Marshallese Suffixal Reduplication

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This paper will discuss suffixal reduplication in Marshallese, a Micronesian language of the Pacific. An understanding of Marshallese syllable structure will be important in understanding its reduplication process and the interaction of reduplication and epenthesis. Marshallese reduplication appears to have two distinct patterns. The reduplicative suffix added to words ending in CVC is of the form CVC while the reduplicative suffix added to words ending in CVVC is of the form VVC, apparently lacking an onset consonant. I will propose an analysis of Marshallese reduplication within the framework described by Steriade (1988) which explains both types of Marshallese reduplication as the result of a single process. I will show that Marshallese demonstrates a very unusual type of reduplication within the typology of reduplication outlined by McCarthy and Prince (1986) filling an otherwise unexplained but nonprincipled gap in this typology. The proposed analysis of Marshallese reduplication will be compared to a new analysis of Tzeltal verbal reduplication. Finally, I will describe Marshallese epenthesis which produces the surface forms of the reduplicated words.

1. Marshallese Syllable Structure

Marshallese is a Micronesian language spoken on the Marshall Islands of the Pacific. There are two main dialects of Marshallese, Ratak (eastern) and Ralik (western), which occasionally differ in pronunciation. The data in this paper will be from a native speaker of the Ratak dialect.[1]

The consonant inventory of Marshallese is shown in (1):

(1)

	light plain or palatalized	heavy velarized	rounded
oral stops			
velar	--	k	q
labial	p	b	--
dental	j	t	--
nasal stops			
velar	--	ŋ	ŋʷ
labial	m	m̦	mʷ
dental	n	n̦	nʷ
laterals	l	ḷ	lʷ
trills	d	r	rʷ

(This orthography is taken largely from Bender, 1969)

The Marshallese language has 12 surface vowel qualities: four front and four central unrounded vowels and four back round vowels. The transcription used in this paper is shown in (2) below.

(2)

	front	central	back
high	i	ɯ	u
higher mid	e	ɤ	ǫ
lower mid	ɛ	ə	ǫ
low	æ	a	ɒ

The front vowel occur in the neighborhood of light consonants; the central in the neighborhood of heavy consonants, and the back in the neighborhood of round consonants. The exact distribution of these surface qualities and their underlying phonological analysis is not clear, and the reader is encouraged to see Bender (1969) and Choi (in preparation).

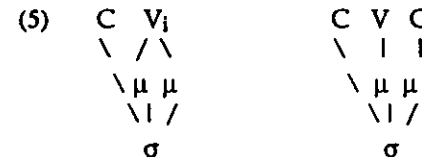Marshallese contrastive vowel and consonant length. Minimal pairs of these alternations are given in (3) and (4).[2]

(3)

dam	forehead	daam	your blood
bat	hill	baat	smoky
mat	cooked	maat	finished
mæŋ	fall	mææŋ	pandamus leaf
tok	to land, settle	took	ashamed
jɛn	lets	jɛ̧ɛ̧n	chain
jæn	from	jːæn	cents

(4)

eta	my name	etta	to be in the early months of pregnancy
ebat	he is slow	ebbat	he is late
elan	squall	ellan	to spread something apart
ele	possessed by a demon	elle	to bear fruit or flower; serves you right
ine	seed	inne	yesterday
ebo	I caught you	ebbo	it's ripe

Marshallese syllables are of the following types: CV, CVV, CVC, and CVVC. Stress falls equally on long and closed syllables in a word and no secondary stresses are used in the language.[3] Light syllables are unstressed and syllables created by epenthetic vowels (to be discussed later) have the lowest level of prominence. No tautosyllabic consonant clusters occur in the language.

Under a moraic theory of syllable weight (Hyman, 1985 and McCarthy and Prince, 1986), the structure of stem CV_iV_i and CVC syllables will be bimoraic, as shown in (5). This is supported by the stress facts in the language. All closed and long syllables of a word receive stress while monomoraic syllables, CV and V, do not.

(5)

$$
\begin{array}{cc}
C\ \ V_i & C\ V\ C \\
\backslash\ /\ \backslash & \backslash\ \ |\ \ | \\
\backslash\ \mu\ \mu & \backslash\ \mu\ \mu \\
\backslash\ |\ / & \backslash\ |\ / \\
\sigma & \sigma
\end{array}
$$

Sequences of unlike vowels do occur in the language but appear to be bisyllabic[4], ie, a sequence of the a CV and V syllable.

We are then left with the question of how CV_iV_iC syllables should be represented. These syllables occur only word finally and in structures where the coda consonant is geminate, ie, the structure $C_1VVC_2C_2V...$[5], although these sequences are not common. This pattern can be seen in the words given in (7).

(7)

jeraamm̦an	fortunate
weeppæn	improved

The moraic representation of the geminate consonants after long vowels is an open question, as geminate consonants are generally considered to be moraic. Here, however, the preceding vowel is long thereby making the syllable already bimoraic. The question of the appropriate syllable structure for the words like those in (7) will not be further addressed here as these are the only examples of such words I have

collected, and they are not relevant to the reduplication data or analysis described below.

