CHAPTER 2.

PREFIXAL BARE-CONSONANT REDUPLICATION

2.1. Introduction

In this chapter, I present cases of bare-consonant reduplication in which the reduplicant is a prefix. The two case studies that I use to illustrate this pattern are Semai, a Mon-Khmeric language, and Marshallese, a Micronesian language. In 2.2, I present an analysis of Semai expressive minor reduplication and indeterminate reduplication. In 2.3, I present an analysis of the Marshallese distributive.

In both cases, I argue that the size of the reduplicant is driven by the competition between the root and the reduplicant for alignment with the left edge of the word. With reduplicant alignment ranked higher than root alignment, the reduplicant surfaces as a prefix to the root. Because of this competition, a minimal reduplicant surfaces in order to maximally satisfy both alignment constraints.

2.2. Semai Reduplication

In Semai, there are two reduplication patterns that fit within the category of bare-C reduplication. One pattern is used to express “prolongation or continuous repetition in time” (Diffloth 1976: 252) in roots. This is known as "expressive minor reduplication." In this pattern, we find that the reduplicant surfaces as a sequence of consonants without a vowel. Further, the reduplicated consonants are copied from both ends of the root, as illustrated by the following data (the reduplicant is in bold-faced underlined type):
Semai Expressive Minor Reduplication

(a) Initial C Root

<table>
<thead>
<tr>
<th>Root</th>
<th>Reduplicant</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ta?øh</td>
<td>th-ta?øh</td>
<td>'appearance of large stomach constantly bulging out'</td>
</tr>
<tr>
<td>payaŋ</td>
<td>pn-payaŋ</td>
<td>'appearance of being disheveled'</td>
</tr>
<tr>
<td>suløŋ</td>
<td>sn-suløŋ</td>
<td>'the odd appearance of a snake's head'</td>
</tr>
<tr>
<td>cayɛm</td>
<td>cm-cayɛm</td>
<td>'contracted fingers of human or animal, not moving'</td>
</tr>
<tr>
<td>ruhɔŋ</td>
<td>rn-ruhɔŋ</td>
<td>'the appearance of teeth attacked by decay'</td>
</tr>
</tbody>
</table>

(b) Initial CC Root

<table>
<thead>
<tr>
<th>Root</th>
<th>Reduplicant</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>dŋɔh</td>
<td>dh-dŋɔh</td>
<td>'appearance of nodding constantly'</td>
</tr>
<tr>
<td>cʔɛ:t</td>
<td>ct-cʔɛ:t</td>
<td>‘sweet’</td>
</tr>
<tr>
<td>cfa:ɬ</td>
<td>cl-cfa:ɬ</td>
<td>‘appearance of flickering red object’</td>
</tr>
<tr>
<td>bʔɔl</td>
<td>bl-bʔɔl</td>
<td>'painful embarrassment'</td>
</tr>
<tr>
<td>ghʌ:ɬ</td>
<td>gp-ghʌ:ɬ</td>
<td>'irritation on skin (e.g. from bamboo hair)'</td>
</tr>
<tr>
<td>cruha:w</td>
<td>cw-cruha:w</td>
<td>'sound of waterfall, monsoon rain'</td>
</tr>
<tr>
<td>slaye:w</td>
<td>sw-slaye:w</td>
<td>'long hair in order'</td>
</tr>
</tbody>
</table>

(c) Initial CCCC Root

<table>
<thead>
<tr>
<th>Root</th>
<th>Reduplicant</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>kmrʔɛ:c</td>
<td>kc-kmrʔɛ:c</td>
<td>'short, fat arms'</td>
</tr>
</tbody>
</table>

The other pattern of reduplication is known as ‘indeterminate’ reduplication, and in this type of reduplication, when the root is of the CV:C shape, then the reduplicant patterns like that in (70), where the reduplicant surfaces as a copy of the initial and final consonants. When the root is of the CCV:C shape, it surfaces as a single C infix, which is a copy of the final consonant. The data in (71) illustrates:
Both patterns of reduplication fit in with the current discussion of bare-C reduplication (Sloan 1988), because the shapes of the reduplicants are a sequence of one or two consonants (C or CC). In section 2.2.1, I provide an account of the ‘expressive’ pattern, while in section 2.2.2, I provide an account of the ‘indeterminate’ pattern. In section 2.2.3, I discuss alternative analyses of these patterns.

2.2.1. **Expressive Minor Reduplication**

2.2.1.1. **Generalizations**

There are several generalizations which can be uncovered from the data in (70). These generalizations are to be accounted for in the following analysis and are presented below:

---

8 At this time, I have no attested forms illustrating indeterminate reduplication with roots like those in (70)(c), which have an initial CCCC cluster.
The following analysis provides an account of these three generalizations. The placement of the reduplicant is shown to be the result of ranking reduplicant alignment over root alignment (2.2.1.2). The edge-matching of the reduplicant and root are shown to be the result of both left- and right-edge anchoring being ranked above root alignment (2.2.1.3). Finally, the CC shape of the reduplicant is shown to be the result of left-edge alignment competition (2.2.1.4). No RED=PCat constraint is required.

2.2.1.2. Placement of the Reduplicant: ALIGN-RED-L >> ALIGN-Root-L

In 1.3.1, I presented a framework for accounting for the positioning of a reduplicant by the relative rankings of alignment constraints. These alignment constraints place morphemes such as the root or the reduplicant at particular edges of the morphological word. Since the expressive reduplicant is a prefix, I use leftward alignment constraints of the following schema in this analysis:

---

9 This could also be viewed as an instance of full reduplication with a shortened base. In this case, the reduplicant would be to the right of the root, and there would be deletion in the root. I take the prefixal analysis, because it is a much less convoluted analysis.
Align (M, L, Word, L)
Align the left edge of M with the left edge of the word, where M is a morpheme.

In the present analysis, the two morphemes that are present in the data are the root and the reduplicant, therefore the crucial constraints are ALIGN-RED-L and ALIGN-Root-L.

Since the reduplicant surfaces as a prefix, it is clear that reduplicant alignment outranks root alignment: ALIGN-RED-L >> ALIGN-Root-L. The following tableau illustrates, for the input /RED, bʔəl/, where the output is bl-bʔəl 'painful embarrassment' (at this point, I only consider candidates of a CC shape, leaving discussion of the shape of the reduplicant to section 2.2.1.4):

<table>
<thead>
<tr>
<th>/RED, bʔəl/</th>
<th>ALIGN-RED-L</th>
<th>ALIGN-Root-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. bl-bʔəl</td>
<td></td>
<td>bl</td>
</tr>
<tr>
<td>b. bʔəl-bl</td>
<td>bl</td>
<td>!əl</td>
</tr>
</tbody>
</table>

In tableau (74), candidate (a), with the reduplicant to the left of the root (i.e. a prefix), is chosen as optimal. This candidate satisfies ALIGN-RED-L, even though it incurs two violations of ALIGN-Root-L. The suffixal candidate (b) fails, as it incurs violations of the top-ranked ALIGN-RED-L, even though it fully satisfies ALIGN-Root-L. Therefore, the ranking of reduplicant alignment over root alignment accounts for the placement of the reduplicant as a prefix, rather than as a suffix.
2.2.1.3. **Edge-Matching of the Reduplicant: L-ANCHOR_{BR}, R-ANCHOR_{BR}**

The edge-matching of the reduplicant with the root can also be straightforwardly captured. In the data above, the reduplicant matches both the initial consonant of the root and the final consonant of the root. This fact about reduplication is ensured by the ANCHOR schema of constraints (Appendix A). However, the ANCHOR schema is defined in terms of reduplicant and *base*, which has not been defined for Semai. If one takes the definition of base given by McCarthy & Prince (1995), the base is “the output of the input stem,” then the base would have to be the root, since the material that does not comprise the reduplicant is the root.

Since both the left and right consonants of the reduplicant match the left and right consonants of the base, then both L(eft)-ANCHOR_{BR} and R(right)-ANCHOR_{BR} must be satisfied. This can be captured by placing both L-ANCHOR_{BR} and R-ANCHOR_{BR} unranked with respect to each other (that is, they must both be ranked high, but neither has a preferential status alone). I assume for this case, that corresponding elements that satisfy ANCHOR are identical (see Appendix A for further discussion). At this point, since there is no motivation for the ranking of the anchoring constraints with respect to alignment, I place them in a highly-ranked position. The following tableau will illustrate for the form *c?ε:t 'sweet':*

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10 Nelson (1999) proposes that there is no R-ANCHOR, but only L-ANCHOR and EDGE-ANCHOR (where both the left and right edges match). Phenomena that have been characterized by R-ANCHOR are accounted for by the addition of a constraint ANCHOR-σ (where every segment in the rime of the stressed syllable must have a correspondent in another string). While this proposal reflects typological facts in the world’s languages that suggest that rightward anchoring effects are rarer than leftward anchoring effects, I believe that further investigation is necessary to successfully eliminate R-ANCHOR. Therefore, I continue to use R-ANCHOR in this dissertation.
(75)  L-ANCHOR\textsubscript{BR}, R-ANCHOR\textsubscript{BR}

<table>
<thead>
<tr>
<th></th>
<th>R-ANCHOR\textsubscript{BR}</th>
<th>L-ANCHOR\textsubscript{BR}</th>
<th>ALIGN-RED-L</th>
<th>ALIGN-Root-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ct-c?e:t</td>
<td></td>
<td></td>
<td></td>
<td>ct</td>
</tr>
<tr>
<td>b. c?-c?e:t</td>
<td></td>
<td>*!</td>
<td></td>
<td>c?</td>
</tr>
<tr>
<td>c. ?t-c?e:t</td>
<td>*!</td>
<td></td>
<td></td>
<td>?t</td>
</tr>
</tbody>
</table>

In tableau (75), candidate (a) is chosen as optimal, as it satisfies both R-ANCHOR\textsubscript{BR} and L-ANCHOR\textsubscript{BR}. Candidate (b) violates R-ANCHOR\textsubscript{BR}, as the right edge of the reduplicant does not match the right edge of the root. Candidate (c) violates L-ANCHOR\textsubscript{BR}, as the left edge of the reduplicant does not match the left edge of the root. The CC reduplicant must match both the right and left edges in order to satisfy both R-ANCHOR\textsubscript{BR} and L-ANCHOR\textsubscript{BR}.

