

# Amharic infixing reduplication targets heavy syllables

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## 1 Introduction

Amharic, a Semitic language spoken in Ethiopia, has a crosslinguistically unique infixing reduplication pattern. The plural marker on adjectives and the iterative marker on verbs are reduplicative infixes which target heavy syllables. This means these infixes can only surface in words containing heavy syllables. Adjectives without heavy syllables must find an alternative way to express plural agreement with a plural head noun, and iterative phrases containing a verb without a heavy syllable must find an alternative means of expressing iterativity.

Here I describe the infixing reduplication system in Amharic and demonstrate that the target of infixation in Amharic further illuminates the typology of infixation pivots as presented by Yu (2007, 2003). Yu claims that infixes target linear, segmental, or prosodic positions that every word is likely to have, specifically word edges, and prominent positions (Yu 2003:193). Yu proposes two competing pressures determining infix location the edge and prominent infix positions we see crosslinguistically. First, the Salient Pivot Hypothesis (Yu 2007:9) states that phonological infixes target psycholinguistically or phonetically salient positions. Second is the idea that infix sites are more reliable if more words possess that site (Yu 2003:195). These two pressures work together to ensure that infixes surface in salient positions present in most words.

Amharic reduplication targets not an edge or the most prominent position in a word; it targets heavy syllables, which are not present in every word. Thus, based on the data presented throughout this paper I propose a constraint-based account of reduplicative infixation in Amharic (Prince, 1995), and I posit a modification to Yu (2007)'s list of possible infixation targets.

Amharic is spoken by 21,600,000 people in Ethiopia and another 200,000 outside of Ethiopia. Unless otherwise specified, the data presented in this paper comes from original work with two native speakers of Amharic from September

2012 to July 2013 in Minneapolis, Minnesota. The speakers are both women, one age 20 and the other age 32, both born in Addis Ababa. The speakers agreed on all judgments relevant for this paper, and most judgments across their Amharic speech.

I first present relevant aspects of the phonological and morphological systems of Amharic in section 2.1, including the phonemic inventory and syllable structure. I then describe and analyze the stress system of the language, which is necessary for understanding the details of the infixing reduplication pattern in section 2.2. In section 3 I present the details of the infixing reduplication pattern in adjectives and verbs. I propose an analysis in section 4, where I demonstrate that it is necessary to specifically refer to heavy syllables in order to predict the correct distribution of the infix. I conclude in section 5 by proposing a modification to Yu (2007)'s list of possible infixation targets based on the Amharic data.

## 2 Amharic morphophonology: sounds, weight, and stress

In this section I lay out certain basic phonological and morphological properties of Amharic relevant for understanding the infixing reduplication pattern of the language. I begin with the phonemic inventory and syllable structure, then proceed to describe and analyze the stress system of the language.

### 2.1 Phonemic inventory and possible syllable structure

The consonant inventory of Amharic is given in (1). Many Amharic consonants have contrastive ejective counterparts, including voiceless stops and affricates, as well as /s/. These are listed in the inventory below.

(1) **Amharic Consonant Inventory**

|            | Bilabial | Alveo-palatal | Palatal | Velar   | Glottal |
|------------|----------|---------------|---------|---------|---------|
| Plosive    | p, p' b  | t, t' d       |         | k, k' g | ʔ       |
| Nasal      | m        | n             | ɲ       |         |         |
| Fricative  | f        | s, s' z       | ʃ ʒ     |         | h       |
| Affricate  |          | tʃ tʃ' dʒ     |         |         |         |
| Approx     |          |               | j       | w       |         |
| Lat. appr. |          | l, r          |         |         |         |

All consonants except the glottal stop can surface as either singleton or geminate. Geminates are quite common in Amharic and can be either lexical or grammatical. Some words lexically contain a geminate, but many grammatical processes

result in geminates even when the roots themselves do not contain lexical geminates. For example, one class of verbs has an underlying geminate (2a); however, another class of verbs does not (2c). Both classes of verbs contain geminates in the preterite (2b,d), but in the imperfective, geminates are only found in those roots that have a geminate specified lexically (2a).

(2) **Lexical versus grammatical geminates**

- a. 'märräqä 'he blessed'    b. jə'märräq 'he blesses'  
 c. 'säbbärä 'he broke'    d. 'jäsäb(ə)r 'he breaks'

The vowel inventory consists of eight contrastive vowels. In certain varieties of Amharic, the central vowels are merely allophones of the front vowels (Hudson, 1997); however, my consultants' dialects contain eight contrastive vowels, so I have listed them all separately here, (3).

(3) **Amharic Vowel Inventory**

|   |   |   |
|---|---|---|
| i | ĩ | u |
| e | ə | o |
| ä | a |   |

Epenthetic vowels are common to break up phonotactically disallowed clusters. The epenthesized vowels are always central, and the choice of central vowel is determined by the height of the preceding vowel in the word.

The syllable structure in the language is maximally CCVCC, where the sonority hierarchy must be obeyed. The first consonant of an onset cluster and the final consonant of a coda cluster must be less sonorant than those nearest the nucleus. Word-internally, complex codas are only allowed if they obey the sonority hierarchy; however, they are much more common word-finally. For our purposes, I assume that all word-final consonants are extrametrical. The relevant syllable types distinguished throughout this paper are those closed by (the first half of) a geminate, marked G here, (4b), and those not closed by a geminate, (4a).

(4) **Amharic syllable types**

- a. (C)(C)VC    b. (C)(C)VG

There are no word-initial geminates in the language. Both halves of a geminate cannot surface within the same syllable unless the geminate is word-final. If a syllable ending in a geminate precedes a syllable beginning with a consonant, the second half of the geminate must either join as a phonotactically well-formed onset with the following consonant (obeying the sonority hierarchy), or a vowel must be epenthesized between the geminate and the following consonant separating the two halves of the geminate into distinct syllables, (5).

(5) **The second half of a geminate must be syllabified as an onset**

- a. wif.fram    b. \*wif.fi.ram  
c. \*fellgo    d. fel.lə.go

Word-medial geminates can never be followed immediately by two consonants, \*wiff.fram, even with the first of the two following consonants is less sonorous. This is evidence that the geminate in (5a) is split across two syllables, and it is not syllabified \*wiff.ram.

Other series of two word-internal coda consonants are allowed, as long as they obey the sonority hierarchy.

(6) **Word-internal complex codas**

- k'ulf.totʃtʃ

## 2.2 The stress system

In this section I characterize Amharic word-level stress. The default stress pattern involves alternating odd-numbered syllable stress, which I propose in 2.2.1 to capture by means of left-aligned disyllabic trochaic feet. I show in 2.2.2, however, that alternating stress on odd-numbered syllables begins anew in each span initiated by a heavy syllable. Thus, when a geminate consonant is present making a syllable heavy, the basic stress pattern is thrown off; syllables closed by geminate consonants are always stressed, and feet no longer align to the beginning of the word, but instead align to syllables closed by geminates.