I suggest that the word final extra heavy syllables be represented as bimoraic, having the coda consonant share the final mora of the syllable template. This structure is shown in (8).

(8)

$$
\begin{array}{ccc}
C & V & C \\
\end{array}
$$
C V C
＼ ／＼ ／
.＼ μ μ
＼ | ／
σ
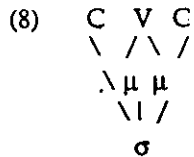
Cross-linguistic evidence suggests that a syllable may be maximally bimoraic (see Hyman, 1985), in the unmarked case. As will be shown, a trimoraic structure for this syllable would prevent the possibility of a unified analysis of reduplication patterns in the language. We will see that a proposal suggesting that the final consonant is extrametrical is also untenable.

While all other syllables in the language have a one-to-one or many-to-one to one (in the case of long vowels assuming a single root node) mapping of moras to segments, the CVVC syllable type has a one-to-many mapping. Consonant clusters in coda would also produce a one-to-many mapping; however, Marshallese does not allow tautosyllabic consonant clusters. I will suggest that this one-to-many mapping is a non-optimal syllable type whose limited distribution in Marshallese is relevant to our understanding of reduplication in the language.[6]

2.0 Reduplication

Reduplication in Marshallese is used to form the causative and the intensive. The process is fairly but not entirely productive. There are two patterns of reduplication. In the first, a suffix is added which has the melody and syllable structure of the final stem syllable. Examples of this type are shown in (9). (A [+] indicates the addition of a grammatical marker prefixally.)

(9) Pattern 1

jæj	slippery	jæj-jæj	bragging, very slippery
ŋar	bite	ŋar-ŋar	bite hard
laq	most recent	laq-laq	far away, long ago
lʏŋɒn	fear	lʏŋɒn-ŋɒn	very afraid
mok	tired	e+mok-mok	very tired
ebbok	to make full	ebbok-bok	puffy
bok	sand	e+bok-bok	sandy
bǫk	carry	eb+bǫk-bǫk	she is a gossip
rǫŋ	ear	ja+rǫŋ-rǫŋ	deaf
ennon	aroused	ennon-non	(sexually) aroused
enno	delicious	enno-no	very delicious

---

tǫ	rope	ka+tǫ-tǫ	hang up
yu	coconut soft meat	kay+yu-yu	collect coconut soft meat
awa	hour	ka+awa-wa	killtime

(these data do not represent surface phonetic realizations as the discussion of epenthesis later will indicate more explicitly.)

The second phonological pattern of suffixal reduplication is found in words having long vowels and a coda consonant in their final syllables. This pattern appears to differ from Pattern 1 in that the reduplicated syllable seems to lack an onset. Examples of this pattern are given in (10).

(10) Pattern 2

baat	smoke	e+baat-aat	smokey
jook	ashamed	e+jook-ook	shy, bashful
naan	talk, word	kʏ+kʏn+naan-aan	talkative
kǫǫn	piglet	ka+kǫǫn-ǫǫn	to own a piglet
kʏjeek	fire	ka+kʏjeek-eek	firey, blazing
tæætŋ	popular	tæætŋ-æætŋ	(very) popular
jituɯl	steel	jituɯl-uɯl	very magnetic
mæætŋ	burn, warm	e+mæætŋ-ætætŋ	burning
mæær	lie, fib	e+mæær-æær	he is a fibber

Long vowels do not surface in word final position due to a process of word final vowel shortening. The reduplicated form of a CVV final stem surfaces with a short vowel in word-final position. For example, the reduplicated form of /baataal/ 'father' is realized as [baata] and will surface in its reduplicated form as baataa-ta 'priestly'.
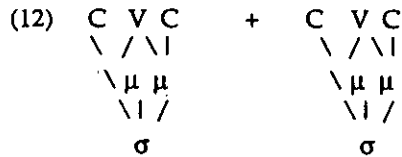
3. Reduplication Analysis

Adopting the above syllable structure and Steriade's (1988) theory of reduplication, a unified account of Marshallese reduplication becomes possible. Recall that Steriade proposes that "templates are not strings of concrete, fillable slots, but rather abstract conditions on the prosodic weight and syllabic organisation of strings" (Steriade, 1988, p. 146). If the weight parameter of the reduplicative suffix is specified as a bimoraic syllable both patterns of reduplication can be explained as the result of a single process. The analysis of the CVC pattern of reduplication, Pattern 1, is straightforward. The entire word with its accompanying syllable structure is copied, suffixed, and trimmed to a bimoraic syllable. The derivation is shown in (11).

