Reduplication in Rotuman

by

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Abstract

This thesis is the first comprehensive investigation of reduplication in Rotuman, an Oceanic language. It includes a rigorous description of Rotuman reduplication based on a corpus of 2600 stems extracted from Churchward's (1940) Dictionary and a thorough analysis within Optimality Theory (Prince and Smolensky, 1993) of all reduplicant shapes. This analysis draws on generalized templates and minimal word phonology to demonstrate that the productive form of foot reduplication is shaped by well-formedness constraints associated with the minimal word in Rotuman. By building an analysis around the prosodic structure of *phase*, a morphological process particular to Rotuman, this thesis captures the intuitions of previous scholars on the relationship between these two processes. All divergences from the minimal word phonology of the reduplicant and *incomplete phase* prosody are accounted for using standard constraint-based accounts of anti-gemination, under-application, and prosodic faithfulness.

Keywords: Rotuman; reduplication; minimal word; phonology; Oceanic; Optimality Theory

To Dad,

for sharing your love of language and of life.

I miss you everyday.

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List of Acronyms and Abbreviations

1	first person
2	second person
3	third person
adj., A	adjective
B	base
COMPL	completive (Blevins, 1994)
DIR	directional (Blevins, 1994)
f.t.	*formal transitive (Churchward, 1940)*
Ft	Foot
inf.t.	*informal transitive (Churchward, 1940)*
n , *n.,* N	noun
NP	noun phrase
OT	Optimality Theory
PAN	Proto-Austronesian
pl	plural
POc	Proto-Oceanic
PrWd	Prosodic Word
rd	*reduplicative affix (Churchward, 1940)*
RED, R;	reduplicant;
RED$_P$	partial reduplicant
sg.	singular
v	verb
v.i.a	*active intransitive verb (Churchward, 1940)*
v.i.s.	*stative intransitive verb (Churchward, 1940)*
vi	intransitive verb
VP	verb phrase
vt	transitive verb

1.   Introduction

1.1. Themes

This thesis provides a comprehensive analysis of reduplication in Rotuman (Austronesian, Malayo-Polynesian, Oceanic) in contemporary phonology and morphology. Rotuman has two reduplication patterns: foot *reduplication* and *partial CV reduplication* (Churchward, 1940; Blevins 1994). The latter is not productive and has received little attention in the descriptive and theoretical literature, but the former, which is highly productive, has been studied in the context of prosodic morphology. Blevins (1994) proposes that foot *reduplication* can be analyzed as the satisfaction of a bimoraic foot template. This approach fits within the larger scheme of using authentic units of prosody to account for non-concatenative morphology (see McCarthy & Prince, 1986). The bimoraic reduplicative template is aligned with the phonology of Rotuman, which employs a bimoraic foot as the unit of prosodic stress.

(1)	Stem	Foot reduplication	Partial reduplication
	sapo – 'to grab hold'	*sap-sapo*	*sa-sapo*
	fisi – 'white'	*fis-fisi*	*fi-fisi*
	mua – 'be in front'	*mua-mua*	*mu-mua*
	toka – 'to be calm'	*toak-toka*	*to-toka*

The goal of explaining the facts in prosodic morphology using authentic units of prosody has deepened with the advent of Optimality Theory and with Generalized Template Theory. With generalized templates (McCarthy & Prince, 1993, 1994) the shape of a reduplicant – the copied part in reduplication – is not the realization of a specified template but rather is derived indirectly through the satisfaction of more general, and arguably universal, well-formedness constraints. One way the generalized template approach has been explored is with 'minimal word' phonology. The reduplicant is specified as a minimal word whose shape and size is ensured by other constraints

active for prosodic words in the language, such as a constraint like Foot Binarity which ensures all feet are binary on the syllabic or moraic level. One goal of this work is to test in rigorous detail if Rotuman reduplication can be approached within the theory of generalized templates rather than designating specific templatic constraints on the shape or size of a reduplicant. The work presented in this thesis is primarily data driven. While many of the theoretical ideas discussed here have been proposed in prior work, an important contribution of this current study is to take previously proposed theories and assumptions that were often based on small datasets and test them on a much larger dataset. I have compiled a root list of 2605 Rotuman roots, and extracted 848 reduplicated forms, allowing me to test, for the first time, certain hypotheses in rigorous detail. I also worked with a native speaker of Rotuman to check reduplicative meanings as well as basic intuitions on stress in *phase* alternations and reduplicated words. The resulting investigation, while not exhaustive, provides the most thorough coverage of the empirical ground of Rotuman reduplication to date.

1.2. Motivation

The focus of explaining the bimoraic shape facts of Rotuman reduplication relates directly to another empirical phenomenon in Rotuman, namely the typologically interesting *phase* alternations of Rotuman morphemes. Churchward (1940) coined the term *phase* to describe the fact that every lexical word in Rotuman will appear both in a longer form – the *complete phase* – and a shorter form - the *incomplete phase*. The phonological relationship between the shapes of the two phases is well described and accounted for, however, the reason phase alternation occurs at all is less understood or agreed upon. McCarthy (2000) incorporates the prosody of phase shapes with a prosodic approach to phase-determining environments proposed by Hale and Kissock (1998). Together they propose that the different incomplete phase shapes arise to satisfy a markedness constraint on prosodic words and the choice of incomplete or complete phase form will depend on the size of the following morpheme. Specifically, they focus on suffixation where monomoraic suffixes will attach to words in their complete phase*s* (*hili +* *-me* → *hilime*), while stems in their bare form or followed by a bimoraic suffix will appear in their incomplete phase (*hili* → *hil;* and *hili + ʔia* → *hilʔia*).

A Generalized Template analysis predicts that the reduplicant will be a separate prosodic word since, as a bimoraic foot, it satisfies the minimal word constraint on its own. McCarthy's (2000) analysis of phase proposes constraints ensuring that every prosodic word ends in a main stressed syllable. The reduplicant-as-a-minimal-word would then also be expected to appear in the incomplete phase:

(2) RED + *ma(saro)* → *{(mas)}-{ma(sar)}*   **{(masa)}-{ma(sar)}*.

There are potential benefits to this approach considering that if the reduplicant is in its incomplete phase, and McCarthy's analysis is correct, then we have independent motivation for McCarthy & Prince's (1999) '*reduplicant as minimal word'* assumption.

In general, some facts of the reduplicant in Rotuman seem consistent with separate prosodic word analysis, namely its shape since typical foot-reduplicants share the same shapes as those found word-final in the incomplete phase. However, there are some divergences between reduplicants and non-reduplicated forms in their incomplete phase. There are three main examples of this divergence from typical minimal words and the foot reduplicant. The first divergence is a number of reduplicants in foot reduplication that have ill formed feet as a result of avoiding adjacent identical consonants. For example, when reduplicated, the stem *koko* will appear as *ko-koko* rather than *kok-koko*. The second concerns a set of vowels, which are restricted to the final syllable of the incomplete phase and therefore predicted in the reduplicant, but in fact these vowels will not always appear in the reduplicant. For example, the stem *mose 'to sleep'* will always appear with an umlauted main vowel, *mœs*, in its incomplete phase, but the reduplicant can appear without umlaut: <u>*mos*</u>-*mose*. A third divergence concerns cases where metathesis would be predicted to occur but instead deletion applies to form the reduplicant of trisyllabic stems, as in the stem *furɛʔi 'to send word'* which would be expected to surface as *<u>fuɛr</u>-furɛʔi* but in fact appears as <u>*fur*</u>-*furɛʔi.*

Questions then arise of if, and how, an analysis of reduplication could marry the general characteristics of prosodic word morphology with the exceptions involving avoidance of adjacent identical consonants, lack of umlauting and unexpected deletions in some reduplicants. Possible answers to these questions are found in the formal

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treatment of reduplication stemming primarily from the nature of faithfulness in reduplication - specifically under-application, anti-gemination and positional faithfulness.

1.3. Synopsis

This thesis is structured as follows:

- ❖ **Chapter Two: Background**
    - focuses on background information including Rotuman phonology and morphology to situate the reader within the generalities of the Rotuman grammar. It also includes a section outlining the methods used to form the stem-list extracted from the Dictionary (Churchward, 1940) and those used in interviews with a native speaker informant.

- ❖ **Chapter Three: Phase Alternation**
    - gives an overview of the oft studied but not completely understood morpho-phonological phenomenon in Rotuman called phase whereby every lexical word in Rotuman alternates between two forms – the complete phase and the incomplete phase.

- ❖ **Chapter Four: Facts of Reduplication**
    - outlines the facts of reduplication in Rotuman in describing the different types with their associated shapes and meanings. This chapter will also give a quantitative description of reduplicated forms from the stem list.

- ❖ **Chapter Five: Reduplication as Minimal Word phonology**
    - focuses on the Minimal Word in Rotuman and develops an Optimality Theory analysis of foot *reduplication* based on the satisfaction of the minimal word constraint where a prosodic word is minimally a bimoraic foot.

- ❖ **Chapter Six: Problems for MinWd analysis**
    - explores some potential problems to the Minimal Word analysis of Rotuman reduplication: specifically, (i) the substandard foot shape that surfaces to avoid adjacent identical consonants in reduplicated forms; (ii) the lack of umlaut in the reduplicant which would otherwise be predicted to occur; and (iii) the reduplicants of trisyllabic stems with the appropriate metathesis environments which fail to undergo metathesis. An analysis is proposed to account for all three of these problems.

- ❖ **Chapter Seven: Conclusion**
    - summarizes conclusions from this study and their applicability to the larger discussion of prosodic morphology; and suggests directions for future work.

2.   Background

Rotuman is an Oceanic language in the Malayo-Polynesian subgroup of the Austronesian language family. It is spoken by approximately 2500 people on the island of Rotuma, 450 kilometres north of the Fijian Islands in the South Pacific Ocean. Rotuman is spoken by an additional 5000 Rotumans on the Fijian Islands and diasporas overseas (Schmidt, 2002). While Rotuman is classified as a language isolate within Central Oceanic (Schmidt, 2002; Lynch et al., 2002), its next closest linguistic relative is Western Fijian and there are many lexical borrowings from the Polynesian languages of Tongan and Samoan (Churchward, 1940; Schmidt, 2002, 2003). As mentioned in the Introduction, Rotuman is similar to other Malayo-Polynesian languages in its productive use of reduplication. The phonology and morphology of Rotuman has many other similarities with its geographic and linguistic neighbours such as its consonant inventory and use of affixation and reduplication. However, Rotuman is also quite distinct from other Oceanic languages and these differences surface to varying degrees in Rotuman reduplicated forms. The first half of this chapter will look at the phonology of Rotuman, specifically the segmental and phonotactic properties, followed by an overview of the basic morphology. The final section of this chapter outlines the methods used in creating a corpus of Rotuman roots as well as those used in native speaker interviews.

2.1. Phonology

Throughout this thesis Rotuman sounds have been converted from Rotuman orthography (circa Churchward, 1940) to the International Phonetic Alphabet (IPA, 2005). These conversions are based on phonetic descriptions in Churchward (1940); Schmidt (2002, 2003); McCarthy (1995); Biggs (1959); and Blevins (1994). See Appendix A for conversion tables.

The Rotuman consonant phoneme inventory is similar to proto Oceanic (Lynch et al., 2002: 64) in that it has primarily voiceless obstruents (Figure 1.), however the stops

/p t k/ do have voiced allophones when directly following a nasal (Churchward, 1940). Proto-Oceanic has only one fricative, *s (Lynch et al., 2002) however Rotuman has /f/ and /v/, as well as /h/ which is present in proto Malayo-Polynesian. The voiced labiodental fricative /v/ becomes the labiovelar glide /w/ when syllable final, and the labiovelar glide /w/ and palatal glide /j/ are predicable allophones of /u/ and /i/, respectively, as off-glides in diphthongs, or as on-glides of /u/ or /o/ and /i/ or /e/ respectively, in metathesized forms (Schmidt, 2002, p815; Churchward, 1940, p64). For pronunciation details see Churchward (1940, p64).

Labial	Coronal	Dorsal	Glottal
p	t	k	ʔ
f	s		h
v			
	tʃ		
m	n	ŋ	
	r		
	l		

Figure 1.   ***Rotuman Consonant Inventory***

The vowel inventory in Rotuman, on the other hand, appears to be much more complex than most Oceanic languages. Rotuman has five main vowels that are fairly typical of the language group but has an additional nine other vowels. Table 1 compares the five main vowels in Rotuman / i ɛ ɑ o u / with proto vowels in the same language family – Proto-Austronesian (PAN) – and with vowels in the language subgroup - Proto-Oceanic. The four Proto-Austronesian vowels - *i *e *a *u - are expanded to five by including the mid back rounded vowel *o which is realized in Rotuman.

Table 1.   ***Main Rotuman vowels compared to PAN and POc vowels.***

Proto Austronesian[1] (PAN)	*i	*e	*a		*u
Proto Oceanic[2] (POc)	*i	*e	*a	*o	*u
Rotuman	i	ɛ	ɑ	o	u

[1]Wolff, 2003:2   [2]Lynch et al., 2002:65

The other nine vowels are divided into five allophones of the main vowels and four additional vowels with extremely limited distribution. Figure 2 shows the main vowels [i ɛ ɑ o u] along with allophones [e æ ɡ̣ ɔ ọ], which are derived by regular raising and fronting phonological rules that are detailed in Section 2.1.1. Note that the diacritic ' ̩' indicates a raised version of the vowel it appears with. The four additional vowels, [a œ ø y], only appear in the incomplete phase, a morphological phenomenon unique to Rotuman, which is described in some detail in Chapter 3.

Figure 2.   ***Rotuman surface vowels***

Churchward (1940:74) first claimed a three-way distinction in length of the five primary (or main) vowels, however the difference between short and medium was not indicated with orthography in his Grammar or Dictionary. Blevins (1994) describes this length description as short, stressed short, and long (which are always stressed) and she has shown that long vowels are not phonemic (contra Churchward, 1940), as they are the result of satisfying a bimoraic foot. Blevins showed that the minimal word in Rotuman (which is explored in more detail in Chapter 5) is a bimoraic foot due to the fact that all vowels appearing word-finally in mono-syllabic lexical words will lengthen. Using lengthening to ensure a proper foot size and maintain regular stress is common evidence

for a bimoraic foot (McCarthy & Prince, 1990). Other vowel combinations, namely diphthongs, are accounted for differently in the literature. While Churchward (1940) does not explicitly identify the possible diphthongs in Rotuman, other scholars that do list them differ in the number of combinations they consider to be attested diphthongs in Rotuman. As the number and type of diphthong depends on the phase of a word, a detailed discussion of diphthongs is addressed in Chapter 3, which deals exclusively with the unique phase alternations.

2.1.1. Phonological Rules

There are a number of phonological rules concerning vowels in Rotuman which Churchward (1940) describes in considerable detail with respect to the conventions and phonological understandings of his time. He outlines five 'primary' vowels, the main Rotuman vowels [i ɛ ɑ o u in Figure 2]; five 'secondary' vowels [ɡ̊ ɔ æ e o̥], which are the result of regular phonological changes; and four 'tertiary' vowels [y ø œ a], which are limited to a specific environment, namely to the closed syllables of the incomplete phase which is discussed in some detail in Chapter 3 of this thesis. Understanding the environments of the different vowels can shed some light on the nature of the reduplicant and its association with phase.

The vowels that result from regular vowel change rules are: [ɡ̊ ɔ æ e o̥]. The rules listed in Table 2 are based on those given by Blevins (1994) and those described in Churchward (1940). Some of the rules listed by Blevins, e.g. /ɛ, a/ → ɔ / {i,u}__, are characterized by Churchward as speaker variation (p77) and therefore have not been included in Table 2. On the other hand, rules which were described in Churchward's Grammar (1940) but not captured by Blevins (1994), such as (1), are included here in Table 2.

Table 2. **Regular phonological rules**

Phonological rule	Examples (Churchward, 1940; 75-83)
1) /ɑ/ -> [ɑ̞] / __{h, ʔ} o #	*mɑ̞ho* 'to become cold'
2) i.) /ɑ/_{stress} -> [ɔ] / __C{u,i} ii) /ɑ/ →[ɔ]/__ i	*vɔlu* 'eight' *hɔi* 'sting ray'
3) i.) /ɑ/_{stress} -> [æ] / __Cɛ ii.) /ɑ/ -> [æ] / __ɛ	*vævɛ* 'rapid' *væɛ* 'to divide'
4) i.) /ɛ/ -> [e] / __ (C){u,i} ii.) /ɛ/ -> [e] / {u,i} __	*seru* 'comb'; *keu* 'to push' *hue* 'fruit'
5) i.) /o/ -> [o̞] / __ (C){u,i} ii.) /o/ -> [o̞]) / {u,i} __	*fo̞lu* 'three'; *ro̞u* 'to leave or reject *Huo̞* 'name of a village'

Churchward states that the sound "posterior ɑ", produced in between [ɑ] and [ɔ], results from a low back vowel preceding either the glottal stop or glottal fricative [h] followed by the mid back vowel [o] (Rule 1). When the low back vowel [ɑ] precedes the mid front vowel [ɛ] it will front to [æ] (Rule 3) and if it precedes a high vowel [i u] it will raise to [ɔ] (Rule 2). These vowel change rules will apply only within a single morpheme, meaning that if the triggering high vowel is in a separate morpheme from the target vowel no vowel change will occur. For example, in the word *masunu*, the *a* in prefix *ma* will not be triggered to change by the *u* in the stem *sunu 'hot' to give* **mɔsunu* since the vowels are in different morphemes. There are few exceptions (Churchward, 1940) to this rule but it does apply variably in loans: *rɔisi* – 'rice' but *papɛtaiso* – to baptize. The mid vowels /ɛ o/ are regularly raised to [e o̞] when both preceding and following high vowels [i u] (Rule 4 and 5). Churchward further states that [e] will eventually become [i] – for example *hefɑu* is sometimes pronounced [hifɑu].

There are four additional vowels that have very restricted environments in Rotuman: [y ø œ a]. These vowels result from *incomplete* phase formation and will

always appear as the nucleus of a heavy closed syllable CVC. These vowels typically only appear in the final syllable of a word, unless there are preceding vowels that are identical to the target vowel. For example, for a word ending in –oCi# (Rule 3 in Table 3), the target vowel is the penultimate vowel - /o/ and if there are additional instances of /o/ preceding the target, these will also undergo umlaut to [ø], while the trigger (the final vowel /i/) deletes. Ex. *roromi ->rørøm*. However spreading only applies when the target and trigger (/o/ and /e/) are within in the same morpheme: *hoto=me ->hotom *hœtœm* Table 3 outlines the various rules that result in these vowels while Figure 4 provides a schematic of the changes, with the back vowels undergoing umlaut to more front vowels.

Table 3. ***Umlauted vowel rules in*** incomplete phase*.*

complete → incomplete	Details:
(1) ɔCi → aC	ɔ is a result of regular vowel rule: /ɑ$_{stress}$ -> [ɔ] / __C{u,i}
(2) oCɛ → œC	[-back] will spread to preceding /o/: popore ->pœpœr
(3) oCi → øC	[-back] will spread to preceding /o/: roromi ->rørøm
(4) uCi → yC	[-back] will spread to preceding /u/: pulufi ->pylyf
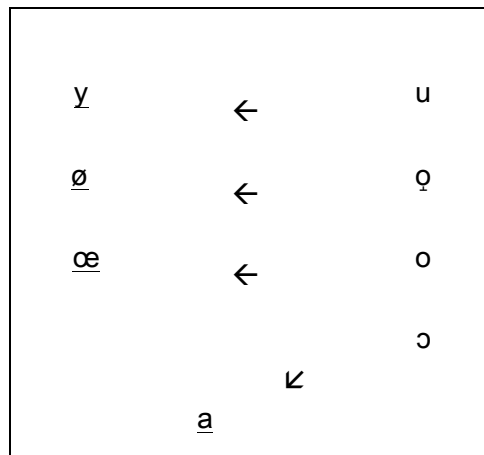
Figure 3. ***Vowels and their correspondents in specific*** incomplete phase **environments**

When there are multiple target vowels affected by the same trigger vowel, two situations arise. For example, for /mɔuri/ – *to live*, both non-final vowels are affected in incomplete phase: /mɔuri/ -> [mayr]. However, for other examples this change does not occur: Konousi -> [konoys] (*konøys, *kønøys). A closer look at the prosody of these

types of cases could shed more light on the situation. Importantly, the allophones of the main vowels that result from regular vowel changes will remain in the incomplete phase formation once final vowel deletes. For example, in the regular rule /ɑ/ ->[ɑ̣] / __{h, ʔ} o #, [ɑ̣] will remain as a surface form of incomplete phase even though the trigger [o] deletes: hɑnɑ̣ʔo – '*to steal*, complete phase; hɑnɑ̣ʔ – '*to steal*, incomplete phase.' Additionally, for the rule: /ɑ/$_{stress}$ -> [ɔ] / __C{u,i} , the resulting [ɔ] remains in incomplete phase when /u/ deletes, but changes to [a] in incomplete phase when /i/ deletes due to the incomplete phase rule of ɔCi → aC in Table 3.

2.1.2.   Phonotactics

The Rotuman syllable template is (C)V$_1$(V$_2$)(C) or (C)V:. In other words, there can be onset and onset-less syllables with simple or complex nuclei, but closed syllables with a long vowel (*CV:C) are not permitted. However, closed syllables (C)V$_1$(V$_2$)C have restricted distribution as they will only appear morpheme finally as part of the incomplete phase: *seseav* [sɛsɛav] 'mistaken'. Therefore, the only adjacent consonants are at morpheme boundaries. The only exceptions are loan words where closed syllables can occur within a single morpheme: *jesle* [tʃɛs.lɛ] 'chisel'.