The phonetic correlates of stress are length and intensity, and, to a lesser extent, pitch. There is no obvious phonetic or impressionistic reason to distinguish primary from secondary stress in Amharic, so throughout this paper I mark all stressed syllables with a primary stress mark. Feet are marked with parentheses, and syllables are separated with dots.

### 2.2.1 Default stress pattern

To capture the left-anchored alternating stress pattern, I propose that Amharic words are footed into left-aligned binary trochees (Sande and Hedding, 2014), (7).

(7) **Default Amharic stress: left-aligned trochees**

- |    |   |                       |
|----|---|-----------------------|
| a. | ( <u>ˈmät.fät</u> )                                   | ‘to vanish’           |
| b. | ( <u>ˈdo.ro</u> )                                     | ‘chicken’             |
| c. | ( <u>ˈmät.räf</u> ).räf                               | ‘to overflow’         |
| d. | ( <u>k’o.fi</u> ).ja                                  | ‘hat’                 |
| e. | ( <u>ˈmän.k’ä</u> )( <u>ˈsa.k’äs</u> )                | ‘to move (your body)’ |
| f. | ( <u>t’ä.rä</u> )( <u>ˈp’e.za</u> )                   | ‘table’               |
| g. | ( <u>ˈas.da</u> )( <u>ˈka.käl</u> ).ku                | ‘I arranged it’       |
| h. | ( <u>jä.tä</u> )( <u>kä.fä</u> )( <u>tä.win</u> ).bir | ‘the open door’       |

In words with an odd number of syllables, final stress is not observed, and I therefore assume that final odd-parity syllables are unfooted, and we see word-final lapse. This is consistent with Leslau (2000)’s observation that “the final syllable in Amharic is not likely to be stressed.” Other than Leslau’s observation, very little has previously been said about Amharic stress.

Stress is not morphologically dependent. It applies to words, not roots or particular morphemes. The root /tʃ’uh/ in (8) is stressed in (b,c) but not in (a). We see left-aligned trochees in all three examples, whether or not the root is stressed.

(8) **Stress is word-level**

- |    |                               |                 |
|----|-------------------------------|-----------------|
| a. | ( <u>mä.tʃ’uh</u> )           | ‘to yell’       |
| b. | (tʃu. <u>hät</u> )            | ‘a yell’        |
| c. | (ij.jä)( <u>tʃ’u.hä</u> ).näw | ‘he is yelling’ |

This default stress pattern of left-aligned trochees can be accounted for via basic, widely used Optimality Theory constraints (Prince and Smolensky, 1993).

In order to account for the fact that feet are binary and trochaic, I use the constraints in (9) and (10).

(9) **Ft-Bin(arity)** (Prince and Smolensky, 1993)

Assign one violation for every syllable that is not disyllabic (binary).

(10) **Ft-Form-T(rochaic)** (Prince and Smolensky, 1993)

Assign one violation for every foot whose leftmost syllable is not stressed.

The above constraints are never violated by candidates who follow the default stress pattern in Amharic. The alignment constraint in (11) ensures that the binary trochaic feet align to the left edge of the prosodic word.

(11) **Align-L(Ft,Wd)** (McCarthy and Prince, 1993)<sup>1</sup>

Assign one violation to every syllable which separates the left edge of a foot from the left edge of the prosodic word.

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<sup>1</sup>The choice of whether to define this constraint gradiently or categorically is minimally relevant for my analysis; however, see McCarthy (2003) for a discussion.

An alternative to this constraint would be LEFTMOST (Karvonen, 2005), which assigns a violation if the initial syllable of a word is unstressed. In words with an odd number of syllables, LEFTMOST and ALIGN-L make different predictions about footing. For example, words of shape ('σσ)(σσ)σ and ('σσ)σ('σσ) would both satisfy LEFTMOST because the left-most syllable is stressed. However, they incur different numbers of violations of ALIGN-L. The candidate with all feet aligned to the left would incur fewer violations of ALIGN-L as defined in (11) than would the candidate with word-medial lapse. Since we see final and not medial lapse in the default stress pattern of Amharic, I propose that ALIGN-L is the relevant highly-ranked constraint.

In order to ensure that syllables are parsed into binary feet whenever possible, I use PARSE, defined in (12).

- (12) **Parse** (Prince and Smolensky, 1993)  
Assign one violation for every syllable not parsed into a foot.

When there is an odd number of syllables in a word, the final syllable cannot be parsed into a binary foot, and it is left unparsed rather than being parsed into its own monosyllabic foot. In these cases, the winning candidate violates PARSE in order to satisfy the requirement on binary feet, so the PARSE constraint must be crucially dominated by FTBIN<sup>2</sup>.

To account for the default stress pattern in Amharic, the relevant constraint ranking is given in (13).

- (13) **OT constraint ranking for default Amharic stress pattern**  
ALIGN-L(FT,WD), FT-BIN, FTFORM-T  
|  
PARSE

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<sup>2</sup>The following three constraints also describe the given data, but are redundant given those above.

- (1) **NonFin(ality)** (Prince and Smolensky, 1993)  
Assign one violation if the final syllable of a word is stressed.
- (2) **\*Lapse** (Elenbaas and Kager, 1999)  
Assign one violation for each occurrence of two consecutive unstressed syllables

We never see a final stressed syllable in the default pattern, so we could use the constraint NONFIN; however, this would be redundant given the fact that we have already specified left-aligned, binary, trochaic feet.

The constraint \*LAPSE is violated by the same winning candidates as PARSE, and is also redundant given our analysis thus far.

### 2.2.2 Stress in the presence of geminates

Geminates are quite common in Amharic, both lexically and grammatically. Syllables closed by geminates are *heavy* syllables in Amharic (Sande and Hedding, 2014), while other closed syllables are light. There are no long vowels in the language. Heavy syllables attract stress in Amharic, throwing off the default stress pattern presented above. From this point forward, I underline all heavy syllables in the data.

#### (14) Amharic stress as attracted to heavy syllables

- |    |  |                           |
|----|--|---------------------------|
| a. | sej. <u>'totftf</u>                                    | 'women'                   |
| b. | mä. <u>'tjäm.mär</u>                                   | 'to add an ingredient to' |
| c. | <u>'wi:f.ja.'</u> <u>'otftf</u>                        | 'dogs'                    |
| d. | <u>'ti.säb.'</u> <u>ral.litf</u>                       | 'she breaks chairs'       |
| e. | tä. <u>'gag.ga.'</u> <u>rätf.tjä.'</u> <u>wal.litf</u> | 'she will bake them'      |

Without exception, syllables closed by geminate consonants are stressed in Amharic. This overrides the default stress pattern described above and leads to multiple consecutive stressed syllables, final stress, and lack of initial stress, none of which are found elsewhere in the language.

