowel length. Moreover, the presence of underlying prosodic elements leading to reduplication is supported by fixed segmentism in Nuuchahnulth. While reduplicants generally obtain their phonological constituents from the base morphemes, some reduplication patterns are involved in fixed segmentism. In order to produce a right fixed segment on the surface, each fixed segment in reduplication must be specified in the input. In particular, a Nuuchahnulth reduplicative prefix is underlyingly specified as a single syllable, and thus each fixed segment must be specified in the right position of the underlyingly syllable. In Nuuchahnulth, fixed segments always stay in the coda position; hence they should be underlying specified as a coda segment. Fixed segmentism in reduplication would support the argument that Nuuchahnulth reduplicant forms are lexically determined (templatically) but not grammatically (a-templatically); the exact shape of each reduplicant is due to its lexical specification, but not to a constraint which defines the shape of a reduplicant.

Nuuchahnulth adds more interesting issues to previous discussions of reduplication and development in both phonological and morphological theories. Theoretical arguments regarding how to deal with reduplicative patterns observed cross-linguistically have been mainly binary: templatic or a-templatic. The Nuuchahnulth case raises a more detailed question as well as providing a counterexample to an a-templatic approach: if it should be a templatic approach, then what drives relevant templates? As we saw above, multiple patterns of reduplication in Nuuchahnulth should be lexically treated rather than using a reduplication-specific constraint. I suggest that each reduplicant form is determined by prosodic and metrical requirements manifested for some suffixes.

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