Schmidt (2002) claims a couple co-occurrence restrictions, namely that /l/ and /r/ never appear in the same morpheme and neither do /v/ and /p/. This was verified for the most part in an examination of the consonant co-occurrences in roots extracted from the Dictionary. /l/ and /r/ only appear within the same morpheme for loan words ex. *kolori* – 'glory' – and /v/ and /p/ were only found in two words – a loan *novempa* 'November', and *rupevao* 'kind of bird' which could potentially be a compound. Additionally, three more co-occurrence restrictions were found: /tʃ/ never appears in the same morpheme as /f/, /t/ or /s/, except in loan words.

2.1.3.   Stress

The most prominent syllable in a word is penultimate in Rotuman (Churchward, 1940; Blevins, 1994; Schmidt, 2002, 2003). Churchward first described 'accent' or stress in Rotuman as being on the penult syllable in a word in the complete phase, except for words ending in long vowels, which have final stress. Blevins (1994:493, 506) captured

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regular word stress by showing that stress falls on the penultimate mora in both phases since coda consonants, which appear in the incomplete phase, are moraic. Thus Rotuman has a bimoraic trochee starting from the right edge of a word (McCarthy, 2000:151). The stressed foot is trochaic because a word ending in two light syllables will have penultimate stress and a word ending in one heavy syllable will have final syllable stress. Stress is lexically marked in some cases, which results in compensatory vowel lengthening, especially in loan words Ex. *su(káa) 'sugar'* (Blevins, 1994).

The aspects of Rotuman phonology that are key in the analysis of reduplication are syllable shape, vowel distribution and foot structure as they feature prominently in both the description and analysis offered in following chapters. We will now look at aspects of morphology that are important for understanding reduplication.

2.2. Morphology

To better understand the nature of reduplication in Rotuman, as well as to test other assumptions in Rotuman morpho-phonology, a stem list was created from the Dictionary (Churchward, 1940), the details of which are outlined in the methodology section, §2.3. A general understanding of the morphological basics of Rotuman was necessary in deciding which forms were to be included in this list and in how to organize them. Additionally, as reduplication is a type of morphological process in and of itself, which can overlap with other morphological processes, it is important to have an understanding of these other processes that are involved. This section begins by outlining the different word classes (roots, affixes, clitics, etc.) as well as other morphological information used in the creation of the stem list, and ends with a brief look at common morphological processes in Rotuman.

2.2.1. Morphology Basics

There is no explicit definition of a morphological word in previous literature on Rotuman. For this thesis, a *lexical word* includes any morphosyntactically independent morpheme, i.e. non-bound roots/stems as well as some proforms, while *function words* are limited to particles and clitics. A *stem* or *root*, used here interchangeably, is the bare form of a word and was the basis in creating the stem list to which many generalizations

in Rotuman were verified for this thesis. Lexical words (both roots and compounds) can be further organized into the categories of verb, noun and adjective, though often one form can function as multiple parts of speech depending on its position in a clause.

There are a number of enclitics, i.e. morphosyntactically bound morphemes, including *ta* 'singular and/or definite', *hɛ* 'diminutive or indefinite singular' and *ʔɛ* 'direction; instrument etc'. Other bound morphemes include some bound roots as well as a number of affixes. There are a few productive prefixes, *faka-* 'similative', *aʔa-* 'causative' and *hai-* 'reciprocal'; and many more suffixes, *-ŋa* 'nominalizer, *-ŋɛ* 'direction', *-na* 'transitive', *-ʔɔki* 'causative instrumental', *-mɛ* 'direction' *-a* 'transitive', some of which are more productive than others.

A phrase in Rotuman consists of a head and its modifiers, which are typically post-posed (Churchward, 1940; Schmidt, 2002; see den Dikken, 2003 for a detailed account of noun phrases in particular.)

Argument structure in Rotuman is shown through word order alone as there are no case markings on subjects and objects (Kikusawa, 2001). Word order is typically Subject-Verb-Object (SVO), however, the verb can precede the subject with intransitive verbs (Churchward, 1940). Word order can also indicate transitivity since in some cases transitivity is unmarked on verbs leaving both intransitive and transitive verbs with the same form. Churchward dubbed such bare transitive forms 'informal' transitives, to indicate there is no formal expression of transitivity, as opposed to 'formal' transitives, which are marked with the 'transitive' suffixes *-a*, *-na* and *-kia*. However, it has been argued (Kissock, 2003) that these so called 'transitive' markers may in fact indicate object-hood rather than transitivity *per se*. For the discussion of Rotuman reduplication, however, these details are not crucial.

2.2.2.   *Morphological Processes*

Rotuman has a number of productive morphological processes namely: affixation (prefixation and suffixation), compounding, reduplication, and phase. Affixation is used to convey different aspects and moods as well as to form causatives by adding the suffix -

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ʔɔki and/or prefix *aʔa-.* Additionally, affixation forms reciprocal verbs with the productive prefix *hai-* and can change lexical categories. For example, the nominalizer suffix *-ŋa* can be added to many verbs and adjectives to form a noun, and many adjectives and adverbs are formed by attaching the prefix *faka-* to nouns or verbs. Compounding produces left-headed compounds and has many characteristics in common with reduplication, which is described in detail in Chapter 4. The Rotuman phenomenon of phase is more complex than affixation and compounding and therefore is the topic of Chapter 3. However, before diving into phase, I will outline the methodologies used in the various aspects of this thesis.

2.3. Methods

In order to verify various claims about Rotuman phonology and morphology, a list of root words was created from Churchward's (1940) Dictionary. Initially a total of 2604 roots were extracted, however all bound roots (180), along with a few interjections, auxiliary roots, and adverbs, were removed for the majority of analyses on stem phonotactics. Additionally, some roots were discarded as they did not have an incomplete phase form - either because they were one of the few with no incomplete phase ("indeclinable") or simply lacked a reference to an incomplete phase form in the Dictionary entry leaving a total of 2361 unbound bare roots that all had two phase forms. This root list was used to verify claims on co-occurrence restrictions (§2.1.2) and phase alternation patterns (Chapter 3) using the phonology analysis software, Dekreke (Casali, 2012) which provides functions for investigating phonotactic generalizations. From the original list of 2604 stems, a smaller dataset of reduplicated forms was created with 847 reduplicated forms of 794 different root words. Approximately 50 of the 794 stems have two reduplicated forms, hence the higher number of reduplicated forms (n= 847). For example, *fisi 'white'* appears in reduplicated form as *fis-fisi 'to show white, present a white appearance'* as well as *fi-fisi 'plural of fisi'.* The remaining 1800 stems extracted from the Dictionary did not have a reduplicative form linked to their dictionary entry.

There were two sources for the reduplicants in Churchward's (1940) Dictionary: either in the entry for the stem, such as in (3) where *rd.* indicates a reduplicative prefix, or from a reduplicated form that had its own entry, such as in (4).

(3) *hako, ɪa,* v.i.a. and inf.t., -*a* f.t., rd. *hak-,* to climb (tree, ladder, etc. ; not hill-

(4) *heaphepa (hepa),* 2, n., palm of hand : *'oto heaphepa.*

In addition to data gathered from the root and reduplication lists, a native speaker of Rotuman was consulted to verify word meanings, general prosodic information and correct pronunciation for certain words and phrases. Konousi Aisake is a 52 year old native Rotuman speaker who acted as informant in verifying words and possible usage. He grew up in Fapufa, Rotuma with Rotuman as his first language until the age of fourteen when he relocated to Fiji. Mr. Aisake also speaks Fijian and English and has been living in Surrey, British Columbia for the past 25 years. He regularly visits Rotuma approximately every five years and speaks Rotuman weekly in cultural events, committee meetings and with relatives on the telephone. Meetings with Mr. Aisake were held on the Simon Fraser University Surrey campus. Any data to be investigated was presented aurally by the interviewer when possible and verified by both the interviewer and the language expert visually using Rotuman orthography. (Again, see Appendix A for conversion of Rotuman orthography to IPA).

3. Phase Alternation

In the first descriptions of reduplication (Churchward, 1940) the reduplicant is likened to a word in its *incomplete phase.* To investigate this initial observation between reduplication and *phase,* it is necessary to have a better understanding of the structure and behaviour of phase in general. Phase is a morphological phenomenon unique to Rotuman whereby every lexical word can appear in two different forms. While even the first individuals to document the Rotuman language (Hocart, 1919; Hale, 1846) commented on two different forms for words, it was Churchward who coined the term phase in describing this phenomenon in his extensive Rotuman Grammar and Dictionary. Phase is characterized by a longer form – *complete phase* – assumed to be the citation form (i.e. the form by which Churchward organizes his Dictionary) and a shorter form – *incomplete phase*. The two alternant forms share many of the same segments but differ in number and shape of syllables. For example, the forms for 'mistaken' are *sɛ.sɛ.va* in complete phase and *sɛ.sɛav* in incomplete phase. The only forms that do not alternate between phase*s* are lexical compounds ending in monosyllabic grammatical words (eg. *ma, kɛ*, etc) and words ending in certain suffixes (eg. *–a, -kia*).

3.1. Describing Phase

In terms of shape, the complete phase will only have open syllables (CV, CVV, CV:, V) whereas the incomplete phase can have both open and closed syllables, although the latter are only permitted morpheme-finally. The main characteristic of the incomplete phase is that it will always end in a heavy syllable (CVV, CV:, CVC, CVVC). The incomplete phase is often described as a 'derived' form as its form can be predicted from the complete phase but not vice versa. Churchward categorized the different phase forms into "declensions" or groups depending on the ways in which the incomplete phase

can be formed from the complete phase. Table 4 shows these "declensions" and the characteristic phase-forming processes which correspond to specific word-final syllable shapes – words that have CV as the final shape and those that end in adjacent vowels - VV.

Table 4.   Types of phase forming processes in Rotuman

word final	complete ~ incomplete	Declension	Process
CV	i. mɑtɑ ~ mɑt	1a	Deletion
	ii. tɔfi ~ taf	1b	(and Umlaut for 1b-d)
	iii. mosɛ ~ mœs iv. hoti ~ høt	1c	
	v. futi ~ fyt	1d	
	vi. tokɑ ~ toɑk	2	Metathesis
	vii. pitʃɑ ~ piatʃ [1] pitʃɛ ~ Ø	e2	
	viii. iʔɑ ~ iɑʔ iʔɛ ~ iɛʔ	e2e	
VV	ix. tʃao ~ tʃa͡o	3	Diphthongization
	x. kouɑ ~ kou͡ɑ kouɛ ~ kou͡ɛ	e3	
	xi. rii ~ rii	4	No change

There are two types of word-final vowel sequences in the complete phase: those ending with long vowels $CV_1V_1\#$ and those with two different vowels $CV_1V_2\#$. Words ending in long vowels (xi.) will not alternate in phase shape, while words ending in two different vowels (ix. & x.) will diphthongize, i.e. the two vowels, each of which were

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[1]   All words where the final vowel is 'a' [ɑ] (vii., viii., & x.), have an alternate version ending in 'e' [ɛ] – pitʃɑ ~ pitʃɛ or kouɑ ~ kouɛ. Churchward labeled the version ending in 'a', the broad version, while the version ending in 'e' is the narrow version. However the '*e*' version will only have an incomplete phase form in cases where the final vowel is preceded directly by a vowel or by a glottal stop. Hale and Kissock (1998) argue that this vowel alternation is phonologically motivated by the phonology of a following morpheme, while Churchward's (1940) explanation for usage is based on semantics. The motivation behind using either form is not relevant to the overall discussion here and only the broad form will be used in illustrations.

previously heterosyllabic, will now share the same syllable which is indicated here by the ligature above the two vowels: a͡o

Words with single simple vowels word-finally (CV#) in the complete phase will form their incomplete phase form in three ways: metathesis (vi., vii., & viii.); deletion (i.); and deletion and umlaut (ii., iii., iv. & v.). A question then arises as to why there are three different possible processes for words ending in light CV syllables. Many scholars (Churchward, 1940; Biggs, 1965; Schmidt, 2002, 2003; McCarthy, 2000) have remarked that the nature of the final *two* vowels influences the choice of phase formation process, i.e. it is important to know the quality of the final vowel as well as the penultimate vowel – VCV#.

McCarthy (2000) and Schmidt (2002) capture the choice of phase formation process in terms of the sonority scale of these two final vowels. Metathesis will apply when the vowels rise in sonority, whereas deletion will apply if the vowels are equal or fall in sonority. Additionally, umlaut will only occur for back-to-front vowel sequences that fall in sonority. Accordingly, these CV final forms will be referred to from now on as VCV# stems since the penultimate vowel plays a major role in the choice phase forming process.

McCarthy's claims of different processes being associated with particular vowel sonorities were tested within the stem list created from Churchward's (1940) Dictionary. Of the 2360 stems, 1408 had a light CV syllable word-final while the rest ended in CVV or CV:. Table 5 illustrates the distribution of each phase formation process according to final vowel sequence (V_1 and V_2) in V_1CV_2# stems. The numbers associated with each cell represent the number of tokens found per sequence of these 1408 stems.

Table 5. **Phase formation processes and final vowel sequences of VCV# roots**

		V₂				
		i	ε	α	o	u
V₁	i	**deletion** (117)	metathesis (2)	metathesis (80)	metathesis (34)	**deletion** (17)
	ε	**deletion** (33)	**deletion** (128)	metathesis (45)	**deletion** (13)	deletion (28)
	α	*umlaut (0)*	*umlaut (0)*	**deletion** (285)	deletion (36)	*umlaut (0)*
	o	umlaut (73)	umlaut (18)	metathesis (72)	**deletion** (137)	**deletion** (22)
	u	umlaut (69)	metathesis (14)	metathesis (81)	**deletion** (1)	**deletion** (103)

As Table 5 shows, the previous claims by McCarthy (2000) and Schmidt (2002) on three processes of phase formation for VCV# words were, for the most part, supported. Metathesis of the final CV occurs with εCα, iCα, oCα, uCα, iCε, uCε, and iCo; all of which rise in sonority. Deletion occurs with iCi, uCu, εCε, oCo, αCα as well as iCu, εCi, εCo, εCu and αCo, all of which are equal or fall in sonority. Additionally, umlaut occurs for oCε, oCi, uCi; which are also sequences of equal or falling sonority but with a back vowel followed by a front vowel. However, Table 5 shows some gaps in the previous claims, as indicated by the zeros in the cells associated with the sequences αCε, αCi, αCu, which have been described as undergoing umlaut (McCarthy, 2000; Schmidt, 2002). The lack of stems extracted with these final sequences is due to regular phonological rules where the penultimate vowel /α/ has already changed to [æ] before /e/ or backed to [ɔ] before /u/ and /i/ before incomplete phase formation. For example, /tari/ 'wait' is [tɔri], /hake/ 'four' is [hæke] and /hafu/ 'stone' is [hɔfu]. Therefore, while many scholars describe the incomplete phase being derived from the complete phase, the complete phase is not always the same as the underlying form. Schmidt (2002) suggests that the regular phonolgocial rules apply to an underlying form to give the complete phase and the umlaut vowels in the incomplete phase arise from vowel change rules applied to the complete phase. Table 6 illustrates the *complete* and *incomplete* surface forms of six underlying vowel sequences claimed by Schmidt (2002) to undergo umlaut.

Table 6.   **Underlying and surface forms (complete and incomplete) of umlauted cases (Schmidt, 2002)**

	complete	incomplete
/oCi/	oCi	øC
/oCɛ/	oCɛ	œC
/uCi/	uCi	yC
/ɑCu/	**ɔCu**	**ɔC**
/ɑCɛ/	**æCɛ**	**æC**
/ɑCi/	**ɔCi**	**aC**

Of the six underlying vowel sequences propsed to undergo umlaut by Schmidt, only five consist of back-to-front vowels. The vowel change occurring to the sequence /ɑCu/ (third from the bottom in Table 6) is a regular vowel change rather than umlauting and should be considered a case of deletion as the penultimate vowel in the complete phase remains the same in the incomplete phase form. Additionally, for the back-to-front vowel sequence /ɑCɛ/ in the second to bottom row in Table 6, regular vowel changes bleed the umlaut vowel changes. This sequence also falls into the category of deletion, since these vowel changes occur outside of phase alternation leaving the penultimate vowel in the complete phase the same in the incomplete phase. However, the sequence /ɑCi/ can be included as a case of umlaut along with other back-to-front sequences oCi, oCe and uCi since it surfaces as ɔCi in complete phase through regular phonological rules and will then umlaut to aC in the incomplete phase. Thus, the zeros in Table 5 result from the fact that the proposed underlying forms /ɑCu/, /ɑCɛ/, /ɑCi/ (in the final three rows in Table 6) never appear as surface forms since the words in the complete phase have already undergone regular vowel changes.

The sequences uCo and oCu, which were unaccounted for in previous literature, were found to both undergo deletion. The sequence oCu has falling sonority, which patterns perfectly with other deletion cases. However, uCo is *not* of equal or falling sonority, which is expected with deletion, but instead has vowels that rise in sonority,

which typically predicts metathesis. This vowel sequence has extremely low frequency (1 out of 1408), which may explain the irregular patterning. Deletion is by far the more frequent process (65.3%) used to form the incomplete phase, as shown in Table 7.

Table 7.   ***Distribution of characteristic* phase *formation processes of VCV#* stems.**

Phase formation process	deletion	metathesis	umlaut
Number (out of 1408 stems)	920 (65.3%)	328 (23.3%)	160 (11.4%)

As mentioned in the background section on phonology (2.1), Rotuman permits a number of diphthongs and the type of diphthong and its distribution can also be categorized by sonority. There are two types of diphthongs in Rotuman – light and heavy (McCarthy, 2000). Light diphthongs are monomoraic and appear only in closed syllables, and thus only in the incomplete phase ex. *sɛsɛ̃av* or *pūɛr* . Typologically, light diphthongs are shown to be limited to only those of rising sonority (McCarthy, 2000), which is true for those in Rotuman as the only light diphthongs – *ɛa, ia, oa, ua, iɛ, uɛ, io* – are products of metathesis (CVVC).

Bimoraic, or heavy, diphthongs, on the other hand, can appear in both phase*s* but will only appear in open syllables: *vãõ* or *pupũi.* There are different accounts of which diphthongs are acceptable in the complete phase. McCarthy (2000:149) states that there are no diphthongs in the complete phase, so vowels in a VV sequence are heterosyllabic. However, Schmidt (2002:817) lists the following diphthongs, typically word-final, in the complete phase: *au, ɛu, ou, ai, ɛi, oi, ao æ[2]ɛ, oɛ, ui.* These are all rising diphthongs or, when same height, the second is more front than the first vowel. To explore these claims, all stems, which have adjacent vowels word-final, were grouped by vowel sequence. Table 8 summarizes the results of these groupings, and as the dictionary does not distinguish between heterosyllabic vowel sequences and tautosyllabic ones (diphthongs), the shaded cells indicate vowel sequences that are

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[2]   Schmidt (2002) uses a font where the first vowel in this diphthong could be read as the open front rounded vowel */œ/* or near-open front unrounded vowel */æ/.* However only the latter is found in the complete phase.

claimed to be diphthongs by Schmidt (2002). The vowel sequences in the unshaded cells are assumed then to be heterosyllabic in the complete phase, however this could be verified with elicitation tasks or acceptability ratings with native speakers in future work. All combinations of non-identical vowels are claimed to diphthongized in the incomplete phase in previous literature except *iɛ* and *oɛ* which apparently never occur in VV# words (Krupa, 1966, Kawasaki, 1990 in McCarthy, 2000). Data from the stem list confirms that there are no stems ending in *iɛ,* however as Table 8 shows, there are six[3] stems ending in *oɛ* all of which become diphthongs in the incomplete phase according to Churchward's declensions. Whether these words are still in use today is a different matter and could be why previous work has claimed they do not occur. Table 8 also highlights some observations missing from previous literature, namely that there are no stems ending in *uo,* and there is only one stem ending in *ɛo (mɛo* 'to feel resentment, be offended (at, *sɛ*)' Churchward, 1940, p264).

Table 8.   Final VV sequences in Rotuman stem words

		V2				
		i	u	ɛ	o	α
	i		10	---	5	22
V1	u	16		5	---	51
	ɛ	29	6		1	32
	o	28	28	6		41
	α	40a	56	31b	29	

a. these vowel sequences surface as ɔi due to regular vowel change rules.
b. these vowel sequences surface as æe

The majority of previous work on Rotuman has focused on words ending in VCV# and thus this empirical look at phase has introduced some new observations on the phonotactics of Rotuman phase. In the larger discussion of reduplication, however,

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[3] *hohoɛ –v.* to laugh with *ho ho* sound*; loloɛ,* vi to continually go to entertainments etc instead of work; *momoɛ* – fine particles/sparks; k. tree with very broad leaves; *tumoɛ* - in *tɛran tumoɛ* day of preparation, eve; *ʔomoɛ* – evening meal, supper; *ʔumomoɛ* – k. prawn or shrimp.

specifics of diphthongs are not needed. Suffice it to say that the same diphthongs that appear in phase also appear in reduplicants with light diphthongs restricted to *ea ia oa ua ue io* and a similar distribution of heavy diphthongs. The only heavy diphthongs to not appear in reduplicants are *iɛ, uo, ɛo;* and *uɛ* and *io* have only 1 token each, as shown in Table 9.

Table 9.   Final VV sequences for reduplicants in Rotuman

		V₂				
		i	u	ε	o	α
V₁	i		3	---	1	5
	u	6		1	---	13
	ε	4	5		---	4
	o	3	4	---		4
	α	9	19	12	15	

To summarize, incomplete phase forms can be predicted from the shape of the complete phase according to the positioning and sonority of the penultimate and final vowels. When these two vowels are adjacent word-final - CVV# - and are identical, there is no change of form. When the final vowels are adjacent word final and not identical, they change from being heterosyllabic to sharing the same syllable as a diphthong. Alternatively, when the final two vowels are separated by consonant (VCV#) they will form the incomplete phase according to the sonority profiles of these vowels. Sequences rising in sonority will metathesize the final syllable, producing a light diphthong in a closed syllable word finally (CVVC), while those with equal or falling sonority will delete the final vowel resulting in a closed syllable with a simple vowel word finally (CVC). A select group of sequences, where the penultimate vowel is back and final vowel is front, will undergo umlauting of the penultimate vowel in addition to deleting the final vowel, again resulting in a closed syllable (CVC). The same shapes that surface in the *incomplete* phase, appear in the reduplicants for foot *reduplication*. To understand why this similarity would occur, we turn to the larger question of why there is a phase alternation in the first place. This is addressed in the following section, which explores the different attempts by linguists at solving the motivation for phase alternation.