In the data in (14) it is not evident whether the feet that form around stressed heavy syllables are trochaic or iambic. I posit, however, that because only trochaic feet are found elsewhere in the language, that feet in words containing heavy syllables like (14) are also trochaic. This argument is one of simplicity, since there is no positive evidence that the feet in (14) are iambic, and by claiming that they are trochaic we can say that Amharic has only trochaic feet. The data from (14) are repeated, footed, in (15).

#### (15) Amharic stress as attracted to heavy syllables

- |    |  |                           |
|----|--|---------------------------|
| a. | sej. <u>('totftf)</u>                        | 'women'                   |
| b. | mä. <u>('tjäm.mär)</u>                       | 'to add an ingredient to' |
| c. | <u>('wi:f.ja.)('otftf)</u>                   | 'dogs'                    |
| d. | <u>('ti.säb.)('ral.litf)</u>                 | 'she breaks chairs'       |
| e. | tä. <u>('gag.ga.)('rätf.tjä.)('wal.litf)</u> | 'she will bake them'      |

The data in (16) shows non-binary feet in words with multiple syllables in a row that contain geminates. The data in (17) shows that when the final syllable of a word contains a geminate coda, it is stressed. The data in (18) shows that in contrast with the default pattern, the initial syllable is not stressed when the second or fourth syllable of the word contains a geminate.

- (16) **Consecutive stressed syllables; monosyllabic feet**
- a. (bäl.)(latf.tfih<sup>w</sup>) ‘y’all ate’
  - b. (ij.jä.)(tät.)(t’al.)(lal.)(latf.tfih<sup>w</sup>) ‘you all are hating each other’  
       ij.jä.tät.t’al.lal.latf.tfih<sup>w</sup>
  - c. (läm.)(min.)(nät.tä.)(mam.mä.)(näb.bät) ‘to the one that we believe in’
- (17) **Final Stress**
- a. (tʃ’a.räs.)(.ʼwall) ‘he finished’
  - b. (.tʃ’a.rä.)sätʃ ‘she finished’
- (18) **No initial stress**
- a. ji.(säb.ra.)(wall) ‘he will break it’
  - b. \*(ji.säb.)ra.(wall)
  - c. k’o.(fi.ja.)(otʃtʃ) ‘hats’
  - d. kä.(gag.gä.)(rä.tfi.)läp ‘if she baked for me’

The data in (18) requires an additional constraint to rule out a candidate \*(ji.)(säb.ra.)(wall) where the initial syllable is stressed but there are multiple stressed syllables in a row (underlined). I propose using the constraint \*CLASH, defined in (19) to penalize consecutive stressed syllables and rule out such a candidate.

- (19) **\*Clash** (Prince, 1983; Selkirk, 1984; Kager, 1994)  
 Assign one violation for each occurrence of two consecutive stressed syllables.

In the default stress pattern, we never see two stressed syllables in a row, so \*CLASH does not interfere with the previously proposed analysis. However, it must crucially be outranked in order to allow consecutive stressed syllables in the case that both those consecutive stressed syllables are heavy, as in (16). To account for the fact that heavy syllables are always stressed in Amharic, even when this causes clash and final stress, I posit that an undominated Weight-to-Stress Principle (WSP) constraint is at play.

- (20) **WSP (Weight-to-Stress Principle)** (Prince, 1990)  
 Assign one violation for every heavy syllable that is not stressed.

WSP must outrank \*CLASH to get the correct output in (16), and it must outrank FTBIN, because when there are consecutive heavy syllables we see monosyllabic feet (21). Additionally, it must outrank ALIGN-L(FT,WD), because if the second or fourth syllable of the word is stressed, we do not see initial (left-aligned) stress; the first syllable is unstressed and unparsed in favor of the heavy syllable being stressed.



- (21) **WSP**»**FtBin**  
 ('bäl.)('latf.tʃih<sup>w</sup>) 'y'all ate.'  
 ('ij.jä.)('tät.)('t'al.)('lal.)('latf.tʃih<sup>w</sup>) 'y'all hate each other'
- (22) **WSP**»**Align-L(Ft,Wd)**  
 as.('gag.gä.)rat 'he made her bake'

From the data provided throughout this section, we also see that FtForm-T must outrank ALIGN-L in words like (22), otherwise we could get an initial iambic foot instead of initial lapse: \*(as.'gag.)('gä.rat) or \*(as.'gag.)('gä.rat) instead of as.('gag.gä.)rat. FTFORM-T must then outrank FTBIN, otherwise we might expect a single iambic foot in a bisyllabic word where the final syllable is stressed. Instead, we get an initial unparsed syllable and a mono-moraic foot as in (14a), \*(sej.'totʃtʃ) instead of sej.('totʃtʃ). In the latter case, there is no phonetic evidence for which form is correct, a single disyllabic iamb or an unparsed initial syllable and a monosyllabic heavy foot. However, because we never see iambs elsewhere in Amharic, I posit that in words like sej.('totʃtʃ) we also do not see an iamb, but instead we are left with an unparsed first syllable. This means that the language prefers trochaic feet to disyllabic ones, and FTFORM-T must outrank FTBIN.

The addition of the undominated WSP constraint ensures that all heavy syllables are stressed; however, we must also account for why the form in (18a) surfaces as ji.('säb.ra.)('wall) rather than \*(ji.säb.)ra.('wall). The heavy syllable is stressed, but rather than resorting to the default pattern of left aligned trochees to foot the rest of the word, \*(ji.säb.)ra.('wall), we see that all of the feet are consecutive, in this case right-aligned unlike the default pattern, ji.('säb.ra.)('wall). Thus, we must account for the fact that all feet must be consecutive within a word, unless this conflicts with the WSP constraint as in ('gag.ga.)ra('tʃatʃ.tʃäw) 'she baked them.' In a word like ('gag.ga.)ra('tʃatʃ.tʃäw), disyllabic trochees form around the two heavy syllables *gag* and *tʃatʃ* resulting in medial lapse and non-consecutive feet. However, in all other cases, we see consecutive feet outranking the left-aligned default pattern, as in ji.('säb.ra.)('wall), (18a).

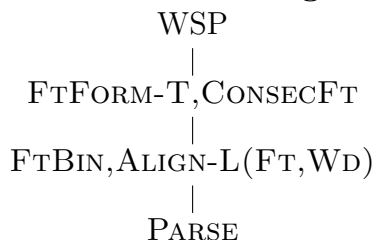
To account for the fact that Amharic prefers consecutive feet to left-aligned ones, I propose a constraint CONSECFT which is crucially dominated by WSP but outranks ALIGN-L.

