A Brief Introduction to Marshallese Phonology

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1. Introduction

Marshallese is an Austronesian language spoken in the Republic of the Marshall Islands (RMI) located in Eastern Micronesia. The RMI consists of 34 atolls comprising two chains: the Ratak Chain in the east and the Ralik Chain in the west. Each chain has a distinct dialect, although the two dialects are mutually intelligible. There are about 58,000 native speakers of Marshallese living in the RMI, with small pockets of speakers scattered throughout Micronesia and the United States.

This paper will provide a brief description of Marshallese phonology, including such topics as the phoneme inventory, vowel dissimilation, consonant sequence constraints, syllable structure and reduplication. In the second half of this work, a more in-depth analysis of vowel underspecification, consonant geminate sequences and reduplication will be presented.

2. Marshallese Phoneme Inventory

The Marshallese phoneme system has been well researched and described. In this section, I will first describe the consonant and then the vowel systems.

2.1 Consonants

Marshallese has a large consonant system. Each consonant has a primary and a secondary articulation site (Choi (1992)). There are three primary sites- bilabial, coronal and velar- and three secondary articulations- palatalization, velarization and rounding. However all places of articulation do no exhibit all three secondary articulations, as shown in Table 1. While there is an oral-nasal contrast, there is no voicing contrast.

Table 1. Marshallese consonant inventory (adapted from Choi (1992)).

		Bilabials	Coronals		Velars
Stops	Palatalized	pʲ	tʲ		
	Velarized	pˠ	tˠ		k
	Rounded				kʷ
Nasals	Palatalized	mʲ	nʲ		
	Velarized	mˠ	nˠ		ŋ
	Rounded		nʷ		ŋʷ
Liquids	Palatalized		lʲ		
	Velarized		lˠ	rˠ	
	Rounded		lʷ	rʷ	
Glides	Palatalized		j		
	Velarized				ɰ
	Rounded	w			

Table 1 also shows that Marshallese contains three semi-consonants /j/, /w/ and /ɰ/

2.2 Vowels

Marshallese has four vowel phonemes. These phonemes are specified for [height] and [ATR] but are not for [back] and [round]. Hale (2000) refers to these phonemes as cup of coffee, ☎, ☻, and soccer ball. I will follow a more standard convention and refer to them as [+hi, +ATR], [+hi, -ATR], [-hi, +ATR], [-hi, -ATR], while I will refer to the surface forms of these phonemes by the symbols represented in Table 2. Marshallese vowels are assigned the qualities [back] and [round] by the surrounding consonants. Vowels become [-back, -round] in the environment of palatalized consonants, [+back, - round] in the environment of velarized consonants and [+back, +round] in the environment of labialized consonants. There are, therefore, twelve vowels which appear in the surface form of Marshallese:

Table 2. Marshallese Vowel Allophones

	[-back, -round]	[+back, -round]	[+back, +round]
[+hi, +ATR]	i	ɯ	u
[+hi, -ATR]	ɪ	ɤ	ʊ
[-hi, +ATR]	e	ʌ	o
[-hi, -ATR]	ɛ	a	ɔ

When a vowel appears between consonants that have different secondary places of articulation, the vowel retains its height specification but consists of a smooth transition from one target to another (Bender (1968), Choi (1992)). For example if a vowel is found in the environment CʲVCʷ, there is steady movement of the tongue throughout the vowel from a [-back, -round] to a [+back, +round] position, such as in *jok* 'shy' where there is a transition between [e] and [o]: /tʲeokʷ/. In other words, [eo] is a dipthong. There are therefore twenty four Marshallese diphthongs, six at each specification of height and ATR.

Table 3. Marshallese Dipthongs

iɯ	iu	ɯi	ɯu	ui	uɯ
ɪɤ	ɪʊ	ɤɪ	ɤʊ	ʊɪ	ʊɤ
eʌ	eo	ʌe	ʌo	oe	oʌ
ɛa	ɛɔ	aɛ	aɔ	ɔɛ	ɔa

3. Vowel Dissimilation

Vowel dissimilation occurs in the 3rd person suffixed form of certain nouns. These forms contain a [-hi,-ATR]C[-hi,-ATR] sequence in which the first vowel dissimilates from the second and becomes a [-hi,+ATR] vowel. However dissimilation occurs only when the second vowel is not deleted or not destined to be (Bender (1969b). Thus both vowels must occur on the surface. As shown in Table 4, the independent form retains its [-hi,-ATR] vowel since it is not followed by [-hi,-ATR] vowel. However, the [-hi,-ATR] vowel of the 3rd person singular suffix created the environment for vowel dissimilation.