Also, R-CONTIG must be ranked low, since the expressive reduplicant does not surface as a contiguous substring of the base. Instead, the reduplicant only surfaces as the first and final consonants of the base. The following tableau illustrates:

(76)  Low Ranking of R-CONTIG

<table>
<thead>
<tr>
<th></th>
<th>R-ANCHOR\textsubscript{BR}</th>
<th>L-ANCHOR\textsubscript{BR}</th>
<th>ALIGN-RED-L</th>
<th>ALIGN-Root-L</th>
<th>R-CONTIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ct-c?e:t</td>
<td></td>
<td></td>
<td></td>
<td>ct</td>
<td>*</td>
</tr>
<tr>
<td>b. c?-c?e:t</td>
<td></td>
<td>*!</td>
<td></td>
<td>c</td>
<td></td>
</tr>
<tr>
<td>c. ?t-c?e:t</td>
<td>*!</td>
<td></td>
<td></td>
<td>t</td>
<td></td>
</tr>
</tbody>
</table>

As tableau (76) shows, candidates such as (b) and (c), which only reduplicate one consonant, fully satisfy R-CONTIG, since one consonant is a contiguous substring of the base. However, such candidates violate R-ANCHOR\textsubscript{BR} or L-ANCHOR\textsubscript{BR}, which are highly
ranked. Therefore, candidate (a) is correctly chosen as optimal, even at the expense of violations of R-CONTIG. In the remaining tableaux of this section, I do not include candidates which violate R-CONTIG, since this constraint is ranked low.

2.2.1.4. **Shape of the Reduplicant (CC)**

Up to this point, I have only considered candidates that satisfied the CC shape for Semai expressive minor reduplication. However, in order to completely account for these reduplicants, the shape must be taken into account. As outlined in 1.3, the compression model states that the shape of the reduplicant is not the result of matching to a template, but the result of base and reduplicant alignment competing for a single edge, the lack of a reduplicative template, and the low ranking of base-reduplicant faithfulness. The following tableau for cayem 'contracted fingers of human or animal, not moving' shows the effect of the current constraint ranking upon the competing shape candidates (I assume that MORPHDIS and EXPONENCE (see 1.3.3) are undominated, and I leave them out of the tableau for convenience):

(77) $R$-ANCHOR$_{BR}$, L-ANCHOR$_{BR}$, ALIGN-RED-L $>>$ ALIGN-Root-L

<table>
<thead>
<tr>
<th>/RED, cayem/</th>
<th>R-ANCHOR$_{BR}$</th>
<th>L-ANCHOR$_{BR}$</th>
<th>ALIGN-RED-L</th>
<th>ALIGN-Root-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. cm-cayem</td>
<td></td>
<td></td>
<td></td>
<td>cm</td>
</tr>
<tr>
<td>b. c-cayem</td>
<td></td>
<td>*!</td>
<td></td>
<td>c</td>
</tr>
<tr>
<td>c. m-cayem</td>
<td></td>
<td>*!</td>
<td></td>
<td>m</td>
</tr>
<tr>
<td>d. caym-cayem</td>
<td></td>
<td></td>
<td></td>
<td>cay!m</td>
</tr>
<tr>
<td>e. cam-cayem</td>
<td></td>
<td></td>
<td></td>
<td>cam!</td>
</tr>
</tbody>
</table>
In tableau (77), candidate (a) is chosen as optimal, as it satisfies both L-ANCHOR\textsubscript{BR}, and R-ANCHOR\textsubscript{BR}, at the expense of two violations of ALIGN-Root-L. Candidates (b) and (c) shorten the reduplicant, incurring fewer violations of ALIGN-Root-L, but are eliminated by a fatal violation of R-ANCHOR\textsubscript{BR} or L-ANCHOR\textsubscript{BR}, respectively. Candidates (d) and (e) satisfy both ANCHOR constraints, but incur fatal violations of ALIGN-Root-L.

In order for this to go through, faithfulness between the base and reduplicant must be ranked low. This faithfulness can be characterized by the MAX schema of constraints (introduced in the Appendix). In this instance, this constraint is parameterized as MAX\textsubscript{BR}.

The following tableau illustrates:

(78) Low Ranked MAX\textsubscript{BR}

<table>
<thead>
<tr>
<th>/RED, cayέm/</th>
<th>R-ANCHOR\textsubscript{BR}</th>
<th>L-ANCHOR\textsubscript{BR}</th>
<th>ALIGN-RED-L</th>
<th>ALIGN-Root-L</th>
<th>MAX\textsubscript{BR}</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. cm-cayέm</td>
<td>cm</td>
<td>ayέ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. c-cayέm</td>
<td>c</td>
<td>ayέ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. m-cayέm</td>
<td>m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. caym-cayέm</td>
<td></td>
<td></td>
<td></td>
<td>cayέ</td>
<td>ε</td>
</tr>
<tr>
<td>e. cam-cayέm</td>
<td></td>
<td></td>
<td></td>
<td>camέ</td>
<td>yέ</td>
</tr>
</tbody>
</table>

As tableau (78) shows, MAX\textsubscript{BR} is best satisfied by candidates (d) and (e), but since it is low-ranked, candidate (a) can still be chosen, even though it incurs more violations of MAX\textsubscript{BR}.

As the above analysis shows, the reduplicant surfaces as a minimal CC reduplicant in order to do the following:
Consequences of Minimal CC Reduplicant

(a) Satisfy morphological exponence (EXPONENTE, MORPHDIS)
(b) Minimize the violations of ALIGN-Root-L
(c) Match the left and right edges of the root to the reduplicant.

Therefore, the CC shape of Semai expressive minor reduplication can be accounted for without the use of a prosodic template.

2.2.2. ‘Indeterminate’ Reduplication

2.2.2.1. Generalizations

The data in (80a-b) illustrate a pattern that is similar in some instances to the pattern described in section 2.2.1. I reproduce the forms below for convenience:

(80) Semai ‘Indeterminate’ Reduplication

(a) ci:p cp-ci:p ‘walk’
y:r yr-y:r ‘unfold’
gm:gm gm-gm:gm ‘winnow vertically’

(b) c?u:l c-l?-u:l ‘choke’
klâ:d k-d-lâ:d ‘curly hair’ [E. Temiar]
sma:j s-n-ma:j ‘ask’

The data in (80)(a) show a pattern which matches that of the ‘expressive’ forms, where the reduplicant is a prefix of two consonants, one of which matches the right edge of the root, while the other matches the left edge. This pattern is produced when the root does not have an initial consonant cluster. In contrast, the data in (80)(b) show examples in
which the reduplicant is an infix of only one consonant, which matches the right edge of
the root. This pattern is produced when the root has an initial consonant cluster.

As with the previous discussion, it is necessary to account for the placement,
edge-matching, and shape of this reduplicant. These generalizations are the following:

(81) Generalizations

(a) If the root is CV:C, then the reduplicant appears to the left of the root.
    If the root is CCV:C, then the reduplicant appears as an infix after the
    initial consonant of the root.

(b) If the root is CV:C, then both the right edge and the left edge of the reduplicant
    match the right edge and the left edge of the root.
    If the root is CCV:C, then the right edge of the reduplicant matches
    the right edge of the root.

(c) If the root is CV:C, then the reduplicant surfaces as only and exactly two
    consonants (CC).
    If the root is CCV:C, then the reduplicant surfaces as a single
    consonant (C).

These generalizations can be summarized in the following table:

(82) ‘Indeterminate’ Reduplication

<table>
<thead>
<tr>
<th>Root Type</th>
<th>Placement</th>
<th>Edge-Matching</th>
<th>Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Single Consonant</td>
<td>Prefix</td>
<td>Both</td>
<td>CC</td>
</tr>
<tr>
<td>Initial Consonant Cluster</td>
<td>Infix</td>
<td>Left</td>
<td>C</td>
</tr>
</tbody>
</table>

The following sections provide an analysis of these generalizations. In section 2.2.2.2, I
discuss the placement of the reduplicant as a prefix or infix. In section 2.2.2.5, I discuss
the matching of either both edges or the left edge. In section 2.2.2.6, I discuss the varied
shape of the reduplicant (C or CC).
Placement of the Reduplicant: ALIGN-RED$_1$-R-$\sigma$-L

In the previous analysis (see 2.2.1.2), the placement of the reduplicant was the result of ALIGN-RED-L outranking ALIGN-Root-L, so that the reduplicant would always surface to the left of the root. In the ‘indeterminate’ case, however, this is not always true. The data in (80)(b) show that the reduplicant also appears as an infix, allowing the left edge of the root to be to the left of the reduplicant. The data in (80)(a) show that in other cases, the pattern is much like that in expressive minor reduplication, where the entire reduplicant appears to the left of the root (i.e., is a prefix). Therefore, there must be some other requirement on ‘indeterminate’ reduplication that forces the violation of prefixal alignment.

Observing the data more closely, a consistent pattern becomes clear. In all forms, the reduplicant is placed to the left of the prevocalic consonant of the root. This may result in CC prefix or in a C infix. The question is why this infixation occurs. It is unlikely that this is in order to satisfy a constraint in Semai that prohibits consonant clusters. The indeterminate infixed forms have the same segmental composition as the prefixed forms: CCCV:C, as shown below:
Regardless of whether or not the reduplicant is prefixal or infixal, the structure of the reduplicated form is CCCV:C. Therefore, the infixal reduplicant is not the result of phonological structure constraints.

I propose, instead, that the infixation of the indeterminate reduplicant is the result of a morphological requirement on indeterminate reduplication, a constraint requiring that it be placed to the left of the prevocalic consonant of the root. In other words, regardless of how many consonants are in the onset, the indeterminate reduplicant is placed to the left of the consonant directly preceding the vowel of the root. In all of the data shown in (80), the reduplicant is aligned to a CV:C sequence. Therefore, there is an alignment constraint that ensures that the reduplicant be aligned to this sequence. However, observe the definition of Generalized Alignment, given in (34), and presented again below:

(84) Generalized Alignment (GA) (McCarthy & Prince 1993b)

Align (Cat1, Edge1, Cat2, Edge2) =def
∀ Cat1 ∃ Cat2 such that Edge1 of Cat1 and Edge2 of Cat2 coincide.

Where
Cat1, Cat2 ∈ PCat ∪ GCat
Edge1, Edge2 ∈ {Right, Left}

This definition requires that the categories which can be aligned are either prosodic categories or morphological categories. The reduplicant is a morphological category and
can therefore be one argument of an alignment constraint. The CV:C sequence is not a morphological category, being only a substring of the root, but is it a prosodic category?

If one takes the position that the clustered consonants in the CCCV:C forms are all onsets of the same syllable, then the structure of the non-reduplicated roots in (80)(b) are as follows:

(85) Structure of Non-Reduplicated Roots

```
  σ
 / \   /
/   /   \
klā   d
```

With such a structure, the CV:C sequence does not constitute a prosodic unit, and can therefore not be an alignment parameter.

However, if the CV:C sequence is separated prosodically from the other initial consonants, then it can act as an alignment parameter. If such a position is taken, what are these outer consonants? Are they prosodic units of their own, or some type of extraprosodic material?