- (23) **Consec(utive)Ft**

Assign one violation for every unfooted syllable which separates two feet.

The candidate \*(ji.säb.)ra.('wall) would incur a violation of the constraint in (23) while the winning candidate ('säb.ra.)('wall) would not. With the addition of this constraint, we get the final ranking of constraints to account for the Amharic stress system, (24). This ranking accounts for both the default stress pattern, as well as stress in the presence of geminates, which create heavy syllables in Amharic.

(24) **Final stress ranking**



In summary, we saw that Amharic prefers left-aligned trochaic feet by default. When geminates are present, the default system is overridden by the fact that heavy syllables must be stressed, no matter their position in the word. In such cases, trochees are formed around heavy syllables.

### 3 Infixing reduplication

We saw in the previous section that heavy syllables attract stress in Amharic. Heavy syllables are also the target of infixation in this language, where reduplicative infixes can only surface in syllables closed by geminates. As an abstract example, a word of shape  $CVC_i.C_iVC$  takes an infixing reduplicant and surfaces as  $CV.C_iVC_i.C_iVC$ . This pattern is found in plural adjectives, as described in section 3.1 and iterative verbs, as described in section 3.2.

#### 3.1 Adjectives

Adjectives surface before the nouns they modify in Amharic. Nouns and their adjective modifiers agree in number. When a noun is singular, neither the noun nor its modifiers takes any morpheme specifying number. When a noun is plural, it takes the suffix  $/-otʃtʃ/$ <sup>3</sup>. Its adjectival modifiers agree in pluralization with one of two morphemes: a reduplicative CV infix, or, just like the noun, with the plural suffix  $/-otʃtʃ/$ .<sup>4</sup>

Most adjectives are pluralized with the suffix  $/-otʃtʃ/$ , (25).

(25) **Adjectives agree with nouns in number**

- a. ('ta.katʃ) saw 'lazy person'
- b. ('ta.ka.)('tʃ-otʃtʃ) saw.-(otʃtʃ) 'lazy people'

<sup>3</sup>This is the productive plural suffix in Amharic. A few words take the archaic plural suffix  $/-(j)an/$  or  $/-(j)at/$ . These only occur in fossilized forms and I ignore them for the purposes of this paper.

<sup>4</sup>It is difficult to hear that final geminates are really geminates in Amharic; however, when a plural noun is definite, it surfaces with  $/-otʃtʃ/$  followed by  $/-u/$ , as in  $k'ulf-otʃtʃ-u$ , 'the keys.' In these cases, it is clear that  $/-otʃtʃ/$  has a final geminate.

When adjectives contain a geminate, however, we see an alternative plural allomorph surface: a CV infix in the heavy syllable containing a reduplicant of the geminate consonant, (26).

(26) **Reduplicative infix for plural adjectives** (adapted from Hedding (2012))

|                        |     |               |                             |                       |               |
|------------------------|-----|---------------|-----------------------------|-----------------------|---------------|
| ( <u>räd</u> ɔ̃.dɔ̃äm) | saw | ‘tall person’ | rä.( <u>dɔ̃ad</u> ɔ̃.dɔ̃äm) | saw.-( <u>ot</u> ʃtʃ) | ‘tall people’ |
| ( <u>at</u> ʃ.tʃir)    |     | ‘short’       | a.( <u>tʃat</u> ʃ.tʃir)     |                       | ‘short (PL)’  |
| ( <u>tɪ</u> l.liɰ)     |     | ‘big’         | tɪ.( <u>lɪ</u> l.liɰ)       |                       | ‘big (PL)’    |
| ( <u>wiff</u> .ram)    |     | ‘fat’         | wi.( <u>fif</u> .fram)      |                       | ‘fat (PL)’    |
| ( <u>saf</u> .fi)      |     | ‘wide’        | sa.( <u>faf</u> .fi)        |                       | ‘wide (PL)’   |

The reduplicative infix in (26) contains two segments, a consonant with identical features to the geminate consonant in the word, and a vowel that follows the regular epenthesis process of the language. The vowel in the infix is always a central vowel, and there is height harmony between the preceding vowel and the infix vowel.

This second plural strategy, the reduplicative infix, is impossible in adjectives without a geminate, like *‘ta.katʃ* and *‘k’on.dzo*. We see that for *‘k’on.dzo* in (27), only the suffixing /-otʃtʃ/ plural morpheme is allowed. No infix is allowed, whether or not we create a new heavy syllable in the word (27c,d).

(27) **Adjectives without geminate cannot reduplicate for pluralization**

|    |                          |                       |  |                    |
|----|--------------------------|-----------------------|--|--------------------|
| a. | ( <u>k’on</u> .dzo)      | saw                   |  | ‘beautiful person’ |
| b. | k’on.( <u>dz-ot</u> ʃtʃ) | saw.-( <u>ot</u> ʃtʃ) |  | ‘beautiful people’ |
| c. | *( <u>k’o.non</u> .)dzo  | sa.( <u>w-ot</u> ʃtʃ) |  | ‘beautiful people’ |
| d. | *k’o.( <u>nonn</u> .dzo) | sa.(w- <u>ot</u> ʃtʃ) |  | ‘beautiful people’ |

So, we see suppletive adjectival plural allomorphs: /-otʃtʃ/ and RED. It seems that the reduplicative infix is the preferable plural allomorph, and /-otʃtʃ/ is the backup strategy in case the conditions are not met for RED to appear.

### 3.2 Verbs

In this section I show that the iterative marker on verbs has the same distribution as the plural marker on adjectives. There is an infixing CV reduplicant which only surfaces in words containing a geminate. Unlike the plural morpheme in adjectives, this seems to be a case of ineffability, where there is no alternative iterative morpheme. In order to express iterativity in verbs not containing geminates, one would use a periphrastic construction meaning something like ‘I did X again and again.’

There is no obvious semantic reason why verbs containing a geminate should be able to express the iterative, while those without geminates cannot. For example, the same root can take the iterative infix in the perfective but not the imperfective, since there is always a geminate in perfective forms, but not always in the imperfective. In the imperfective, some verbs have geminates while others do not. In these cases, only those verbs with geminates in the imperfective can undergo iterative reduplication.

Examples of the verbal infixation pattern are given in (28)<sup>5</sup>. All verbs have a geminate in the perfective stem, thus all verbs can reduplicate in the perfective, as in (28a,c). However, not all verbs have a geminate in the imperfective stem (28b). Those that do not cannot undergo iterative reduplication in the imperfective. Those that do, (28d), can undergo iterative reduplication in both the perfective and imperfective. I have found no cases of heteromorphemic geminates in Amharic verbs, so it is hard to say whether they would act the same way as geminates within a morpheme.