3.2. Two Approaches to Phase Alternation

While most scholars generally agree on the types of processes involved in forming the two phase*s*, there are two very different approaches to the motivation of this phase alternation in Rotuman. The first approach used to describe this phenomenon is based on syntactic-semantic rules and is the classic description used by scholars. The other, based on phonological triggers, is more recent. This latter approach is used as the basis for analysis in this thesis as it successfully links phase shape with phase alternation.

3.2.1. Syntactico-semantic Approach

Many linguists (Biggs, 1959, 1965; Milner, 1971; Cairns, 1976; Anttila, 1989; Besnier, 1987; Vamarasi, 1991; Geraghty, 1995; McCarthy, 1995) have analyzed the alternation of phase in Rotuman as a case of allomorphy where the underlying morpheme is equivalent to the form of the complete phase and each allomorph (*complete* and incomplete phase) will appear in different environments. UR = /mɑfɑ/, SR= { mɑfɑ $_{cmp}$, mɑfɑ$_{inc}$ }. The environments of each allomorph are morphologically, semantically and syntactically defined and based on Churchward's (1940) original observations, which are paraphrased in Figure 4.

The first three rules are the most general and capture a majority of the instances of phase alternation. In short, all non-final constituents - non-final morpheme in complex word or non-final word in a phrase - will appear in the incomplete phase. The only place we see phase alternation is phrase-final where either incomplete or complete phase can appear. This alternation is based on a semantic motivation of definiteness for complete and indefiniteness for incomplete phase. There are some exceptions, namely with proper names and pronouns, and before certain suffixes.

1) Every non-final morpheme in a word (except certain suffixes) will appear in the incomplete phase, regardless of the phase of the whole word.

2) Words that are non-final in a syntactic phrase are in incomplete phase.

3) Definiteness is shown with the phase of the phrase- final word where complete phase indicates "definite" while incomplete phase indicates "indefinite".

4) Complete phase also indicates "positive-ness, finality or emphasis, or certainty (in questions)."

5) Verbs ending in a pronominal suffix in its complete phase indicate completive tense.

6) The cardinal pronouns and *seia*, will be in the incomplete phase unless they appear immediately after prepositions *ʔe* and *se* or fall under Rule 1-5.

Figure 4. *Churchward's rules governing* phase*. (paraphrased from the Grammar (1940:88); See Appendix B for original rules)*

Both Schmidt (2003) and Churchward (1953) suggest a similarity between Rotuman phase and Definitive Accent in Tongan, a Polynesian language spoken by the people of the island of Tonga, who have historically many interactions with Rotuman (Schmidt, 2003). Definitive Accent in Tongan is characterized by shifting stress from the penultimate to final syllable in a word to indicate definiteness. While different from phase in structural specifics (as there is no metathesis, deletion or umlauting), Definitive Accent (DA) is similar to phase since both, either directly or indirectly, affect word stress. DA is similar in environment and meaning to specifically the complete phase as both indicated "definiteness" and both only apply word- and phrase-final. A major difference, however, is that the complete phase is thought to be the underived form with regular penultimate stress and while DA changes the regular penultimate stress in Tongan to final stress to signify the definite-ness of a word. While there are some very suggestive similarities between the different phenomena in the two languages, phase in Rotuman is not thought to be derived from Definitive Accent in Tongan, but instead, perhaps the two phenomena developed independently and/or are regional specialities (Schmidt, 2003).

Schmidt (2003) further supports this theory by offering an explanation for the irregular patterns of phase before certain suffixes. Churchward notes the exceptional behaviour of stems before a select number of suffixes in his first rule which states that stems that are not word-final in complex words (i.e. affixation, compounding, etc) will be

in their incomplete phase. Schmidt explains this difference through productivity and borrowing whereby, stems are in the incomplete phase when followed by a suffix but the select few stems that are in *complete* phase are followed by suffixes borrowed from Tongan. However, Schmidt discusses only a few suffixes and does not mention the behaviour of stems before certain clitics.

In general, this approach to phase alternation is not very elegant since it entails multiple rules focussing on distinct but overlapping linguistic domains (morpho-syntax and semantics). Additionally, proper names of people and places, as well as pronouns, often appear in either phase, which is difficult to handle with these generalizations of definiteness and may not be consistent with the morpho-syntactic generalizations. For example, it is difficult to assign an indefinite interpretation to *ŋoua (1 sg pronoun 'I')* when appearing in its incomplete phase as *ŋou,* especially if this pronoun is phrase final, as in (5) where it is at the end of the noun phrase.

(5) *ŋou la tyk iris*   (Churchward, 1940; 116)
     [ŋou]$_{NP}$ [la tyk iris]$_{VP}$
     1sg$_{inc}$ FUT stop$_{inc}$ 3pl$_{inc}$
     'I will stop them'

Despite these exceptions or irregularities, there have been numerous rule-based analyses of phase (Biggs, 1959, 1965; Milner, 1971; Cairns, 1976; Anttila, 1989; Besnier, 1987; Vamarasi, 1991; Geraghty, 1995) and one constraint based analysis (McCarthy, 1995) based on Churchward's (1940) semantic and syntactic motivations for phase. Most of the rule-based analyses describe and predict the phase shapes but do not offer generalizations of the different processes working towards one goal. However, Besnier's (1987) template-based analysis of phase using Autosegmental Phonology, captures the idea of different processes conspiring to satisfy two different CV templates – one with the final V deleted (incomplete phase*)* and one with the final V slot (complete phase). Similarly, McCarthy's (1995) Optimality Theory analysis captures this conspiring nature of phase formation processes to satisfy a specific constraint. However, all of these analyses focus on the formation of phase shape alone rather than also expanding on the motivations for phase alternation in the first place. They all seem to take Churchward's generalizations for granted, except perhaps Schmidt (2003) who, as discussed earlier, expands on the behaviour of stem-final phase before certain suffixes suggesting at least some of these exceptions are a result of borrowings from Tongan.

3.2.2.   Phonology-based Approach

The analysis proposed in this thesis is based upon a prosodic approach to phase proposed by Hale & Kissock (1998) who explored Churchward's observation that phase can alternate not just word-finally but also when preceding certain suffixes. Churchward notes that a stem will be in its complete phase before a limited number of suffixes: *-ŋa* 'nominalizer'; *-ŋɛ* 'ornamental'; *-mɛ* 'directional'; *-afu* 'directional'; *– aŋɛ* 'directional'; *-t* 'singular'; *-s* 'interrogative': *–na* 'transitive'; *-a* 'completive tense'; *–a* 'transitive'; and pronominal suffixes. Aside from these select suffixes, only the final morpheme in a word is able to alternate in phase. Hale & Kissock took these suffixes along with clitics and compared them with those that attach to stems in their complete phase. They concluded that the alternation is motivated purely by phonological reasons and their analysis is summarized as the following: incomplete phase is triggered by disyllabic suffixes or no suffix at all (6); and complete phase occurs with mono-syllabic suffixes (7).

(6)   *ala* 'to die' + *-tia* 'completive' → *al$_{inc}$tia*

(7)   *hoʔa* 'to take' + *-me* 'directional' → *hoʔa$_{com}$mɛ* 'to bring' **hoaʔ$_{inc}$mɛ*

The asyllabic suffixes *-t* and *-s* which attach to complete phase are analyzed as incomplete phase forms of the clitics *ta* and *se* respectively and thus monosyllabic, i.e. ta$_{comp}$ and –t$_{inc}$. This approach crucially depends on a floating mora to account for other exceptions. For example, the 'locative' and 'definitive' null suffixes could be exceptions to the generalization as they are preceded by the complete phase but have no segmental content. Thus they are given morae in order to pattern with other monosyllabic suffixes. Additionally, the 'singular definite' clitic *ta* is assumed to include the null definite suffix in order to fit the pattern. *Ta* is therefore bimoraic to account for the fact that stems preceding this monosyllabic clitic are exclusively in the incomplete phase rather than the *complete*. In this way, *ta* is reduced to '-*t*' and means 'singular' while [tɑ] is actually *ta* + -$\varnothing_{\mu\,\text{'definite'}}$ and denotes 'singular definite'.

This approach leads to a much more elegant theory that can capture most situations. It is attractive considering the actual forms of each phase are also

phonologically triggered (sonority of vowels dictates incomplete phase shape). Both phase form and the motivating environments can be accounted for within an Optimality Theory framework, which is the approach taken by McCarthy (2000) . The floating morae proposed to account for what appear on the surface to be exceptions to the generalization, also have support in neighbouring Polynesian languages such as Samoan and Tongan, which employ non-segmental moras in locative and definite accent respectively (Hale and Kissock, 1998; 122). Since words with no suffix or clitic following are in incomplete phase, this approach accounts for the fact that all non-phrase-final words are in incomplete phase and that many phrase-final words are in incomplete phase. The question is whether the remaining phrase-final words, which appear in their complete phase form, could all be accounted for by assuming that a null suffix ('locative' or 'definitive') attaches. Hale and Kissock provide evidence for their approach using stems of suffixed forms but are not explicit about whether, or how, this generalization could extend to phase alternations appearing in levels higher than word level – i.e phrasal level.

As mentioned in the description of phase (2.3.1), we see complete phase in phrase-final position (8a). However, Hale and Kissock fail to explicitly discuss or even explore whether all these phrase-final forms in complete phase are also followed by either the 'locative' or 'definite' mono-moraic null suffix $-\varnothing_\mu$ as hypothesized in 8b.

(8)   a.   {[tutur$_{inc}$]$_N$ [popo$_{com}$]$_A$}$_{NP}$ 'the rotten posts'

      b.   {[tutur$_{inc}$]$_N$ [popo$_{com}$]$_A$ $-\varnothing_\mu$ }$_{NP}$ 'the rotten posts'

Additionally, Hale and Kissock (1998) fail to mention if, or how, this analysis could extend to names of people and places which appear in both phase*s* when phrase final. Many situations (Table 10) can be accounted for if one assumes the 'definite' null marker with its floating mora will always follow a proper name. This would not be too much of a stretch considering proper names refer to definite objects. Exceptions would be names of Chiefs which may not have the null suffix except when used in ceremony.

Finally Hale and Kissock suggest that the semantics of the monomoraic suffixes are in line with the semantics claimed by Churchward for complete phase. Similarly, the

semantics of disyllabic suffixes are in line with semantics of the incomplete phase. However they do not flesh this out in any detail by examining each suffix individually.

Table 10.   Phase and proper names (adapted from Churchward, 1940)

	complete	incomplete
Names of Commoners	Usually. Ex. *le Tu'a*	with *ta: Tua' ta* ; when addressing: *ko Tua'*
Names of Chiefs	only in ceremony	Usually
Names of places	Usually	Courteous speech or before demonstratives

All of the formal analyses based on Hale and Kissock's prosodically motivated approach to phase alternation have used some version of Optimality Theory (OT). Hale and Kissock (1998), in response to an Output-Output Correspondence OT analysis based on the semantic based motivation for phase alternation (McCarthy, 1995), briefly outline an analysis whereby each phase has its own OT grammar: there would be a 'core' lexical OT phonology and a separate phrasal OT phonology that applies to the clitic groups. This phrasal OT grammar would apply to the output of the lexical OT rather than both referencing the same input.

The most exhaustive OT analysis of the prosody of phase, proposed by McCarthy (2000), accounts for both phase shape and phase environment with the same constraint ranking. McCarthy's (2000) analysis of phase captures the observation of homogeneity of target, heterogeneity of process with the various processes (metathesis, deletion, umlaut) conspiring to produce a main stressed syllable at the end of a prosodic word.

(9) ALIGN-HEAD-σ: Align (H'(PrWd), R, PrWd, R)

The right edge of the head syllable in the head foot of a prosodic word, i.e.
the main stressed foot, should align with the right edge of a prosodic word.

Along with a constraint ensuring foot binarity – FTBIN : *all feet must be binary in terms of syllables or morae* – and one ensuring trochaic feet – FTFORMTROCHEE: *feet are left headed* – this main stressed final syllable will be a heavy syllable which is a key characteristic of the incomplete phase. Tableau 1 shows the preference for a bare stem to appear in the shorter incomplete phase (candidate a.) than the longer, more faithful *complete* phase (b.)

Tableau 1.   **ALIGN-HEAD-σ, FTBIN, FTFORMTROCHEE >> MAXIO**

/sapo/	ALIGN-HEAD-σ	FTBIN	FTFORMTROCHEE	MAXIO
☞ a. {(sáp)}				*
b. {(sápo)}	*!			
c. {sa(pó)}		*!		
d. {(sapó)}			*!	

Since bimoraic suffixes are a footable domain in and of their own, they can form a separate prosodic word leaving the stem to form its own independent prosodic word that must again appear with a final heavy syllable (incomplete phase).

(10)   /sunu$_{stem}$+ -ʔiɑ$_{suffix}$ / → {(sun)} $_{PrWd}${(ʔiɑ)}$_{PrWd}$

In contrast, monomoraic suffixes cannot form a prosodic word on their own and must share with the stem. This leads to the stem being prosodically bound with the monomoriac suffix and will therefore appear in its complete phase as ALIGN-HEAD-σ concerns the end of a prosodic word, not of a stem.

(11)   /puʔɑ + ŋɑ / → {(puʔɑ)ŋɑ}   (McCarthy, 2000:166)

McCarthy mentions (p 164) that the whole word (stem + suffix) will be in the incomplete phase where the suffix alternates as part of the stem to form a heavy syllable word final as in (12).

(12).   fere$_{stem}$ + -ŋɑ $_{suffix}$ → {fere-ɑŋ}$_{PrWd}$

However, McCarthy (2000) does not explore how a complex word, consisting of a stem and monomoraic suffix, can appear in its complete phase *i.e. fereŋa*. Presumably, this attested form of a complex word is followed by an additional mono-moraic suffix i.e. definite or locative null suffix ∅$_μ$, triggering the complete phase of the entire word: {[fere]$_{stem}$ [ŋa]$_{suffix}$ -∅$_μ$}. Blevins (1994) also notes examples where a stem will remain in its in complete phase when followed by two monomoraic suffixes: *tʃoni-me-a*, 'to flee, DIR, COMPL. This is a potential problem for McCarthy's account of phase but does not appear

to affect an analysis of the reduplicant, which is the focus of this thesis. A more detailed account of McCarthy's Optimality Theory analysis of prosodic words will be given in Chapter 5 when outlining the minimal word in Rotuman.

McCarthy's analysis of the different incomplete phase shapes works as follows. The different ways to form the incomplete phase fall out from a particular constraint ranking where metathesis is the preferred form and thus LINEARITY – a constraint prohibiting metathesis - is lowly ranked. Since only rising diphthongs can appear as a result of metathesis, a constraint LIGHTDIPHTHONG - ensuring only rising diphthongs appear as light diphthongs – is highly ranked. If metathesis results in a heavy diphthong, deletion, which would violate MAX, is the next best way to satisfy a final heavy syllable. If the heavy diphthong that results after metathesis consists of a back vowel followed by a front vowel – ui, oi, oe, ɔi – the two vowels coalesce resulting in an umlauted vowel. Coalescence violates the low ranked constraint UNIFORMITY prohibiting two elements in an input from corresponding with a single element in the output. The specific ranking is given in 13, which is adapted from McCarthy (2000). Both the *complete and* incomplete phase*s* are derived from the input as they differ in both markedness and faithfulness. In terms of markedness, only open syllables are permitted in complete phase but closed syllables often appear in the incomplete phase, which necessarily ends in a final heavy syllable. In terms of faithfulness the complete phase is a maximal output of the input while incomplete phase will either delete a segment or have unfaithful mapping in terms of linear order of segments. Thus the constraints can be specified as such: FAITHIO.

(13) LIGHTDIPH, ALIGN-HEAD-σ >>MAX-IO >> LINEARITY-IO, UNIFORMITY-IO

Tableaux 2-4 show this constraint ranking successfully predicting the attested incomplete phase form shapes for metathesis, deletion and umlaut cases. The subscripted indices are simply a convenient way to keep track of correspondent elements. For more specifics of this analysis, see McCarthy, (2000). Any details relevant to reduplication will be discussed further in Chapters 5 and 6.

Tableau 2. *Metathesis cases*

/pur$_1$e$_2$/	LIGHTDIPH	ALIGN-HEAD-σ	MAXIO	LINEARITYIO	UNIFORMITYIO
☞ a. (pue$_2$r$_1$)				*	
b. (pur$_1$)			*!		
c. (pu.r$_1$e$_2$)		*!			

Tableau 3. *Deletion cases*

/rak$_1$o$_2$/	LIGHTDIPH	ALIGN-HEAD-σ	MAXIO	LINEARITYIO	UNIFORMITYIO
☞ a. (rak$_1$)			*		
b. (rao$_2$k$_1$)	*!			*	
c. (rák$_1$o$_2$)		*!			
d. (ro$_2$k$_1$)[4]			*	*!	

Tableau 4. *Umlaut cases*

/muri/	LIGHTDIPH	ALIGN-HEAD-σ	MAXIO	LINEARITYIO	UNIFORMITYIO
☞ a. (myr)				*	*
b. (muir)	*!			*	
c. (muri)		*!			
d. (mur)			*!		

Unlike most previous analyses, McCarthy's successfully links phase shape with phase alternation in Rotuman while keeping language universals in mind. However, as mentioned earlier, McCarthy's look at the prosody of phase does not fully account for the phase alternations of complex words with monomoraic suffixes. Additionally it is unclear if this analysis can account for the exceptions found in names of people and places or pronouns, or crucially, for the irregularities in stress in Rotuman. For example, the suffix

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[4] This candidate is also ruled out by the constraint HEADMATCH – ensuring that the main stressed vowels are in correspondence. This constraint which is only relevant for deletion cases in *phase* will be re-examined in Chapter Five with reduplication of tri-syllabic words. HEADMATCH: If α is in H'(PrWd) and $\alpha\Re\beta$, then β is in H'(PrWd)

McCarthy used to exemplify the prosody of a stem with a monomoraic suffix is the nominalizer suffix *-ŋa* which is one of only two suffixes that cause stress to shift resulting in penultimate stress of the complex morpheme (Blevins, 1994; Schmidt, 2002).

(14)   'fere_{stem} + -ŋɑ _{suffix} → {fe('reɑŋ_{inc})}_{PrWd}

In contrast, with all other monomoraic suffixes (*-me -ŋe –a etc.*), the stress apparently remains on the penultimate syllable of the stem after suffixation (Schmidt, 2002; Blevins, 1994).

(15)   *'ʔihi* 'invite' + *-me* 'dir. suffix'
        'ʔihi-me_{complete}   'ʔihim_{incomplete}

Thus, in the complex word *'ʔihim,* the main stressed syllable is initial and not word final, even though the word is in its incomplete phase (i.e. has a heavy syllable word-final). This is in direct opposition with prosodically independent stems and bimoraic suffixes which are characterized by a final heavy <u>main-stressed</u> syllable as the result of satisfying ALIGN-HEAD-σ. McCarthy does suggest (p160) as alternatives to ALIGN-HEAD-σ, a family of markedness constraints, which favour neutralizations of word-final syllabic distinctions, such as final light syllables, final heavy syllables, final consonants, etc. A viable option would be to use a constraint simply specifying that the final syllable must be heavy, rather than deriving a heavy syllable from specifying word-final main stress. In this case, all prosodic words would end in a heavy syllable and the fact that stress remains on the stem could be ensured by a constraint ensuring tautomorphemic feet, TAUTOF.[5] This markedness constraint would prohibit a foot from containing more than one morpheme such as **ʔi('him)* where both the monomoraic suffix *-me* and the last syllable of the stem *ʔihi* would share the same foot. Alternatively, McCarthy's (2000) proposes the constraint HEADMATCH, which ensures that the main stressed vowels in output forms are in correspondence, to account for the attested forms in deletion cases in phase.

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[5]   TAUTOF is independently motivated in Rotuman when accounting for partial CV reduplication, detailed in 5.2.

(16) HEADMATCH: If α is in Hˈ(PrWd) and $\alpha\Re\beta$, then β is in Hˈ(PrWd).

This constraint could account for the main stress remaining on the same vowel of the stem regardless of phase and regardless of presence of an affix. Future work, taking a closer look at stress in Rotuman with native speaker data, may show that there is in fact primary stress on the final heavy syllable in the incomplete phase meaning ALIGN-HEAD-σ can successfully account for complex morphemes in their incomplete phase. Either using ALIGN-HEAD-σ or a combination of TAUTOF or HEADMATCH with a markedness ensuring a final heavy syllable at the edge of a prosodic word could successfully account for the reduplicant shape, which is the focus of this thesis. Thus, while there may be areas to flesh out with phase and suffixes with McCarthy's OT analysis of phase, the premise of a prosodic motivation for phase alternation in Rotuman is still viable. Due to its larger applicability, the more concise and elegant theory of phase alternation – the phonological approach – is assumed in this thesis and integrated into an analysis of reduplication in Rotuman which is developed in Chapters 5 and 6. Before such analysis, I will outline the facts of reduplication in Rotuman.

# 4.	Facts of Reduplication

As with many Malayo-Polynesian languages (Blust, 2009; Kiyomi, 1995), Rotuman uses reduplication as a productive word formation process (Churchward, 1940; Blevins, 1994; Schmidt, 2002). Rotuman has two types of reduplication – *foot* and *partial CV* (Blevins, 1994). This choice in terminology is deliberately different from Churchward's (1940) initial description of '*full'* and '*partial'* as Blevins (1994) observed that all of the '*full'* and many of the *'partial'* cases described by Churchward could be captured as all fulfilling a bimoraic foot template. Churchward reserved the term *full reduplication* for reduplicated mono- and di-syllabic words where the entire word is copied and the reduplicant appears in its incomplete phase as in (17a-d). Churchward (1940, p103) uses *partial reduplication* for reduplication of trisyllabic stems where the initial syllable is copied along with the initial consonant of the second syllable (18) and for cases where only the first syllable is copied, as in (19). The term *foot reduplication* generalizes the characteristics of reduplicating mono- and di-syllabic stems in (17) and the trisyllabic stems (18), reserving the term *partial CV reduplication* to identify the less productive CV reduplication (19). Note that '.' demarcates syllables in the following examples.