### 2.2.2.3. Initial Cluster Extraprosodicity

This extraprosodicity of consonant clusters has come up in papers such as Bagemihl (1991) and Shaw (1993). Bagemihl argues that such sequences in Bella Coola are not phonologically syllabified and are not prosodic constituents. They are, however, moraic and are prosodically licensed by that moraicity. His evidence comes from the Salishan language Bella Coola, a language which is characterized by long complex
sequences of obstruents. His arguments are based upon the reduplicative patterns of the language. In such patterns, the reduplicant only surfaces as consonant-vowel (CV) or consonant-sonorant (CR) sequences, even if there are other obstruents available at the appropriate edge of the base. For example:

(86) Bella Coola Reduplication

\[
\begin{array}{ll}
p'la & tqa'la \\
tq\eta k & tq\eta q\eta k \\
st'q^\sw l\! s & st'q^\sw l\! s \\
\end{array}
\]

‘wink, bat the eyes/contin.’

‘be under/underwear’

‘black bear snare’

In this form, the reduplicant seems to find the leftmost sequence of CV or CR to copy. If a reduplicative template for Bella Coola were simply a light syllable (monomoraic), then one would expect that the leftmost strings that satisfy the template would be the obstruent strings. Since they are not, Bagemihl argues that such prosodic strings are not prosodic constituents.

Shaw (1993) takes a different position, using evidence from Semai and other related languages (Temiar, Kammu). It is her position that the reduplicative patterns of these languages provide evidence that such CC sequences are, indeed, viable as prosodic templates, as they can be used to determine the shape of the reduplicants, as Sloan also proposed. Under Shaw’s analysis, the structure of the form \(kla:d\) would be the following:

(87) Structure of Semai Roots (Shaw 1993)\(^{11}\)

\[
\begin{array}{c}
\sigma \\
\sigma \\
kla:d
\end{array}
\]

\(^{11}\) Shaw does not go into detail as to the internal structure of the syllable \(/la:d/\). Based upon other data given in Shaw (1993), codas are moraic, and thus this would seem to be a trimoraic syllable.
Under this characterization, only the prevocalic consonant is part of the same syllable as the vocalic nucleus. The peripheral consonant is treated as part of a “minor syllable.” However, under the compression model, a “minor syllable” need not be called upon as a reduplicative template to account for the shape, and therefore, even if minor syllables are accepted in prosodic structure, it is not necessary that minor syllables be included as specific units in the Prosodic Hierarchy.\textsuperscript{12} Therefore, there is no need to posit such minor syllables as targets of a template constraint.

Other sources of evidence called upon by Shaw from the languages involve the association of stress with such CC sequences and allomorphic restrictions on words with CC sequences. For example, Shaw presents the following paradigm for a reduplicative process in Semai, which she calls ‘expressive’\textsuperscript{13}:

\begin{align*}
\text{tus} & \quad \rightarrow \quad \text{tus-tus-tus} \quad \text{‘repeated sound of running fast’} \\
\text{kǔc} & \quad \rightarrow \quad \text{kǔc-kǔc-kǔc} \quad \text{‘noises of swallowing a liquid’} \\
\text{dyɔːl} & \quad \rightarrow \quad \text{dyɔːl-yaːl} \quad \text{‘the appearance of an object floating down and getting stuck here and there’} \\
\text{gyul} & \quad \rightarrow \quad \text{g-ra-yul-yul} \quad \text{‘several people shaking something’} \textsuperscript{14}
\end{align*}

In the paradigm in (88), the reduplication pattern is reduplication of the final syllable. As the data shows, if the root is of a CCV(:)C shape, then the final CV(:)C syllable is copied. Also, Diffloth (1976) mentions that CCV(:)C roots are treated as disyllabic.\textsuperscript{15}

\textsuperscript{12} For further discussion, see section 2.2.3.1.
\textsuperscript{13} It is not clear why Shaw calls this pattern ‘expressive’, since this is the same term used by Diffloth (1976) to indicate the pattern in (70), a pattern that Shaw terms ‘continuous’.
\textsuperscript{14} The function of the string /ra/ is unclear in these data, but as this morpheme is also placed before the CVC string, this is further evidence of the separate status of this string.
\textsuperscript{15} In Temiar, a related Mon-Khmeric language, Benjamin (1976) states that forms with the prosodic structures CCVC and CCCVC show evidence of a phonetically-motivated vowel, so that such structures are
2.2.2.4. Placement of the Reduplicant Revisited

Regardless of whether one takes the position espoused by Bagemihl (1991) or Shaw (1993), it is clear that there is evidence to support the unique prosodicity of outer consonants in clusters. Both Shaw and Bagemihl agree that the outer consonants are not in the same syllable as the vowel of the word. I follow Shaw’s proposal that the CV:C sequence of the root in Semai comprises a unique prosodic unit. Therefore, it can be a parameter of an alignment constraint. In the present instance, the indeterminate reduplicant is aligned to a syllable. The following is the definition of the appropriate alignment constraint:

\[(89) \text{ALIGN-RED}_i \cdot \text{R-}\sigma \cdot \text{L} \]
Align (RED, R, σ, L)
Align the right edge of the indeterminate reduplicant with the left edge of a syllable.

This constraint would be satisfied if a candidate had the following configuration: [RED,][CV(V)C]. Since the reduplicant does not infix unless necessary to satisfy ALIGN-RED, both ALIGN-RED-L and ALIGN-Root-L must be lower ranked. The following tableau illustrates (the input contains RED, which is the input for indeterminate reduplication):

---

pronounced C\text{CVC} and C\text{CVC}. This evidence does not seem to conclusively motivate the use of such sequences as targets for morphological processes, only that such sequences can be prosodically licensed.
In tableau (90), I address the positioning of the reduplicant when the root is of a CV:C shape (at this point, I do not address the shape of the reduplicant). Candidate (a) is chosen as optimal, as it satisfies ALIGN-RED_i-R-σ-L, at the expense of two violations of ALIGN-Root-L. Candidate (b) suffers numerous violations of ALIGN-RED_i-R-σ-L, as the reduplicant does not align properly with a syllable. This candidate also incurs many violations of ALIGN-RED_i-L, as this reduplicant is placed too far to the right. Candidate (c) does not incur a violation of ALIGN-RED_i-R-σ-L, as it aligns with an onsetless syllable, but it incurs a violation of ALIGN-RED-L, as it is placed too far to the right.

In tableau (91), I address the positioning of the reduplicant when the root is of a CCV:C shape. Candidate (d), which follows the pattern of (90)(a), fails because it incurs a violation of ALIGN-RED_i-R-σ-L, since it aligns to a syllable with a complex onset. Candidate (e) violates ALIGN-RED_i-R-σ-L and ALIGN-RED-L, as it is placed as a suffix, rather than a prefix. Finally, candidate (f) is chosen as optimal, because it fully satisfies
ALIGN-RED<sub>r</sub>-R-σ-L, even at the expense of a violation of ALIGN-RED-L.

Coincidentally, it also fully satisfies ALIGN-Root-L.

2.2.2.5. Edge-Matching of the Reduplicant

Now the facts regarding edge-matching must be accounted for. It would appear that in the prefixal reduplicants, both edges match, much like the ‘expressive’ pattern. Therefore, both L-ANCHOR<sub>BR</sub> and R-ANCHOR<sub>BR</sub> must be ranked appropriately. In the ‘expressive’ pattern, it was shown that both anchoring constraints must be ranked above ALIGN-Root-L, so that both edges match, even if it results in more violations of root alignment. The same seems to apply here, and there is also no evidence to rank either anchoring constraint with respect to reduplicant alignment. The following tableaux illustrate:

(92) R-ANCHOR<sub>BR</sub>, L-ANCHOR<sub>BR</sub>: CV:C Roots

<table>
<thead>
<tr>
<th>/RED&lt;sub&gt;i&lt;/sub&gt;, ci:p/</th>
<th>R-ANCH&lt;sub&gt;BR&lt;/sub&gt;</th>
<th>L-ANCH&lt;sub&gt;BR&lt;/sub&gt;</th>
<th>ALIGN-RED&lt;sub&gt;i&lt;/sub&gt;-R-σ-L</th>
<th>ALIGN-RED-L</th>
<th>ALIGN-Root-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. cp-ci:p</td>
<td></td>
<td></td>
<td></td>
<td>cp</td>
<td></td>
</tr>
<tr>
<td>b. c-ci:p</td>
<td></td>
<td></td>
<td>!</td>
<td></td>
<td>c</td>
</tr>
<tr>
<td>c. p-ci:p</td>
<td></td>
<td></td>
<td>!</td>
<td></td>
<td>p</td>
</tr>
</tbody>
</table>

In tableau (92), in which the root is of the shape CV:C, candidates (a-c) follow, just as in the ‘expressive’ pattern. The reduplicant surfaces as a CC prefix that copies both the right and left edges of the reduplicant. The following tableau illustrates the interaction of anchoring with roots of a CCV:C shape:
In tableau (93), the incorrect candidate is chosen as optimal among candidates (d-f).

Candidate (d), which is the optimal candidate, violates L-ANCHOR$_{BR}$, as it does not match at the left edge. Candidate (e) violates R-ANCHOR$_{BR}$ in a similar fashion. Candidate (f) is then chosen, as it satisfies anchoring, but this is incorrect.

Since root alignment plays no role in the infixing cases, as it is always satisfied, there must be some other reason why the reduplicant is limited to only one consonant. In fact, a total infixed reduplicant would also satisfy the constraint ranking shown above, as shown by (92)(g). This candidate would win, taking into account base-reduplicant faithfulness, as it is most faithful to the input, and would incur the fewest violations of MAX$_{BR}$. The next section accounts for the variation in shape of the reduplicant.

2.2.2.6. **Shape of the Reduplicant: O-CONTIG**

The following tableau shows candidates with the variety of possible reduplicant shapes for indeterminate reduplication (I include MAX$_{BR}$ to illustrate the relevance of faithfulness):

(93) \( R\text{-ANCHOR$_{BR}$, L-ANCHOR$_{BR}$: CCV:C Roots} \)

<table>
<thead>
<tr>
<th>/RED$_i$, klāːd/</th>
<th>R-ANCH$_{BR}$</th>
<th>L-ANCH$_{BR}$</th>
<th>ALIGN-RED$_{-}$</th>
<th>ALIGN-RED-L</th>
<th>ALIGN-Root-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>d. k-\d-lāːd</td>
<td>![ ]</td>
<td>*!</td>
<td>k</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. k-k-lāːd</td>
<td>*!</td>
<td></td>
<td>k</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. k-\kd-lāːd</td>
<td></td>
<td></td>
<td>k</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. k-\klāːd-lāːd</td>
<td></td>
<td></td>
<td>k</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In tableau (94), one can see that there is no limit on the size of the reduplicant, and therefore any size reduplicant satisfies the higher constraints of the constraint ranking, as long as both anchoring constraints are maintained. This is not desirable, however, because the ranking eliminates the surface-true candidate, since it incurs a violation of L-ANCH_BR. In fact, the candidate that is chosen as optimal is the candidate that best satisfies MAX_BR, candidate (e). Therefore, there must be some other constraint upon these forms that forces a single-consonant reduplicant as opposed to the CC or total reduplicant.