(28) **Verbal iterative infixing reduplication**

- |    |                       |              |                               |                         |
|----|-----------------------|--------------|-------------------------------|-------------------------|
| a. | ( <u>sä</u> b.bä.)rä  | ‘he broke’   | sä.( <u>bab</u> .bä.)rä       | ‘he broke repeatedly’   |
| b. | (jə.sä.)b(ə)r         | ‘he breaks’  | * (jə.sä.)( <u>ba</u> .b(ə)r) | ‘he breaks repeatedly’  |
| c. | ( <u>mär</u> .rä.)qä  | ‘he blessed’ | mä.( <u>rar</u> .rä.)qä       | ‘he blessed repeatedly’ |
| d. | jə.( <u>mär</u> .räq) | ‘he blesses’ | (jə.mä.)( <u>rar</u> .räq)    | ‘he blesses repeatedly’ |

### 3.3 Infixation summary

We have seen two cases of infixing reduplication in Amharic that target heavy syllables. In both cases, the morpheme in question can only surface in words containing heavy syllables. In other words, there must be an alternative strategy to express the same meaning when a heavy syllable is not present. For the plural marker on Adjectives, the backup strategy is an alternative affix, the suffix /-otʃtʃ/, which has no restrictions on attachment, except that it must be a suffix. When the infixing iterativity morpheme on verbs cannot surface due to lack of heavy syllables, there is no alternative affix. Instead, to get an iterative meaning for verb roots without a heavy syllable, one must resort to a phrasal construction with the meaning ‘again and again.’ Both strategies, alternative affixes and periphrastic constructions, are common repairs to ineffability (cf. Inkelas 2014 chapter 9).

Both Amharic infixes, the adjectival plural morpheme and the verbal iterative morpheme, target heavy syllables. This is the first attested example of a language where infixation obviously targets heavy syllables. There are a few attested

<sup>5</sup>Crucially, iterative reduplication targets the verb root plus its aspectual information, not larger verb stems. This is likely related to the scope of iterativity on Amharic verbs; however, such a discussion is outside the scope of this paper, so I do not discuss this further here.

languages that superficially resemble Amharic in this respect, but which exhibit key differences. In Chamorro, the reduplicating adjectival intensifier surfaces as a suffix if the adjective ends in a vowel (29a,b), but as an infix if the adjective ends in a consonant (29c,d) (Topping and Dungca, 1973; McCarthy and Prince, 1994b; Klein, 1997).

(29) **Chamorro infix targets stressed syllable**

- |    |         |          |           |               |
|----|---------|----------|-----------|---------------|
| a. | dánkolo | ‘big’    | dánkolo   | ‘very big’    |
| b. | buníta  | ‘pretty’ | bunítata  | ‘very pretty’ |
| c. | ñálang  | ‘hungry’ | ñálala+ng | ‘very hungry’ |
| d. | métgot  | ‘strong’ | métgogot  | ‘very strong’ |

Chamorro infixation as in (29) has been described as following the last vowel of the adjective (Topping and Dungca, 1973), or as preceding the final syllable (danko+lo+lo as opposed to dankolo+lo) (McCarthy and Prince, 1996). One could instead describe the above infix as seeking a closed-syllable landing site, where the CV affix prefers to be in a closed (heavy) syllable but will move maximally one segment from the right edge of the word. If it cannot surface with a coda, it alternatively surfaces as a light syllable suffix. This alternative analysis is only motivated if there is evidence for Chamorro codas as heavy. This is not the case, however. There is no evidence that codas make syllables heavy in Chamorro (Topping and Dungca, 1973). McCarthy and Prince (1996) even notes that we could consider the final consonant in Chamorro to be extrametrical, and the reduplicant in (29) to be a suffix. Thus, an analysis of Chamorro infixing reduplication as targeting heavy syllables seems unmotivated.

Perhaps a more parallel case is Hausa, where it seems that the reduplicative affix wants to be contained inside of a syllable closed by a geminate. The key difference between Hausa and Amharic reduplicative affixation is that the Amharic infix only surfaces when the input word already contains a geminate. In Hausa, new geminates are formed to make the infixed syllable heavy, (30) (Newman 2000, cited by Inkelas 2014).

(30) **Hausa reduplicative affixes induce gemination**

- Pluractional verbal reduplication
 

|    |        |                   |                       |
|----|--------|-------------------|-----------------------|
| a. | búgà:  | <u>bú</u> bbúgà:  | ‘beat’                |
| b. | dánnè: | <u>dá</u> ddànné: | ‘press down, oppress’ |
| c. | bí     | <u>bí</u> bbí     | ‘follow’              |
- Intensive adjective reduplication
 

|    |         |                    |                   |
|----|---------|--------------------|-------------------|
| a. | gáutsí: | <u>gà</u> ggáutsá: | ‘brittle’         |
| b. | zářtsí: | <u>zà</u> zzářtsá: | ‘salty, brackish’ |

We have seen data from Chamorro and Hausa where it seems as though the affix prefers to be realized inside of a heavy syllable. However, in Amharic, the reduplicative infix targets input heavy syllables. Input singletons do not geminate to satisfy the heavy syllable requirement in Amharic.

The fact that infixation target heavy syllables in Amharic is especially interesting because heavy syllables are not predicted to be targets of infixation (Yu, 2007). Yu claims infixes prefer to target landing sites present in as many words as possible (preferably all words). The more words have a certain landing site, the more likely that site is a target of infixation. He specifically lists the linear, segmental, and prosodic targets in (31) as possible infixation pivots.

(31) **Yu's infixation pivots**(Yu 2003:195)

- Edge pivots: left- or rightmost consonant, vowel, or syllable
- Prominence pivots: Stressed vowel, syllable, or foot

Heavy syllables are not present in every word in Amharic, and are not predicted by Yu's typology. In section (5) I return to this issue with a modification of Yu (2007)'s list of possible infixation pivots.

## 4 Deriving Amharic reduplication via constraints

In this section I consider two types of analysis in the Optimality Theory framework (Prince and Smolensky, 1993) to account for the Amharic infixing reduplication facts. I focus here on Adjectival infixing reduplication; however, unless otherwise specified the analysis applies to verbal infixing reduplication as well. Additionally, I only consider candidates that obey the stress pattern described in section 2.2.

To account for the CV shape of the reduplicative infix, we could imagine the input morpheme having a specified CV template. Then, in order to ensure that the infix surfaces in the correct location—immediately before the geminate, inside the heavy syllable—we could posit a constraint `ALIGN-L(RED,GEMINATE)`, which aligns the reduplicant to the left edge of the geminate. This seems to capture the facts; however, this analysis is non-optimal. We know of no other languages where infixes target geminates as opposed to word edges or prominent positions, so this constraint seems unmotivated. Additionally, we have specified an input template instead of letting the CV shape fall out from TETU effects (cf. McCarthy and Prince 1994a).