Table 4. Marshallese Vowel Dissimilation

English	independent form	3rd sing suffixed form
head	pˠarˠ	pˠʌrˠaɛnʲ
name	jɛatˠ	jeʌtˠaɛnʲ
eye	mʲɛtʲ	mʲetʲɛnʲ

While a dissimilation process provides an accurate description of the forms in Table 4, Bender (1969b) admits there is some validity to the alternative explanation that the 3rd singular form contains the unaltered [-hi,+ATR] form and that this vowel is becomes [-hi,-ATR] in the independent form. However, this alternation would have to be restricted to disyllabic forms because neither assimilation nor dissimilation occurs when there are more than two syllables.

Table 5. Marshallese forms with neither assimilation nor dissimilation

English	independent form	3rd sing
bigness	kɯilʲepʲ	kɯilʲepʲɛnʲ

If an assimilation analysis is adopted, then the second vowel of the stem in the independent form in Table 5 should become a [-hi,-ATR] vowel. However, since this does not occur, Bender rejects the assimilation analysis in favor of the dissimilation analysis. Under this analysis, the [-hi,+ATR]C[-hi,-ATR] vowel sequence of the 3rd singular form in Table 5 is not the correct environment for dissimilation, so dissimilation does not apply. Thus only a dissimilation analysis can account for the data.

4. Consonant Sequences

Marshallese only allows homorganic consonant sequences.[1] When there is a non-homorganic sequence, the sequence is separated by excrescence (McClintock (1999)). This process can occur within a word or across a word boundary. Additionally, even though a

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[1] When the term "homorganic" is used, only the primary articulation site is considered.

consonant sequence may be homorganic, certain sequences are not allowed and are eliminated

either by excrescence or assimilation to the secondary place of articulation, as summarized in

table 6.

Table 6. Marshallese Consonant Sequences (adapted from McClintock (1999))

	Homorganic sequence	Non-homorganic sequence
Obstruent-Obstruent	palatal/velar assimilation	excrescence
Nasal-Nasal	palatal/velar assimilation	excrescence
Liquid-Liquid	palatal/velar assimilation	excrescence
Nasal-Obstruent	palatal/velar assimilation	excrescence
Liquid-Obstruent (except /lʲtˠ/ & /lˠtˠ/)	excrescence	excrescence
Obstruent-Nasal	[+coronal] = excrescence	excrescence
	[-coronal] = nasal assimilation	excrescence
Obstruent-Liquid	excrescence	excrescence
Liquid-Nasal	nasal assimilation	excrescence
Nasal-Liquid	palatal/velar assimilation	excrescence

In the remainder of this section, I will focus solely on homorganic sequences, since there is little

to say about non-homorganic ones.

4.1 Geminates

Geminates may appear morpheme internally and stem initially (Bender (1968)).

However, geminates do not appear word initially. The two dialects of Marshallese- the eastern

Ratak dialect and the western Ralik dialect- have different surface forms for words which could

potentially have an initial geminate sequence in the UR. (This claim regarding the UR will be

justified later in the paper.) The Ratak chain has a vowel intervening between the geminate

consonants, while the Ralik chain has adds a vowel word initially (Bender 1969a).

Table 7. Initial geminate sequences (from McClintock (1999))

English	Ralik	Ratak
'good'	mˠamˠaɛnʲ	jɛamˠmˠaɛnʲ
'feel unworthy'	pʲɛpʲɛatˠ	jɛpʲpʲɛatˠ
'angry'	lʲilʲiuw	jilʲlʲiuw

4.2 Consonant Sequence Assimilation

Consonant sequence assimilation occurs in obstruent-obstruent, nasal-obstruent and nasal-liquid sequences. Obstruent-obstruent sequence assimilation occurs when the two obstruents differ in secondary place of articulation. Assimilation is regressive, shown in Table 8.

Table 8. Marshallese Consonant Assimilation (from McClintock (1999))

Sequence type	Consonants				
labial stop	pˠ/pʲ	pˠpʲ ?	pʲpʲ	pʲpˠ ?	pˠpˠ
coronal stop	tˠ/tʲ	tˠtʲ ?	tʲtʲ	tʲtˠ ?	tˠtˠ
bilabial nasal	mˠ/mʲ	mˠmʲ ?	mʲmʲ	mʲmˠ ?	mˠmˠ
coronal nasal	nˠ/nʲ	nˠnʲ ?	nʲnʲ	nʲnˠ ?	nˠnˠ
lateral	lˠ/lʲ	lˠlʲ ?	lʲlʲ	lʲlˠ ?	lˠlˠ
retroflex	rˠ/rʲ	rˠrʲ ?	rʲrʲ	rʲrˠ ?	rˠrˠ

Regressive assimilation also occurs with nasal-obstruent and nasal-liquid sequences. However, in obstruent-nasal sequences, nasal assimilation occurs if the nasal is [-coronal]. (If the nasal is [+coronal] excrescence occurs.) Nasal assimilation can occur within words as well as across word boundaries, as in *lep mouj* "white eggs", which becomes [lʲɛmʲ mʲou̯tʲ]. Regressive Assimilation is also triggered by liquid-nasal sequences, as in the place name *Arno*, which becomes a[nˠnˠ]o.