Since all of the candidates are infixes in order to maintain the alignment with the core syllable, each candidate intrudes material into the root. However, since the indeterminate reduplicant is a single consonant, there must be some constraint that disallows the intrusion of segments within a morpheme. As shown in the Appendix, the CONTIGUITY constraint schema disallows the intrusion of such material, by ensuring that that a particular string that stands in correspondence be a contiguous string. If material is intruded within a morpheme, that morpheme is no longer a contiguous string. In the case
of the indeterminate reduplicant, the correct specification of the constraint would be 

\[ \text{[O(UTPUT)]-CONTIG}, \text{ defined below:} \]

(95) \hspace{1cm} \text{O-CONTIG}

The exponent of an input morpheme must be a contiguous string.

This constraint is violated when material is inserted into a morpheme, interrupting the morpheme string. It must be the case that O-CONTIG can be violated, so that the root can be aligned to the left edge. However, since only one consonant can infix, O-CONTIG cannot be top-ranked. What is ranked above O-CONTIG to force the violation?

By examining the data, one can see that the infixed consonant always matches the right edge. As opposed to the prefixed reduplicant, only the right edge consonant is allowed to surface if the reduplicant infixes. By this fact, I assume that O-CONTIG must be ranked below R-ANCHOR\textsubscript{BR}, but above L-ANCHOR\textsubscript{BR}. It must also be ranked below ALIGN-RED\textsubscript{i-σ-L}, which forces infixation. Both anchoring constraints are ranked higher than root alignment, so that the prefixing cases still surface. The following tableau illustrates this interaction (for convenience, I leave out ALIGN-RED-L):

(96) \hspace{1cm} \text{O-CONTIG: CV:C Root}

<table>
<thead>
<tr>
<th>/RED\textsubscript{i}, ci:p/</th>
<th>R-ANCH\textsubscript{BR}</th>
<th>ALIGN-RED\textsubscript{i-σ-L}</th>
<th>O-CONTIG</th>
<th>L-ANCH\textsubscript{BR}</th>
<th>ALIGN-Root-L</th>
<th>MAX \textsubscript{BR}</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. \text{cp-ci:p}</td>
<td></td>
<td></td>
<td></td>
<td>cp</td>
<td>i:</td>
<td></td>
</tr>
<tr>
<td>b. \text{c-ci:p}</td>
<td></td>
<td></td>
<td></td>
<td>c</td>
<td>i:p</td>
<td></td>
</tr>
<tr>
<td>c. \text{p-ci:p}</td>
<td></td>
<td></td>
<td></td>
<td>p</td>
<td>ci:</td>
<td></td>
</tr>
</tbody>
</table>
In tableau (96), nothing has changed for candidates (a-c), as O-CONTIG is never violated. The CC prefixal candidate (a) is still chosen as optimal. The following tableau illustrates the interaction of contiguity on CCV:C roots:

\[(97)\] \begin{center} O-CONTIG: CCV:C Root \end{center}

\[
\begin{array}{|c|c|c|c|c|c|}
\hline
& \text{/RED} \_ & \text{R-ANCH}_{BR} & \text{ALIGN-RED}_{R-\sigma-L} & \text{O-CONTIG} & \text{L-ANCH}_{BR} & \text{ALIGN-Root-L} & \text{MAX}_{BR} \\
\hline
d. & k-d \_l\_a:d & * & * & \text{kl\~a:d} \\
e. & k-k\_l\_a:d & *! & \text{\_l\_a:d} \\
f. & k-kd\_l\_a:d & **! & \text{\_l\_a:d} \\
g. & k-k\_l\_a:d & *! & k & \text{\_l\_a:d} \\
\hline
\end{array}
\]

In tableau (97), candidate (d) is chosen over (e-f), because (d) incurs only one violation of O-CONTIG, while avoiding violations of R-ANCHOR\textsubscript{BR}. Candidate (e) anchors the wrong edge, while candidate (f) incurs two violations of O-CONTIG, and is thus eliminated, even though it incurs fewer violations of MAX\textsubscript{BR}. Candidate (g) shows that prefixing the reduplicant in order to avoid violations of O-CONTIG incurs a fatal violation of R-ANCHOR\textsubscript{BR}, as well as a violation of ALIGN-RED\textsubscript{R-\sigma-L}. Therefore, the ‘indeterminate’ form of reduplication can also be accounted for without recourse to prosodic templates.

The indexing properties of Correspondence Theory also allow for another candidate not considered above: \([k-d\_l\_a:d]\). In this candidate, the initial consonant is coindexed both for the root and for the reduplicant. The following diagram illustrates:
(98) Coindexation of Base and Reduplicant:

\[ k_{B1,R1} - d_{R2} - \text{la}:\text{d}_{B2} \]

where B1, B2 refer to segments of the base, and R1, R2 refer to corresponding segments of the reduplicant.

Such a candidate would best satisfy the constraint ranking, since both the reduplicant and the root are at the left edge, and the reduplicant is anchored at both edges. However, such a candidate would violate MORPHDIS (discussed in 1.3.3 and defined in (55)), which does not allow distinct morphemes to have overlapping contents. Therefore, the optimal candidate for /klä:d, RED/ remains [k-d-lä:d], where the root and reduplicant are distinct.

The analysis proposed in (96) and (97) does not conflict with Semai expressive reduplication, as shown by the following tableau:

(99) Semai Expressive Reduplication Revisited

<table>
<thead>
<tr>
<th>/RED, cayem/</th>
<th>R-ANCH</th>
<th>ALIGN-RED, R-σ-L</th>
<th>O-CONTIG</th>
<th>L-ANCH</th>
<th>ALIGN-RED-L</th>
<th>ALIGN-Root-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. cm-cayem</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>cm</td>
<td></td>
</tr>
<tr>
<td>b. c-cayem</td>
<td>!</td>
<td></td>
<td></td>
<td></td>
<td>c</td>
<td></td>
</tr>
<tr>
<td>c. m-cayem</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>p</td>
<td></td>
</tr>
<tr>
<td>d. cayem-cayem</td>
<td>!</td>
<td></td>
<td></td>
<td>!</td>
<td>cay!em</td>
<td></td>
</tr>
<tr>
<td>e. c-cm-ayem</td>
<td>!*</td>
<td></td>
<td></td>
<td>!*</td>
<td>c</td>
<td></td>
</tr>
</tbody>
</table>

As tableau (99) shows, the expressive reduplicant vacuously satisfies ALIGN-RED, R-σ-L, because that constraint is specified for the indeterminate reduplicant, and there is no indeterminate reduplicant in the candidate set. However the expressive reduplicant still relies upon the ranking of ANCHOR >> ALIGN-RED-L >> ALIGN-Root-L to limit the size
of the reduplicant to CC. The expressive reduplicant does not vary in shape, as does the indeterminate reduplicant. The ranking also eliminates expressive candidates that infix to the root, as shown by the elimination of candidate (e). Candidate (e) is eliminated by violations of O-CONTIG.

2.2.2.7. Summary

In section 2.2.2, I have provided an analysis of Semai indeterminate reduplication. This analysis accounts for the following facts regarding the reduplicative pattern:

(100) Indeterminate Reduplication

(a) Reduplicant is a prefix or infix: ALIGN-RED\textsubscript{R}-R-\sigma-L >> ALIGN-Root-L

(b) Reduplicant matches right edges: R-ANCHOR\textsubscript{BR}

(c) Reduplicant is either C or CC: O-CONTIG >> L-ANCHOR\textsubscript{BR}

This analysis does not require the use of a prosodic template to account for the shape of the reduplicant. This is desirable in order to maintain a limit on the units in the prosodic hierarchy, as including C or CC in the prosodic hierarchy would cast doubt upon the restrictive nature of the prosodic hierarchy.

2.2.3. Alternative prosodic analyses

2.2.3.1. Sloan (1988)

In the previous sections, I have presented analyses of the Semai reduplicative patterns which utilize an Optimality Theoretic framework. Sloan (1988) provides a
prosodic account for this data under a derivational framework. In her proposal, Sloan makes use of a proposed syllable type: the minor syllable. Sloan includes minor syllables in the prosodic inventory of Semai. Minor syllables are syllables of the shape C or CC, where C is nonmoraic and CC is monomoraic. According to Sloan's account, the CC reduplicant in Semai is the result of mapping to a prosodic template defined as a monomoraic minor syllable.

Another crucial rule in Sloan's account is that the reduplicant must associate to the right of the base first. This is captured by the following principle:

(101) Special Association Principle (SAP)

As the first step of association, associate the rightmost element of the copy to the affixal template.

The SAP is designed to ensure that both edges of the base are copied into the reduplicant, which is accounted for in my proposal by satisfaction of both R-ANCHORBR and L-ANCHORBR.

The derivation of the form \( gp-gh\text{u}.p \) 'irritation on skin (e.g. from bamboo hair)' under Sloan's proposal looks like the following, where s1 is a monomoraic minor syllable (CC), and s0 is a nonmoraic minor syllable (C):
In this derivation, a monomoraic minor syllable (s1) is affixed to the root, which is composed of a nonmoraic minor syllable and a syllable. Then copy occurs, placing a copy of the base into the template. The SAP is applied first, associating the rightmost element to the template. Then, from left to right, the copy is associated to the template. Since there is only one position open, the initial consonant of the base is associated to that position, resulting in the correct CC reduplicant.

As for the indeterminate reduplicant, Sloan provides an account of a similar pattern in Temiar. This pattern is parallel to indeterminate reduplication in Semai. Under this analysis, the initial consonant of the CCV:C root is not associated to any prosodic structure in underlying form. The indeterminate reduplicant prefixes a minor syllable template, and then a copy of the syllabified material of the root is mapped to that minor
syllable template\textsuperscript{16}. The following illustrates the reduplication of the root \textit{sløg} ‘sleeping’ as \textit{sgløg}:

\begin{enumerate}
\item Derivation of Temiar Continuative:
\end{enumerate}

- **Affixation**
  \[
  \begin{array}{c}
  \text{s1} + s \\
  s \overbrace{\text{løg}}
  \end{array}
  \]

- **Copy**
  \[
  \begin{array}{c}
  \text{s1} + s \\
  s \overbrace{\text{løg}} \overbrace{\text{løg}}
  \end{array}
  \]

- **SAP**
  \[
  \begin{array}{c}
  \text{s1} + s \\
  s \overbrace{\text{løg}} \overbrace{\text{løg}}
  \end{array}
  \]

- **Association**
  \[
  \begin{array}{c}
  \text{s1} + s \\
  s \overbrace{\text{løg}} \overbrace{\text{løg}}
  \end{array}
  \]

Under this analysis, the initial underlyingly unsyllabified consonant provides one consonant for the minor syllable template.