Here I consider an alternative analysis that allows the output reduplicative infix in Amharic to fall out from highly motivated, phonologically optimizing constraints. The goal of this section is to determine whether we can derive Amharic infixes as purely phonologically optimizing, rather than specifying a target surface

position (heavy syllables) or a templatic input shape (CV). Additionally, I derive the infix without specifying in the input that it is a reduplicant. This approach aligns with other recent approaches in the literature to derive reduplicative infixes as purely phonologically optimizing (cf. Hendricks 1999; Yu 2005; Riggle 2006).

#### 4.1 The reduplicant shape

The reduplicant always has the shape CV. Inserting only a C or V, an extra copy of the geminate consonant (32b), or an extra vowel (32c), is ungrammatical. Additionally, inserting anything larger than CV is disallowed, otherwise we might expect forms with a CVC infix like (32d). The added reduplicant material is bolded in (32).

(32) **CV reduplicant shape**

- a. rä('d**ʒ**adʒ.dʒäm)
- b. \*('räd**ʒ**dʒ.dʒäm)
- c. \*('rä.d**ʒ**a.)dʒäm
- d. \*k'o.('nonn.dʒo) (from k'ondʒo)

I demonstrate here that the CV shape of the reduplicant does not have to be specified in the input. Instead, it can be derived via other highly motivated well-formedness constraints. Taking for granted for now that the reduplicant surfaces as an infix as opposed to a suffix, adding CV to a word is the minimum possible additional structure that allows the word to remain well formed.

The \*STRUC constraint in (33) penalizes each output segment, preferring the shortest possible candidate. This is why we get a CV infix, and not CVC or CVCV. However, in order to ensure that \*STRUC does not prefer a candidate where the plural morpheme is simply not realized, which would incur the fewest possible violations of \*STRUC, we need the constraint REALIZE MORPH (34). REALIZE MORPH must be ranked higher than \*STRUC, (35).

(33) **\*Struc(ture)** (Prince and Smolensky, 1993)

Assign one violation for each segment present in the output.

(34) **RealizeMorph(eme)** (Kurusu, 2001)

Assign one violation for each input morpheme that is not phonologically realized in the output.

(35) **RealizeMorph**  $\gg$  **\*Struc**

| rädʒdʒäm + PL                 | REALIZE MORPH | *STRUC |
|-------------------------------|---------------|--------|
| ☞ a. rä('d <b>ʒ</b> adʒ.dʒäm) |               | *****  |
| b. ('rädʒ.dʒäm)               | *!            | *****  |

A combination of phonotactic well-formedness (Markedness) constraints in the language give rise to CV shape of the reduplicant instead of only V or only C. In the tableau above, I do not specify an input shape or input features of the plural morpheme; I simply specify that there is a plural morpheme. The constraints interact to prefer a CV-shaped infix on their own. The optimal candidate satisfies REALIZEMORPH and violates \*STRUC eight times. The alternative candidate only violates \*STRUC six times but violates REALIZEMORPH. Thus, we know that REALIZEMORPH must be ranked higher than \*STRUC in order to ensure the correct output.

I assume a MAX-IO constraint (Prince and Smolensky, 1993), which is violated when input segments do not have corresponding segments in the output. This is necessarily ranked above \*STRUC in order to rule out a candidate that has the fewest possible segments while still realizing the morphemes in question. For an extreme example, the candidate /ra/, which contains an /r/ from the word ('rädʒ.dʒäm) and a vowel from the plural morpheme would only violate \*STRUC twice, as opposed to the actual output candidate, which violates \*STRUC eight times. Neither violates REALIZEMORPH, so in order to ensure the correct optimal output, MAX-IO must be highly ranked.

(36) **MaxIO** » » **\*Struc**

| rädʒdʒäm + PL        | REALIZEMORPH | MAX-IO | *STRUC |
|----------------------|--------------|--------|--------|
| ☞ a. rä('dʒadʒ.dʒäm) |              |        | *****  |
| b. ('rädʒ.dʒäm)      | *!           |        | *****  |
| c. ('dʒadʒ.dʒäm)     |              | *!*    | *****  |

The candidate in (c) above, violates \*STRUC fewer times than the optimal candidate, and it realizes both morphemes; however, it has failed to maximize the input segments in the output. Thus, it incurs a violation of MAX-IO and we get the correct output. Ranking MAX-IO above \*STRUC leaves any input structure in tact, but penalizes excessively large reduplicant infixes.

This ranking in (35) does not rule out a candidate like \*('rä**dʒ**dʒ.dʒäm), where an additional reduplicative consonant surfaces without a vowel. This is ruled out by the phonotactics of the language, however. As discussed in section 2.1, with the exception of word-final geminates, both halves of a geminate cannot surface within the same syllable. In other words, a coda cannot contain both halves of a geminate in Amharic. We could imagine a \* $\sigma_{\mu\mu\mu}$  constraint to rule out trimoraic syllables, or simply a constraint prohibiting three identical consonants in a row. I leave these constraints aside, and I no longer consider this candidate since it violates basic phonotactic restrictions in Amharic.

Additionally, we need to rule out the candidate \*('rä.dʒ**a**).dʒäm, where the shape of the infix is solely a vowel. Inserting a vowel involves inserting a mora



linked to a vowel, so we could imagine a constraint like  $\text{DEPLINK-}\mu(\text{V})$ , which penalizes epenthesizing a moraic linked to a vowel. However, the optimal candidate would also violate this constraint, so we still do not rule out the candidate  $*(\text{r}\ddot{\text{a}}.\text{d}\mathfrak{z}\text{a.})\text{d}\mathfrak{z}\ddot{\text{a}}\text{m}$ . We could instead imagine a constraint penalizing input geminates that are broken up in the output. However, I posit that we do not need such a constraint, and that we should set aside this candidate for now and return to it in section 4.3. In section 4.3 we will see that this candidate is eliminated based on constraints otherwise already required in this analysis, one that specifies that the infix surfaces inside of a heavy syllable.

With the ranking  $\text{MAX-IO}, \text{REALIZEMORPH} \gg * \text{STRUC}$  we can account for the CV shape of the reduplicant without specifying a CV or moraic template.

## 4.2 The reduplicant features

The consonant in the reduplicant always surfaces with the same features as the geminate consonant in the word. We do not see some default epenthetic consonant, as in (37b), or features corresponding to a different consonant in the same word, as in (37c).