(11)

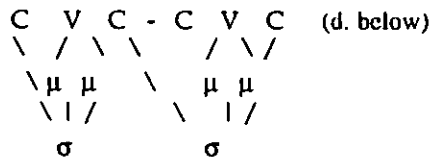| input: | ebbok | to make full |
copy:	ebbok-ebbok	
prosodic weight:	ebbok-bok	
output:	ebbokbok	puffy

Furthermore, the reduplication of words ending in CVVC syllables which seems to affix an onsetless suffix can now be given a straightforward explanation. This structure is represented in (12).

(12)
```
     C  V  C      +      C  V  C
      \ / \ |             \ / \ |
       \ μ μ               \ μ μ
        \ | /               \ | /
          σ                   σ
```

Recall that we suggested that the one-to-many mode of association of moras to segments, ie. the extra heavy syllable, is less preferable than a one-to-one or many-to-one mapping. Such syllables are in fact only allowed in Marshallese finally or as parts of geminate structures internally. In the case of a reduplicated stem with a final CVVC syllable, the sequence must resyllabified after affixation in such a way as to make a regular heavy syllable out of the now word internal extra heavy stem syllable. The final stem consonant reassociates as an onset to the suffixal reduplicated syllable. Here, it becomes relevant that Marshallese does not permit complex onsets (or any tautosyllabic consonant clusters). This forces the original suffixal onset to delete to yield a simplex onset. The original coda consonant is now the onset of the reduplicated syllable. The derivation is shown in (13).

(13a)   j i t ɯ ɯ l + j i t ɯ ɯ l   ------>   j i t ɯ ɯ l ɯ ɯ l

```
        C   V  C - C  V   C     (d. below)
         \ / \  \    / \ /
          \ μ μ  \   μ μ
           \ | /   \  | /
             σ        σ
```

(13b)
a. input: jitɯɯl
b. copy: jitɯɯl-jitɯɯl
c. prosodic weight: jitɯɯl-tɯɯl
d. get rid of extra heavy syllables: jitɯɯ.ltɯɯl
e. no complex onsets: jitɯɯ.lɯɯl
f. output: jitɯɯlɯɯl

Resyllabification, creating an illicit onset, occurs to remedy the illicit word internal occurrence of an extra heavy syllable rather than deletion of the offending stem final coda consonant. It seems likely that a rule deleting the second consonant in complex onsets is a less marked rule than one deleting (word internal) coda consonants. Steriade (1988) states that complex onsets appear to simplify systematically by eliminating non-initial consonants. Marshallese corrects the illicit syllable structure created by the reduplication of CVVC forms by resyllabification. Then a common rule of onset simplification occurs.

Steriade's (1988) framework for reduplication is adopted here over a copy-and-associate framework as introduced by Marantz (1982) and developed in the work of Yip (1982), Broselow and McCarthy (1983), Levin (1983), Kiparsky (1986), and others] which considers the shape of reduplicated affixes to be

independent of their base as are normal affixes (Steriade, 1988). In Steriade's reduplication framework, the template has no independent existence and arises as a result of weight and syllable markedness parameter settings which are satisfied independently of one another using a full copy of the base *and* its syllable structure. This framework is preferred here, a copy-and-associate framework, for reduplication whereby a template is affixed and the melody copy then associated or mapped to it does not have a mechanism to account for the transfer of vowel length from the stem to the reduplicated affix. (Note that the proposal of McCarthy and Prince (1987), however, does account for length transfer by adopting the insertion of the lexical specification of the base in lieu of copying and assuming that "all and only the lexically specified properties of the input are available for association.") Steriade comments that Clements (1985), Davis (1985) and Kiparsky (1986) have "noted that many instances of reduplication cannot be derived [by a copy-and-associate model] unless the first step is to link a syllabic segment to the V slot of the template." (1988, p. 86) Steriade suggests that these instances actually demonstrate "not the need to give priority in association to Vs but rather the fact that partial reduplication copies not just segments but also syllable structure." (1988, p. 87) This is the position adopted in the analysis presented below.

To continue the description of Marshallese reduplication, recall the cases of the vowel-final words and the process of final vowel shortening. The relevant derivation is given in (14).

(14)
input:	baataa
copying:	baataa-baataa
prosodic weight:	baataa-taa
final-vowel shortening:	baataa-ta
output:	baataata

The reduplicated forms of true CV-final words like /awa/ look like syllable copying resulting in /ka+awawa/ (shown in (15)) but in fact are due to a combination of the requirement of template satisfaction and the rule of word final vowel shortening. The final vowel in *kaawawa* is lengthened in order to maximally satisfy the template but then undergoes word final vowel shortening.

(15)
input:	awa
copying:	(ka+) awa-awa
prosodic weight:	kaawa-wa
template satisfaction:	kaawa-waa
final vowel shortening:	kaawa-wa
output:	kaawawa

Although there is no empirical evidence to show that this vowel lengthening occurs to fill the template, arguments by McCarthy and Prince and others suggest that a reduplicative template must be satisfied if possible in the language. As Marshallese does have long vowels, we infer that the template is satisfied but that this final long vowel doesn't surface due to the independently motivated rule of word-final vowel shortening.