Foot Reduplication

(17)	(a) *ma.ta*	*'wet'*	→	*mat-mata*
	(b) *rɛ:*	*'to do'*	→	*rɛ: - rɛ:*
	(c) *to.ka*	*'to be calm'*	→	*toak-toka*
	(d) *tʃao*	*'spear'*	→	*tʃao - tʃao*
(18)	(a) *ka.ra.rɑ:*	'to snore'	→	*kar-karara:*
	(b) *u.no.ku*	'to bulge'	→	*un-unoku*
	(c) *kɛ.i.ɑ*	'poor'	→	*kɛi-kɛia*

Partial Reduplication

(19)	(a) *sa.po*	'to hold'	→	*sa-sapo*
	(b) *fi.si*	'white'	→	*fi-fisi*
	(c) *no.tʃo*	'straight'	→	*no-notʃo*

The first half of this chapter (4.1) focuses on the different reduplicative patterns in terms of their input parts of speech, reduplicant shape, and meanings of reduplicated words. The latter half (4.2) looks at the interaction between the morphological processes of reduplication and phase.

4.1. Reduplicative Patterns

Reduplication can apply to a variety of roots including nouns, verbs, and adjectives as well as to affixes (*fak=soro 'to entreat' -> fak-fak=soro*) and to compound words (*rak+sa'a (from rako + sa'a) -> rak-raksa'a)* (Churchward, 1940:103). Some stems, such as *fata* in *fatfata 'chest'* are bound roots and only found in a reduplicated form. The most productive type of reduplication, *foot reduplication*, as noted above, is characterized by prefixing a heavy syllable that consists of segmental content copied from the left edge of the base. Blevins (1994) was first to use the term foot reduplication to capture the fact that this heavy syllable is equivalent to a bimoraic foot template, which she demonstrates is also the minimal word in Rotuman. The minimal word is discussed in more detail in Chapter 5. The claim of foot reduplication as most productive in Rotuman (Churchward, 1940; Blevins, 1994; Schmidt, 2002) is supported by the fact that over 90% of the reduplicated forms extracted from the dictionary have foot-sized reduplicants.[6]

The reduplicant shapes associated with foot reduplication are necessarily bimoraic feet and are the same as the syllable shapes acceptable in incomplete phase forms: CVC, CVV, CV:, VC, VVC and CVVC. Note that the latter two are still bimoraic as here the VV sequence is considered a light diphthong with one mora associated with the two vowels and one mora for the coda consonant, compared to CVV where each vowel is associated with its own mora resulting in a heavy diphthong. The reduplicant shape CVCV is only attested in songs and poetry (Blevins, 1994; K. Aisake, interview, 2012). The data in (20) and (21) illustrate the different reduplicant shapes present in Rotuman. The frequency of each shape is indicated by a number, out of a total 847 reduplicated forms, which appears in parentheses after each reduplicant type.

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[6]   Future work could test the productivity of foot reduplication with native speaker intuitions on the acceptability of novel stems with foot reduplicants.

(20) Reduplicants with closed syllables:

    CVC (509)
        fan-fana   'to shoot repeatedly'
        maʔ-maʔɔnu 'muddy'
        saʔ-saʔau 'rocky (of sea bottom)'

    CVVC (64)
        fuɛʔ-fuɛʔi 'to take hold of loosely'
        hiok-hiko '(of mattress etc) soft and springy'
        miol-milo 'peaked head-dress with feathers'

    VC (43)
        al-ala   'mortal, mortality'
        ok-oko   'bewildered, confused, perplexed'

    VVC (4)
        uas-usa   'to be wet, rainy'
        uat-uata   'to retch
        uɛt-utɛ   'to swing to and fro'

(21) Reduplicant with open syllables:

    CVV (101)
        sui-sui   'covered with spikes'
        ruɛ-ruɛ   'to move to and fro'
        mou-mou 'lower part of the back'

    CV: (31)
        ko:-ko: 'having thorns, prickly'
        ʔa:-ʔa: 'to eat'
        ta:-ta:tu: 'to bang, thud'

    VV (10)
        oi-oi   'to vex, annoy'
        ao-aoga   'cloudy'

    V: (5)
        o:-o: 'to make a rumbling noise'
        u:-u: 'to shelter from the wind (also fig.)

This distribution of reduplicant shapes, assuming coda consonants are moraic, confirms Blevins' analysis that the only exceptions to the bimoraic foot reduplicant in Rotuman are the relatively few CV shapes (> 10%). Half of these CV forms (n=40) are typical cases of partial CV reduplication while the other half (n=40) could be analyzed as either foot or partial CV reduplication for different reasons. These latter 'ambiguous' forms will be addressed after outlining the characteristics of canonical partial *CV* reduplicants.

Partial *CV-* reduplication, as discussed, is a much less common form of reduplication where only the initial CV syllable is copied and prefixed. This type of reduplication applies to the same parts of speech as foot reduplication - nouns, adjectives and verbs. Unlike foot reduplication, which applies to stems of any length, all but one[7] of the 40 partial *CV* reduplicated forms extracted from the dictionary were mono or disyllabic. Rather than being a limit on the stem size for partial reduplication, this distribution could simply be due to the low number of partial *CV* reduplicated forms (40 out of 847). Interestingly, stems that have *CV-* reduplicated forms will typically also appear with foot reduplication - each with different but related meanings (27ii-iii). (Churchward, 1940:105; Blevins, 1994:514). Additionally, partially reduplicated forms can be reduplicated themselves resulting in double reduplication (27iv).[89]

> (22) *i) sapo – 'to take hold of'*   *(stem)*
> *ii) sap-sapo – repetitive of sapo*   *(foot redup.)*
> *iii) sa-sapo – to hold*   *(partial redup.)*
> *iv) sa-sa-sapo – contin. of sasapo*   *(double partial redup.)*

Blevins (1994) describes instances of partial CV reduplication as "frozen reduplicated forms" due to their limited number and lack of productiveness as well as their idiosyncratic meanings and the fact that the stems will also occur with the productive foot reduplicative affix. Blevins analyzes (22iv) *sasa-sapo* as another type of

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7   *ri-riạki* from *riạki* vt 'to turn over, turn out, shuffle'

8   Double partial CV- reduplication is also found in Hawaiian, an Oceanic language (Alderete & MacMillan, 2013)

9   Double reduplication appears to be limited to partial CV as there is no mention in previous literature, or in the empirical data from the dictionary, of examples of double foot reduplication i.e. * sap-sap-sapo.

foot reduplication and associates *continuance* with these forms of foot reduplication and *repetition* with the typical foot reduplication forms that resembles the incomplete phase (i.e. a single heavy syllable). Churchward, however, does not link any particular form - in his case *full* or *partial* - with a particular type of meaning. In testing this with native speaker judgements, the double partial reduplication cases (22iv) were either not recognized or were found to be unacceptable. (K. Aisake, interview, 2012).

The most productive meanings associated with reduplication in general are (i) repetition or frequency and (ii) continuance (or spatial extension) of a state or action (Schmidt, 2002 p825; Blevins, 1994 p500; Churchward, 1940 p104). Other meanings associated with reduplicative forms include: (i) plurality of nouns and adjectives; (ii) forming adjectives from nouns (N -> Adj), adverbs from nouns (N -> Adv) or forming adjectives from verbs (V -> Adj); (iii) denoting something "similar but counterfeit or inferior"; (iv) as well as some special uses such as in *mose 'to sleep' -> a'=mos-mose 'to act as if sleeping'.* (Churchward, 1940, pp102,104-105; Schmidt, 2002, pp822-823). Table 11 shows the distribution of meanings associated with foot reduplication and partial *CV-* reduplication as indicated by the list of reduplicative forms extracted from the Dictionary. Churchward did not provide meanings for 68% of the reduplicative forms (i.e. they did not have their own entry in the Dictionary). Churchward was not explicit about which reduplicated forms were chosen to be included in the dictionary. Perhaps he chose to only include those with atypical meanings as separate entries in the Dictionary and all other reduplicated forms, with typical meanings of *repetition* or *continuance,* were simply listed in the entry for their bases.

Table 11.   ***Reduplicative meanings and type of reduplication.***

Redpulicative meaning	Partial CV	Foot	total # of tokens per meaning
V > Adj	6	22	29
Body part	--	8	8
Similar	10	32	42
Repetitive	--	7	7
Plural	9	4	13
Bound root	8	108	116
n/a	3	537	577
N > Adj	--	27	29
Other[+]	4	22	26
Total # tokens per type	40	767	807[++]

[+] Other includes the following categories, each with 5 or less tokens:
    Adj > N; Adj > V; N>Adv, V > Adv; V > N; N > Adv; Colour; Continuative; Doing/not doing.
[++] The 40 'ambiguous' CV reduplicant shapes are not included in the table but break down as follows:
    n/a – 37; N> Adj – 2; V>Adj – 1.

The two types of reduplication share a lot of overlap in associated meanings, supporting Blevins' (1994) claim of one productive form – foot reduplication – and one 'frozen' form – partial reduplication. However, there are some cases where there is little or no overlap. Approximately a quarter of partial reduplicated forms indicate plurality while less than 0.5% of the foot reduplicative forms do so. Conversely, meanings such as 'body parts', 'repetitive' and 'change a noun to an adjective' seem exclusive to foot reduplication.

Churchward (1940, p103) notes that when reduplication results in two adjacent identical consonants, these consonants will coalesce: *koko 'foolish' -> ko-koko *kok-koko.* The assumption here is that the reduplicant is underlyingly a bimoraic foot (CVC) but the resulting syllable shape resembles partial reduplication (CV). Half of the 80 CV reduplicant shapes fit this description. In investigating Churchward's claim against adjacent identical consonants, these potentially ambiguous cases were compared with canonical partial and canonical foot reduplication forms to see if they pattern closer to one or the other.

In terms of output, there are no meanings associated with the ambiguous reduplicated forms that match categorically to meanings associated with either partial or foot reduplication. The majority of meanings attributed to the ambiguous forms (n=37) are *n/a* indicating that no definition was given in the Dictionary. This could be assumed to indicate that they follow the productive meanings of *continuation* or *repetition* as claimed by Blevins, however in consultation with a native speaker, these assumptions were not supported. Of the 34 stems recognized by the speaker, most (n=20) were not acceptable in reduplicated form. The rest (n=14) were divided between repetitive (4), continuous (4), similar (2), V→ Adj (2) and other (2). It is possible that in consultation with more native speakers, a clearer pattern could emerge in the meanings associated with these ambiguous CV- reduplicated forms since the percentage of words recognized and deemed acceptable was low.

In terms of input, none of the three "types" of reduplication (foot, partial *CV* and *ambiguous CV*) indicate a categorical preference for particular parts of speech over the others: 95% of ambiguous forms are applied to verbs, while verbs account for 76% of foot reduplication and 54% of partial reduplication (Table 12). Due to the large number of forms acting as verbs, this category was divided into intransitive verbs (VI) and transitive verbs (VT). Some forms were categorized as able to act as both intransitive and transitive verbs, hence the column VI/VT.

Table 12.   Parts of speech inputs to reduplication

	VI	VT	VI/VT	Adj	N	Adv	Bound Root	TOTAL
Partial	11	8	3	10	1	--	8	40
Ambiguous	10	25	3	--	2	--	--	40
Foot	265	237	78	20	44	5	117	767

Thus, while these ambiguous CV- forms appear on the surface to be partial reduplication due to their reduplicant shape (CV-), there is no other supporting evidence for them being partial over foot reduplication. As mentioned previously, partial *CV-* reduplicated forms often participate in foot reduplication*,* i.e. the stem *sapo* can participate in partial reduplication as in *sa-sapo,* but also appears in a foot-reduplicated

form, *sap-sapo*. However, none of these ambiguous CV- forms ever appear in a foot reduplicative from. Additionally, while many stems with partial CV reduplicated forms can appear with double reduplication (27iv), there is no evidence that these ambigious CV forms have double reduplication. i.e. *ko-ko-koko. Thus, it is most probable that Churchward's (1940) initial description is a more accurate analysis and these ambiguous forms are underlyingly foot reduplication (CVC) but surface with a CV reduplicant shape to avoid adjacent identical consonants. An analysis of these foot CV- reduplication forms will be outlined in Chapter 6.

In sum, there is one productive type of reduplication in Rotuman, with a foot-sized reduplicant that is the main focus of this thesis. Foot reduplication will appear with a single CV reduplicant in select cases to avoid adjacent identical consonants. The remaining pattern of reduplication, partial reduplication where only a CV is copied, is an unproductive form that is limited in number and idiosyncratic in meaning. The next section will explore the similarity and differences between incomplete phase and foot reduplication.

4.2. Reduplication and Phase

Churchward first described the reduplicant in foot reduplication of disyllabic words (his 'full reduplication') as being in the incomplete phase (1940:89) and for other cases of foot reduplication (included in his 'partial reduplication'), the reduplicant copied the first syllable as well as the initial consonant of the second syllable. Successive work on Rotuman (Blevins, 1994:500; McCarthy, 2000; Schmidt, 2002), having assumed Churchward's description, has cited reduplication as an example of the incomplete phase in a complex word. This is similar to both compounding and other forms of affixation where a non-final morphemes in a complex word will appear in the incomplete phase.

(23) *Iria hat-hat   puk*
      3DL REDUP-read book
      'They were reading.'   (Schmidt, 2002: 827)

The examples in (24) show a selection of stem types and their foot reduplicated forms - each in both phases. Notice the similarities between the incomplete phase

(second column) and the reduplicant (first morphemes in each of the third and fourth columns).

(24.) Di-syllabic Stem   Reduplicated Di-syllabic Stem

complete	incomplete	complete	incomplete
i. riː	riː	riː-riː	riː-riː
ii. ru.ɛ	ruɛ	ruɛ-ruɛ	ruɛ-ruɛ
iii. puɾɛ	puɛɾ	puɛɾ-puɾɛ	puɛɾ-puɛɾ
iv. sɑpo	sɑp	sɑp-sɑpo	sɑp-sɑp
v. mosɛ	mœs	mos-mosɛ	mœs-mœs

The *reduplicant-as-incomplete-phase* generalization seems to account for all the data in (24) except (v) where the incomplete phase and reduplicant for *mose* 'to sleep' are not the same: *mœs* vs. *mos.* The reduplicant, when the whole reduplicated form is in its complete phase (third column), does not have the umlauted vowel characteristic of the incomplete phase of this type of stem. However, when the entire reduplicated form is in its incomplete phase (fourth column), both reduplicant and stem vowels are umlauted. This lack of umlauting is specific to reduplication as umlauted vowels will appear in the incomplete phase forms of initial stems in compounds: *mœstegi* 'nod with drowsiness' from *mose (mœs)* 'sleep' + *tegi* 'to nod'.

Umlauting aside, there are numerous external reasons supporting Churchward's assumption that the reduplicant is an incomplete phase form. Firstly, the reduplicant in foot reduplication is always a single heavy syllable: ((C)VC, (C)VV, (C)VVC) and these syllable shapes are otherwise *only* found in incomplete phase in Rotuman (excluding loans words.) Secondly, reduplication is considered to be a type of affixation or compounding depending on whether the reduplicant is more affix-like or stem-like in terms of segmental and shape restrictions (Urbanczyk, 2006). McCarthy's (2000) analysis predicts the incomplete phase in compounding by ensuring a heavy syllable at the right edge of every prosodic word. If the reduplicant is assumed to be stem-like, it would form its own prosodic word and would need to end in a heavy syllable which is realized as the incomplete phase. In terms of affixation, Blevins (1994) analyzes reduplication in Rotuman as "the prefixation of a bimoraic foot $[\mu\mu]_{foot}$". All other prefixes

in Rotuman are affixed in their incomplete phase (Churchward, 1940; Schmidt, 2002) Ex. *faka-* 'causative' attaches as *fak-.* In short, the reduplicant can be captured descriptively as a bimoraic foot in its incomplete phase*,* with the exception of umlauted vowels.

Not all Rotuman words are bimoraic and by looking at words that are tri-syllabic in (25) we see that the reduplicant is again a bimoraic foot in the form of a single heavy syllable.

(25.)	Stem		Reduplicated Stem	
	complete	incomplete	complete	incomplete
i. tɑːopɛ	tɑːœp	tɑː-tɑːopɛ	tɑː- tɑːœp
ii. fæɛŋɑ	fæɛaŋ	fæɛ-fæɛŋɑ	fæɛ-fæɛaŋ
iii. furɛʔi	furɛʔ	fur-furɛʔi	fur-furɛʔ
iv. mɑsɑro	mɑsɑr	mɑs-mɑsɑro	mɑs-mɑsɑr
v. tokiri	tokir	tok-tokiri	tok-tokir

The reduplicant could still be a bimoraic foot copied from the left edge of the stem and realized in its incomplete phase: /masa/ is copied from the stem /masaro/ and surfaces in its incomplete phase after attaching to the base: mas-masaro. Similar to disyllabic stems, there is a lack of umlaut in reduplicants of trisyllabic stems, as shown in (25v.). A bimoraic foot, copied from the left edge would produce /toki/ as the underlying reduplicant and for the incomplete phase of this morpheme, we would predict *tøk* since oCi at the right edge of a morpheme is a motivating environment for umlaut cases: oCi → øC Ex. 'to move'*: moli$_{com}$ ~ møl$_{inc}$.* However there is no umlaut in the reduplicant at all. This is not unexpected in Rotuman since previous scholars had noticed the lack of umlaut (Churchward, 1940) in reduplicated forms and typologically, reduplicants often have less marked structures and segments (McCarthy & Prince, 1993, Urbanczyk, 2006). The data in (26) illustrate the fact that the only time umlaut appears in a reduplicant is if the base to which it attaches also has umlaut: *møl-møl.*

(26.) Umlauting oCi → øC

Stem		Reduplicated Stem	
complete	incomplete	complete	incomplete
a) *moli*	*møl*	*mol-moli (*møl-moli)*	*møl-møl*
b) *tokiri*	*tokir*	*tok-tokiri (*tøk-tokiri)*	*tok-tokir*

An interesting problem arises when applying this '*reduplicant as incomplete phase*' generalization to typical metathesis environments in tri-syllabic words. If the reduplicant were to copy the first two syllables from *furɛʔi* (25iii) to form a foot, we would see /furɛ/ as the underlying form of the reduplicant. The vowel sequence here rises in sonority - uCe, which would typically motivate metathesis for the incomplete phase - **fuɛr,* giving a predicted reduplicated form of **fuɛr -furɛʔi* rather than the attested *fur-furɛʔi*. A comparison of similar metathetic vowel contexts (uCe) in disyllabic (a) and poly-syllabic (b) words is given in (27).

(27.) Metathesis uCe→ ueC

Stem		Reduplicated Stem	
complete	incomplete	complete	incomplete
a) *purɛ*	*puɛr*	*puɛr-purɛ*	*puɛr-puɛr*
b) *furɛʔi*	*furɛʔ*	*fur-furɛʔi (*fuɛr-furɛʔi)*	*fur-furɛʔ*

To put this phenomenon in perspective, from the stem list, only six of the 98 tri-syllabic words and none of the seven 4+syllable words had this type of environment. All six are shown in (28).

(28)	complete	incomplete	*Reduplicated form*		Stem gloss
a. funɛʔi	funɛʔ	*fun-funɛʔi*	*(*fuɛn-funɛʔi)*	to take out entrails
b. furɛʔi	furɛʔ	*fur-furɛʔi*	*(*fuɛr-furɛʔi)*	to send word
c. lifoʔi	liføʔ	*lif-lifoʔi*	*(*liof-lifoʔi)*	to cover a native oven
d. ʔinoso	ʔinos	*ʔin-ʔinoso*	*(*ʔion-ʔinoso)*	to be married
e. ʔisɛʔi	ʔisɛʔ	*ʔis-ʔisɛʔi*	*(*ʔiɛs-ʔisɛʔi)*	to elevate leg sideways
f. tʃipɛɑ	tʃipɛɑr	*tʃip-tʃipɛɑ*	*(*tʃiɛp-tʃipɛɑ)*	to spell, read aloud

There is no general word length restriction on metathesis, since it appears in the incomplete phase of unreduplicated trisyllabic words. *man-manɛʔa* → *man-man<u>ɛa</u>ʔ* 'to play'; or *sɔk-sɔkiro* → *sɔk-sɔk<u>ior</u>* 'to examine or scrutinize closely'. There are no prefixes or suffixes with metathetic environments to compare with; however, in compounds, when the initial stem in the compound ends in a sequence of vowels that rise in sonority, it will metathesize to form its incomplete phase: *fiʔa + rere* → *fiaʔrere* 'to squat'. Thus, the lack of metathesis in the reduplicant is particular to trisyllabic stems. However, typologically this phenomenon may not be so unique. There are languages which have different reduplicative patterns for bases larger than the reduplicant target.

This lack of metathesis could inspire an alternate generalization where the reduplicant in foot reduplication copies strictly from left to right enough segments from a base to fill a heavy syllable template, $\sigma_{\mu\mu}$. For example, the first three segments of *furɛʔi* are copied to form a heavy syllable, where coda consonants are moraic, to give *fur-furɛʔi* as the reduplicated form. This '*reduplicant as a heavy syllable template*' generalization would account for all tri-syllabic data in (25) and most cases of di-syllabic stems in (24) however it could not account for disyllabic roots with metathesis environments i.e. (24iii) *pure.* Due to the large number of stems that behave like *pure* when reduplicated, it is more likely that the tri-syllabic gap in metathesis is an exception to the rule of a reduplicant being in its incomplete phase. Additionally, a third hypothesis could be that di-syllabic and tri-syllabic stems have different types of reduplication. This also seems unlikely as there is no input or output difference between disyllabic and trisyllabic reduplication. In other words, reduplicated forms of both stem lengths share all the same meanings and have all the same input parts of speech.