This analysis relies upon the inclusion of minor syllables in the prosodic hierarchy, so that it may be considered a target shape for reduplication. However, such syllables have not generally been accepted as part of the hierarchy as put forth in McCarthy & Prince (1986) and Selkirk (1981). The prosodic hierarchy provides a restrictive account of generalizations in morphological domains such as infixation, reduplication, etc. By allowing minor syllables into the prosodic hierarchy, the restrictiveness of the theory is lessened, and its usefulness is called into question. The

\textsuperscript{16} Sloan assumes that only underlyingly syllabified material is copied in reduplication.
following shows that the inclusion of such units is not necessary in Semai, and therefore the restrictive nature of the prosodic hierarchy can be maintained.

### 2.2.3.2. Irrelevance of Prosodic Template

As stated before, by my proposal outlined above, the question as to whether or not minor syllables are appropriate prosodic units becomes irrelevant. Sloan’s account requires that the reduplicant be a prefix. My proposal also makes this requirement, accounting for it using Generalized Alignment. Sloan’s account requires the Special Association Principle, which ensures that the right and left edges of the reduplicant and root match. My account also ensures this dual edge-matching, using anchoring constraints.

In order to illustrate the irrelevance of a prosodic template in analyzing Semai reduplication, I now provide a prosodic account of Semai reduplication in an Optimality Theoretic framework that incorporates minor syllables as prosodic templates, much like Sloan’s analysis does. Sloan’s prosodic analysis accounts for the same facts about Semai reduplication that I outlined above. Much like my own analysis, Sloan states that the reduplicant is a prefix. Therefore, alignment of the reduplicant to the left may be included in the analysis. Also, Sloan’s SAP is intended to account for the fact that the reduplicant matches both the right and left edges of the base (root). This can be handled with anchoring, as I have proposed above. At this point, there is no reason to assume that there is any crucial ranking of these constraints.
The primary difference between Sloan’s account and that of my own is that Sloan includes a prosodic template for the reduplicant, which is defined as a monomoraic minor syllable. Under Optimality Theory, prosodic templates are realized as a constraint RED=Pros. In this case, the constraint is RED=$m\sigma_\mu$, where $m\sigma_\mu$ is a monomoraic minor syllable. There is still no particular reason to rank any of the constraints (except for $\text{MAX}_{\text{BR}}$, which must be ranked low), as the optimal candidate will satisfy the template constraint, anchoring constraints, and alignment. The following tableau illustrates the Optimality Theoretic account, using a minor syllable template to limit the reduplicant:

(104) Minor Syllable Analysis

<table>
<thead>
<tr>
<th>/RED, c?ɛ:t/</th>
<th>RED=$m\sigma_\mu$</th>
<th>L-ANCHORBR</th>
<th>R-ANCHORBR</th>
<th>ALIGN-RED-L</th>
<th>MAXBR</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ct-c?ɛ:t</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>b. c?ɛ:t-c?ɛ:t</td>
<td>!</td>
<td></td>
<td></td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>c. c?-c?ɛ:t</td>
<td></td>
<td></td>
<td>!</td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>d. ?t-c?ɛ:t</td>
<td></td>
<td></td>
<td></td>
<td>!</td>
<td>**</td>
</tr>
<tr>
<td>e. c?ɛ:t-tct</td>
<td></td>
<td></td>
<td></td>
<td>c!?ɛ:t</td>
<td></td>
</tr>
</tbody>
</table>

In this tableau, one can see that candidate (a) is the optimal candidate, because there are no violations of the constraints. Candidate (b) violates RED=$m\sigma_\mu$, because the reduplicant is not a minor syllable. Candidates (c) and (d) violate one or the other of the anchoring constraints, as one of the edges does not match. Candidate (e) violates the alignment constraint, as it is placed as a suffix, and not a prefix. The inclusion of $\text{MAX}_{\text{BR}}$ illustrates that without some way to limit the reduplicant, the total reduplication candidate (b) would be chosen as it maximally preserves base-reduplicant identity.
2.2.3.3. Summary

As stated above, the differences between Sloan’s account and my own is the use of a prosodic template constraint vs. a constraint upon the alignment of the root. The question then is what makes a non-templatic account more desirable. For one thing, a constraint such as RED=σm is very specific constraint used to match morphological categories to prosodic categories, and thus does not generalize to the matching of other domains. In contrast, Generalized Alignment (which also can match morphological categories to prosodic categories) has been shown to be of use in a number of linguistic domains, such as features, prosody, morphology, etc. Therefore, ALIGN-Root-L makes use of existing constraint mechanisms, while RED=σm requires a constraint specific to one particular morphological phenomenon.

The constraint RED=mσµ can be written in terms of Generalized Alignment, however ineffectively. In order to do this one must propose alignment constraints such as Align (RED, R, mσµ, R) and Align (RED, L, mσµ, L). These constraints ensure that the reduplicant is aligned to the right edge of a minor syllable and to the left edge of a minor syllable. Since RED=mσµ is violated by misalignment in either case, both of the alignment constraints are in a relation of local disjunction, where a violation of either or both violates the constraint. Of course, there is also the restriction on the two Generalized Alignment constraints that they both be satisfied by alignment to the same minor syllable. By the proposal in this chapter, only the alignment of one edge is crucial, and there is not need for a disjunctive relation.
Also, the reduplicative template proposed by Sloan requires the inclusion of minor syllables into the prosodic hierarchy. The prosodic hierarchy accounts for a number of prosodic morphological phenomena, including infixation, reduplication, etc. However, the usefulness of the prosodic hierarchy is devalued by allowing more and more prosodic categories. In contrast, the compression model renders the minor syllable question irrelevant, as the size of the reduplicant is accounted for without specifying the prosodic shape of the reduplicant.

Finally, an account including a minor syllable template does not account for the non-uniformity of the indeterminate reduplicant. The indeterminate reduplicant surfaces as either C or CC. A templatic analysis alone cannot account for this, but must also include machinery to account for the limiting of the moraicity of the minor syllable in some cases of indeterminate reduplication. The solution proposed by Sloan (1988) is to assume that the peripheral initial consonant in a CCV:C root is not syllabified underlyingly, and is available to partially fill a template. This creates a condition of morphemes sharing phonological material. The usefulness of the prosodic template is not as clear in such cases, as the shape of the indeterminate reduplicant varies, dependent upon the root shape. Chapter 4 expands upon this problem, using data from Hopi, a Uto-Aztecan language.

2.2.4. Gafos (1995)

The continuative in Temiar (see (103) above) is discussed in Gafos (1995). This continuative reduplication pattern can be illustrated below:
As the forms in (105) show, forms with two consonants reduplicate both edges of the root and the reduplicant is a prefix. Forms with three consonants reduplicate just the right edge of the root and the reduplicant is an infix.

In order to account for this form of reduplication, Gafos proposes that the input of the reduplicant is a phonologically empty root node. There is no constraint in the ranking to ensure that the reduplicant is restricted to a single root node, but it is assumed that the continuative morpheme is included in the lexicon as a single root node. In order to provide structure for this root node, the root is reduplicated. This empty root node is placed to the left of the CV(:)C syllable, much like in Semai. It appears to be crucial that the reduplicant be an empty moraic root node in the input.

The choice of consonant to be reduplicated is determined by a constraint that requires faithfulness of structural roles between base and reduplicant (\textsc{StRoleBr}, see section 3.2, figure (150)). If the root node is a moraic root node, only the rime of the root is possible to fill the root node. Also, Gafos proposes that the reduplicant cannot be the vowel of the root, because of a constraint 1-V, which disallows multiple instances of a root vowel. This constraint is meant as a short hand for a number of undefined constraints that must ensure that only one instance of the root vowel is allowed.

\footnotesize
\begin{enumerate}
\item[(105)] Temiar Continuative
\begin{tabular}{ccc}
\texttt{k\textalpha\textomega} & \texttt{kw.k\textalpha\textomega} & `to call`\\
\texttt{s\textlambda\textbeta} & \texttt{g.s\textlambda\textbeta} & `to lie down`
\end{tabular}
\end{enumerate}

There is no apparent reason to assume reduplication over epenthesis. Gafos assumes that the continuative morpheme surfaces as a reduplicant that is specified as one string in a base-reduplicant correspondence relation. If instead one proposes that the correspondence constraints merely specify that
These constraints require that the root node be filled by the coda of the root, as shown below:

\[(106)\quad \text{StRole}_{\text{BR}}, 1-V\]

<table>
<thead>
<tr>
<th></th>
<th>StRole_{BR}</th>
<th>1-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>/RED(root node), s\text{\textipa{\textipa{g}}}\textipa{\textipa{g}}/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. s\text{\textipa{\textipa{g}}}\textipa{\textipa{g}}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. s\text{\textipa{\textipa{g}}}\textipa{\textipa{g}}</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>c. s\text{\textipa{\textipa{g}}}\textipa{\textipa{g}}</td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

As tableau (106) shows, candidate (b), which reduplicates the onset of the root as a coda, violates StRole_{BR}. Candidate (c) is eliminated, because there are two instances of the root vowel (a violation of 1-V). Therefore, candidate (a) is chosen as optimal. It should be noted that if RIGHT-ANCHOR_{BR} is introduced, neither StRole_{BR} nor 1-V is needed, since candidates (b) and (c) both violate RIGHT-ANCHOR_{BR}.

In order to account for the biconsonantal pattern, Gafos proposes that ONSET be ranked high. Therefore, the onset of the root will copy to provide that onset. However, at that point, the reduplicant is actually two root nodes, even though it is specified for only one root node. The specification of the reduplicant as a single root node seems designed to account for the minimal reduplicant, but the reduplicant does not always surface as a single root node. This specification on the reduplicant is not well-defined. It appears that this specification is part of the lexical specification of the continuative morpheme. However, when the reduplicant does not surface as a single root node, there must be a faithfulness violation.
It is not clear what limits exist on this mechanism. If the size of a reduplicant is determined by specifying the segmental content of the reduplicant, then the mechanism proposed in Gafos (1995) bears a striking resemblance to the templates in Marantz (1982) (see 1.2.1). There does not seem to be any limit on the number of root nodes possible to define the reduplicant, and therefore there are more predicted patterns of reduplication than actually exist in language. The compression model accounts for the minimal reduplicant without making such a requirement on the reduplicant. Under the compression model, the input of the reduplicant is merely unspecified for any material at all, allowing the constraint ranking to determine the size of the reduplicant.

Finally, the analysis of the continuative in Temiar in Gafos (1995) requires the constraint 1-V. Although this condition on root vowels may be well-motivated in the language, the compression model shows that such a stipulation is not necessary. The compression model uses existing mechanisms that are independently motivated to determine the shape of the reduplicant.