Although sequences of unlike vowels are uncommon in Marshallese, there are a few examples of reduplication in such words. These forms are shown in (16).

(16) pi.o   cold   pi.yo.yo   very cold
      de.ọ   pretty   de.ọ.yọ   very pretty
      ki.ọ   orange   ki.yọ.yọ   orangey
      (where [y] is a palatal glide)

An explanation for the presence of glides in the reduplicated forms is available if the final syllabic stem vowel is analyzed as having a glide in onset position. This follows the line of Bender's (1969) analysis in which he posits a light glide, [y], and a round glide,[w], in the language noting that the glides are "often heard mainly in [their] effect on the neighboring vowels" (p. xviii). Clearly, a glide must exist as an onset in the second syllable of the stem because it appears in the reduplicated affix and is an unrounded glide rather than the rounded glide which would be predicted by a rule of glide insertion between two round vowels. The choice of a iV or iyV transcription was rather arbitrary in most cases because of its contextually predictability after the first vowel of the stem. No phonological contrast between VV and VGV exists. The glide in the suffix is copied from phonological material in the base; however transcription of the glide in the stem final syllable was somewhat arbitrary due to the natural acoustic transitions after a front vowel. The stem internal glide appears to be transcribed more reliably when followed by an affix in which the glide is clearly present.

4. Marshallese Fills an Unexplained Gap

Marshallese is very unusual with respect to its weight parameter for reduplication. McCarthy and Prince (1986) state that they have found no cases of bimoraic syllable suffixation (p. 41). They do cite examples of suffixal minimal word/foot reduplication in Manam, bisyllabic reduplication in Siriono, and monosyllabic reduplication in Kamaiura (with an onset) and in Tzeltal (purportedly without an onset). They comment regarding the lack of any bimoraic syllable suffixation that "[t]his gap does not appear to be a principled one; the relative rarity of suffixing reduplication, joined with the relative rarity of bimoraic reduplicative affixes, is sufficient to account for it."(McCarthy and Prince, 1986, p. 41) Under the proposed analysis, Marshallese appears to fill an otherwise unexplained gap in reduplication typology. A bimoraic syllable weight parameter for the reduplicative suffix in Marshallese then appears theoretically economical in that two apparently different patterns of reduplication are given a unified analysis, as well as being of interest as an example of a rare type of suffixal reduplication.

5. A Note on Tzeltal Reduplication

Tzeltal, a Mayan language of Mexico has a reduplication process which is similar in certain ways to that of Marshallese. McCarthy and Prince (1986) offer an example of reduplication in Tzeltal in which the reduplicated suffix has the form VC. They say, "Tzeltal appears to add only a rhyme, deriving its onset from phonological material already present in the base " (McCarthy and Prince, p. 41, 1986) Several examples are given in (17).

(17) Pattern A   (Berlin, 1963)
      nit   nititan   push
      net'   net'et'an   press
      haš   hašašan   feel with palm
      čol   čololan   make rows
      p'uy   p'uyuyan   grind in fingers

McCarthy and Prince (1986) claim that this reduplication pattern arises because of a transparent morphological juncture between stem and affix with respect to the Onset Rule. Because the morphological juncture is transparent, the association process whereby segments are mapped to the morphological template will reach into the stem to obtain an onset consonant for the suffixal template. The stem final consonant is disassociated from its coda position and reassociates as an onset in the suffix. The suffix initial consonant is then prevented from association because the onset position of the template has already been filled. McCarthy and Prince (1986) state that their analysis explains the restriction of VC affixes to suffixal position. They state that the Tzeltal case parallels cases of prefixal reduplication which they describe in Mokilese, Orokaiva, and Ponapean. They claim that these language likewise have a transparent morphological junctures between prefix and stem. However, it is not clear that the cases are in fact parallel. In the Tzeltal case the suffix initial consonant does meet the template requirements for an onset, is closer than the stem final consonant, and, according to their analysis, is available for association. The delinking and reassociation of the stem final consonant as the suffix onset requires right to left association in suffixes which is a counterexample to Marantz' (1982) observed correlation between the type of affixation (i.e., prefixal or suffixal) and the direction of association of the reduplicative melody--R to L in suffixes. The prefixal cases of Mokilese, Orokaiva, and Ponapean differ from the Tzeltal case in that the prefix final consonant is the only available consonant and associates to an empty stem onset position. In comments on these cases, McCarthy and Prince (1986) state that "the ultimate shape of a reduplicated sequence is sensitive in subtle ways to the character of syllabification in a language. When syllabification across the prefix-stem boundary is permitted...an extra consonant will be taken to fill an empty onset position (p. 16)." It is unclear if any independent evidence exists, in these languages or in the reportedly opaque boundary languages of Kaingang, Sudanese and Ilokano, to support the status of transparency or opaqueness of affixal morphological boundaries as a language specific variable. I would suggest that McCarthy and Prince are correct that the ultimate prosodic shape of the reduplicative affix is sensitive to the prosodic character of the language, but that the Tzeltal case can be explained more straightforwardly without stipulations as to the special status of the morphological boundary.