Further, rounding assimilation may also occur with liquid and nasal/non-nasal velar consonants. The direction of assimilation may be both regressive and progressive, as shown in (1)[2]:

(1) Marshallese   Regressive rounding assimilation
     [pˠʌk]   'take'   bo[kʷ kʷ]eet ne   'take that octopus'

     Marshallese   Progressive rounding assimilation
     [kʌ]   question particle   ear ito[kʷ kʷ]e   'Did he/she come?'

4.3 Excrescence

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[2] In (3), I have shown only the relevant assimilation in IPA, leaving the rest of the sentence in Marshallese orthography.

There are three homorganic sequences which trigger excrescence: obstruent-liquid,

liquid-obstruent (with the exception of /lʲtˠ/ and /lˠtˠ/ in which neither assimilation nor

excrescence occurs) and obstruent-nasal when the nasal is [+coronal].   For coronal nasals,

excrescence can occur word internally, as in 'curious' *kajnet* [kɐtˠaɛnʲɛtʲ], or across a word

boundary, as in 'that watch' *waj ne-* [wɔatˠ ʌe nʲɛ]. When excrescence occurs across a word

boundary, the vowel is still a smooth transition from one target to another.

5. Syllable Structure

Marshallese syllable structure may be CV, CVC, or VC. Marshallese does not allow

complex onsets or codas. Further, what appears to be long vowel are in fact V_1GV_1 sequences,

where /G/ = {/j/, /w/, /ɰ/} (Bender 1968). For example the word *naj* 'future' contains the long

medial vowel [a]. In this word, both consonants are palatalized, yet the vowel is not [-back] as it

should be in the environment of palatalized consonants. Instead, this vowel is [+back, -round].

Thus there must be something pulling the vowel towards [+back,-round] qualities. If the long

vowel is in fact VGV, then there is an explanation for vowel quality. Thus the correct phonetic

form for 'future' is [nʲeaɰaetʲ]. It is of course possible that the word was transcribed incorrectly

and the long vowel is [e], in which case there would be no need for positing a glide. However

the vast number of Marshallese words which would have been transcribed incorrectly leaves this

option in doubt.

There is empirical evidence which supports the claim that there is a glide in this

sequence. In an acoustical analysis, Choi (1992) examined the F2 trajectories of CGC "long

vowels" versus short vowels. While there was not significant difference between the trajectories

of long and short vowels where the consonant and glides bore the same secondary articulation-

/tˠapˠ/ vs. /tˠaɰapˠ/- there was a significant difference between /tʲapʲ/ vs. /tʲaɰapʲ/ as well as

instances where the two consonants had different secondary articulation. From these results,

Choi concludes that Bender's analysis correctly predicts dipthongs with F2 transition patterns

that contrast with those in short vowels. However, Choi also concludes that there is no evidence

that the glide is present phonetically. Despite this fact, he does not rule out the possibility that

this glide could exist as "a deeper level of representation" (71).

More Support for Bender's analysis comes from prosodic weight. McClintock (1999)

explains that only final consonants may carry prosodic weight. Under this analysis, the syllable

structure of [jɛnʲtˠɐɰ] is:

(2)
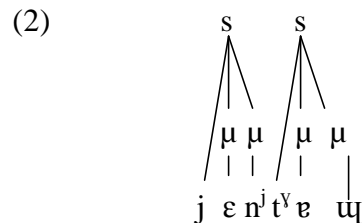
Due to the fact that complex consonants and codas are not allowed in Marshallese, it can be

conluded that Marshallese does not allow super-heavy syllables. If this is the case, then the

inadmissibility of CVVC syllables is explained. Since both vowels and the coda bear prosodic

weight, a CVVC sequence would result in a super-heavy syllable. Further a $CV_1\{y, w, h\}V_1C$

syllable structure would not create super-heavy syllables.