In summary, all foot reduplicants of Rotuman stems, except the tri-syllabic stems with initial vowels that rise in sonority, can be captured by the same generalization: the reduplicant is an incomplete phase form of a bimoraic foot whose segmental content is taken from the left edge of a base. The exceptional trisyllabic cases are explored in Chapter 6.3 with an analysis proposed to account for the different effects of base size (bimoraic vs. tri-syllabic) on metathetic cases. Also addressed in Chapter 6 is the avoidance of adjacent identical consonants in reduplicants and the fact that either both the base and reduplicant have umlaut vowels, or neither do. Before these exceptions are accounted for however, an analysis for basic foot and partial reduplication is proposed in Chapter 5.

5. Reduplication as MinWd Phonology

Classical analyses of reduplication (Marantz, 1982; McCarthy and Prince, 1986) state a specific reduplicative template to capture the generalizations of shape invariance for reduplicants: eg. RED=$\sigma_{\mu\mu}$: *The reduplicant is a heavy syllable.* More recently, McCarthy and Prince (1994a) propose instead Generalized Template Theory, where templatic specification is limited to simply stating the reduplicant is either an affix or a stem and the rest of the prosodic and segmental details result from the interaction of constraints on well-formedness and on reduplicative identity.

The productive form of reduplication in Rotuman, as in *mas-masaro,* was first described by Blevins (1994) as fulfilling a bimoraic foot template, hence the name, foot *reduplication*. However, I will argue here that the pattern found in this type of reduplication is better analyzed using minimal word phonology. The fact that the reduplicant seems to be a bimoraic foot in its incomplete phase suggests that the reduplicant is a minimal prosodic word, since it has been shown that the incomplete phase results from ensuring every prosodic word ends in a heavy main-stressed syllable (McCarthy, 2000).

McCarthy and Prince (1986, 1994b) first introduced the idea of a "reduplicant as a minimal word" to show that the size and shape of a reduplicant is often directly related to the minimal word in a language and thus, the reduplicant is susceptible to any markedness constraints specific to a prosodic word. They demonstrated this with the Australian language Diyari, where the reduplicant has primary stress and will always end in a vowel (p16). These two facts are identical to key characteristics of a minimal prosodic word in Diyari and thus are evidence that the reduplicant is a prosodic word, rather than simply a foot. Similarly, in Rotuman the minimal word is a bimoraic foot (Blevins, 1994) and must end in a main stressed syllable (McCarthy, 2000). By specifying that the reduplicant for foot reduplication is a minimal word rather than just a foot, we can predict a final heavy syllable which is attested. As mentioned in Chapter 4, the

reduplicant shapes in Rotuman foot reduplication cover all possible instantiations of a monosyllabic bimoraic foot ((C)VC, (C)VV, (C)V:), which supports the analysis of reduplicant as a minimal word rather than any bimoraic foot. The only exception to this shape invariance are the few CV reduplicants that are assumed to be foot reduplication that have deleted a coda consonant in order to avoid adjacent identical consonants.

The framework of the following analyses in this thesis is based upon Optimality Theory (OT), which is a model of grammar in which observed forms are derived from the interaction of conflicting constraints on an underlying representation (Prince and Smolensky, 1993; McCarthy and Prince, 1995). The observations for foot reduplication are captured within Optimality Theory by constraints ensuring the reduplicant is both a stem and a prosodic word. The unproductive cases of partial CV- reduplication, on the other hand, are simply affixes and thus not required to be an independent prosodic word. This chapter begins by developing an analysis for basic foot reduplication in 5.1 incorporating constraints proposed by McCarthy (2000) in his analysis of phase to capture the various shapes of the reduplicant, along with those constraints specific to *minimal word* in Rotuman. Following this, section 5.2 proposes an analysis to account for the limited number of partial CV- reduplication cases. Any potential problems to the 'reduplicant as a minimal word' analysis, including the foot *CV-* reduplication cases, are addressed in Chapter 6.

5.1. Foot Reduplication

Within OT, there are a number of constraints used to characterize the shape of reduplication in general, which will interact with constraints specific to Rotuman phonology and morphology. Reduplication is characterized by the attachment of a morpheme of a particular shape - the reduplicant - to a base, from which the reduplicant receives its segmental content. This segmental content of the reduplicant is primarily governed by faithfulness constraints. There is necessarily a relationship between the segments of the reduplicant and the segments of the base to which it attaches and this relationship is captured through *correspondence* similar to that which characterizes the relationship between an input and an output (McCarthy & Prince, 1995, 1999). However instead of correspondence between input and output it is between the reduplicant and its

base – FAITHBR. A fully faithful reduplicant would satisfy the constraint MAXBR, which requires that every element of a base must have a correspondent in a reduplicant and therefore one violation mark is assigned for every segment in the base that does not appear in the reduplicant.

(29) Max-BR: every element of base, B, has a correspondent in the reduplicant, R.

The shape of the reduplicant in foot reduplication could be captured by a high ranking constraint on foot shape, FOOTBIN, where any foot with either more or less than two morae will be assigned one violation mark.

(30) FOOTBIN: A foot is binary in terms of mora or syllables.

(Prince 1980, McCarthy and Prince, 1986.)

However, the reduplicant in foot reduplication cannot be captured with just MAXBR AND FOOTBIN since, as shown in Tableau 5, a fully-faithful reduplicant of a disyllabic word, candidate a. could be selected as a winner, which is unattested in Rotuman.[10]

Tableau 5.   **FOOTBIN AND MAXBR**

/RED + mata /	FOOTBIN	MAX-BR
☞ a. (mata)-(mata)		*
b. (mat)-(mata)		

The attested reduplicant must be a single heavy syllable rather than any bimoraic foot shape. As mentioned in section 3.2, McCarthy proposed the alignment constraint, ALIGN-HEAD-σ, to capture the fact that the incomplete phase is characterized by a heavy syllable in final position of a prosodic word.

(31) ALIGN-HEAD-σ: a main stressed syllable is final in every prosodic word.
(McCarthy, 2000)

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[10]   except in songs and poetry, as mentioned in 4.1.

This constraint can be logically extended to reduplication once the relationship between reduplicants and prosodic words is formally defined. A templatic approach could utilize Blevins' (1994) analysis that the reduplicant is a bimoraic foot template, which she notes is equivalent to the minimal word.

(32) Reduplicative template   (Blevins, 1994, p 501)
     Prefix: [μ μ] $_\Sigma$ (=minimal word)

However, assigning a specific template can be avoided within Generalized Template Theory while still capturing Blevins' original observation that the reduplicant is equivalent to a minimal word. The undominated constraints RED$_F$=STEM and STEM=PRWD, along with NonRec(PrWd) do just this by ensuring that every reduplicant in foot reduplication will be an independent prosodic word.

(33) RED$_F$=STEM : The reduplicant in foot reduplication is a stem.
(34) STEM=PRWD : A stem equals a prosodic word.
(35) NONREC(PRWD): prohibits recursion of the category PrWd

In the interest of saving space, the first two constraints (33-34) will be collapsed into one for the prosody of reduplicants – REDPROSCON – which is still undominated. With the prosodic word defined for the reduplicant, we can now see how McCarthy's alignment constraint ranks with other constraints in reduplication. Tableau 6 shows that the markedness constraint ALIGN-HEAD-σ must outrank the faithfulness constraint MAX-BR to ensure that the less faithful bimoraic foot is selected as the winner since it satisfies the highly ranked markedness constraint ensuring a stressed final syllable in every prosodic word.

Tableau 6.   *ALIGN-HEAD-σ >> MAX-BR*

/RED + masaro /	ALIGN-HEAD-σ	MAX-BR
☞a. {(más)}-{ma(sar)}		**
b. {(mása)}-{ma(sar)}	*!	*

With its general shape now accounted for, we can focus on location and specific segmental content of the reduplicant. The fact that it attaches to, and copies material

from, the left edge of the base is ensured by an anchoring constraint, ANCHORL, where the left peripheral element of R (reduplicant) corresponds to the left peripheral element of B (base), if R is to the left of B. Since the reduplicant is always at the left edge of the base and never skips any elements of the base, this constraint is also undominated along with REDPROSCON and NONREC(PRWD).

(36) ANCHORL: the left peripheral element of R corresponds to the left peripheral element of B, if R is to the left of B.

The constraint ranking for foot reduplication thus far (37) ensures the general shape and location of the reduplicant and parallels McCarthy's (2000) analysis of phase alternation by ensuring that a reduplicant in foot reduplication will be its own prosodic word that ends in a heavy stressed syllable and is attached to the left edge.

(37) ANCHORL, REDPROSCON, FOOTBIN, ALIGN-HEAD-σ >> MAX-BR

Turning now to segmental specifics, the syllable shape of the reduplicant is predicted, for the most part, by the sonority of the final two vowels in the same way the incomplete phase shape is predicted in McCarthy's analysis of incomplete phase formation (§3.2.2). McCarthy shows that the ranking LIGHTDIPH >> MAXIO >> LINEARITYIO correctly predicts the preference for metathesis at the end of a prosodic word, as long as the resulting diphthong in the closed syllable is of rising sonority. McCarthy states that the complete and *in*complete phase are both in correspondence with the input and thus the relationship is one of Input-Output (IO) correspondence (p170). However, he has no need to indicate this explicitly in the naming of constraints as this is the only relationship he focuses on. In contrast, in this analysis of reduplication we need to distinguish between correspondence in faithfulness of the input and output forms (MAXIO) as well as faithfulness of the base and reduplicant (MAXBR). For the whole reduplicated form in its *in*complete phase, this same ranking will predict the attested form. For example, the candidates in Tableau 7 all satisfy MaxBR since each base is fully realized in its reduplicant, but the base in winning form for the metathesis environment (*candidate a)* is most faithful to its input (the complete phase of the stem) at the expense of violating lower ranked constraint against metathesis. For deletion cases (e.g. *talu)*, the candidate with the less faithful base (candidate d.) is correctly selected as the winner since the

more faithful base (in candidate c.) fatally violates the constraint ensuring only rising sonority for light diphthongs.

Tableau 7. **LIGHTDIPH >> MAXIO >> LINEARITYIO**

Input	Output	LIGHTDIPH	MAXIO	LINEARITYIO
/RED + toka /	☞a. {(toak)}-{(toak)}			*
	b. {(tok)}-{(tok)}		*!	
/RED + talu/	c. {(taul}-{(taul)}	*!		*
	☞d. {(tal)}-{(tal)}		*	

However when a reduplicated form is in its complete phase (i.e. when followed by a monomoraic suffix, which is represented in the Tableaux by the null suffix -$\varnothing_\mu$[11]) we can see the interaction of the base-reduplicant versions of both faithfulness constraints: MAX-BR and LINEARITY-BR. Tableau 8 shows the crucial ranking of LIGHTDIPH >> MAX-BR >> LINEARITY-BR since a reduplicant with metathesis is only successfully selected as the winner over the less faithful reduplicant when it contains a light diphthong (candidate a.). When metathesis would result in a heavy diphthong in the reduplicant, deletion is preferred (candidate d).

Tableau 8. **LIGHTDIPH >> MAX-IO, MAX-BR >> LINEARITY-IOO, LINEARITY-BR**

Input	Output	LIGHTDIPH	MAX-IO	MAX-BR	LINEAR-IO	LINEAR-BR
/RED + toka -$\varnothing_\mu$ /	☞a. {(toak)}-{(toka)-$\varnothing_\mu$}					*
	b. {(tok)}-{(toka)-$\varnothing_\mu$ }			*!		
/RED + talu -$\varnothing_\mu$ /	c. {(taul}-{(talu)-$\varnothing_\mu$ }	*!				*
	☞d. {(tal)}-{(talu)-$\varnothing_\mu$ }			*		

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[11]   The null suffix, which could theoretically be replaced with another monomoraic suffix, will not be footed as it would violate the highly ranked FootBin constraint if footed alone {(toak)}-{(toka)-($\varnothing_\mu$)} or if sharing the same foot as the base {(toak)}-{(toka-$\varnothing_\mu$)}. Forms such as {(toak)}-{ to(ka-$\varnothing_\mu$)} , where the null suffix shares a foot with the final syllable of the base will fatally violate the undominated constraint TautoFoot which ensures a foot only contains a single morpheme. With a reanalysis of McCarthy's (2000) work on *phase* there could be alternate reasons for not including the monomoraic suffix in a foot.

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Heavy diphthongs do appear in reduplicants of words in their complete phase, as long as they are in open syllables. Similarly, in the incomplete phase heavy diphthongs are common but typically limited to the final syllable in a prosodic word. McCarthy captured the preference for simple open syllables in Rotuman (especially in the complete phase) with a constraint ensuring monomoraic syllables. This constraint, SYLL=µ, is an umbrella constraint encompassing NODIPHTHONG and NOCODA to account for the fact that any type of heavy syllable is relatively marked in Rotuman. Tableau 9 shows that heavy diphthongs are only acceptable in order to satisfy the alignment constraint, ALIGN-HEAD-σ. If the markedness constraint SYLL=µ were not dominated by ALIGN-HEAD-σ, a reduplicant with two syllables would be predicted to occur, which is unattested.

(38) SYLL=µ: Syllables are monomoraic   (McCarthy, 2000: 152)

Tableau 9.   ALIGN-HEAD-*σ* >> SYLL=*µ*

/RED + su.i -∅µ /	ALIGN-HEAD-σ	SYLL=µ
☞a. {(sui)}-{(su.i)-∅µ}	*	*
b. {(su.i)}-{(su.i)-∅µ}	*!*	

Other attested reduplicants with heavy open syllables, i.e. those with long vowels, will violate SYLL=µ assuming it includes a constraint against long vowels - NOLONGVOWEL. However, these reduplicants are still predicted within this ranking as they will satisfy the higher ranked constraint ensuring foot-binarity as shown in Tableau 10.

Tableau 10.   FOOTBIN >> SYLL=*µ*

/RED + ree /	FOOTBIN	SYLL=µ
☞a. {(ree)}-{(ree)}		**
b. {(re)}-{(ree)}	*!	*
c. {(re)}-{(re)}	*!*	
c. {(ree)}-{(re)}	*!	*

The shape and segmental properties, as well as the placement, of the reduplicant in foot-reduplication have now been accounted for by the following constraint ranking where the constraints to the left of the vertical line dominate those to the right of the line.

| (39) | REDPROSC, ANCHORL, LIGHTDIPH, FOOTBIN, ALIGNHEAD-σ | SYLL=μ, MAXIO, MAXBR | LINEARITY IO, LINEARITYBR |

The results of these rankings are summarized in Tableau 11, which successfully accounts for cases of Rotuman foot reduplication of mono- and di-syllabic stems including those with typical deletion and typical metathesis environments. As umlaut environments behave differently in foot reduplication than in phase, these cases will be addressed in Chapter 6. As Tableau 11 demonstrates, reduplicants that are not independent prosodic words (candidates f. and l.) fatally violate the undominated constraint REDPROSCON and those that attached to the end of a word (candidates e. and k.) fatally violate the undominated anchoring constraint ANCHORL. Reduplicants with ill-formed feet (candidates d. and j.) fatally violate highly ranked FOOTBIN and those that do not have the main stress final (candidates c. and i.) fatally violate ALIGNHEAD-σ. For deletion cases, /RED + talu -$\varnothing_\mu$/, the winning form (candidate a.) violates the faithfulness constraint MAXBR as well SYLL=μ, but does not violate any of the higher ranked constraints that crucially dominate MAXBR. If LIGHTDIPTHONG were not crucially ranked above MAXBR, a candidate with a more faithful reduplicant (candidate b.) could be selected was the winner, which is unattested. For reduplicants with metathetic environments, /RED + pure - $\varnothing_\mu$/, the winning from (candidate g.) has the most faithful reduplicant that also satisfies the highly ranked prosodic requirements. If LINEARITY were ranked above MAXBR, the candidate with a less faithful reduplicant (candidate h.) would be selected as the winner, which is unattested.

Tableau 11.   Basic Foot Reduplication Summary Tableau

Input	Output	REDPROS CON	ANCHORL	FOOTBIN	ALIGN-HEAD-σ	LIGHT DIPH	SYLL=μ	MAXBR	LINEARITY-BR
/RED + talu -∅μ/	☞ a. {(tal)}-{(talu)-∅μ}				*		*	*	
	b. {(taul)}-{(talu)-∅μ}				*	*!	*		*
	c. {(tálu)}-{(talu)-∅μ}				*!*				
	d. {(ta)}-{(talu)-∅μ}			*!	*			**	
	e. {(tálu)-∅μ }-{(lu∅μ)}		*!		*		*	**	
	f. (tal)-{(talu)-∅μ}	*!			*		*	*	
/RED + pure -∅μ/	☞ g. {(puer)}-{(pure)-∅μ}				*		*		*
	h. {(pur)}-{(pure)-∅μ}				*		*	*!	
	i. {(púre)}-{(pure)-∅μ}				*!*				
	j. {(pu)}-{(pure)-∅μ}			*!	*			**	
	k. {(pure)-∅μ}-{(re∅μ)}		*!				*	**	
	l. (puer)-{(pure)-∅μ}	*!			*		*		*

Thus far, the majority of the data used to motivate the constraint ranking for Rotuman reduplication has consisted of disyllabic stems. Trisyllabic stems however, when reduplicated are susceptible to some additional constraints. To account for the selection of typical deletion cases in phase alternation (*rák* over **rók* for the incomplete phase form of *rako),* McCarthy (2000) proposed the constraint HEADMATCH, which ensures two forms have their main stressed vowels in correspondence and this constraint is ranked above MAXIO.

(40) HEADMATCH-OO: If α is in H˘(PrWd) and $\alpha\mathcal{R}\beta$, then β is in H˘(PrWd)

However with trisyllabic stems, the main stressed vowel in the base will never be in correspondence with the stressed vowel in the reduplicant. Thus, a version of this constraint specific to the correspondence between a base and reduplicant – HEADMATCHBR - will be ranked below MAXBR, while the version specific to the

incomplete/complete phase correspondence, HEADMATCHOO, will still dominate MAXIO (and MAXBR).

(41) HEADMATCH-BR: If α is in H˙(PrWd) and $\alpha\Re\beta$, then β is in H˙(PrWd)

Tableau 12. *HEADMATCH-OO >>MAXIO, MAXBR >> HEADMATCHBR*

Input	Output	ANCHORL	ALIGN-HEAD-σ	LIGHT DIPH	HEADMATCHOO	MAXIO	MAXBR	LINEARITY-BR	HEADMATCHBR
/RED + tapéʔi/	☞a. {(tap)}-{ta(peʔ)}					*	**		*
	b. {(tep)}-{ta(peʔ)}					*	**	*!	
	c. {(tap)}-{ta(peiʔ)}			*!			***		*
	d. {(tap)}-{(tápe)ʔi}		*!		*		***		
	f. {(peʔ)}-{ta(peʔ)}	*!				*	**		

Additionally, the constraint PARSE-SYLL, which ensures that every syllable is parsed into a foot, is required to rule out total reduplication of trisyllabic stems.

(42) PARSE-SYLL:　　All syllables must be parsed into feet

Tableau 13 illustrates how reduplicants which retain all three syllables and parse them in the same foot, fatally violate the highly ranked constraint ensuring foot binarity, FOOTBIN (candidate d). Additionally, parsing the third syllable into its own foot (candidate e.) also fatally violates FOOTBIN. The only other possibilities are (i) to leave the third syllable in the reduplicant unparsed, (candidate c.) fatally violating PARSESYLL, or (ii) to only copy enough material for a bimoraic foot (candidates a & b.) which is the attested reduplicant size. The winning candidate (a.) with a less faithful reduplicant *sak-*, is selected over candidate b. to avoid a heavy diphthong in the reduplicant, *saok-*.

Tableau 13.   FOOTBIN, PARSE-SYLL, LIGHTDIPH >> MAXBR >> LINEARITYBR

Input: *RED+sakoto-$\varnothing_\mu$*	FOOTBIN	PARSE-SYLL	LIGHTDIPH	MAXBR	LINEARITYBR
☞a. *{(sak)}-{sa(koto)-$\varnothing_\mu$ }*		*		***	
b. *{(saok)}-{sa(koto)-$\varnothing_\mu$ }*		*	*!	**	*
c. *{sa(kot)}-{sa(koto)-$\varnothing_\mu$ }*		**!		*	
d. *{(sakot)}-{sa(koto)-$\varnothing_\mu$ }*	*!	*		*	
e. *{(sa)(kot)}-{sa(koto)-$\varnothing_\mu$ }*	*!	*		*	

Through transitivity, the ranking listed in (43) can successfully account for typical foot reduplication of disyllabic and trisyllabic stems in Rotuman. The atypical cases of CV-foot reduplication and the divergences from typical incomplete phase behaviour for umlaut cases and certain metathesis cases in foot reduplication are explored in Chapter Six after an account of partial CV- reduplication.

(43)   REDPROSC, ANCHORL,
LIGHTDIPH, FOOTBIN,
ALIGNHEAD-σ,   SYLL=μ,   LINEARITYIO,
HEADMATCHOO,   MAXIO,   LINEARITYBR   HEADMATCHBR
PARSESYLL   MAXBR

5.2. Partial CV Reduplication

For partial *CV* reduplication, the reduplicant is not a stem and therefore does not need to fulfill the minimal word constraint of being a foot. Being simply an affix, the partial *CV-* reduplicant will never be required to satisfy the markedness constraint ALIGN-HEAD-σ, which motivates the shape of the foot reduplicant and of the incomplete phase*,* as the reduplicant in partial reduplication will never appear final in a prosodic word. Instead the *partial CV-* reduplicant will share the same prosodic word as its base and its shape is dictated by general Rotuman phonology constraints. As mentioned in Chapter 3, coda consonants are not only marked typologically but also marked in Rotuman since, aside from loanwords, closed syllables are restricted to morpheme-final position in the

incomplete phase. As mentioned in 5.1, the constraint used by McCarthy, SYLL=μ, entails the constraint prohibiting coda consonants, NoCODA. While previously (i.e. in Tableau 10) there was no crucial ranking between SYLL=μ and MAX-BR, Tableau 14 illustrates the crucial ranking of the markedness constraint, NoCODA above the faithfulness constraint MAX-BR, to prevent the reduplicant in partial reduplicant from ever containing a coda consonant.