When one examines Tzeltal verbal reduplication more closely, one finds that there are two patterns of reduplication for the transitive and intransitive verbs of Tzeltal. Most verbs appear to reduplicate the entire final syllable: CVC -> CVC-CVC. This pattern of reduplication sometimes prespecifies a vowel and/or consonant in the rhyme. This is the type of Tzeltal reduplication described in Steriade (1988). Examples are given in (18) below.

(18) Pattern B   (Berlin, 1963)
      p'ik   to touch lightly   p'ikp'ik   to touch it lightly,
                                                   repeatedly
      c'al   to make ready for carrying c'alc'an   to continue carrying
                                                   cargo
                                      (final n prespecified)

The only two desinences which have a reduplicative suffix lacking the stem onset are the classes of verbs which require an additional -VC suffix *after* the reduplicative suffix (Berlin, 1963). This is the type shown in (17). The

grammatical[7] VC suffix is -an for the transitive verbs (shown above) and -et for intransitive verbs. Whenever this grammatical suffix is not present, the final syllable reduplicates retaining the same onset consonant which is seen in the stem. Under the McCarthy and Prince (1986) account, the verbs which take a -VC grammatical suffix after the reduplicative suffix (Pattern A) would have a transparent morphological boundary between stem and the reduplicated affix over which syllabification may operate, but the verbs which do not have this grammatical suffix (Pattern B) would have to have an opaque boundary between stem and reduplicative affix so that the association process would be prevented from reaching into the stem to map the stem final consonant to the onset position of the suffix. The suggestion that the transparency of this boundary may vary within a language's verbal reduplication process is unattractive, and a better explanation should be sought.

I suggest that, as in Marshallese, prosodic requirements of the language can be called upon to explain the lack of an onset in the Pattern A Tzeltal case. Under Steriade's (1988) framework adopted in this paper, reduplication proceeds normally producing an affix by copying the melodic and prosodic structure of the stem. The addition of the final -VC grammatical suffix, however, alters the prosodic structure of the word. Resyllabification makes the coda of the reduplicative suffix the onset for the grammatical suffix. Tzeltal mainly has CV and CVC syllables. VC and V syllables occur word medially in words like ha.e.tik and las.le.iʃ (Berlin, 1962). After creation of an onset for the grammatical -VC suffix, a reduplicated CVC form will have the form CVC.CV.Can. The derivation to this point appears in (19):

(19)
a. input: nit
b. copy and grammatical suffix: nit-nit+an
c. onset rule: nit.ni.tan

A consideration of prosodic structure in Tzeltal is relevant here. While neither Berlin (1962) nor Kaufman (1971) offer an systematic description of stress in Tzeltal. Berlin states that two main patterns of primary stress or accent exist: sometimes stress is on the final syllable and sometimes on the penult. An examination of Berlin (1962) and Kaufman (1971) shows that stress falls on the penult in words ending in vowels.[8] These words are mostly borrowed from Spanish:

(20) kirsánu   Christian
      kawáyu   horse
      báka   cow
      kálto   sou   (sic Kaufman 1971, p.13)
      kostúmpre   custom

Stress falls on the final syllable in the native forms, which generally end in a closed syllable, and in those borrowed forms that end in a closed syllable:

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(21) winík   man
      yaʔtík   today
      ganár   earning
      migél   Michael

Kaufman and Berlin use the orthographic <h> to denote a voiceless non-syllabic vowel with the same articulation as the adjacent tautosyllabic vowel (Kaufman, 1971, p. 8). These syllables also appear to count as heavy with respect to stress:

(22) kahpéh   coffee
      lasmahmáh   they fight
      huhukáh   each

When primary stress is on the final syllable, secondary stress falls on the antepenultimate and on alternating syllables before that in longer words, apparently without regard to weight. If only one syllable precedes the primary stress (whether it is on the penult or final) the secondary stress falls on that syllable (Berlin, 1962). Berlin's examples include: yàʔtík, t'ùfahík, and h-poftàwanéh. In words ending in a light syllable (generally borrowed), primary stress falls on the penult and secondary stress two syllables before it on the pre-antepenult. Berlin's examples include: tà-pínka, hùn-wárti, and ta-tènehápa.