6. Reduplication[3]

Marshallese reduplication occurs for a variety of morpho-semantic reasons, which will be

discussed briefly before types of reduplication are introduced. The primary reasons for

reduplication are 1) the derivation of verbs from nouns, 2) the derivation of intransitive verbs

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[3] In the discussion of reduplication, examples are taken from Bender (1969) and (1973), Harrison (1973) and Zewen (1977).

from their transitive counterparts, 3) the formation of 'distributive' verbs and 4) the formation of

special forms of numbers (Bender (1971))[4].

 The derivation of verbs from nouns requires little explanation except to say that a noun

can become a verb through the process of reduplication, as in (3):

(3)   tʸɯ?   'sound of hitting or chopping   tʸɯ?tʸɯ?   'to make a *ti?* sound'
       wɔaɥ   'canoe'   wɔaɥwɔaɥ   'go by canoe'
       wɔɛtʲ   'watch'   wɔɛtʲwɔɛtʲ   'wear a watch'

Likewise the derivation of intransitive from transitive verbs is also simple, with one exception.

For many in transitive verbs, there are segments which are not in the reduplicated intransitive

form:

(4)   mʸɯitʲiɯtʸ   'to cut' trans.   mʸɯitʲmʸɯitʲ   'to cut' intrans.
       ?arʸɯitʲ   'to bite (the dust)' trans.   ?arʸ?arʸ   'to bite (the dust)' intrans
       nʸʌow   'to pound' trans.   nʸʌownʸʌow   'to pound' intrans.

The first two examples in (4) show that the endings -*it* and –*ij* are not included in the intransitive

form. It is possible that these are some sort of transitive endings, but this issue is not yet clear.

 Reduplication may also occur with distributive forms of verbs and nouns. The

distributive signifies a general spreading out, distribution, or intensification of an action:

(5)   pʸarʸ   'rocks along the shore'   pʸarʸpʸarʸ   'full of rocks along the shore'.
       kʸapʸwuɯlʸʌ?   'to cause surprise'   kʸapʸpʸw uɯlʸʌ?lʸʌ?   'cause great surprise'
       pʲijɛɔw   'chilly'   pʲpʲijɛɔwyeow   'sensitive to chills'

Finally reduplication can be used to form special verbs from numbers. These verbs have the

meaning 'to count by."

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[4] Bender also claims that reduplication can derive a postpositional adjective from a stative verb. However it is
unclear whether these "statives" are verbs or if they are really adjectives with a silent copula. For some forms, what
Bender claims is a postpositional form, Gaiun (PC) describes as having a distributive meaning. Thus it is possible
that these forms are in fact distributives. Due to this discrepancy and the fact that there syntactic issues which need
to be resolved first, I have chosen not to include postpositionals in reasons for reduplication. Their reduplicative
form, however, is similar to other forms, and therefore, this exclusion will not affect the analysis of reduplication.

6.1 Types of Reduplication

There are four types of reduplication in Marshallese: full reduplication, right edge reduplication, left edge reduplication and doubling (Bender (1971), (Harrison (1973)). These four types of reduplication do not correspond to the four functions of reduplication, i.e. the distributive can be formed through doubling, right edge reduplication or both, intransitive can be formed through doubling or full reduplication, etc.

6.1.1 Full Reduplication

Full reduplication consists of the reduplication of the entire word. However this type of reduplication rarely occurs when the word consists of more than one syllable. While it might be possible that full reduplication is actually right or left edge reduplication, this cannot be seen determined from the surface forms. Full reduplication occurs for the formation of the distributive, the derivation of a verb from a noun and intransitive verb formation.

Table 9. Intransitive full reduplication

nˠʌow	'to pound'	nˠʌownˠʌow	'to pound'
pʲeʌrˠ	'to doubt'	pʲeʌrˠpʲeʌrˠ	'to doubt'

Table 10. Distributive full reduplication

pˠarˠ	'rocks along the shore'	pˠarˠpˠarˠ	'full of rocks along the shore'
pˠatˠ	'hill'	pˠatˠpˠatˠ	'full of hills'
pˠʌokʷ	'sand'	pˠʌokʷ pˠʌokʷ	'full of sand'
rˠʌtˠ	'sunshine'	rˠʌtˠrˠʌtˠ	'full of sunshine'
rˠɯij	'bone'	rˠɯijrˠɯij	'boney
rˠʌ?	'hear'	rˠʌ?rˠʌ?	'hear well'
tˠʌolʷ	'mountain'	tˠʌolʷtˠʌolʷ	'full of mountains'