Tableau 14. NoCODA >> MAX-BR

/RED$_P$ + fisi-∅$_μ$/	NoCODA (IN SYLL=μ)	MAX-BR
☞a. {fi-(fisi)-∅$_μ$}		**
b. {fis-(fisi)-∅$_μ$}	*!	*

A number of constraints are required to prevent a fully-faithful reduplicant (i.e. *fisi-fisi*) from surfacing for partial reduplication in its complete phase, namely: a constraint ensuring all feet are aligned with the right edge (ALLFTR) and a constraint ensuring tautomorphemic feet that assigns one violation for every foot encompassing two or more morphemes.

(44) ALLFTR: Align (Ft, Right, PrWd, Right)
        Every foot stands the right edge of the prosodic word.

(45) TAUT-F: Feet are tautomorphemic.

Tableau 15 illustrates the relevant constraint ranking for *partially* reduplicated forms both in complete and incomplete phase. In its incomplete phase, a reduplicated form with a CV syllable reduplicant (candidate a.) will be selected over a fully-faithful reduplicant (candidate b.) due to the crucial ranking of SYLL=μ over MAXBR. For partially reduplicated forms in the complete phase, again a CV reduplicant (candidate g.) will be selected over a fully faithful reduplicant (candidate h.) due to the crucial ranking of ALLFTR and TAUTOF over SYLL=μ and MAXBR. PARSESYLL was shown to crucially dominate MAXBR in foot reduplication for trisyllabic stems, however it is not crucially ranked with SYLL=μ.

Tableau 15. Partial CV- Reduplication

Input	Output	AʟʟFᴛR	TᴀᴜᴛoF	RᴇᴅPʀᴏsCᴏɴ	AɴᴄʜᴏʀL	FᴏᴏᴛBɪɴ	Aʟɪɢɴ-Hᴇᴀᴅ-σ	Sʏʟʟ=μ	PᴀʀsᴇSʏʟʟ	MᴀxBR
/REDp + /fisi/	☞a. {fi-(fis)}							*	*	*
	b. {fis-(fis)}							*!*	*	
	c. {fi-(fisi)}						*!		*	**
	d. {(fi)-(fis)}	*!				*				*
	e. {(fisi)-si}	*!			*		*		*	**
	f. {(fisi)-(fisi)}	*!					*			
/REDp + /fisi-∅μ/	☞g. {fi-(fisi)-∅μ}	*					*		*	**
	h. {(fisi)-(fisi)-∅μ}	*,*!*					*			
	i. {fis-(fisi)-∅μ}	*					*	*!	*	*
	j. {(fi-fi)(si-∅μ)}	*	*!*				*			**
	k. {(fi)-(fisi)-∅μ}	*,*!*				*	*			**
REDp + /masaro-∅μ/	l. {ma-ma(saro)-∅μ}	*					*		**	
	m.{(ma-ma)(saro)-∅μ}	*,*!*	*				*			

As mentioned in Chapter 4 there were no trisyllabic stems from the Dictionary that underwent partial CV reduplication. This could be due to TautoFoot which would be fatally violated by candidates such as: *(ma-ma)(saro) or a constraint on the maximal size of a prosodic word: {ma-ma(saro)}. If partial *CV*-reduplication of trisyllabic stems were acceptable, the hypothetical example given in the final rows of Tableau 15 show that a form with a single foot and two unparsed syllables {ma-ma(saro)} would be predicted to be the most harmonic candidate.

Thus the following constraint ranking provides a general OT analysis of both basic foot reduplication cases and the limited number of partial CV reduplication cases. The constraint(s) to the left of a solid line crucially dominate the constraint(s) to the right of the line.

(46)	ALLFTR, TAUTOM, REDPROSCON, ANCHORL, FOOTBIN, ALIGNHEAD-σ, LIGHTDIPH, HEADMATCHOO	SYLL=μ, PARSESYLL	MAXIO, MAXBR	LINEARITYIO, LINEARITYBR	HEADMATCHBR

6.   Problems for MinWd Analysis

While a minimal word analysis seems to account for the basic patterns of foot reduplication, there are some potential problems. There are a number of reduplicants in foot reduplication that do not fulfill a bimoraic foot due to the avoidance of adjacent identical consonants but are still considered to be prosodic words in and of themselves. Additionally, typical prosodic words in Rotuman have umlauted vowels in their final syllables when ending with a back-front vowel sequence that falls in sonority (uCi, oCe, oCi, ɔCi). In the reduplicant, however, this is not the case, due to a stronger preference for the reduplicant and base to be in more faithful correspondence. Lastly, there are a select number of trisyllabic stems whose reduplicants would seem to have ideal environments for metathesis but undergo deletion instead. This phenomenon is due to Rotuman stress and positional faithfulness where only unstressed syllables are eligible for metathesis. The following chapter outlines these potential problems and offers OT analyses to account for the three different patterns. This chapter ends by offering a complete ranking for all cases of reduplication in Rotuman.

6.1. Antigemination Effects

As mentioned in Chapter 4, there are a number of CV reduplicants that can be analyzed as foot-reduplication even though they do not have well-formed feet. These forms appear to have undergone deletion in order to avoid adjacent identical consonants, which could be described as *anti-gemination*. This term was first used by McCarthy (1986) to describe instances where syncope fails to apply between consonants in order to avoid adjacent identical consonants. A geminate consonant is a consonant that is of longer duration than a non-geminate consonant (i.e. a short consonant or *singleton*). Keer (1999) demonstrates two possible phonological representations of a geminate: (1) a *single* geminate where a single melody (C) is associated with two timing units (X) and (2) a *pair* geminate which consists of two adjacent identical consonants. Keer argues that

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single geminates are the only type to appear tautomorphemicly while *pair* geminates can appear both within and across morpheme boundaries.

(1) Single geminate: X X[12]   (2) Pair geminate: X X
                                      \ / | |
                                         C   C C
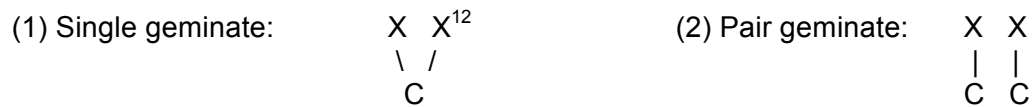
Figure 5.   ***Geminate Types (adapted from Keer, 1999)***

Rose (2000), on the other hand, indicates that the geminate in (2) (her 'fake' geminate) results from concatenation of morphemes or from syncope while the double linked structure in (1) (her 'true' geminate) occurs underlying or may be produced through total assimilation of one consonant to another. This latter case, where a 'true' (*single)* geminate arises from total assimilation could be the interpretation Churchward was referring to in his initial description of these CV foot reduplicants. He indicated that the coda consonant of the reduplicant and the onset of the base "coalesce into one" (1940, p 103).

If adjacent identical consonants are avoided in Rotuman, then those that result from reduplication, i.e. *pair* or *fake* geminates, could be repaired by either i) becoming a doubly-linked as a *single/true* geminate via coalescence; or ii) by deleting one of the consonants. There is no indication in the Dictionary or in consultation with a native speaker that there is a salient length distinction to suggest a true/single geminate in these cases or in any other environment in Rotuman morpho-phonology. Thus, geminates in any form, are presumed to be prohibited in Rotuman.

While many antigemination analyses focus on cases where syncope fails to apply in order to avoid adjacent identical consonants (McCarthy 1986; Blevins, 2005), Urbanczyk (1999) uses the term *anti-gemination* to describe a phenomenon in a Salish language, Lushootseed, that is nearly identical to Rotuman. In Lushootseed, CVC reduplication is used productively for *distributive* meaning; however, if prefixing the CVC reduplicant to a stem results in adjacent identical consonants, only CV to attach to the

[12] X is used to represent a timing unit which could be either i) syllable positions i.e. σ & μ nodes *a la* Moraic Theory (for details see Hyman, 1984; Hayes, 1986; McCarthy & Prince 1986 in Keer 1999) or (ii) root nodes as in Two Root Theory (see Selkirk, 1990 in Keer, 1999).

base: *c'i - c'ic'al-b* rather than **c'ic' - c'ic'al-b.* To account for this anti-gemination, Urbanczyk proposes two constraints to rule out geminate structures: the Obligatory Contour Principle (OCP) and NoLink. Her OCP constraint (Leben 1973; Goldsmith 1976; McCarthy 1986 in Urbanczyk 1999) rules out adjacent identical consonants that are separate segments (i.e. pair or fake geminates) while NoLink is a constraint prohibiting any linked structures such as, in this case, ruling out doubly linked geminates (i.e. single/true geminates.)

(47) OCP: at the melodic level, adjacent identical elements are prohibited.

(48) NoLink: * •   •
                       \ /
                        α   (Selkirk 1984 in Urbanczyk, 1999)

Figure 6 is repeated from Urbanczyk's (1999) constraint ranking for anti-gemiantion in the Lushootseed Distributive reduplicant. She argues that 'gemination' (in this case candidate b.) satisfies the OCP by "linking identical melodemes, but it violates NoLink" (p. 516). However 'antigemination', i.e. candidate c, satisfies both the OCP and NoLink as there is only one segment and it is not doubly linked. The winning candidate (c.) does however violate the lowly ranked faithfulness constraint specific to the distributive copy of the stem.

(34)   OCP, NoLink ≫ MAX-DIST

	OCP	NoLink	MAX-DIST
a. c'ic'c'ic'al	*!		**
b. c'ic'c'ic'al V		*!	**
c. ☞ c'ic'ic'al			***

Figure 6.   Antigemination in Lushootseed Distributive Reduplication
(from Urbanczyk, 1999)

While geminates are quite rare in Lushootseed, there are a few which are limited to $g^w g^w$ *qq* and *ll,* making it necessary for Urbanczyk to use the constraints OCP and NoLink to distinguish between adjacent identical consonants and those that are linked to form geminates. However in Rotuman there is no evidence of geminates of any form and while the analysis used by Urbanczyk would account for antigemination in Rotuman, a single constraint ruling out geminates would also suffice and be more economical. Bakovic (2005) accounts for antigemination with the constraint NOGEM which penalizes "all basic ('true') and derived ('fake') geminates, regardless of how these are to be represented and whether they are to be represented differently" (p283). Thus the constraint chosen for this analysis, which assigns one violation mark for every instance of two adjacent identical consonants whether they are doubly linked or are each associated with their own timing slots, is defined as following:

(49) NOGEM: adjacent completely identical consonants – geminates, in any representation – are prohibited.

The markedness constraint NoGem interferes with realizing the reduplicant as minimal word by preventing a bimoraic foot. Blevins (1994) proposes that underlyingly all mono-syllabic words will undergo vowel lengthening to form a bimoraic minimal word in the output (complete phase). As this is not an option for reduplicants, a constraint preventing vowel lengthening between the base and reduplicant is required.

(50) DEP-μ-BR: Moras in the reduplicant have base correspondents.

The antigemination constraint, NOGEM, will outrank the faithfulness constraint MAX-BR, as shown in Tableau 16. Candidate b., with two adjacent identical consonants fatally violates NOGEM and candidate c, with a coalesced (double-linked) segment also fatally violates NOGEM. Candidate d., in which the reduplicant has a lengthened vowel to satisfy FOOTBIN, fatalliy violates DEP-μ-BR. The winning candidate (a.), satisfies NOGEM at the expense of a second MaxBR violation by deleting one of the offending adjacent consonants. By deleting the additional segment, the resulting foot in the reduplicant is ill-formed and thus violates FOOTBIN.

Tableau 16.   NoGem, Dep-μ-BR >> FootBin>> MaxBR

RED + *fufi-∅μ*	NoGem	Dep-μ-BR	FootBin	MaxBR
☞a. {(fu)}-{(fufi)-∅μ }			*	**

b. {(fuf)}-{(fufi)-∅μ }
  | |
  X   X
	*!			*

c. {(fuf)}{(fufi)-∅μ }
   V
   X
	*!			*

d. {(fuː)}{(fufi)-∅μ }		*!		

The constraint ranking thus far for foot reduplication (51) has the anti-gemination constraint NoGem undominated, enabling a reduplicant to surface which does not conform to the minimal word in Rotuman. In (51), constraints to the left of a solid line crucially dominate those to the right, for each stratum.

(51) REDPROSCON,
      ANCHORL,
      ALIGNHEAD-σ,
      LIGHTDIPH,   FOOTBIN | SYLL=μ | PARSESYLL | MAXIO, | LINEARITYIO, | HEADMATCHBR
      HEADMATCHOO,   MAXBR   LINEARITYBR
      NOGEM,
      DEP-μ-BR

In sum, what seems like a problem for minimal word phonology – ill-formed feet - is accounted for by a well-established ranking result involving anti-gemination.

6.2. Umlaut in Reduplication: *All-or-Nothing*

In Rotuman, the vowels *œ ø y a* have a very limited distribution in that they are restricted to closed syllables in the incomplete phase. These vowels would be expected to appear in the appropriate environments (oCe, oCi, uCi, and ɔCi respectively) in foot-reduplication since reduplicants and the incomplete phase both share the characteristic

of having a heavy syllable at the end of a prosodic word. However, the umlauted vowels do not appear in reduplicants unless the base is also in the incomplete phase, as shown by the data in (52). This under-application of umlaut is due to a preference to have faithful correspondence between the base and reduplicant.

(52.)   Umlauting oCi → øC

Stem		Reduplicated Stem	
complete	incomplete	complete	incomplete
moli	*møl*	*mol-moli* (*møl-moli)	*møl-møl*

In Chapter 5, McCarthy's (2000) OT analysis for the phase-forming processes of deletion and metathesis were extended to the reduplicant in foot reduplication. His analysis of the third phase formation process, 'umlaut', centres around the ranking: MAXIO >> UNIFORMITYIO, LINEARITYIO. As mentioned in Section 3.2, the process of umlaut is characterized by coalescence which is assumed in reduplication, as is by McCarthy for phase, to be segmentally-based. This means that coalescence does not violate the faithfulness constraint MAX since every input segment has a correspondent in the output. However, coalescence does violate LINEARITY since vowels can only coalesce once they are adjacent after undergoing metathesis. Coalescence also violates UNIFORMITY which prohibits two or more segments from sharing a correspondent and is only possible with final vowel combinations that fall in sonority where the penultimate is a back vowel and the ultimate is front. The resulting vowel will be identical to the penultimate vowel in height and roundedness but have the frontness of the final vowel. McCarthy does not elaborate on the specific IDENTITY constraints interacting to preserve the appropriate vowel features of each vowel involved but the most relevant IDENTITY constraint is IDENT[back].

(53) IDENT[back]:   Correspondent vowels are identical for the feature [back].

Because umlauted vowels appear in the incomplete phase of un-reduplicated forms, IDENT[back]-IO, which ensures that the back feature is identical for correspondents in the complete and *in*complete phase will ranked below all other constraints discussed in this analysis. However, the lack of umlaut in the reduplicant results from IDENTBR[BACK] - ensuring correspondent vowels in the base and reduplicant

share the same value for the feature [back] - being ranked above the constraint prohibiting deletion, MAXBR. It is preferable to undergo metathesis than to delete a segment as shown by McCarthy's (2000) analysis for the incomplete phase briefly outlined in Chapter 3 (ALIGNHEAD-σ >> MAXIO >> LINEARITYIO). However as we are dealing with a different set of faithfulness constraints (FAITH BR), this is not necessarily true for reduplication. In reduplication, preserving the identity of a base-correspondent in the reduplicant is more important than having every segment realized, as predicted by the constraint ranking: IDENTBR[BACK] >> MaxBR.

Tableau 17.   MAXIO, IDENTBR[BACK] >> MAXBR, LINEARITYIO, UNIFORMITYIO

Input	Output	MAXIO	IDENTBR[BACK]	MAXBR	LINEARITYIO/ UNIFORMITYIO
RED + *mose-*∅_μ	☞a. {*(mos)*}-{*(mose-*∅_μ*)*}			*	
	b. {*(mœs)*}-{*(mose-*∅_μ*)*}		*!		
RED + *mose*	c. {*(mos)*}-{*(mos)*}	*!			
	☞d. {*(mœs)*}-{*(mœs)*}				*
	e. {*(mos)*}-{*(mœs)*}		*!	*	*
	f. {*(mœs)*}-{*(mos)*}	*!	*		

The first half of Tableau 17 shows the crucial ranking of IDENTBR[BACK] over MAXBR for reduplicated forms in the complete phase. Candidate a., which has a segment deleted in the reduplicant, is selected as the winner as it only violates the lower ranked MAXBR. The unsuccessful candidate (b.) fatally violates the higher ranked IDENTBR[BACK] as the penultimate vowel in the base '*o*', does not have the identical feature for [back] as its correspondent in the base, '*œ*'. For reduplicated forms in their incomplete phase*,* however, deletion is less optimal, as shown in the lower half of Tableau 17. The preference to maximize the input in the incomplete phase form of the base results in metathesis and coalescence of the two vowels. By metathesizing the final syllable of the incomplete phase, the winning candidate (d.) has maximal correspondence from input to output (IO) and the base is maximally expressed in the reduplicant (BR). Unsuccessful candidates (c, e & f) either delete a vowel in the

incomplete phase and thus fatally violate the higher ranked constraint MAXIO (candidate c.), or have an umlauted vowel in only one of the reduplicant or base, causing a lack of identity in backness between the base and reduplicant (i.e. violate IDENTBR[BACK]).

Thus, the lack of umlaut in reduplicants is attributed to a greater preference for base-reduplicant identity faithfulness. The new ranking (54) for Rotuman foot reduplication now requires MAXIO to crucially dominate MAXBR, as shown in Tableau 17, whereas previously they shared the same stratum.

(54)

REDPROSCON, ANCHORL, ALIGNHEAD-σ, LIGHTDIPH, HEADMATCHOO NOGEM, DEP-μ-BR	FOOTBIN	SYLL=μ, MAXIO, IDENTBR[BACK], PARSESYLL	MAXBR, LINEARITYIO, UNIFORMITYIO	LINEARITYBR	HEADMATCHBR

Here, the lack of umlaut in the final syllable of a prosodic word, which seems to be a problem for the minimal word phonology analysis of reduplication is simply a well-established ranking effect of B-R identity faithfullness.

6.3. The Effect of Base Size on Metathesis

Another interesting divergence from the predicted reduplicant shape involves stems with metathetic environments. Metathesis occurs at the final edge of a prosodic word for disyllabic stems where the penultimate and ultimate vowels in a VCV# sequence rise in sonority: /purɛ/ → [puɛr]. The reduplicant, as a minimal word (bimoraic foot), can copy the entire stem of a disyllabic word allowing metathesis to occur at the edge of the reduplicant regardless of whether the base has metathesized: /Red + purɛ/ → [{puɛr}-{puɛr}]ᵢₙc ~ [{puɛr}-{purɛ+∅μ}]comp. However, the same does not apply to trisyllabic stems. If a vowel sequence rising in sonority is copied from the base of a trisyllabic stem to fill a minimal word reduplicant, there will not be any metathesis (55b). In other words, even

though the underlying form for a minimal-word-reduplicant from the stem *furɛʔi* would be /furɛ/ we see [fur- furɛʔi] rather than *[fuɛr-furɛʔi].

(55.)   Metathesis uCe→ ueC

	Stem		Reduplicated Stem	
	complete	incomplete	complete	incomplete
a)	*purɛ*	*puɛr*	*puɛr-purɛ*	*puɛr-puɛr*
b)	*furɛʔi*	*furɛʔ*	*fur-furɛʔi (*fuɛr-furɛʔi)*	*fur-furɛʔ*

These differing results are reflected in conflicting constraint rankings: the appropriate constraint ranking of MAXBR >> LINEARITYBR for disyllabic stems conflicts with that which would capture trisyllabic stems, LINEARITYBR >> MAXBR. In Rotuman reduplication, it is preferable to maintain faithfulness at the cost of linear order as demonstrated for disyllabic stem MAXBR >> LINEARITYBR. In this case, the segments undergoing metathesis are members of an unstressed syllable (eg. '*rɛ*' in *púrɛ)*. However, in stems larger than two syllables, the segments that would participate in metathesis are members of a stressed syllable- *furɛ́ʔi*. It is well-established that the properties of heads are preserved over non-head elements (Beckman, 1997). An example of positional faithfulness was previously discussed in Chapters 3 and 5, where McCarthy (2000) proposed the constraint HEADMATCH – ensuring that the head syllable in complete phase matches that in the incomplete phase – to account for the fact that a stressed vowel is never deleted to form an incomplete phase form. i.e. *ráko → rák *rók*. For the trisyllabic stems undergoing reduplicaiton, positional faithfulness is captured by a constraint ensuring the linear order of segments in a head syllable.[13]

(56)   LINEARHEAD-BR: No segment reversal within the head syllables of reduplicant-base correspondence.

With this head specific anti-metathesis constaint LINEARITYHEADBR ranked above the anti-deletion constraint MAXBR and anti-metathesis constraint LINEARITYBR, the

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[13] Two alternate analyses of base effects for metathesis in foot reduplicaiton are presented in Appendix C.

observed forms are selected as winners. In Tableau 18, the reduplicant with deletion (candidate a.) fatally violates MAXBR, leaving the metathesis as the preferred form (candidate b.) However, for trisyllabic stems, the reduplicant with metathesis (candidate d.) fatally violates LINEARHEADBR since the main stressed syllable of the base *rɛ* undergoes metathesis in the reduplicant. This leaves the reduplicant with deletion (candidate c.) as the most harmonic form. A candidate with maximal correspondence (candidate e.) fatally violates the highly ranked PARSE-SYLL.