### (37) Identity of infix to geminate consonant

- a.  $\text{r}\ddot{\text{a}}\mathfrak{d}\mathfrak{z}\text{ad}\mathfrak{z}\text{d}\mathfrak{z}\ddot{\text{a}}\text{m}$
- b.  $*\text{r}\ddot{\text{a}}\text{tad}\mathfrak{z}\text{d}\mathfrak{z}\ddot{\text{a}}\text{m}$
- c.  $*\text{r}\ddot{\text{a}}\text{mad}\mathfrak{z}\text{d}\mathfrak{z}\ddot{\text{a}}\text{m}$

In order to account for this, I posit that the infix consonant is in *correspondence* with the geminate consonant, as per Agreement by Correspondence (Rose and Walker, 2004). In order to ensure this correspondence, I posit the following constraint.

### (38) $\text{Ident}(\text{Sr}, \text{Sl})$ (Rose and Walker, 2004; Yu, 2005)

Let  $\text{Sr}$  be a segment in the output and  $\text{Sl}$  be any corresponding segment of  $\text{Sr}$  such that  $\text{Sl}$  precedes  $\text{Sr}$  in the sequence of segments in the output ( $\text{L} \gg \text{R}$ ). Assign one violation for two corresponding segments which are not identical.

This constraint is a place-holder for two distinct constraints, one that ensures correspondence and the other that ensures identity between corresponding segments. It says that there are two consonants in a word that correspond, where the segment  $\text{Sl}$  is left of segment  $\text{Sr}$  in the output. In the case of Amharic, the infix consonant is the left-most one, and its corresponding consonant is to its right. This constraint rules out a candidate like (39b), where the infixing consonant is

not in correspondence with the geminate. It also rules out a candidate like (39c), where the reduplicant consonant is in correspondence with the geminate, but is not identical to it. It must be ranked above basic markedness constraints prohibiting certain consonants, in this case \*d<sub>3</sub>. In the tableau below, coindexation marks corresponding segments.

(39) **IdentSrSl**  $\gg$  \*d<sub>3</sub>

| räd <sub>3</sub> d <sub>3</sub> äm + PL                 | IDENTSRSL | *d <sub>3</sub> |
|---|-----------|-----------------|
| ☞ a. räd <sub>3</sub> ad <sub>3</sub> d <sub>3</sub> äm |           | ***             |
| b. rät <sub>i</sub> ad <sub>3</sub> d <sub>3</sub> jäm  | *!        | **              |
| c. rät <sub>i</sub> ad <sub>3</sub> d <sub>3</sub> iäm  | *!        | **              |

We must also rule out candidates where the infix consonant is identical to some consonant in the word other than the geminate consonant. We need a constraint ensuring that the infix has the features of the geminate consonant, and not some other output consonant to its right. For this purpose, I posit the constraint in (40). With this constraint, along with the correspondence constraint proposed above, we get the right output, as in (41).

(40) **Locality** (Riggle, 2004; Yu, 2005; Hedding, 2012)<sup>6</sup>

Assign one violation for every segment that intervenes between two corresponding segments.

(41) **Ident(SrSl), Locality**

| räd <sub>3</sub> d <sub>3</sub> äm + PL   | SrSL | LOCALITY | *d <sub>3</sub> |
|---|------|----------|-----------------|
| ☞ a. rä('d <sub>3</sub> <sub>i</sub> ad <sub>3</sub> .d <sub>3</sub> <sub>i</sub> äm) |      |          | ***             |
| b. rä('m <sub>i</sub> ad <sub>3</sub> d <sub>3</sub> äm <sub>i</sub> )                |      | *!       | **              |

The candidates in (41) are identical except for the features of the infixing consonant. We see that both candidates satisfy IDENT(SrSl), because in both candidates the corresponding segments are identical. However, candidate b violates LOCALITY because there is a consonant intervening between the corresponding segments. We cannot rank these two constraints with respect to each other, but we need both of them in order to ensure the correct output.

I have shown in this section that using basic agreement by correspondence constraints, we can ensure the correct features of the infixing segment without specifying in the input that the infix is a reduplicant. That fact falls out from phonologically optimizing constraints.

<sup>6</sup>An alternative means of achieving the same result would be to posit a ranked set of correspondence constraints where the highest-ranked constraint says that adjacent C's must correspond, the next highest constraint says that C's separated by one vowel must correspond, and both of those outrank a constraint saying that C's separated by two vowels must correspond, etc. This follows Hansson (2001) among others.

Since the quality of the infix vowel is predictable given normal vowel-epenthesis processes in Amharic as discussed in section 2, I set aside the discussion of which constraints are relevant for ensuring the correct infix vowel. The epenthetic vowel surfaces in order for the infix to satisfy basic phonotactic requirements of the languages, as discussed in section 4.1, and the backness of the epenthetic vowel is always central but it undergoes height harmony with the preceding vowel.

### 4.3 The reduplicant location

In sections 4.1 and 4.2, we discussed the constraints necessary to account for the shape and features of the reduplicant. Here I propose a constraint to account for the surface location of the reduplicant: inside heavy syllables, those closed by geminates.

We saw in section 2.2 that in the default pattern, trochees are aligned to the left edge of the word. However, when geminates are present, they throw off the default pattern, since stress is attracted to heavy syllables in Amharic, and only those syllables closed by geminates are stressed. Without exception, heavy syllables in Amharic are stressed, and trochees are formed around them; even if this means a lack of initial stress, and a lack of binary feet. Given this stress pattern, the only syllable in a word that is guaranteed to be stressed is one closed by a geminate. I propose that it is not a coincidence, then, that infixes surface in heavy syllables. They are targeting the only position in the word where they are guaranteed to be stressed on the surface. In other words, the infixes are targeting heavy syllables so that they will surface in prominent (stressed) positions.

If there is no heavy syllable in the word, the infix is not certain to be stressed, so some alternative construction is used. The alternative construction for the adjectival plural morpheme is a heavy syllable suffix, /-otʃtʃ/. For the iterative verbal marker, there is no alternative affix; instead, a periphrastic construction is used when no heavy syllable is present in the word. I posit an alignment constraint to ensure that the plural morpheme surfaces inside of a heavy syllable. It must be undominated in order to force an alternative construction when no heavy syllable is present.

(42) **Align-L(Plural,  $\sigma_{\mu\mu}$ )** (cf. Yu 2005)

Assign one violation if the left edge of the plural morpheme does not align with the left edge of a bimoraic syllable.

This constraint rules out any candidate where the plural morpheme is not inside of a heavy syllable, for example, \**rä.dʒa.dʒäm*.

We cannot posit a constraint that aligns the plural morpheme to any stressed syllable, because in a word containing multiple stressed syllables, there would be nothing in the grammar ruling out infixation to non-heavy stressed syllables.