Table 11. Noun to verb full reduplication

ɰatˠ	'hat'	ɰatˠɰatˠ	'wear a hat'
kˠalˠ	'loincloth'	kˠalˠkˠalˠ	'wear a loincloth'
kˠʌtˠ	'call of a turnstone (bird)'	kˠʌtˠkˠʌtˠ	'to make the call of a turnstone

mˠaɛtʲ	'glasses'	mˠaɛtʲ mˠaɛtʲ	'wear glasses'
ʔɯrˠ	'sound of groaning'	ʔɯrˠʔɯrˠ	'to groan/grunt'
tˠɯʔ	'sound of hitting or chopping'	tˠɯʔtˠɯʔ	'to make a *tiʔ* sound'
wɔaɰ	'canoe'	wɔaɰwɔaɰ	'go by canoe'
wɔɛtʲ	'watch'	wɔɛtʲwɔɛtʲ	'wear a watch'
wuɯtˠ	'flower'	wuɯtˠwuɯtˠ	'wear a flower'

6.1.2 Right Edge Reduplication

Right edge reduplication occurs when the base has more than one syllable. In these instances, the right syllable is reduplicated.

Table 12. Distributive right edge reduplication.

ɰarˠrˠɯmˠʌetʲ	'feeble'	ɰarˠrˠɯmˠʌetʲmˠʌetʲ	'very feeble'

Table 13. Noun to verb right edge reduplication

pˠaɰatˠ	'smoke'	pˠaɰatˠɰatˠ	'to smoke'
tʲeʌɰʌetʲ	'shirt'	tʲeʌɰʌetʲɰʌetʲ	'to wear a shirt'
tʲeokʷoʌnˠ	'walking stick'	tʲeokʷoʌnˠ kʷoʌnˠ	'to use walking stick'
tʲeowoʌpˠ	'soap'	tʲeowoʌpˠwoʌpˠ	'to be soapy'
tʲiuwiutʲ	'shoes'	tʲiuwiutʲwiutʲ	'to wear shoes'
kˠaʔɯrˠ	'belt'	kˠaʔɯrˠʔɯrˠ	'to wear a belt'
kˠaɔwɔɛtʲ	'blanket'	kˠaɔwɔɛtʲwɔɛtʲ	'to use a blanket'
kˠʌowoʌlˠ	'hair'	kˠʌowoʌlˠwoʌlˠ	'to be hairy'

Table 14. Right edge reduplication for intransitive verbs.

ɰatˠɯitʲiɯkˠ	'to smoke'	ɰatˠɯitʲiɯkˠ tʲiɯkˠ	'to smoke fish or copra'
kˠalˠʌɰʌrˠ	'to drive in the ground'	kˠalˠʌɰʌrˠɰʌrˠ	'upside down'
jiɯlˠʌejiɯkˠ	'to string'	jiɯlˠʌejiɯkˠjiɯkˠ	'to string'

6.1.3 Left Edge Reduplication

Bender (1971) gives only one form of left edge reduplication:

Table 15. Left edge reduplication

jetʲɛalˠ	'to go'	jejetʲɛalˠ	'to walk'

While [jejet^jɛal^ɣ] seems to be formed by reduplication, it does not have a reduplicative meaning that falls into one of the morph-semantic category. Further Abo (1976) does not list this word as a reduplicated form. It is probably that there are more convincing examples of left edge reduplication, but more research will need to be done to uncover them.

6.1.4 Doubling

Doubling consists of the reduplication of a syllable initial consonant. In many instances, it is the initial syllable of the stem, but as is shown by number doubling, this is not always the case. In number doubling, the causative prefix *ka-* is also added to the right edge of the word.

Table 16. Number doubling

t^jiuwuʌn^ɣ	'one'	k^ɣaɛt^jt^jiuw	'count by ones'
r^ɣɯuwow	'two'	k^ɣar^ɣr^ɣɯuwwow	'count by twos'
t^jiɯl^ɣɯuw	'three'	k^ɣaɛt^jt^jiɯl^ɣl^ɣɯuw	'count by threes'
jeʌm^ɣan^ɣ	'four'	k^ɣaɛjeʌm^ɣm^ɣan^ɣ	'count by fours'
l^ɣal^ɣʌm^ɣ	'five'	k^ɣal^ɣl^ɣal^ɣl^ɣʌm^ɣ	'count by fives'
t^jiɯl^ɣt^jiɯn^ɣʌow	'six'	k^ɣaɛt^jt^jiɯl^ɣt^jiɯn^ɣʌow	'count by sixes'

Table 16. Intransitive verb doubling

t^jiɯb^ɣɯr^ɣ	'to hug'	t^jt^jiɯb^ɣɯr^ɣ	'to hug'
k^ɣal^ɣ	'to build'	k^ɣk^ɣal^ɣ	'to build'
k^ɣɯn^ɣ	'to invent'	k^ɣk^ɣɯn^ɣ	'to invent'
k^ɣɯr^ɣ	'to call'	k^ɣk^ɣɯr^ɣ	'to call'
l^ɣiuw	'to scold'	ll^ɣiuw	'to be angry'
p^jiɯk^ɣ	'to look for'	p^jp^jeʌk^ɣ	'to look for'
k^wuɯn^ɣ	'to extinguish'	k^wk^wuɯn^ɣ	'to extinguish'

Doubling may also be combined with right edge reduplication to form the distributive.