### 2.2.5. Semai Reduplication: Conclusion

In section 2.2, I have provided an analysis of two patterns of reduplication in Semai: expressive and indeterminate. This analysis accounted for reduplicant placement, edge-matching, and the C or CC shape of the reduplicant without recourse to a prosodic template such as RED=Pros, where Pros is some type of prosodic unit, such as a minor syllable. This proposal also does not require the stipulation that the input of such morpheme surfaces as a reduplicant to maintain anchoring constraints (see 5.4 for a similar discussion).
reduplicants is a non-prosodic timing slot, such as a bare root node, as proposed in Gafos (1995). The shape of the reduplicant is determined by the constraints that determine placement and edge-matching.

The basis of this analysis is the compression model, outlined in Chapter 1. The minimal size of the reduplicant is the result of competition between the root and the reduplicant for the left edge of the word, with the alignment constraint pertaining to the reduplicant ranked higher. Since both morphemes cannot occupy the same edge, the reduplicant surfaces as a prefix, and the reduplicant surfaces as minimally as possible to satisfy exponence and maximally satisfy both alignment constraints.

This analysis has a number of advantages over an analysis that includes a template constraint. One reason is that a template analysis would require that a unit such as CC or C be included as a unique prosodic unit, thus expanding the prosodic hierarchy and lessening the restrictiveness of the theory. Another reason is that it allows the minimal size of the reduplicant to be accounted for using constraints that have a wider array of uses in other phonological and morphological domains than General Template Theory. Finally, the Semai indeterminate reduplicant does not surface as a unique prosodic unit. Therefore, if one proposes that there is a prosodic template, this template is often violated. In such cases, there is some other mechanism necessary to account for the size of the reduplicant, rendering the template irrelevant.
2.3. Marshallese Consonant Doubling

2.3.1. Data and Generalizations

There is a process in Marshallese, an Austronesian language, known as initial-consonant doubling (Bender 1969, 1991; Abo, et al. 1976). This process is often used along with final-syllable reduplication to mark a semantic category called “distributive”. The precise semantics of this category have yet to be determined (Bender 1969, 1991). In this section, I do not focus on the final-syllable reduplication, leaving that for section 5.3, but only focus on the prefixal reduplication. This reduplication surfaces differently in the two primary dialects of Marshallese, Ratak and Ralik (Abo, et al (1976) and Suh (1997)). The following data illustrates:
In the above data, one can see that the distributive in these cases is marked at least by reduplication of the initial consonant. In the Ralik dialect, the initial consonant of the root is doubled, and the surface form has an epenthetic CV in order to maintain correct syllabic structure. In the Ratak dialect, the initial CV is copied, much like syllable reduplication.

I include Marshallese consonant-doubling in this section primarily because of the Ralik dialect. Since in this instance, the actual copied material is one single consonant, I consider Ralik consonant-doubling to be an instance of bare-C reduplication. I also

---

18 The symbols used in this data set are taken from the phonemic transcriptions provided in Abo, et al. (1976). The symbol [e] refers to a [high,mid] vowel, the symbol [q] refers to a rounded velar stop, and the symbols [l] and [m] refer to rounded versions of [l] and [m].
discuss the Ratak dialect, which is actually a form of syllable reduplication. This discussion introduces an extension of my proposal, in which prosodic reduplication can also be handled without the use of a prosodic template. I do not focus on the final-syllable reduplication. In this section, I show how the Ralik “doubling” effect can be captured by considering this to be an example of prefixal bare-C reduplication of one consonant.

2.3.2. Ralik Dialect

In the Ralik dialect, an epenthetic yV combination is inserted before the doubled consonant. The epenthetic vowel takes on the features of the following vowel (except when the following vowel is /a/, in which case the epenthetic vowel is /e/). For example, the distributive forms of the words [bale] and [jahal] would be pronounced as [yebbalele] and [yejjahalal] in the Ralik dialect.

As a reduplicant, the alignment, anchoring, and shape must be accounted for. The following are the relevant generalizations for this data:

(108) Generalizations

(a) The reduplicant is a prefix.
(b) The reduplicant matches the initial consonant of the root.
(c) The reduplicant is of the shape C.
(d) An epenthetic consonant-vowel sequence is inserted before the reduplicant.

The following analysis accounts for these generalizations.
2.3.2.1. Placement of the Reduplicant

First, the reduplicant is a prefix. As was shown in Semai, Generalized Alignment can capture this effect, by ranking constraints that compete for a single edge. Therefore, leftward alignment of the reduplicant (ALIGN-RED-L) must ranked above leftward alignment of the root (ALIGN-Root-L) as discussed in 1.3.1. The following tableau illustrates (at this point, I do not account for the epenthetic segments):

(109) \text{ALIGN-RED-L} >> \text{ALIGN-Root-L}

<table>
<thead>
<tr>
<th>/RED, biqen/</th>
<th>ALIGN-RED-L</th>
<th>ALIGN-Root-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. b-biqenqen</td>
<td></td>
<td>b!</td>
</tr>
<tr>
<td>b. biqenqen-b</td>
<td>b!iqenqen</td>
<td></td>
</tr>
</tbody>
</table>

In the above tableau, it can be seen that if the reduplicant is not placed as a prefix, it incurs violations of ALIGN-RED-L. Thus, the high ranking of ALIGN-RED-L accounts for the placement of the reduplicant.

2.3.2.2. Edge-Matching of the Reduplicant: \text{LEFT-ANCHOR}_{BR}

The next fact to be accounted for is the edge-matching of the reduplicant with the root. As discussed in the Appendix, edge-matching is regulated by the ANCHOR schema of Correspondence constraints. The edges that match are the left edge of the reduplicant and the left edge of the root. Therefore, \text{LEFT-ANCHOR}_{BR} is the relevant constraint. Since the reduplicant attaches to the root, I identify the base for reduplication as the
The following tableau illustrates (at this point, I place LEFT-ANCHOR<br>in an undominated position, as the ranking is not relevant):

(110) \text{LEFT-ANCHOR}_{BR}^{20}

\begin{tabular}{|c|c|c|}
\hline
/RED, biqen/ & LEFT-ANCHOR<br>& ALIGN-RED-L & ALIGN-Root-L \\
\hline
\hline
\text{a. } b\text{-biqen} & & b \\
\hline
\text{b. n\text{-biqenqen}} & \ast ! & b \\
\hline
\end{tabular}

In tableau (110), candidate (b) is eliminated, as the reduplicant matches the right edge of the root, not the left edge.

\textbf{2.3.2.3. Shape of the Reduplicant}

The final fact to be accounted for is the shape of the reduplicant, which appears as C. In the Semai example, this was the result of the interaction of the alignment of the reduplicant and the alignment of the root. I propose that a similar account can be made here. Therefore, the reduplicant appears as a single consonant, in order to maximize the alignment of the reduplicant and the root to the left edge of the word. The following tableau illustrates the evaluation of candidates of varying shapes by the present constraint ranking:

\textsuperscript{19} It is possible that the base is a component that is smaller than the root that begins at the left edge, but such possibilities are not relevant to the discussion in this section.

\textsuperscript{20} As discussed in the Appendix, I assume that this constraint is violated if the corresponding edges are not identical.
In the tableau (111), candidate (a) is chosen as optimal, even though it incurs a violation of ALIGN-Root-L. Any other candidates of sizes greater than a single consonant incur further violations of ALIGN-Root-L. Therefore, the identity of the reduplicant is accounted for without use of prosodic templates, much as was the case in Semai.

However, as the data in (107) show, the correct surface form of the distributive of [biqen] is not *[bbiqen], but [yibbiqen], where an epenthetic yV sequence is added to the left of the reduplicant. In order to account for this, further analysis is necessary. In Marshallese, there is a general restriction against consonant clusters. This restriction can be accounted for by the constraint *CC. As long as *CC is ranked above a constraint barring epenthesis (DEP<sub>IO</sub>), a candidate such as *[bbiqen] is eliminated. Also, since the epenthetic segments are both C and V, there must be a high ranking of ONSET, in order to require an epenthetic consonant. The interactions of these constraints are shown by the following tableau:
(112) No Consonant Clusters

<table>
<thead>
<tr>
<th>/RED, biqen/</th>
<th>Onset</th>
<th>*CC</th>
<th>Dep IO</th>
<th>L-Anchor BR</th>
<th>AL-RED -L</th>
<th>AL-Root -L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. b-biqenqen</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td>b</td>
</tr>
<tr>
<td>b. bi-biqenqen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bi</td>
</tr>
<tr>
<td>c. biq-biqenqen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bi!q</td>
</tr>
<tr>
<td>d. ib-biqenqen</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td>ib</td>
</tr>
<tr>
<td>e. yib-biqenqen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>yib</td>
</tr>
</tbody>
</table>

As tableau (112) shows, candidate (a), in which there is a consonant cluster, is eliminated by a fatal violation of *CC. However, candidate (b) is then chosen as optimal, rather than candidate (e), which violates Dep IO. Therefore, there must be a constraint that bars overreduplication to satisfy *CC.

The compression model states that bare-consonant reduplication is the result of competition between different morphemes at a particular edge. In the case of Semai, the reduplicant and root both competed for alignment to the left edge of the morphological word. In this instance, in order to maximally satisfy Align-Root-L, the optimal form is one that overreduplicates in order to maintain correct surface structure. However, this is based upon the assumption that the morphological word is simply defined by all phonological material in the output form.

If the morphological word is instead defined as all the phonological structure that is associated to morphological input, then epenthetic segments are not included in that domain. Epenthetic segments are not associated to any morphological structure, but are
only there in order to maintain correct surface structure. Therefore, the morphological word domain of the form \textit{yibbiqenqen} is the following:

\begin{equation}
(113) \quad \text{Morphological Word:}
\end{equation}

\begin{equation*}
yi[b\text{b}b\text{i}q\text{e}nq\text{e}n] \_ \text{Word}
\end{equation*}

By this definition of the morphological word, the form \textit{yibbiqenqen} maximally satisfies ALIGN-Root-L, while satisfying ALIGN-RED-L, as expected.

If \texttt{DEP\textsubscript{IO}} is ranked low, then the epenthetic candidate will be chosen. The following tableau illustrates:

\begin{equation}
(114) \quad \text{Alignment to Morphological Word}
\end{equation}

\begin{tabular}{|c|c|c|c|c|c|}
\hline
/RED, biqen/ & ONSET & \texttt{*CC} & L-ANCH & AL-RED & AL-Root & DEP \textsubscript{IO} \\
\hline
a. \texttt{[b-biqenqen]} \_ \text{Word} & & & & b & \\
\hline
b. \texttt{[b]-biqenqen]} \_ \text{Word} & & & & bi! & \\
\hline
c. \texttt{biq-biqenqen]} \_ \text{Word} & & & & bi!q & \\
\hline
d. \texttt{[b]} \_ \text{Word} & & \texttt{*} & & b & * & \\
\hline
\text{\textcolor{red}{e. yi[b-biqenqen]}} \_ \text{Word}\textsuperscript{21} & & & & b & ** \\
\hline
\end{tabular}

According to tableau (114), candidates (b) and (c) are eliminated by two violations of ALIGN-Root-L. Candidates (a) and (d) are eliminated by *CC and ONSET, respectively.