The data has clear gaps but the account that seems compatible with all available examples would be that Tzeltal creates bimoraic left-headed feet from right to left. This would explain the pattern of primary stress being final in words ending in a heavy syllable, and penultimate in words ending in a light syllable. This being the case, the form resulting from step c in (19), [nit.ni.tan], will yield a final bimoraic foot of the form CVC and a preceding unfootable monomoraic syllable trapped word internally between two acceptable bimoraic feet.[9]

(23)

    φ   φ
    | |
    σ̄   σ̆   σ̄
   /I\   /\   /I\
   CVC   CV   CVC
   nit   ni   tan

If the first two syllables here were incorporated into a single foot, the foot would be trimoraic rather than bimoraic. In order to make an acceptable bimoraic foot out of the sequence, the final moraic stem coda consonant is resyllabified.[10] As in Marshallese, this consonant is prosodically incorporated into a following onset which is then simplified. The complete derivation appears in (24):

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[7] I use the term grammatical here only to differentiate between this final suffix and the reduplicative suffix which both appear as VC sequences.

[8] There is some "morphophonemic" variation between final and penultimate stress in the words which Berlin describes as penultimately stressed (Berlin, 1962).

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[9] I thank Donca Steriade for her discussion of this possibility with me.

[10] Note that when a grammatical suffix of the form -CV is added to a reduplicated form, Pattern B results, and the original onset consonant is not lost. So, pas 'to make it' reduplicates with the grammatical suffix -ta to yield paspasta 'to continue to make it' (Berlin, 1962). Final light syllables occur in the language and are allowed presumably by extrametricality when preceded by heavy syllables; ie., unfootable, or extrametrical, syllables are allowed peripherally.

(24)
a. input: nit   to push it
b. copy and grammatical suffix: nit-nit+an   to push it
                                                                 rapidly in a crooked
                                                                 or curvy path
c. onset rule: nit.ni.tan
d. make bimoraic feet (R to L):
   (in order to do this the first syllable must be monomoraic, so resyllabify)
                                                   [ni.tni][tan]
d. no complex onsets: ni.ti.tan
e. output: nititan

In support of the requirement of cluster simplification in step (d), we note that no more than one coda consonant is allowed before a morphological boundary, and native morphemes have no onset clusters (Kaufman, 1971). (s and š may create clusters when prefixed to a root.) Kaufman (1971) lists three possible forms for native roots: CV, CVC, and CVhC. (Geminate consonants do not occur.) While loans from Spanish retain all or most consonant clusters, Berlin notes that onset clusters in these words are broken up by the insertion of an epenthetic vowel (Berlin, 1962). This limited distribution of consonant clusters motivates the delinking of the original onset consonant of the reduplicative suffix after resyllabification creates a new onset from the stem final consonant. Since Tzeltal does not generally allow C1C2 onsets, the output of (20d) must be fixed. This is accomplished by deleting C2.

Under this analysis, the two patterns of reduplication, whole syllable suffix and onsetless syllable suffix, in Tzeltal can be understood as a single process. An appeal to the Pattern A type of reduplication to support the rhyme as the reduplicative template accompanied by the postulation of a "transparent" morphological juncture does not appear to be a fully explicit account of the Tzeltal verbal reduplication. Both patterns of Tzeltal reduplication must be examined, and both can be considered to form a suffix of the entire final syllable of the stem. Foot structure requirements of the language account for the loss of the original onset in the reduplicative affix in the verbs which require a grammatical -VC suffix in this form. We see that apparent differences in the surface prosodic structures of the base and the copy in both Marshallese and Tzeltal can be accounted for by considering the prosodic requirements of each language. The stem coda becomes an onset in Marshallese because a trimoraic syllable is impossible and in Tzeltal because a trimoraic foot is impossible.[11] In both cases the onset clusters then simplifies losing the second consonant. Seemingly different patterns of reduplication within each of the languages whereby an onsetless reduplicative suffix appears in some cases and a complete syllable in others can be unified under a single analysis when requirements of prosodic structure are considered. These facts support the general conclusion that no VC or VVC templates are necessary.

5. Marshallese Vocalic Epenthesis
In order to derive the final surface forms of the Marshallese reduplicated words, a description of epenthesis in Marshallese is required. An epenthetic vowel is inserted, both within and across words, between two stops which differ in their primary place of articulation, ie. between heterorganic consonants. The

[11]A comparable phenomenon is encountered in Ibibio where a long vowel shortens in a CVVC verbal stem before a CV suffix in order to satisfy footing requirements in the language (Akinabi & Urua, 1992).

reduplicated forms given in (9) where adjacent closures are created by reduplication are realized after epenthesis as shown in the following examples:

(25)   lʏŋoŋ   ->   lʏŋoŋmoŋ   --------------------
        mok   ->   e+mokmok   ->   e+mokəmok
        ebbok   ->   ebbokbok   ->   ebbokəbok

Stop clusters having the same primary place of articulation but differing in their secondary place of articulation do not give rise to a mediating epenthetic vowel. While such clusters are unusual in Marshallese, epenthesis is impossible for the native speaker.