Tableau 18. PARSE-SYLL, LINEARHEADBR >> MAXBR>> LINEARITYBR

Input	Output	PARSE-SYLL	LINEAR HEADBR	MAXBR	LINEARITY BR
RED + purɛ-∅ₘ	a. *{(pur)}-{(purɛ) -∅ₘ }*	*		*!	
	☞b. *{(puɛr)}-{(purɛ)-∅ₘ }*	*			*
RED+ furɛʔi-∅ₘ	☞c. *{(fur)}-{(fu.rɛ.ʔi)-∅ₘ }*	*		***	
	d. *{(fuɛr)}-{(fu.rɛ.ʔi)-∅ₘ }*	*	*!	**	*
	e. *{fu.(rɛʔ)}-{fu.(rɛ.ʔi)-∅ₘ}*	**!*		*	

The final constraint ranking for all reduplication in Rotuman is given in (57). This constraint ranking is demonstrated in Tableau 26 for forms in their complete phase and in Tableau 27 for forms in their incomplete phase in Appendix D.

(57)	ALLFTR, TAUTOM, REDPROSCON, ANCHORL, ALIGNHEAD-σ, LIGHTDIPH, NOGEM	FOOTBIN, HEADMATCHIO	SYLL=μ, MAXIO, IDENTBR[BACK], PARSESYLL, LINEARHEADBR	MAXBR, LINEARITYIO, UNIFORMITYIO	LINEARITYBR	HEADMATCHBR

7. Conclusion

This thesis had a number of main goals pertaining to the description and analysis of reduplication in Rotuman. Initial aims were to give a rigorous description of the reduplicative patterns found in Rotuman and test previously proposed hypotheses empirically within a much larger data set. Another key aim was to provide a complete analysis of all reduplicative patterns found in Rotuman within contemporary morpho-phonological theory, specifically, within Optimality Theory. This conclusion will summarize the results of these key aims and situate them in the larger picture of contemporary phonology. It will end by highlighting areas for future work related to reduplication in Rotuman in both experimental and theoretical domains.

Blevins' (1994) hypothesis of reduplicant shapes being primarily foot shaped with a limited number of "frozen" partial CV cases, was supported in data taken from a 2600 word stem list and the reduplicated forms associated with these stems. Out of the 847 reduplicants, 767 were foot shaped and all possible instantiations of a bimoraic foot were attested, except CVCV. This fact supports Churchward's (1940) initial claim of the reduplicant being in its incomplete phase as this would restrict the bimoraic foot to being a single heavy syllable. The incomplete phase formation generalizations claimed by previous scholars (Schmidt, 2002; McCarthy, 1995, 2000) were also confirmed when looking at the final vowel sequences of every Rotuman stem in the stem list in terms of their sonority. All stems underwent the phase forming process as predicted for their specific vowel sequence except the single stem ending with the sequence uCo, which according to the Dictionary, undergoes deletion rather than the predicted metathesis. Additionally, the initial claim that a subset of CV- reduplicants are in fact ill-formed foot-reduplicants due to antigemination was supported by comparing the different reduplicant shapes with any associated inputs (POS) or outputs (meanings) of reduplication. In general, the thorough description of reduplication in Rotuman presented in this thesis offers a valuable resource and reference for other scholars working on Rotuman morpho-

phonology in particular, or for those studying reduplication and/or Oceanic languages in general.

The previous assumption of analyzing the reduplicant-as-the-incomplete phase (Churchward, 1940; Blevins, 1994; and McCarthy, 2000) has been explored and ultimately altered to a more insightful characterization of the reduplicant-as-a-minimal-word. This allows the reduplicant to behave like other minimal words in Rotuman such as being required to end in a heavy syllable and of being a bimoraic foot. The instances where the reduplicant deviates from other prosodic words in Rotuman were all accounted for with general constraints with independent motivation in other studies. The ill-formed feet in foot *CV* reduplication result from an undominated constraint against adjacent identical consonants, NOGEM. Additionally, the lack of umlaut in reduplicants is attributed to the preference for base-reduplicant identity faithfulness over input-output faithful correspondence (Ident-BR[back] >> MaxIO). The six reduplicated trisyllabic stems that undergo deletion rather than metathesis as would normally be predicted, do so in order to preserve positional faithfulness of heads. Only unstressed syllables can undergo metathesis in Rotuman.

Overall, this analysis of Rotuman reduplication adds to growing literature in support of McCarthy & Prince's (1999) claims of the reduplicant as a minimal word. No other studies to date have analyzed Rotuman reduplication in any detail, let alone within Optimality Theory. By incorporating many of McCarthy's original rankings proposed for phase and adapting others to capture certain aspects of reduplication, this thesis marries the intuition of previous scholars (Churchward, 1940; Blevins, 1994) on the link between the phenomenon of phase and the patterns in reduplication. This current analysis complements previous works on reduplication (Urbanczyk, 1999) and provides additional support for Generalized Template Theory approach to reduplication. The differences between the two reduplicative patterns - foot reduplication and partial *CV*-reduplication - simply fallout from the morphological affliations of stem and affix, respectively. Additionally, this thesis may be of interest to other Rotuman scholars as it may give more support for analyses of phase, in particular those proposed by McCarthy (2000) and by Hale and Kissock (1998).

However, many of the problems identified in this thesis require more attention to give a clearer picture of the prosody of reduplication in Rotuman as well as the general prosody of phase. Primarily, a confirmation of stress patterns using native speaker intuition and experimental techniques would aid in the analysis of reduplication and of phase. Additionally, a revision of the Optimality Theoretic analysis of phase (McCarthy, 2000) is needed to account for any potential combinatory effects of suffixes and explore how that may affect the minimal word in Rotuman. How is the difference between /hili + me/ surfacing as *hilim* and *hilime* accounted for and how does this fit in with Rotuman stress patterns? Moreover, further research is required beyond everyday language, such as with the behaviour of reduplicated words in songs or poetry: do we see *talu-talu* and *masa-masaro*? And if so, what would that mean for phase and for the minimal word analysis of reduplication? While these questions still need to be addressed for a deeper understanding of the intricacies of Rotuman prosody, this current analysis offers a fairly exhaustive look at reduplication in Rotuman.

References

Anderson, V., & Otsuka, Y. (2006). The phonetics and phonology of " Definitive Accent" in Tongan. *Oceanic Linguistics, 45* (1), 21-42.

Anttila, R. (1989). *Historical and comparative linguistics.* Amsterdam: John Benjamins Publishing Co.

Bakovic, E. (2005). Antigemination, assimilation and the determination of identity. *Phonology, 22* (3), 279-315.

Beckman, J. N. (1997). Positional faithfulness, positional neutralisation and Shona vowel harmony. *Phonology*, *14*(1), 1-46.

Besnier, N. (1987). An autosegmental approach to metathesis in Rotuman. *Lingua, 73* (3), 201-223.

Biggs, B. (1965). Direct and indirect inheritance in Rotuman. *Lingua, 14*, 383-415.

Biggs, B. G. (1959). Rotuman vowels and their history. *Te Reo, 2*, 24-26.

Blevins, J. (1994). The bimoraic foot in rotuman phonology and morphology. *Oceanic Linguistics, 33*, 491-516.

Blevins, J. (2005). Understanding antigemination. In Z. Frajzyngier, D. Rood, and A. Hodges (Eds.), *Linguistic diversity and language theories* (pp. 203–234). Amsterdam/Philadelphia: Benjamins.

Blust, R. (2007). Disyllabic attractors and anti-antigemination in austronesian sound change. *Phonology, 24*(1), 1-36.

Blust, R. (2009). *The Austronesian languages book*. Canberra: The Australian National University, Research School of Pacific and Asian Studies.

Cairns, C. E. (1976). Universal properties of umlaut and vowel coalescence rules:Implications for Rotuman phonology', in A. Juilland (Ed.), *Linguistic Studies Offered to Joseph Greenberg*, Vol. 2 (Phonology), (pp. 271–283). Saratoga, California: Anma Libri.

Churchward, C. M. (1940). *Rotuman grammar and dictionary: Comprising Rotuman phonetics and grammar and a Rotuman-English dictionary.* Sydney: Australasian Medical Publishing Co. [Repr. AMS Press, New York, 1978.]

Churchward, C. M. (1959). *Tongan dictionary: Tongan-English and English-Tongan* Oxford University Press.

Clark, R. (1974). On the origin of the Tongan definitive accent. *The Journal of the Polynesian Society*, *83*(1), 103-108.

Condax, I. D. (1989). Tongan definitive accent. *The Journal of the Polynesian Society*, *98*(4), 425-450.

Den Dikken, M. (2003). *The structure of the noun phrase in Rotuman* (Vol. 5). Lincom GmbH, München.

Geraghty, P. (1995). Rotuman. In D.T. Tryon, (Ed.) *Comparative Austronesian dictonary, Part 1*, (pp. 931-936). Berlin: Mouton de Gruyter.

Hale, H. (1846). Notes on the language of Rotuma: Rotuman vocabulary. *United States Exploring Expedition Under the Command of Charles Wilkes, 6*, 469-478.

Hale, M., & Kissock, M. (1998). The Phonology-Syntax interface in Rotuman. In M. Pearson (Ed.), *Recent Papers in Austronesian Linguistics: Proceedings of the Third and Fourth Meetings of the Austronesian Formal Linguistics Society*, UCLA Occasional Papers in Linguistics #21, (pp. 115–128) Los Angeles: UCLA Department of Linguistics.

Hale, M., Kissock, M., & Reiss, C. (1998). Output-Output Correspondence in OT. In E. Curtis, J. Lyle, and G.Webster (Eds.), *The Proceedings of the Sixteenth West Coast Conference on Formal Linguistics*, (pp. 223–236). Stanford: CSLI Publications.

Hocart, A. M. (1919). Notes on Rotuman grammar. *The Journal of the Royal Anthropological Institute of Great Britain and Ireland, 49*, 252-264.

Kikusawa, R. (2001). Rotuman and Fijian case-marking strategies and their historical development. *Oceanic Linguistics, 40*(1), 85-111.

Kissock, M. J. (2003). Transitivity and objecthood in R2otuman. *Oceanic Linguistics, 42*(1), 144-160.

Kiyomi, S. (1995). A new approach to reduplication: A semantic study of noun and verb reduplication in the malayo-polynesian languages. *Linguistics, 33*(6), 1145-1168.

Lynch, J., Ross, M., & Crowley, T. (2002). *The Oceanic languages*. Richmond, Surrey: Curzon Press.

Marantz, A. (1982). Re reduplication. *Linguistic inquiry*, *13*(3), 435-482.

McCarthy, J. J. (1995). *Extensions of faithfulness: Rotuman revisited*, unpublished ms., University of Massachusetts, Amherst. [Rutgers Optimality Archive #110.]

McCarthy, J. J. (2000). The prosody of phase in Rotuman. *Natural Language & Linguistic Theory, 18*(1), 147-197.

McCarthy, J. J., & Prince, A. (1994a). An overview of Prosodic Morphology: Parts I and II. [Talks presented at the OTS/HIL Workshop on Prosodic Morphology, Utrecht.] Retrieved from http://scholarworks.umass.edu/

McCarthy, J. J., & Prince, A. (1994b). The emergence of the unmarked: Optimality in prosodic morphology. In Merce Gonzalez, (Ed.), *Proceedings of the North East Linguisics Society 24,* (pp. 333-379). Amherst, MA: Graduate Linguistic Student Association. Retrieved from http://scholarworks.umass.edu/

McCarthy, J. J., & Prince, A. (1995). Faithfulness and reduplicative identity. In J. Beckman, L. W. Dickey & S. Urbanczyk, *University of Massachusetts Occasional Papers in Linguistics 18: Papers in Optimality Theory*, (pp. 249–384). Amherst: GLSA.

McCarthy, J. J., & Prince, A. (1999). Faithfulness and identity in prosodic morphology. In R. Kager, H. van der Hulst and W. Zonneveld (Eds.), *The Prosody- Morphology Interface,* (pp. 218–309). Cambridge: Cambridge University Press.

Milner, G. B. (1971). Fijian and rotuman. *Current Trends in Linguistics, 8*, 397-425.

Piggott, G. (1991). Apocope and the licensing of empty-headed syllables. *The Linguistic Review, 8*(2-4), 287-318.

Prince, A. S. (1980). A metrical theory for Estonian quantity. *Linguistic Inquiry, 11*(3), 511-562.

Schmidt, H. (2002). A short sketch of Rotuman grammar. In Lynch, Ross, and Crowley (Eds.), *The oceanic languages.* (pp. 815-832). Richmond, Surrey: Curzon Press.

Schmidt, H. (2003). Temathesis in Rotuman. *Issues in Austronesian Historical Phonology.* Lynch, John (ed.), Canberra, Australia: Pacific Linguistics. pp. 175-207.

Schutz, A. J. (2001). Tongan accent. *Oceanic Linguistics, 40*(2), 307-323.

Smolensky, P. (1995). On the internal structure of the constraint component *Con* of UG. Ms, *UCLA*. Available as ROA-86 from the Rutgers Optimality Archive.

Smolensky, P. and A. Prince (1993). Optimality Theory, ms. University of Colorado at Boulder and Rutgers University. Rackowski, A and Richards, N. (eds.)

Taumoefolau, M. (2002). Stress in Tongan. Paper presented at the *MIT Working Papers in Linguistics. Proceedings of AFLA VIII: Eighth Meeting of the Austronesian Formal Linguistics Association.* (pp. 341-353). Cambridge, MA.

Urbanczyk, S. (1999). Double reduplications in parallel. In H. van der Hulst, R. Kager, and W. Zonneveld (Eds.), *The Prosody - Morphology Interface* (pp. 390-428). Cambridge: Cambridge University Press.

Urbanczyk, S. (2006). Reduplicative form and the root-affix asymmetry. *Natural Language & Linguistic Theory*, *24*(1), 179-240.

Vamarasi, M. (2005) On the notion of cliticization in Rotuman. In Heinz & Ntelitheos (Eds.), *Proceedings of AFLA XII* (pp. 411-419). *UCLA Working Papers in Linguistics, (12).*

Appendices

Appendix A. Rotuman Orthography (Churchward, 1940) and IPA symbols

Rotuman Vowels	IPA		Rotuman Consonants	IPA
a	ɑ		f	f
ạ	ɔ		g	ŋ
å	a		h	h
ä	æ		j	tʃ
o	o		k	k
ö	œ		l	l
ö	ø		m	m
i	i		n	n
e	ε		p	p
u	u		r	ɾ
ü	y		s	s
ā	aː		t	t
ē	eː		v	v
ī	iː		'	ʔ
ō	oː			
ū	uː			

Appendix B.   Churchward's Rules of Phase
(1940, pp. 88-89)

"First Rule

Except before certain suffixes, and in a few other cases, each element or component part of a composite word, other than the last, is used in its inc. phase, no matter what may be the phase or the whole word. (The phase of the word as a whole is shown, of course, by the phase of its last element."

More explanatory notes on page 89.

"*Second Rule*

A word is used in its inc. phase when it qualifies or defines the word or group of words that follows, or (except in a few special cases) when it is qualified or defined by it.

When the inc. phase has two versions, it is the broad version that is used under this rule, except immediately before the following particles, where the narrow version is required: ta *(the sing.),* te'isi *(this)* ta'a *(that)* tei *(vocative sign) and* te *(in* te ma *, each)."*

More explanatory notes on p91

Third Rule

"In most cases -

If no defining word or group follows, a noun or verb is used in its com. phase when definite but in its inc. phase when indefinite.

If a defining word or group follows, the definiteness or indefiniteness of a noun, cardinal pron. or verb, shows itself (unless prevented by some other factor) in the phase of the defining word or in that of the last word of the defining group."

More explanatory notes pp 91-94.

"Fourth Rule

In some cases the use of the com. phase indicates positiveness, finality or emphasis, or (in questions) the desire to be positive or certain." More explanatory notes pp 95.

"Fifth Rule

In the case of verbs ending in a pron. suffix, the com. Phase *usually expresses the force of the completive tense."* More explanatory notes pg 95.

"Sixth Rule

"The cardinal prons. and seia*, except as they come under the control of the foregoing rules, are reated as follows:*

Immediately after the preps. 'e *and* se *the normal usages is the com.* phase*, sometimes embellished with* -g.

In all other positions the inc. phase *is used."* More explanatory notes pp 95-96.

Appendix C.   Two Alternate Analyses for Base-size Effects on Metathesis

There are two other possible OT analyses for the base-size effects of metathesis in Rotuman foot reduplication. One, based on the idea that languages have different reduplicative patterns for when the base size exceeds the reduplicant target size, incorporates the constraint MAXBRALL. Another approach uses Smolensky's (1995) constraints on Local Conjuncion to capture the fact that in forming a reduplicant, metathesis or deletion can be used but not both processes together. Both alternate analyses will be outlined here, beginning with the latter.

As mentioned in Chapter 6, the differing results of metathesis in reduplicants of disyllabic and trisyllabic stems are reflected in conflicting constraint rankings. The appropriate constraint ranking of MAXBR >> LINEARITYBR for disyllabic stems conflicts with that which would capture trisyllabic stems: LINEARITYBR >> MAXBR. In Rotuman reduplication, it is preferable to maintain faithfulness at the cost of linear order as demonstrated for disyllabic stem MAXBR >> LINEARITYBR. However, in stems larger than two syllables, if even after metathesis there will be segments from the base lacking correspondence in the reduplicant, then it is preferable to only delete rather than to both delete and alter the linear order of segments. In other words it is better to only utilize one repair strategy for ALIGNHEAD-σ.

In his description of local conjunction, which can create new constraints within *Con*, Smolensky (1995) proposed the idea that "two constraint violations are worse when they occur in the same location "(p4). He uses the example of languages which have labial consonants (violating *PL/LAB) and codas (violating NOCODA) but do not have labials in coda position. This could be extended to the domain of the prosodic word, where a language can have metathesis (violating LINEARITY) or deletion (violating MAX) at the end of a prosodic word but will not have both. This is captured by the constraint [C1&C2]$_D$ (McCarthy, 2003). For Rotuman, the constraint would be [LINEARITY&MAX]$_{PrWd}$ and it will crucially dominate MaxBR to ensure that deletion alone will occur in the reduplicants with trisyllabic bases. Tableau 19 demonstrates this crucial ranking with both disyllabic and trisyllabic stems. The previously motivated ranking of MAXBR >>

LINEARITYBR correctly predicts the attested metathesized reduplicant for disyllabic stems (candidate b.) since less faithful reduplicants, (candidate a.) fatally violate MAXBR. With trisyllabic stems, candidates with deletion alone in the reduplicant (candidate c.) are successfully selected as the most harmonic over those with both deletion and metathesis (candidate d.), as the latter fatally violate the local conjunction constraint, [LINEARITY&MAX]$_{PrWd}$. As will all trisyllabic stems, candidates with total reduplication (candidate e.) incur multiple fatal violations of PARSE-SYLL.

Tableau 19. ***PARSE-SYLL, [LINEARITY&MAX]$_{PRW_D}$ >> MAXBR>> LINEARITYBR***

Input	Output	PARSE-SYLL	[LINEARITY &MAX]$_{PrWd}$	MAXBR	LINEARITYBR
RED + pure-∅$_μ$	a. *{(pur)}-{(pure) -∅$_μ$ }*	*		*!	
	☞b. *{(puer)}-{(pure)-∅$_μ$ }*	*			*
RED+ furɛʔi-∅$_μ$	☞c. *{(fur)}-{(furɛʔi)-∅$_μ$ }*	*		***	
	d. *{(fuɛr)}-{(furɛʔi)-∅$_μ$ }*	*	*!	**	*
	e. *{fu(rɛʔ)}-{fu(rɛʔi)-∅$_μ$}*	**!*		*	

Thus local conjunction captures the fact that in Rotuman, it is preferable to use a single repair strategy to ensure heavy syllables at the end of a prosodic word. The final constraint ranking for all reduplication in Rotuman using this alternate analysis is given in (58). This constraint ranking is demonstrated in Tableau 22 for forms in their complete phase and in Tableau 23 for forms in their incomplete phase at the end of this appendix.

(58) ALLFTR, TAUTOM, REDPROSCON, ANCHORL, ALIGNHEAD-σ, LIGHTDIPH, NOGEM	FOOTBIN, HEADMATCHIO	SYLL=μ, MAXIO, IDENTBR[BACK], PARSESYLL, [LINEARITY& MAX]$_{PRWD}$	MAXBR, LINEARITYIO, UNIFORMITYIO	LINEARITYBR	HEADMATCHBR

Alternatively, another solution for the lack of metathesis in the reduplicants of trisyllabic bases could stem from the idea that some languages have different reduplcitive patterns for bases that exceed the ideal reduplicant size. This could be captured with constraints that treat faithfulness violations in two different ways. McCarthy (2003) argues that gradient constraints such as ALIGN or HNUC can be translated to a number of categorical constraints that each focus on a member of the associated scale. For example with the gradient constraint HNUC, FAITH will dominate the categorical version *NUC/m,n for some languages, such as English, while it will dominate *NUC/r,l for others i.e. Spanish. Perhaps categorical constraints such as MAX can also be deconstructed into different versions along the prosodic constituent scale with the smallest constituents incurring violations at one end and an absolute version at the other end where violations can be incurred any amount of violation within the largest constituent – the entire string. Constraints prohibiting the deletion of segments (MaxSeg), sub-segments (MaxSubseg) and features (Max(Feature)) have all been proposed (Zoll 1998). However in each of these cases it is the entire constituent that cannot be deleted rather than just an element within the constituent. Nevertheless perhaps the phenomenon of base size affecting the application of metathesis can be captured with an "absolute" faithfulness constraint prohibiting any deletion at all – MAXBRALL. This absolute constraint must be ranked above typical categorical MaxBR which also prohibits deletion but can incur multiple violations depending on the number of deleted segments. MAX-BR was previously defined in (29) as "every element of B has a correspondent in R" and one violation is incurred for each element of the base that does not have a correspondent in the reduplicant. This violation assignment still applies for the constraint MAX-BR. The absolute version – MAXBRALL - will similarly require that every element of B have a correspondent in R but a candidate will incur only one violation if there is any lack of corresponding elements, regardless of how many elements are deleted.