Table 18. Distributive right edge reduplication and doubling

p^ɣaɥwow	'chicken'	p^ɣp^ɣaɥwowwow	'full of chickens
p^ɣar^ɣɯuw	'crab'	p^ɣp^ɣar^ɣɯuwr^ɣɯuw	'full of crab'
r^jeʌk^ɣak^ɣ	'stone'	r^jr^jeʌk^ɣak^ɣk^ɣak^ɣ	'full of rocks'
r^jijl^ɣaɥ	'nail'	r^jr^jijl^ɣaɥl^ɣaɥ	'have many nails'

tʲeʌkᵞabᵞ	'checkered'	tʲtʲeʌkᵞabᵞkᵞabᵞ	'checkered all over'
tʲeʔaɔw	'odor of fish'	tʲtʲeʔaɔwʔaɔw	'permeated with fish odor'
tʲeɔwɔakᵞ	'ashamed'	tʲtʲeɔwɔakᵞwɔakᵞ	'easily ashamed'
kᵞabᵞwuɯlᵞʌʔ	'to cause surprise'	kᵞkᵞabᵞwuɯlᵞʌʔlᵞʌʔ	'cause great surprise'
kᵞarᵞtʲiɯnᵞ	'kerosene'	kᵞkᵞarᵞtʲiɯnᵞtʲiɯnᵞ	'smell of kerosene'

6.1.5 Ambiguous Reduplication

As was stated in the beginning of this section, transitive verbs have segments that are both not reduplicated in the intransitive form and are deleted. Thus it is unclear as to what type of reduplication is occurring. I will put off labeling these in this descriptive portion of the paper and will refer to them as "ambiguous" for the time being.

Table 19. Intransitive ambiguous reduplication

mᵞɯitʲiɯtᵞ	'to cut'	mᵞɯitʲmᵞɯitʲ	'to cut'
pʲɛɔwuɯnᵞ	'to bind'	pʲɛɔwpʲeʌw	'to coil up'
rᵞakᵞɯitʲ	'to clean an area'	rᵞaɰrᵞʌɥ	'to clean up'
rᵞaɔkʷuitʲ	'to scratch'	rᵞaɔkʷrᵞʌokʷ	'to scoop up'
tᵞaɛtʲiɯkᵞ	'to wind up'	tᵞaɛjtᵞʌetʲ	'to wind/roll up'
jɛatᵞɯtᵞ	'to smell'	jɛatᵞjɛatᵞ	'to smell'

6.2 Part 1 Conclusion

In this section, I have examined some of the major features of Marshallese phonology. In section 7, I will examine a vowel underspecification, geminates and reduplication in more detail with the hopes of providing possible analyses for the issues raised in part 1.

7. Vowel Underspecification

In order to account for Marshallese vowel underspecification, Hale, following Keating (1988), suggests three levels of representation in the production of the vowels: the phonological representation /…/ , the phonetic representation […], and the acoustic/articulatory representation ⚥ […] ⚥ . Only at the acoustic/articulatory representation do vowels become specified, since it is

at this level that specification must be determined in order to be produced. (6), adapted from Hale, represents the derivation of two Marshallese words:

(6) a. $C_{\text{palatalized}}VC_{\text{velarized}}$: $/n^j[\text{-high,+ATR}]t^\gamma/ > [n^j[\text{-high,+ATR}]t^\gamma] >$ ✝ $[n^je\Lambda t^\gamma]$ ✝ - squid
   b. $C_{\text{palatalized}}VC_{\text{palatalized}}$: $/t^j[\text{-high,-ATR}]t^j/ > [t^j[\text{-high,-ATR}]t^j] >$ ✝ $[t^j\epsilon t^j]$ ✝ - Lutjanus Flavipes

This analysis has been confirmed by Choi (1992), who showed that F1 was an inherent property of the vowel, while F2 was determined by the property of the surrounding consonants. Further, movement of F2 between consonants with different secondary places of articulation confirmed interpolation, the movement from target to target, in Marshallese.