(26)   *epenthesis prohibited in:*
        ḷæntʏn   lantern   palatalized alveolar+velarized
                                                       alveolar
        bujentʏma   balloon   palatalized alveolar+velarized
                                                       alveolar
        ellaḷḷaḷe   a down-to-earth person
                                                       velarized lateral+palatalized lateral

Recall that the Marshallese consonant inventory includes only stop consonants with the exception of the lateral and glides.[12] Laterals appear to behave irregularly with respect to the epenthesis process. This fact is not surprising in light of the somewhat ambiguous status of constriction degree, ie. stop vs. continuant, which lateral liquids often have. In light of the fact that the consonant inventory includes only stops, Marshallese epenthesis can be described in the following way: two adjacent closure gestures are disallowed.[13] Phrase-final consonants are allowed without a following epenthetic vowel as no closure gesture follows them, and stop sequences differing only in secondary place also surface without epenthesis as the secondary constriction is not a closure.

Recalling that the CVC syllables will always receive stress, one might wonder whether a rule of epenthesis is a stress conspiracy preventing two clashing stresses. This does not appear to be the case, however, as all heavy syllables are stressed, including CVV syllables which *can* immediately precede or follow other heavy syllables thereby yielding adjacent stresses. Given that the language systematically releases even phrase final consonants and that there is no prohibition on adjacent stresses, a more accurate explanation of the data is offered by an analysis prohibiting two adjacent closure gestures. Such underlying sequences surface with an intervening epenthetic vowel.

Itô (1989) has suggested that cases of epenthesis similar to that of Marshallese can be explained by the existence of a Coda Filter which prevents a Place node from being singly linked to a coda consonant (Itô, 1989; Itô, 1986), shown here in (27).

[12]The trills behave like the full stops with respect to epenthesis and are sometimes phonetically prestopped.
[13]I thank Donca Steriade for her discussion of this analysis with the author.

(27) Coda Filter (from Itô, 1989)

* C]σ
      |
   [PLACE]

When the Coda Filter is violated because the coda consonant has an independent place component epenthesis occurs to resolve the violation by turning the consonant into an onset for an epenthetic vowel. While the Coda Filter might appear to explain epenthesis in Marshallese word-internal closed syllables, there are several problems with postulating a Coda Filter for Marshallese. First, closed syllables are allowed word finally; no final epenthetic vowel is inserted. A Coda Filter with no special conditions would predict that word final consonants should be prohibited. Secondly, there are no cases of epenthesis between extra heavy CVVC syllables and a following consonant. When such syllables are derived word internally due to the reduplication process, resyllabification, not epenthesis, occurs.

    In order to explain the reduplication and epenthesis facts, one might postulate that the final consonant in extra heavy syllables is extraprosodic and that such consonants are licensed only word finally.[14] This approach combined with a Coda Filter leads to incorrect predictions. Recall that these extra heavy syllables *are* separated from a following consonant across word boundaries by an epenthetic vowel such as that formed in the reduplicated form of [ebbok] which surfaces as [ebbokəbok]. A Coda Filter wouldn't predict this as the extraprosodic final consonant should not be seen by a Coda Filter. Additionally, Steriade (1982) shows that languages having a Coda Filter and final extrametricality will allow two consonants at word edges (Itô, 1989 and Itô, 1986). Marshallese does not allow such sequences.

    Although these above objections to postulating a final stray consonant in the extra heavy syllables rely on an interaction with a Coda Filter, there are problems with an analysis postulating final extrametricality of the coda consonants of extra heavy syllables, even without the assumption of a Coda Filter. Such an analysis would assert that coda consonants in the language are extrasyllabic just in case they are in a syllable with a bimoraic vowel. Syllables with a short vowel and a coda consonant would be bimoraic, not having extrasyllabic coda consonants. The final consonant in an XCVC# sequence cannot be extraprosodic since it carries weight as indicated in the stress pattern; i.e. closed syllables receive primary stress, regardless of their position, just as do syllables containing a long vowel.

    Because of the inadequacies encountered in postulating a Coda Filter or final extrametricality or both to describe the Marshallese epenthesis and reduplication data, I have proposed an analysis of these facts which describes both patterns of reduplication and the surface forms created by epenthesis as a result of prosodic requirements of the language which limit the distribution of extra heavy syllables and prohibit two consecutive closure gestures. Phrase final consonants, geminate consonants, and consonants differing only in secondary place may surface without epenthesis occurring.

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[14]This leaves aside the word internal CVVC syllables where the final C is part of a geminate consonant.

6. Satisfying Prosodic Requirements in Marshallese

    The proposed analysis of reduplication in Marshallese suggests that the language appears to conform to prosodic requirements using resyllabification, deletion, and epenthesis mechanisms. Illegitimate stop sequences are created in the derivation of both Pattern 1 and Pattern 2 of Marshallese reduplication. In deriving surface forms of the reduplicated words, Pattern 1 (repeated here in (28)) yields two abutting CVC syllables.