(59) MAXBRALL: the entire string of elements of the base, B must have correspondence in the reduplicant, R. Violations are incurred for any reduplicant that has less corresponding elements than the base, regardless of the number of missing correspondents.

(60) MAXBR- every element of B has a correspondent in R. Violations are incurred for every element that of the base which does not have a correspondent in the reduplicant.

In a previous constraint ranking for Rotuman reduplication (54), MAXBR crucially outranked LINEARITYBR. This can be replaced by the ranking in (61) where the absolute faithfulness constraint MAXBRALL outranks LINEARITYBR, which in turn dominates MAXBR.

(61) MAXBRALL >> LINEARITY-BR>> MAX-BR

For disyllabic stems, MAXBRALL rules out a candidate where there is a segment from the base that is not represented in the reduplicant (candidate d. in Tableau 20) allowing the metathesized reduplicant to be selected as the winner. However for reduplicated trisyllabic stems, all candidates will incur a violation of MAXBRALL leaving the crucial ranking of LINEARITYBR over MAXBR to select the attested form (candidate a.). The candidate with the most faithful reduplicant (candidate c.) is ruled out, like with other trisyllabic stems, by PARSE-SYLL, which it violates more than once.

Tableau 20. PARSE-SYLL, MAXBRALL >> LINEARITYBR >> MAXBR

Input	Output	PARSE-SYLL	MAXBRALL	LINEARITYBR	MAXBR
RED + pure-∅ᵤ	a. *{(pur)}-{(pure) -∅ᵤ }*	*	*!		*
	☞b. *{(puer)}-{(pure)-∅ᵤ }*	*		*	
RED+ furɛʔi-∅ᵤ	☞c. *{(fur)}-{(furɛʔi)-∅ᵤ }*	*	*		***
	d. *{(fuɛr)}-{(furɛʔi)-∅ᵤ }*	*	*	*!	**
	e. *{fu(rɛʔ)}-{fu(rɛʔi)-∅ᵤ}*	**!*	*		*

This revised ranking has no difficulties accounting for other, non-metathesis data, as demonstrated in Tableau 21, which is a revised version of the tableau (Tableau 7) that motivated the original ranking of LIGHTDIPH >> MAX-BR >> LINEARITY-BR.

Tableau 21.   LIGHTDIPH >> MAXBRALL >> LINEARITY-BR >> MAX-BR

Input	Output	LIGHTDIPH	MAXBRALL	LINEARITY-BR	MAX-BR
/RED + toka -$\varnothing_\mu$/	☞a. {(toak)}-{(toka)-$\varnothing_\mu$}			*	
	b. {(tok)}-{(toka)-$\varnothing_\mu$}		*!		*
/RED + talu -$\varnothing_\mu$/	c. {(taul)}-{(talu)-$\varnothing_\mu$}	*!		*	
	☞d. {(tal)}-{(talu)-$\varnothing_\mu$}		*		*

With this alternate analysis, the final constraint ranking for all reduplication in Rotuman is given in (62). This constraint ranking is demonstrated in Tableau 24 for forms in their complete phase and in Tableau 25 for forms in their incomplete phase.

(62)

ALLFTR, TAUTOM, REDPROSCON, ANCHORL, ALIGNHEAD-σ, LIGHTDIPH, NOGEM	FOOTBIN, HEADMATCHIO	SYLL=μ, MAXIO, IDENTBR[BACK], PARSESYLL	MAXBRALL, LINEARITYIO, UNIFORMITYIO	LINEARITYBR	MAXBR, HEADMATCHBR

Tableau 22. Alternate constraint ranking for reduplicative forms in complete phase with Local Conjunction

Constraint	a	b	c	d	e	f	g	h	i	j	k	l	m
HEADMATCHBR	*	*	*				*				*	*	*
LINEARITYBR		*			*					*		*	*
MAXBR	***	**	***			*!	***	***	*		***	**	**
UNIFORMITYIO													
LINEARITYIO													
[LINEARITY& MAX]PRWD		*!										*	*
PARSESYLL	*	*	*				*	*			*	*	*
IDENTBR[BACK]												*!	
MAXIO			*										
SYLL=μ	*	*	*	*	*		*	*	*	*	*	*	*
HEADMATCHOO							*!						
FOOTBIN													
NOGEM													
LIGHTDIPH										*!			*!
ALIGNHEAD-σ	*	*	*	*	*	*!*	*	*	*	*	*	*	*
ALLFEETR	*	*	*	*	*	*	*	*	*	*	*	*	*
REDPROSCON			*!										

Output candidates:

- ☞ a. {(fur)}-{fu(rɛʔi) +∅μ}
- b. {(fuɛr)}-{fu(rɛʔi) +∅μ}
- c. (fur)-{fu(rɛʔi) +∅μ}
- ☞ d. {(puɛr)}-{(puɛr) +∅μ}
- e. {(pur)}-{(puɛr)+∅μ}
- f. {(puɛr)}-{(puɛr)+∅μ}
- ☞ g. {(mas)}-{ma(saro)+∅μ}
- h. {(mas)}-{(masa)ro+∅μ}
- ☞ i. {(tal)}-{(talu) +∅μ}
- j. {(taul)}-{(talu) +∅μ}
- ☞ k. {(tok)}-{(to(kiri)+∅μ}
- l. {(tøk)}-{(to(kiri)+∅μ}
- m. {(toik)}-{(to(kiri)+∅μ}

Input:
- RED +furɛʔi +∅μ (candidates a–c)
- RED + puɛr + ∅μ (candidates d–f)
- RED +masaro+∅μ (candidates g–h)
- RED + talu +∅μ (candidates i–j)
- RED + tokiri +∅μ (candidates k–m)

	RED + mose +∅μ		RED +kakepo+∅μ		RED + fufi+∅μ		REDp+ fisi +∅μ		
	n. ☞ {mos}-{(mose) +∅μ}	o. {(mœs)-{(mose) +∅μ}	p. ☞ {(ka)}-{ka(kepo) +∅μ}	q. {(kak)}-{ka(kepo) +∅μ}	r. ☞ {(fu)}-{(fufi) +∅μ}	s. {(fuf)}-{(fufi) +∅μ}	t. ☞ {fi-(fisi) +∅μ}	u. {(fis)-(fisi) +∅μ}	v. {(fisi)-(fisi) +∅μ}
HEADMATCHBR			*	*					
LINEARITYBR		*							
MAXBR	*		****	***	**	*	**	*	
UNIFORMITYIO									
LINEARITYIO									
[LINEARITY& MAX]PRWD									
PARSESYLL			*	*			*		
IDENTBR[BACK]		*!							
MAXIO									
SYLL=μ	*	*		*		*	*!		
HEADMATCHOO									
FOOTBIN			*		*				
NOGEM				*!		*!			
LIGHTDIPH									
ALIGNHEAD-σ	*	*	*	*	*	*	*	*	
ALLFEETR	*	*	*	*	*	*	*	*!*	*!*
REDPROSCON									

Tableau 23. Alternate constraint ranking for reduplicative forms in incomplete phase with Local Conjunction

Constraint	a	b	c	d	e	f	g	h	i	j	k	l	m	n
HEADMATCHBR	*		*				*				*			
LINEARITYBR		*		*								*	*	
MAXBR	**	*	**				**	***			**	*	*	
UNIFORMITYIO														*
LINEARITYIO					*					*				*
[LINEARITY& MAX]PRWD		*!										*	*	
PARSESYLL	*	*	*				*	*			*	*	*	
IDENTBR[BACK]												*!		
MAXIO	*	*	*				*			*	*	*	*	
SYLL=μ	**	**	**	*	**		**	*	**	**	**	**	**	**
HEADMATCHOO								*						
FOOTBIN														
NOGEM														
LIGHTDIPH										*!			*!	
ALIGNHEAD-σ				*!		*!*	*							
ALLFEETR								*!						
REDPROSCON			*!											

Output:
☞ a. {(fur)}-{fu(rɛʔ)}
b. {(fuɛr)}-{fu(rɛʔ)}
c. (fur)-{fu(rɛʔ)}
d. {(puɛr)}-{(purɛ)}
☞ e. {(puɛr)}-{(puɛr)}
f. {(purɛ)}-{(purɛ)}
☞ g. {(mas)}-{ma(sar)}
h. {(mas)}-{(masa)ro}
☞ i. {(tal)}-{(tal)}
j. {(taul)}-{(taul)}
☞ k. {(tok)}-{(to(kir)}
l. {(tøk)}-{(to(kir)}
m. {(toik)}-{(to(kir)}
☞ n. {(mœs)}-{(mœs)}

Input:
RED +furɛʔi (a, b, c)
RED + purɛ (d, e, f)
RED +masaro (g, h)
RED + talu (i, j)
RED + tokiri (k, l, m)
RED + mose (n)

Constraint	o. {(mos)}~{(mos)}	☞ p. {(ka)}~{ka(kep)}	q. {(kak)}~{ka(kep)}	☞ r. {(fy)}~{(fyf)}	s. {(fuf)}~{(fuf)}	t. {(fyf)}~{(fyf)}	☞ u. {fi-(fis)}	v. {(fis)~(fis)}	w. {(fisi)~(fis)}
HEADMATCHBR		*	*						
LINEARITYBR									
MAXBR		***	**	*				*	
UNIFORMITYIO				*			*		
LINEARITYIO				*			*		
[LINEARITY& MAX]PRWD									
PARSESYLL		*	*					*	
IDENTBR[BACK]									
MAXIO	*!	*	*		*			*	*
SYLL=μ	**	*	**	*	**	**		*	**
HEADMATCHOO									
FOOTBIN		*		*					
NOGEM			*!		*!	*!			
LIGHTDIPH									
ALIGNHEAD-σ									
ALLFEETR								*!	*!
REDPROSCON									

Input: RED +kakepo (o, p, q); RED + fufi (r, s, t); REDp+ fisi (u, v, w)

Tableau 24. Alternate constraint ranking for reduplicative forms in complete phase with MAXBRALL

Input / Output	HEADMATCHBR	MAXBR	LINEARITYBR	UNIFORMITYIO	LINEARITYIO	MAXBRALL	PARSESYLL	IDENTBR[BACK]	MAXIO	SYLL=μ	HEADMATCHOO	FOOTBIN	NOGEM	LIGHTDIPH	ALIGNHEAD-σ	ALLFEETR	REDPROSCON
RED +furɛʔi +∅μ																	
☞ a. {(fur)}-{fu(rɛʔi) +∅μ}	*	***				*	*			*					*	*	
b. {(fuɛr)}-{fu(rɛʔi) +∅μ}	*	**	*!			*	*			*					*	*	
c. (fur)-{fu(rɛʔi) +∅μ}	*	***				*	*		*	*					*	*	*!
RED + purɛ + ∅μ																	
☞ d. {(puɛr)}-{(puɛr) +∅μ}										*					*	*	
e. {(pur)}-{(purɛ)+∅μ}		*	*							*					*	*	
f. {(purɛ)}-{(purɛ)+∅μ}						*!									*!*	*	
RED +masaro+∅μ																	
☞ g. {(mas)}-{ma(saro)+∅μ}	*	***				*	*			*					*	*	
h. {(mas)}-{(masa)ro+∅μ}		***				*	*			*	*!				*	*	
RED + talu +∅μ																	
☞ i. {(tal)}-{(talu) +∅μ}						*				*					*	*	
j. {(taul)}-{(talu) +∅μ}		*	*							*				*!	*	*	
RED + tokiri +∅μ																	
☞ k. {(tok)}-{(to(kiri)+∅μ}	*	***				*	*			*					*	*	
l. {(tøk)}-{(to(kiri)+∅μ}	*	**	*			*	*	*!		*					*	*	
m. {(toik)}-{(to(kiri)+∅μ}	*	**	*			*	*			*				*!	*	*	

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Input	Output	HEADMATCHBR	MAXBR	LINEARITYBR	UNIFORMITYIO	LINEARITYIO	MAXBRALL	PARSESYLL	IDENTBR[BACK]	MAXIO	SYLL=μ	HEADMATCHOO	FOOTBIN	NOGEM	LIGHTDIPH	ALIGNHEAD-σ	ALLFEETR	REDPROSCON
RED + mose +∅μ	☞ n. {(mos)}-{(mose) +∅μ}		*				*				*					*	*	
	o. {(mœs)}-{(mose) +∅μ}			*					*!							*	*	
RED +kakepo+∅μ	☞ p. {(ka)}-{ka(kepo) +∅μ}	*	****				*	*			*		*			*	*	
	q. {(kak)}-{ka(kepo) +∅μ}	*	***				*	*						*!		*	*	
RED + fufi+∅μ	☞ r. {(fu)}-{(fufi) +∅μ}		**				*				*		*			*	*	
	s. {(fuf)}-{(fufi) +∅μ}		*				*							*!		*	*	
REDp+ fisi +∅μ	☞ t. {fi-(fisi) +∅μ}		**				*	*			*!					*	*!	
	u. {(fis)-(fisi) +∅μ}		*				*									*	*!	
	v. {(fisi)-(fisi) +∅μ}																	

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Tableau 25. Alternate constraint ranking for reduplicative forms in incomplete phase with MaxBRALL

Candidate legend (☞ = optimal):

Input	Output
RED +furɛʔi	a. ☞ {(fur)}-{fu(rɛʔ)}
	b. {(fuɛr)}-{fu(rɛʔ)}
	c. (fur)-{fu(rɛʔ)}
RED + purɛ	d. {(puɛr)}-{(purɛ)}
	e. ☞ {(puɛr)}-{(puɛr)}
	f. {(purɛ)}-{(purɛ)}
RED +masaro	g. ☞ {(mas)}-{ma(sar)}
	h. {(mas)}-{(masa)ro}
RED + talu	i. ☞ {(tal)}-{(tal)}
	j. {(taul)}-{(taul)}
RED + tokiri	k. ☞ {(tok)}-{(to(kir)}
	l. {(tøk)}-{(to(kir)}
	m. {(toik)}-{(to(kir)}

Constraint	a	b	c	d	e	f	g	h	i	j	k	l	m
HEADMATCHBR	*		*				*				*		
MAXBR	**	*	**				**	***			**	*	*
LINEARITYBR		*!	*									*	*
UNIFORMITYIO													
LINEARITYIO					*					*			
MAXBRALL	*	*	*				*	*			*	*	*
PARSESYLL	*	*	*				*	*			*	*	*
IDENTBR[BACK]												*	
MAXIO	*	*	*				*				*	*	*
SYLL=μ	**	**	**	*	**		**	*	**	**	**	**	**
HEADMATCHOO								*					
FOOTBIN													
NOGEM													
LIGHTDIPH										*!		*!	
ALIGNHEAD-σ				*!		**		*					
ALLFEETR								*!					
REDPROSCON		*!											

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Input	Output	HeadMatchBR	MaxBR	LinearityBR	UniformityIO	LinearityIO	MaxBRAll	ParseSyll	IdentBR[back]	MaxIO	Syll=μ	HeadMatchOO	FootBin	NoGem	LightDiph	AlignHead-σ	AllFeetR	RedProsCon
RED + mose	☞ n. {(mœs)}-{(mœs)}				*	*					**							
	o. {(mos)}-{(mos)}									*!	**							
RED +kakepo	☞ p. {(ka)}-{ka(kep)}	*	***				*	*		*	*		*					
	q. {(kak)}-{ka(kep)}	*	**					*		*	**			*!				
RED + fufi	☞ r. {(fy)}-{(fyf)}		*		*	*	*				*		*					
	s. {(fuf)}-{(fuf)}						*			*	**			*!				
	t. {(fyf)}-{(fyf)}				*	*					**			*!				
REDp+ fisi	☞ u. {fi-(fis)}										*							
	v. {(fis)-(fis)}		*				*	*		*	**						*!	
	w. {(fisi)-(fis)}									*	*						*!	

Appendix D. Summary Tableaux for Rotuman Reduplication

Tableau 26.   Constraint ranking for reduplicative forms in complete phase

Candidate outputs:

	Input	Output
a.	RED +furɛʔi +∅μ	☞ {(fur)}-{fu(rɛʔi) +∅μ}
b.		{(fuɛr)}-{fu(rɛʔi) +∅μ}
c.		(fur)-fu(rɛʔi) +∅μ
d.	RED + puɛr + ∅μ	☞ {(puɛr)}-{(puɛr) +∅μ}
e.		{(pur)}-{(puɛr)+∅μ}
f.		{(puɛr)}-{(puɛr)+∅μ}
g.	RED +masaro+∅μ	☞ {(mas)}-{ma(saro)+∅μ}
h.		{(mas)}-{(masa)ro+∅μ}
i.	RED + talu +∅μ	☞ {(tal)}-{(talu) +∅μ}
j.		{(taul)}-{(talu) +∅μ}
k.	RED + tokiri +∅μ	☞ {(tok)}-{(to(kiri)+∅μ}
l.		{(tøk)}-{(to(kiri)+∅μ}
m.		{(toik)}-{(to(kiri)+∅μ}
n.	RED + mose +∅μ	☞ {(mos)}-{(mose) +∅μ}
o.		{(mœs)}-{(mose) +∅μ}

Constraint violations:

Constraint	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
HEADMATCHBR	*	*	*				*				*	*	*		
LINEARITYBR		*								*		*	*		*
MAXBR	***	**	***		*!		***	***	*		***	**	**	*	
UNIFORMITYIO															
LINEARITYIO															
LINEARHEADBR		*!										*	*		
PARSESYLL	*	*	*				*	*			*	*	*		
IDENTBR[BACK]												*!			*!
MAXIO			*												
SYLL=μ	*	*	*	*	*		*	*	*	*	*	*	*	*	*
HEADMATCHOO								*!							
FOOTBIN															
NOGEM															
LIGHTDIPH										*!			*!		
ALIGNHEAD-σ	*	*	*	*	*	*!*	*	*	*	*	*	*	*	*	*
ALLFEETR	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
REDPROSCON			*!												

Input	Output	HEADMATCHBR	LINEARITYBR	MAXBR	UNIFORMITYIO	LINEARITYIO	LINEARHEADBR	PARSESYLL	IDENTBR[BACK]	MAXIO	SYLL=μ	HEADMATCHOO	FOOTBIN	NOGEM	LIGHTDIPH	ALIGNHEAD-σ	ALLFEETR	REDPROSCON
RED +kakepo+∅_μ	☞ p. {(ka)}-{ka(kepo) +∅_μ}	*		****				*					*			*	*	
	q. {(kak)}-{ka(kepo) +∅_μ}	*		***				*			*			*!		*	*	
RED + fufi+∅_μ	☞ r. {(fu)}-{(fufi) +∅_μ}			**									*			*	*	
	s. {(fuf)}-{(fufi) +∅_μ}			*							*			*!		*	*	
REDp+ fisi +∅_μ	☞ t. {fi-(fisi) +∅_μ}			**				*								*	*	
	u. {(fis)-(fisi) +∅_μ}			*							*!					*	*!*	
	v. {(fisi)-(fisi) +∅_μ}															*	*!*	

Tableau 27. Constraint ranking for reduplicative forms in incomplete phase

Constraint	a. ☞ {(fur)}-{fu(rɛʔ)}	b. {(fuɛr)}-{fu(rɛʔ)}	c. (fur)-{fu(rɛʔ)}	d. {(puɛr)}-{(purɛ)}	e. ☞ {(puɛr)}-{(puɜr)}	f. {(purɛ)}-{(purɛ)}	g. ☞ {(mas)}-{ma(sar)}	h. {(mas)}-{(masa)ro}	i. ☞ {(tal)}-{(tal)}	j. {(taul)}-{(taul)}	k. ☞ {(tok)}-{(to(kir)}	l. {(tøk)}-{(to(kir)}	m. {(toik)}-{(to(kir)}
HEADMATCHBR	*		*				*				*		
LINEARITYBR		*		*								*	*
MAXBR	**	*	**				**	***			**	*	*
UNIFORMITYIO													
LINEARITYIO					*					*			
LINEARHEADBR		*!										*	*
PARSESYLL	*	*	*				*	*			*	*	*
IDENTBR[BACK]												*!	
MAXIO	*	*	*				*		*		*	*	*
SYLL=μ	**	**	**	*	**		**	*	**	**	**	**	**
HEADMATCHOO								*					
FOOTBIN													
NOGEM													
LIGHTDIPH										*!			*!
ALIGNHEAD-σ				*!		*!	*						
ALLFEETR								*!					
REDPROSCON			*!										

Input: a–c: RED +furɛʔi; d–f: RED + purɛ; g–h: RED +masaro; i–j: RED + talu; k–m: RED + tokiri.

Input	Output	HeadMatchBR	LinearityBR	MaxBR	UniformityIO	LinearityIO	LinearHeadBR	ParseSyll	IdentBR[back]	MaxIO	Syll=μ	HeadMatchOO	FootBin	NoGem	LightDiph	AlignHead-σ	AllFeetR	RedProsCon
RED + mose	☞ n. {n.{(mœs)}-{(mœs)}}				*	*					**							
	o. {(mos)}-{(mos)}									*!	**							
RED +kakepo	☞ p. {(ka)}-{ka(kep)}	*		***				*		*	*		*					
	q. {(kak)}-{ka(kep)}	*		**				*		*	**			*!				
RED + fufi	☞ r. {(fy)}-{(fyf)}			*	*	*				*	*		*					
	s. {(fuf)}-{(fuf)}									*	**			*!				
	t. {(fyf)}-{(fyf)}				*	*					**			*!				
REDp+ fisi	☞ u. {fi-(fis)}			*				*		*	*							
	v. {(fis)-(fis)}									*	**						*!	
	w. {(fisi)-(fis)}									*	*						*!	

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