\textsuperscript{21} It is possible that the structure of this candidate has the following segmental structure \texttt{[yibiqenqen]}, where the \texttt{[b]} is linked both to a mora and to a following onset. In this case, there are no segmental violations of ALIGN-Root-L, and one must assume that the segment-mora association on that consonant satisfies MORPHDIS. Such a structure would bring such forms more in line with Suh (1997), but the analysis presented here does not crucially rely upon such a distinction.
This leaves candidate (e), the correct surface form, to be chosen as optimal, even at the expense of violations of DEP\textsuperscript{IO}.\textsuperscript{22}

2.3.2.4. The Ralik Dialect and Vowel Quality

But what about the vowel quality inherent in this structure? The root vowel and the epenthetic vowel share certain features. According to Bender (1969), there are only three phonemic vowels in Marshallese, with height being the distinguishing feature\textsuperscript{23}. Other features such as roundness and backness can be predictable from the surrounding consonantal environments. Therefore, the three vowels of Marshallese are a high vowel (represented by Bender as /i/), a mid vowel (/e/), and a low vowel (/a/). The only vowels which appear before the consonant of the reduplicant are /i/ and /e/, never /a/. In order to make a three-way height distinction between these vowels, the following are the height features of the vowels:

(115) Vowel Quality

\[
\begin{align*}
/i/ & : [+hi][-lo] \\
/e/ & : [-hi][-lo] \\
/a/ & : [-hi][+lo]
\end{align*}
\]

The feature that is notably absent from /i/ and /e/ is [+lo]. Therefore, an analysis of the vowel quality of the epenthetic vowel must account for the lack of a [+lo] feature and the presence of the distinction between /i/ and /e/.

\textsuperscript{22} I do not account for the fact that the epenthetic consonant is always /y/. I assume that this is determined by markedness constraints (see McCarthy & Prince 1994b for further discussion of epenthesis and TETU).

\textsuperscript{23} Bender mentions that there is a fourth vowel, [e], which is a high-mid vowel. I account for a three-way vowel distinction, since the status of this vowel is unclear. However, this type of analysis should extend to a four-way system, as well.
McCarthy & Prince (1994b) discusses a type of analysis to account for the quality of epenthetic vowels. Under this theory, known as The Emergence of the Unmarked (TETU), markedness constraints are allowed to “emerge,” if they are not regulated by input-output faithfulness. That is, since an epenthetic segment is not part of the input, input-output faithfulness constraints do not regulate the quality of that segment, and so the quality of that segment is conditioned by lower-ranked markedness constraints.

In the present circumstance, if there is a restriction on the feature [+lo], then vowels with the feature [+lo] are disfavored, and an epenthetic vowel with the feature [lo] will not be chosen as optimal. A markedness constraint mirroring this restriction is the following:

\[(116) \quad *V/[+lo]\]

Vowels must not have the feature [+lo].

This constraint is violated whenever there is a vowel that has the feature [+lo].

Of course, this constraint must be ranked below a constraint that ensures that input vowels with the feature [+lo] have corresponding output vowels with the feature [+lo] ([IDENT]_[lo][lo]), so that vowels with the feature [+lo] that are present in the input are still present in the output. The following tableau illustrates for the form [yebbalele] “fish, starry flounder”: 
In tableau (117), candidate (c) is eliminated, as it incurs two violations of V/ [+lo]. Candidate (d) shows that a candidate in which there are no violations of V/ [+lo] incurs a violation of IDENT_\text{IO}[lo]. Candidates (a) and (b) are both viable candidates, as they equally violate V/ [+lo]. However, candidate (b) is the correct surface candidate.

In order to allow the constraint ranking to choose between candidates such as (117)(a) and (117)(b), there must be another constraint that allows the epenthetic vowel to surface as a [-hi] vowel. This can also be accounted for by a markedness constraint barring high vowels, as defined below:

$$\text{(118)} \quad *V/ [+hi]$$

Vowels must not have the feature [+hi].

This constraint, along with *V/ [+lo] will ensure that the epenthetic vowel surfaces as a [-hi] [-lo] vowel, as a default. As before, this constraint must be ranked below a constraint regulating the input-output faithfulness of the feature [hi] (for convenience, I collapse both IDENT constraints into a single IDENT_\text{IO} constraint). The following tableau illustrates (for convenience, I eliminate ONSET and *CC from the ranking, and do not consider candidates that violate those constraints):

<table>
<thead>
<tr>
<th>/RED, bale/</th>
<th>IDENT_\text{IO}[lo]</th>
<th>V/ [+lo]</th>
<th>ONS</th>
<th>*CC</th>
<th>LANCH</th>
<th>ALIGN-RED-L</th>
<th>ALIGN-Root-L</th>
<th>DEP_\text{IO}</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. yab-balele</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>b. yeb-balele</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>c. yab-balele</td>
<td>**!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>d. yeb-belele</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b</td>
<td>**</td>
<td></td>
</tr>
</tbody>
</table>
As tableau (119) shows, all else being equal, the epenthetic consonant surfaces as a [-hi, -lo] vowel.

However, all else is not equal if the root includes a [+hi] vowel. In such a case, the epenthetic vowel surfaces with the feature [+hi]. The current constraint ranking is not sufficient to account for this, as illustrated by the following tableau, for the form [yibbiqenqen]’chunky’:

In tableau (120), candidate (a), the correct surface form, is eliminated by two violations of *V/[+hi]. Candidate (b) is incorrectly chosen as the optimal form, because it only violates *V/[+hi] once. Candidate (c) is eliminated by a fatal violation of *V/[+lo], as expected.

In order to allow the correct surface form to be chosen, the feature [+hi] on the root vowel must be associated to the epenthetic vowel, as well. This association can be regulated by a constraint aligning the feature [+hi] to the left of the word. Such uses of
alignment to regulate feature spreading is supported by the literature (Kirchner 1993).

This constraint is the following:

(121) ALIGN-[+hi]-L

Align ([+hi], L, Word, L)
Align the left edge of the feature [+hi] to the left edge of the Word.

This constraint is violated if the [+hi] feature of the root vowel is not linked to the epenthetic vowel, which is to the left.

This constraint must be ranked above *V/[+hi], in order to allow the specification of [+hi] on the epenthetic vowel. The interaction of this constraint can be illustrated by the following tableau:

(122) Alignment of [+hi]

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [+hi]</td>
<td></td>
<td></td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td>b</td>
<td>**</td>
</tr>
<tr>
<td>yerb-biqenqen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. [+hi]</td>
<td></td>
<td>!</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>b</td>
<td>**</td>
</tr>
<tr>
<td>yerb-biqenqen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. [+hi]</td>
<td></td>
<td>!</td>
<td>*</td>
<td></td>
<td>*</td>
<td></td>
<td>b</td>
<td>**</td>
</tr>
<tr>
<td>yerb-biqenqen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As tableau (122) shows, candidate (b) is eliminated, since the feature [+hi] is not aligned to the left of the word. This is also true of candidate (c), but candidate (c) also violates *V/[+lo]. This leaves candidate (a) as the optimal candidate, even though it violates *V/[+hi] twice. Having accounted for the Ralik dialect, I now turn to the Ratak dialect,
to show that this dialect can be accounted for by a simple re-ranking of ALIGN-Root-L and DEP₀.

### 2.3.3. Ratak Dialect

At this point, accounting for the Ratak dialect is rather simple. As shown in tableau (112), if DEP₀ is ranked above ALIGN-Root-L, a candidate which overreduplicates is chosen as optimal. This candidate bears a striking resemblance to the Ratak dialect forms. This indicates that, in the Ratak dialect, ALIGN-Root-L is ranked below DEP₀, as shown below:

(123) High Ranking of DEP₀

<table>
<thead>
<tr>
<th>/RED, biqen/</th>
<th>ONS</th>
<th>*CC</th>
<th>L-ANCHBR</th>
<th>DEP₀</th>
<th>ALIGN-RED-L</th>
<th>ALIGN-Root-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. b-biqenqen</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b</td>
</tr>
<tr>
<td>b. bi-biqenqen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bi</td>
</tr>
<tr>
<td>c. big-biqenqen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>biq!</td>
</tr>
<tr>
<td>d. ib-biqenqen</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b</td>
</tr>
<tr>
<td>e. yib-biqenqen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b</td>
</tr>
</tbody>
</table>

In tableau (123), I show that the high ranking of DEP₀ allows candidate (b) to be chosen as optimal. Candidate (a) is eliminated by the fatal violation of *CC. Candidate (c) is eliminated by three violations of ALIGN-Root-L, as opposed to the two violations in candidate (b). Candidate (d) is eliminated by a violation of ONSET, and candidate (e) is eliminated by violations of DEP₀. Based on this, I propose that the difference between the Ralik and Ratak dialect in this instance is the relative rankings of ALIGN-Root-L and DEP₀.
As for the vowel quality of the reduplicated vowel, the same constraint ranking proposed to account for the vowel quality in the Ralik dialect accounts for the vowel quality in the Ratak dialect. Crucially, these constraints must be ranked above \( \text{IDENT}_{\text{BR}} \) constraints, so that the vowel of the reduplicant may surface against base-reduplicant identity. The following tableau illustrates for [bebalele] (for convenience, I eliminate \( \text{DEP}_{\text{IO}} \) and \( \text{LEFT-ANCHOR}_{\text{BR}} \), and do not consider candidates that violate those constraints):

(124) Root with [+lo] Vowel

<table>
<thead>
<tr>
<th>/RED, bale/</th>
<th>( \text{ID}_{\text{IO}} )</th>
<th>ONS</th>
<th>*CC</th>
<th>*V/ [+lo]</th>
<th>ALIGN-[+hi]-L</th>
<th>*V/ [+hi]</th>
<th>ALIGN-RED-L</th>
<th>ALIGN-Root-L</th>
<th>( \text{ID}_{\text{BR}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. be-balele</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>be</td>
<td>*</td>
</tr>
<tr>
<td>b. bi-balele</td>
<td></td>
<td></td>
<td>*</td>
<td>*!</td>
<td></td>
<td></td>
<td>bi</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>c. ba-balele</td>
<td></td>
<td></td>
<td>**!</td>
<td></td>
<td></td>
<td></td>
<td>ba</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. b-balele</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td>b</td>
<td></td>
</tr>
</tbody>
</table>

As shown in tableau (124), candidate (b) is eliminated by a violation of *V/ [+hi], since it incurs the same number of violations of *V/ [+lo] as candidate (a). Candidate (c) is eliminated by a fatal violation of *V/ [+lo]. Candidate (d) shows that a single C reduplicant is still eliminated by *CC, even though it incurs fewer violations of ALIGN-Root-L. Therefore, candidate (a), the correct surface candidate, is chosen as optimal, even at the expense of a violation of \( \text{IDENT}_{\text{BR}} \).
The next tableau illustrates the interaction of these constraints if the root vowel is a high vowel, with the form [jijiyyjetjet]:

(125) Root with [+hi] Vowel

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. je-jiyjetjet</td>
<td></td>
<td></td>
<td></td>
<td>*!</td>
<td>*</td>
<td>je</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. ji-jiyjetjet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**</td>
<td>ji</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. ja-jiyjetjet</td>
<td></td>
<td></td>
<td></td>
<td>!</td>
<td>*</td>
<td>ja</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. i-jiyjetjet</td>
<td></td>
<td></td>
<td>!</td>
<td></td>
<td>*</td>
<td>j</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As tableau (125) shows, candidate (a) incurs a violation of ALIGN-[+hi]-L, as the [+hi] specification on the root is not aligned to the left of the word, and is eliminated. Candidate (c) is eliminated by a fatal violation of *V/ [+lo]. Candidate (d) is eliminated by a fatal violation of *CC. Thus, candidate (b) is chosen as optimal.