7. Geminates

In order to assume that word initial geminates in the UR are either separated or made word internal by epenthesis, the claims made about the UR must be justified. Surface forms for the two dialects have already been proposed. However, I now give further examples:

(7a) Kwo   lukkun $[er^jr^je\Lambda k^\gamma]$ Ratak dialect
      2$^{\text{nd}}$ SG   much   grow
      You are really growing.

(7b) Kwo   lukkun $[r^jer^je\Lambda k^\gamma]$ Ralik dialect
      2$^{\text{nd}}$ SG   much   grow
      You are really growing.

These two example show how each dialect handles word initial geminate. Now consider (8), in which the word initial geminate has a subject pronoun prefix:

(8) $[je\text{-}r^jr^je\Lambda k^\gamma]$ imon wia   en   an   (Abo (1976))
     3SG-grow   store   the   his
     His store is progressing

Both dialects use the form shown in (8). When a word initial geminate is prefixed, epenthesis does not occur. Thus it can be concluded that these geminates exist in the UR.

8. Reduplication

Before beginning OT analysis of reduplication, it is necessary to briefly to review the types of reduplication proposed in section 6. I have already stated that since full reduplication in for monosyllabic words only, it is ambiguous. It might in fact be the case that right or left edge reduplication is occurring. Further, since there is one instance of left edge reduplication, it will not be addressed in this analysis.

8.1 Framework

McCarthy and Prince (1995) developed a model of reduplication within OT which is known as Correspondence Theory. The constraints involved in this theory define the relationship between the stem and base, the base and reduplicant and the stem and reduplicant. However, McCarthy and Prince claim that the relationship between the stem and the reduplicant play a subsidiary role. They therefore exclude this relationship from their basic model of reduplication:

(9)   Basic Model
        Input: /Af $_{RED}$ +   Stem/
                                   ?? I-O Faithfulness
        Output: R ?   B
                         B-R Identity

I-O Faithfulness constraints require that the output and the input identical, while B-R Identity constraints require that the base and reduplicant identical. This model of reduplication thus implies the following constraints:

(10)   MAX-BR
           Every segment of the base has a correspondent in the reduplicant.

       MAX-IO
           Every segment of the input has a correspondent in the output.

       IDENT-BR
           Reduplicant correspondents of a base [?F] segment are also [?F].

IDENT-IO
　　　　Output correspondents of an input [?F] segment are also [?F].

While IDENT-IO will not play a role in the analysis of Marshallese reduplication, the other three

constraints are of crucial importance.

8.2 Analysis

　　　　In most instances Marshallese can only reduplicate one syllable. This could be explained

by a markedness constraint against the reduplication of more than one syllable.

(11)　　*Multi Syllable Reduplication– Only one syllable can be reduplicated.

This constraint outranks MAX-BR. There must also be a constraint that will ensure that the right

edge is reduplicated rather that the left edge:

(12)　　Right Anchor BR – Reduplicate the right edge of the base.

Multi Syllable >> Right Anchor BR >> MAX-BR

/pˠaɯat ˠ+red/	*MULTI SYLLABLE	MAX-BR	RIGHT ANCHOR BR
☞ [pˠaɯat ˠ-ɯat ˠ]		*	
*[pˠa-pˠaɯat ˠ]		*	*!
*[pˠaɯat ˠ-pˠaɯat ˠ]	*!		

There is not a necessary constraint ranking of MAX-BR and Right Anchor BR.

　　　　The issue of what I have termed the "transitive suffix" could be resolved in a few

different ways. One would be to assume that the transitive form does in fact have a suffix which

is absent in the UR. At this point, I do not have enough evidence to make this claim. Therefore I

will continue to assume that the intransitive, reduplicated form is derived from the transitive

form.

Under this assumption, constraints must be proposed that will ensure both that the "transitive suffix" will not be reduplicated and that it will not appear in the surface form. These constraints are not well defined at this time.

(13)   *Transitive suffix – The transitive suffix may not appear in the reduplicated form.

        *Reduplicate transitive – Don't reduplicate the transitive suffix.

These two constraints must outrank MAX-IO and MAX-BR. Further, two more constraints are required to ensure that the correct syllable will be reduplicated and that it will be placed on the right edge of the word.

(14)   *Left Anchor BR – Don't reduplicate the left edge of the base.

        Align-RED-Right - Align the left edge of the reduplicant with the right edge of the base.