(28) Pattern 1

lʏŋọŋ	fear	lʏŋọŋ-ŋọŋ	very afraid
mok	tired	e+mok-mok	very tired
ebbok	to make full	ebbok-bok	puffy
rọŋ	ear	ja+rọŋ-rọŋ	deaf
ennon	aroused	ennon-non	(sexually) aroused
enno	delicious	enno-no	very delicious
tọ	rope	ka+tọ-tọ	hang up
yu	coconut soft meat	kay+yu-yu	collect coconut soft meat
awa	hour	ka+awa-wa	killtime

This pattern cannot surface when two heterorganic stops occur adjacently. In these cases, epenthesis must occur yielding the surface forms. This produces the surface forms shown in (29).

(29) Pattern 1--surface forms

lʏŋọŋ	fear	lʏŋọŋŋọŋ	very afraid
mok	tired	e+mokəmok	very tired
ebbok	to make full	ebbokəbok	puffy
rọŋ	ear	ja+rọŋərọŋ	deaf
ennon	aroused	ennonnon	(sexually) aroused
enno	delicious	ennono	very delicious
tọ	rope	ka+tọtọ	hang up
yu	coconut soft meat	kay+yuyu	collect coconut soft meat
awa	hour	ka+awawa	killtime

Pattern 2 (repeated here in 30) arises when two extra heavy syllables abut after reduplication.

(30) Pattern 2

baat	smoke	e+baat-baat	smokey
jook	ashamed	e+jook-jook	shy
naan	talk, word	kʏ+kʏn+naan-naan	talkative
kọọn	piglet	ka+kọọn-kọọn	to own a piglet
kʏjeek	fire	ka+kʏjeek-jeek	blazing
tææŋ	popular	tææŋ-tææŋ	very popular
jitʉʉl	steel	jitʉʉl-tʉʉl	very magnetic
mææŋ	burn, warm	e+mææŋ-mææŋ	burning
mæær	lie, fib	e+mæær-mæær	he is a fibber

The Pattern 2 structure, at this point in the derivation, cannot meet the syllable structure requirements of the language because extra heavy syllables are disallowed

word internally (excepting in the case where the final consonant is geminate) and because complex onsets are prohibited. Marshallese fulfills prosodic requirements by resyllabification of the coda consonant making it an onset and deletion of the second consonant in the resulting complex onset. Epenthesis does not occur. Thus, the surface forms shown in (31) are produced.

(31)   Pattern 2--surface forms
        baat   smoke   e+baataat   smokey
        jook   ashamed   e+jookook   shy
        naan   talk, word   kʏ+kʏn+naanaan   talkative
        · kǫǫn   piglet   ka+kǫǫnǫǫn   to own a
                                                       piglet

        kʏjeek   fire   ka+kʏjeekeek   blazing
        tææŋ   popular   tææŋææŋ   very popular
        jituɯɯl   steel   jituɯlɯɯl   very magnetic
        mææŋ   burn, warm   e+mææŋææŋ   burning
        mæær   lie, fib   e+mææræær   he is a fibber

Thus we see the following distribution of epenthesis and deletion in creating acceptable syllables in reduplicated forms.

(32)   Epenthesis   Resyllab. & Deletion
              CC ->   CəC   CØ

Pattern 1   ron-ron   ->   ronəron   *ronon
Pattern 2   jook-jook ->   *jookəjook   jookook

                             coda+onset   onset cluster

The prohibition of two adjacent closure gestures appears to be satisfied through epenthesis in the case of a heterosyllabic cluster, ie. an adjacent coda and onset, and by deletion in a derived tautosyllabic cluster, ie. a complex onset. These processes and the distributional restrictions placed on extra heavy syllables serve to determine the prosodic realization of words in this Marshallese morphological process.

6.   Conclusion

In conclusion, I have described how both patterns of Marshallese suffixal reduplication are the result of a single process of affixation with a bimoraic syllable weight parameter. This analysis unifies the two apparently different patterns of reduplication in the language: the apparently onsetless reduplicative suffix in one pattern and the more common suffixation which retains an onset in the other. I have compared the proposed analysis of Marshallese reduplication with a new analysis of the facts of Tzeltal verbal reduplication. I have explained the process of epenthesis which creates the surface realization of the Marshallese reduplicated forms as a prohibition against two adjacent closure gestures. Finally, I have noted that Marshallese bimoraic syllable suffixation demonstrates a very unusual type of reduplication within the typology of reduplication outlined by McCarthy and Prince (1986) filling an otherwise unexplained but nonprincipled gap in this typology.

Appendix

Unusual Phonemes of Marshallese and Corresponding Transcriptions

j   laminal palatalized palato-alveolar stop or fricative
ɫ   velarized apico-alveolar stop
r   apical dento-alveolar stop
q   labialized velar stop
b   velarized bilabial stop
ļ   velarized lateral
ļ   palatalized lateral
ņ   velarized alveolar nasal
ñ   palatalized alveolar nasal
m̧   velarized bilabial nasal
ɯ   high central vowel
a   low central vowel
ǫ   higher mid back vowel
o   lower mid back vowel
y   palatal glide
ʏ   higher mid central vowel

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