Finally, for completeness, I illustrate how the present constraint ranking accounts for roots with a [-hi, -lo] vowel, with the form [dedetdet]:
Root with [-hi, -lo] Vowel

(126) Root with [-hi, -lo] Vowel

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. de-detdet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>de</td>
</tr>
</tbody>
</table>
| b. du-detdet |                 |     |     |          |          | *!       |              |              | du     *
| c. da-detdet |                 |     |     |          |          |          |              |              | da     *
| d. d-detdet  | *!              |     |     |          |          |          |              |              | d      |

As tableau (126) shows, candidate (b) is eliminated by a fatal violation of *V/ [+hi]. Candidate (c) is eliminated by a fatal violation of *V/ [+lo]. Candidate (d) is eliminated by a fatal violation of *CC. This leaves candidate (a), the correct surface candidate, to be chosen as optimal, by full identity between the root and reduplicant.

One question that can be considered here is whether or not the inserted vowel of the distributive in the Ratak dialect is actually part of the reduplicant or an epenthetic vowel. This would make the Ratak dialect mirror the Ralik dialect more exactly. However, if this was the case, then there would be violations of DEP\textsubscript{io} that are not incurred by candidates in which the inserted vowel is part of the reduplicant. This is illustrated by the following tableau, where DEP\textsubscript{io} is reintroduced into the Ratak constraint ranking:
In tableau (127), candidate (a), the epenthesized candidate, incurs a single violation of $\text{DEP}_{\text{IO}}$, while candidate (b), the reduplicated candidate, does not incur a violation of $\text{DEP}_{\text{IO}}$, and is chosen as optimal.

2.3.4. Suh (1997)

Suh (1997) discusses a similar phenomenon in Marshallese, in the context of underlying doubled consonants. It has been noted (Bender 1969; Abo, et al. 1976) that there are forms in Marshallese that have an underlying initial geminate. These underlying geminates surface in forms that parallel the distributive consonant doubling. For example, Suh presents the following forms:

(128) Underlying Geminates:

<table>
<thead>
<tr>
<th>Gloss</th>
<th>Ralik</th>
<th>Ratak</th>
</tr>
</thead>
<tbody>
<tr>
<td>to inhibit</td>
<td>yebbaar</td>
<td>bebaar</td>
</tr>
<tr>
<td>to grow</td>
<td>yeddek</td>
<td>dedek</td>
</tr>
<tr>
<td>to look up</td>
<td>yejjed</td>
<td>jejjed</td>
</tr>
<tr>
<td>to entice</td>
<td>yekkal</td>
<td>kekal</td>
</tr>
<tr>
<td>sandbank</td>
<td>yeppe</td>
<td>pepe</td>
</tr>
</tbody>
</table>

In each of the forms in (128), the geminate surfaces with a preceding yV sequence in the Ralik dialect, while the “geminate” in the Ratak dialect surfaces with an interconsonantal vowel. Suh (1997) assumes that the underlying representation of the forms in (128) have the following structure:
(129) Underlying Structure of Initial Geminates

\[
\begin{array}{c|c}
\text{ex. } bbaar & \text{baar} \\
\text{/CV/} & \text{/baar/}
\end{array}
\]

In each of the underlying forms, the initial consonant is pre-linked to a mora. Under this proposal, underlying geminate consonants must be doubly-linked on the surface.\(^{24}\)

The analysis in Suh (1997) which accounts for the different dialectal forms also relies upon the ranking of \(\text{DEP}_{\text{IO}}\), much like the analysis of the distributive in this section. In Suh’s case, if \(\text{DEP}_{\text{IO}}\) is ranked below a constraint that requires that all input segments have one and only one corresponding segment, then the Ratak dialect form surfaces. This is because Suh (1997) proposes that the geminate consonant in \([\text{yebbaar}]\) is a single segment that is doubly-linked to a moraic position and an onset position.\(^{25}\) If \(\text{DEP}_{\text{IO}}\) is ranked above such a constraint, then the geminate is broken up by an epenthetic consonant.

The analysis of the distributive in this section does not discredit this account. Suh (1997) discusses phonologically-motivated consonant doubling, while the analysis in this section discusses morphologically-motivated consonant doubling. In the morphologically-motivated data presented in this section, there is no underlying structure on the root such as that in (129). Because of this, there is nothing in the input that requires that the output form have a doubly-linked initial consonant. Therefore, there

\(^{24}\) It is uncertain how a form such as \(\text{bebaar}\) would maintain the moraic status of the copied consonant, as neither output correspondent of the input geminate is in a moraic position.

\(^{25}\) As discussed earlier (fn. 21), such a structure is possible under my analysis, as it would allow maximal satisfaction of compression constraints. However, the distinction is not crucial for the analysis that I have proposed in this section.
must be some morphological specification that results in the same type of structure. In this section, I have chosen to represent this specification as an abstract morpheme RED.\textsuperscript{26} This RED copies material from the root to provide the exponent of that morpheme. This move obviates the need to propose any specific input structure for the distributive morpheme. The fact that the phonologically-driven and morphologically-driven structures are similar is the result of the constraint ranking choosing similar optimal forms to resolve an illicit prosodic structure. In the phonologically-driven cases, the constraints are designed to regulate the surface form of an underlying linked structure (either to ensure that they remain linked, or are separated by an epenthetic vowel). In the morphologically-driven cases, the constraints are designed to regulate the surface form of a structure that is not underlyingly linked. Since the mechanisms have different paths to the same goal, I have provided a separate analysis for the morphologically-driven cases. Similarities between the analyses are the high-ranking of \textit{ONSET} and that \textit{DEP} is the crucial constraint to account for the dialect difference.

### 2.3.5. Marshallese and \textit{ALLσL}

As discussed in 1.2.4, one method to account for a minimal reduplicant is \textit{ALLσL} (Walker 1998). This constraint, developed by Spaelti (1997), requires that all syllables in a form must be aligned to the left edge of the word. Under this constraint, a form with more than one syllable will incur violations. As shown in 2.3, there are two dialects of Marshallese. The two dialect forms can be illustrated by the examples below:

\textsuperscript{26} Moravcsik (1978) also characterizes morphological Marshallese consonant doubling as a reduplicative
(130)  Ralik/Ratak Dialect Forms

\[
\text{yib}.\text{bi.qen.qen} \quad \text{(Ralik)} \\
\text{bi}.\text{bi.qen.qen} \quad \text{(Ratak)}
\]

As the two forms in (130) show, each of the forms have precisely the same number of syllables. Therefore, they both violate ALL\(\sigma\)L equally.

Since ALL\(\sigma\)L cannot decide between the two forms in (130), there must be some other method for accounting for the violation. One possibility is to redefine ALL\(\sigma\)L in terms of the morphological word, rather than the prosodic word (Align (\(\sigma\), L, Wd, L)). Such a definition would then evaluate the number of syllables in the following structures:

(131)  Morphological Word and ALL\(\sigma\)L

\[
a. \quad \text{yib}[\text{bi.qen.qen}] \\
b. \quad [\text{bi}.\text{bi.qen.qen}]
\]

Since the morphological word spans a syllable boundary in yib[bi.qen.qen], it is uncertain as to how such a form would be evaluated. However, it would seem that there are three syllables in each of (131)(a-b) that are not aligned to the left edge of the morphological word, and therefore, four violations of ALL\(\sigma\)L. Therefore, it would still be equally as bad as bi.bi.qen.qen. Therefore, while ALL\(\sigma\)L can account for minimal reduplication in many cases, it does not differentiate between the dialects in Marshallese. The compression model can account for the minimal reduplication and provide an account for the dialect variation by the relative rankings of constraints that are necessary phenomenon.
to account for morpheme ordering and edge-matching. These constraints determine the
minimal shape without recourse to constraints that count syllables.

2.3.6. Summary of Marshallese Consonant Doubling

In this section, I have provided an account of Marshallese Consonant Doubling as
reduplication of a single consonant in the Ralik dialect, and a syllable in the Ratak
dialect. The crucial portion of this analysis is the definition of the morphological word.
If the morphological word is all phonological material associated with input
morphological structure, then epenthetic segments do not count in determining the
domain of the morphological word. Therefore, the compression model adequately
accounts for the minimal size of the reduplicant, as predicted.

The relative ranking of $\text{DEP}_{\text{IO}}$ determines the dialectal form of the distributive. In
the Ralik dialect, $\text{ALIGN-Root-L}$ is ranked above $\text{DEP}_{\text{IO}}$, which allows the reduplicant to
match the root edge as closely as possible, while still satisfying prosodic well-formedness
constraints. In the Ratak dialect, $\text{ALIGN-Root-L}$ is ranked below $\text{DEP}_{\text{IO}}$, which allows the
reduplicant to reduplicate more than a single consonant to satisfy prosodic well-
formedness.

Finally, the analysis in this section provides an account for the vowel quality of
either the epenthetic vowel (Ralik) or the reduplicated vowel (Ratak). This account is
based upon the principles of TETU, in which markedness constraints are allowed to
emerge, because they are ranked below input-output faithfulness, but higher than base-
reduplicant faithfulness.
2.4. **Summary of Prefixal Reduplication**

In this chapter, I have provided analysis of data in which the reduplicant is a prefix and of either a CC or C shape. Under the analyses presented here, the crucial ranking is that of \textsc{Align-Red-L} above \textsc{Align-Root-L}. This ranking ensures that the reduplicant appears as minimal as possible to maximally satisfy both constraints of the ranking. As shown in 2.2.4, another language that has evidence of such reduplication is Temiar (Gafos 1999). Shim (1996) provides data from Umpila, an Australian language, and Nakanai, an Austronesian language in which a CV reduplicant surfaces as the result of both-edge reduplication of a vowel-final root (see 6.4).