*Multi Syllable, *Left Anchor BR, Align-red-Right, *Transitive suffix, *Reduplicate transitive
>> Right Anchor BR, MAX-IO MAX-BR

/mˠɰitʲiɯtˠ + RED/	*MULTI SYLLABLE	*LEFT ANCHOR BR	*REDUPLICATE TRANSITIVE	MAX-IO	MAX-BR	RIGHT ANCHOR BR
☞ [mˠɰitʲ-mˠɰitʲ]				*	*	*
*[mˠɰitʲiɯtˠ- tʲiɯtˠ]			*!		*	
*[mˠɰi-mˠɰitʲiɯtˠ]		*!			*	*
*[mˠɰitʲiɯtˠ-mˠɰitʲiɯtˠ]	*!					

One more phenomenon needs to be addressed which has not yet been introduced. This is the phenomena of "*a* raising." Bender (1973) explains that [-high, -ATR] raising occurs when *a* is found between *i* in the base and reduplicant. When this occurs, the vowel becomes a [-high, +ATR] vowel. The correct "raised" vowel is easily derivable in a rule based analysis:

(15)   /rˠɔkʷuitʲ/
        rˠɔkʷu   loss of final C
        rˠɔkʷu-rˠɔkʷu   reduplication
        rˠɔkʷu-rˠʌokʷu   *a* raising
        rˠɔkʷ-rˠʌokʷ   apocope
        rˠɔkʷ-rˠʌokʷ

However, it is more difficult to account for this process in OT. A *aCa constraint cannot
be proposed, as this sequence is possible in other Marshallese words. Therefore I will simply
propose a vague A-Raising constraint for the time being which penalizes any *a* which does't
raise.

(16)   *A in raising environment – assign a violation to any *a* that do not "raise" in the proper
        environment.

*A in raising environment violates faithfulness between the base and reduplicant. Thus it must
be ranked higher than IDENT-BR.

(17)   *Multi Syllable, *Left Anchor BR, Align-red-Right, *Transitive suffix,
        *Reduplicate transitive, *A in raising environment >> Right Anchor BR, MAX-IO,
        MAX-BR, Ident BR

/bʸatʸ+red/	*A	IDENT-BR
☞ [bʸatʸ-bʸʌtʸ]		*
*[bʸatʸ-bʸatʸ]	*!	

8.2.1 DOUBLING

Doubling also presents a problem for an OT analysis, as will shortly become apparent. In
order to account for doubling, a constraint must be proposed only allows the onset of a syllable
to be reduplicated. This constraint outranks both MAX-BR and *Multi Syllable.

(18)   No NC – Do not reduplicate the nucleus and coda

This constraint has been named No-NC to show that the reduplicant cannot be composed of a
nucleus and coda and must be ranked above MAX-BR, *Left Anchor BR and Right Anchor BR

(19)   *Multi Syllable, Align-red-Right, *Transitive suffix, *Reduplicate transitive, *A in
raising environment, No NC >> Right Anchor BR, MAX-IO, MAX-BR, Ident BR, *Left Anchor
BR,

/RED+kʸalʸ/	*NO-NC	MAX-BR	*LEFT ANCHOR BR	RIGHT ANCHOR BR
☞ [kʸkʸalʸ]		*	*	*
*[kʸalʸkʸalʸ]	*!			

There is one major problem with this constraint. In order for (19) to be derived, this constraint must be undominated. However in right edge or full reduplication, this constraint would need to be ranked at the bottom. Additionally, some words that involved both doubling and right edge reduplication would imply that this constraint is simultaneously ranked undominated and ranked low in the hierarchy. Therefore, this constraint seems impossible.

Perhaps a better explanation would be to propose a shape tier. Currently, I am unable to match any of the morpho-semantic reasons for reduplication to a shape tier. But something of this sort seems to be occurring in verb forms of certain numbers. A shape tier could account for simultaneous right edge and doubling. Take for example, the shape CCVCCVCCVC. This would cause $r^ɣɯijl^ɣak^ɣ$- CVCCVC to become $r^ɣr^ɣɯijl^ɣak^ɣ\ l^ɣak^ɣ$ in the distributive.

4.2. Reduplication Conclusion

In this section, a ranking of constraints have been proposed for Marshallese reduplication. However there are many more questions which need to be addressed in order to account for all types and forms of reduplication. First is the question of what drives the selection of reduplication type. For example, why is one intransitive verb formed by right edge reduplication but another formed by doubling? This could be explained if the different types of reduplication corresponded to the morpho-semantic reasons for reduplication. While it is encouraging that the "number forms" are created through doubling only, none of the other categories seem to correspond to anything.

5. Conclusion

This paper has examined many of the relevant issues in Marshallese phonology while raising a number of questions which may be examined in future research. The most questions have been raised by the analysis of reduplication.

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