Additionally, an alignment constraint targeting stress would not predict the absence of infixation in words without heavy syllables. Thus, we must specify that the plural morpheme aligns to a heavy syllable, not a stressed one.

#### 4.4 The infix as the preferred allomorph

Thus far I have demonstrated how to derive the optimal infix shape, features, and target location. However, I have not discussed why a given word would prefer the reduplicative infix allomorph to the suffix allomorph /-otʃtʃ/. In this section I propose a constraint to ensure that the reduplicative form is optimal in words containing heavy syllables, but that the suffixing allomorph is optimal in all other words.

The relevant candidates are those in (43), where the input for candidates (a,b) is /rädʒdʒäm/, with a geminate, and for candidates (c,d,e,f) are /k'ondʒo/ and /takatʃ/, without a geminate. We see that words with a geminate take the reduplicative infixing allomorph, while other words take the suffixing allomorph. The plural morpheme is underlined in (43).

(43) **Which allomorph to choose?**

- a. rä.(dʒadʒ.dʒäm)
- b. \*(rädʒ.dʒä.)('motʃtʃ)
- c. \*k'o.('nonn.dʒo)
- d. k'on.('dʒotʃtʃ)
- e. \*ta.('kak.katʃ)
- f. ('ta.ka)('tsotʃtʃ)

The data in (43) shows that we need our analysis to prefer the reduplicative allomorph in words with geminates (43a,b), but the suffixing allomorph in words without geminates (43c,d,e,f). Our analysis to this point specifies that the reduplicant must be as small as possible while still surfacing, and it must align to a heavy syllable. In words containing geminates, for example *rädʒdʒám*, the constraints posited thus far prefer the correct output (43a) to the non-optimal (43b). Candidate (b) has more total segments than (a), so (a) violates \*STRUC fewer times, (44).

(44) **Prefer the reduplicative allomorph in words with heavy syllables**

| rädʒdʒäm + PL                             | ALIGN-L(PL, $\sigma_{\mu\mu}$ ) | REALIZE | *STRUC |
|---|---------------------------------|---------|--------|
| ☞ a. rä.( <u>dʒadʒ</u> .dʒäm)             |                                 |         | *****  |
| b. ( <u>rädʒ</u> .dʒä.)( <u>'motʃtʃ</u> ) |                                 |         | *****! |

Both plural allomorphs in (44) are aligned to heavy syllables. Additionally, both candidates realize the plural morpheme. No segments are deleted from the input; however, the suffixing candidate inserts three segments while the infixing candidate only inserts two. Thus, the infixing candidate violates \*STRUC fewer times and is optimal. So, without additional constraints, we correctly prefer the reduplicant in words containing heavy syllables.

How, then, do we account for the fact that the suffixing allomorph surfaces in words without heavy syllables, /*k'ondʒo, takatʃ*/? The possible candidate (*k'o.non*)*dʒo* contains a reduplicative infix, however, the infix does not surface in a heavy syllable, so it is ruled out by ALIGN-L(PL,  $\sigma_{\mu\mu}$ ). The candidate *k'o.(nonn.dʒo)* contains a geminate, thus a heavy syllable, and the plural infix surfaces within that heavy syllable. However, the same candidate violates basic phonotactic restrictions of Amharic, which does not allow both halves of a geminate to surface within the same syllable word-internally. Thus, it would be ruled out by a basic constraint on super-heavy syllables such as \* $\sigma_{\mu\mu\mu}$ . Thus, only *k'on.(dʒotʃtʃ)* satisfies the previously discussed basic phonotactic constraints of the language.

The input /*takatʃ*/ causes a problem for our current analysis, however. It does not contain a heavy syllable, and the correct plural form is *takatʃ-otʃtʃ*. However, we currently have no way of ruling out the reduplicating candidate \**ta.(kak.katʃ)*, (45).

(45) **A problematic candidate**

| takatʃ+PL              | ALIGN-L(PL, $\sigma_{\mu\mu}$ ) | REALIZE | *STRUC |
|------------------------|---------------------------------|---------|--------|
| ☞a. ('ta.kɑ)('tʃotʃtʃ) |                                 |         | *****  |
| ⊖b. ta.('kak.katʃ)     |                                 |         | *****  |

With our current constraints alone, the candidates in (45a,b) receive the same number of \*STRUC violations and do not violate the other relevant constraints. The constraints proposed throughout this paper thus far cannot distinguish between the desired optimal output in (45a) and the unwanted output in (45b).

To solve this problem, I propose a New Markedness constraint (cf. Lubowicz 2003), which penalizes input singleton consonants that surface as geminate consonants in the output, \*NEWGEM in (46). This penalizes the geminate *kk* in (45b), because the singleton input /*k*/ surfaces as a geminate in the output. It does not penalize the geminate *tʃtʃ* in (45a), because there is no corresponding input singleton /*tʃ*/.

(46) **\*NewGem(inate)**

Assign one violation for every output geminate not present in the input.

(47) **Undominated \*NewGem**

| takatʃ+PL               | ALIGN-L | REALIZE | *NEWGEM | *STRUC |
|-------------------------|---------|---------|---------|--------|
| ☞ a. ('ta.ka)('tʃotʃtʃ) |         |         |         | *****  |
| b. ta.('kak.katʃ)       |         |         | *!      | *****  |

With the addition of this new markedness constraint, \*NEWGEM, we account for the preference of the reduplicative infix plural allomorph in words whose inputs contain heavy syllables, and the suffixing allomorph in words whose inputs are without heavy syllables. Unlike Wolf (2008)'s analysis of suppletive allomorphs in Dyrbal, we do not need to specify preference of allomorph with a constraint like PREFER-RED, (48).

(48) **Prefer-Red(uplicant)** (Wolf, 2008)

Assign one violation if the suffixing plural allomorph is realized and the reduplicative allomorph is not.

The above constraint stipulates that the infixing allomorph is a reduplicant, which we otherwise can avoid stipulating. Additionally, the analysis presented in this paper derives the choice of allomorph from basic constraints on segmental structure and new markedness, thus a constraint like (48) is unnecessary.

#### 4.5 The analysis in summary

In this section I have shown that we can derive the Amharic reduplicative infixation facts with an Optimality Theoretic constraint ranking (Prince and Smolensky, 1993). Additionally, I have done so without stipulating that the infixing morpheme is a reduplicant, or that it has a specified template. I claim here, though, that we cannot avoid specifying that the infix targets a heavy syllable in Amharic, a fact which has interesting theoretical implications to be discussed in section 5.

In order to derive the CV reduplicant shape, I posited the constraint ranking MAX-IO, REALIZEMORPH  $\gg$  \*STRUC, which ensures that the reduplicant surfaces, but it must be as small as possible while still obeying basic phonotactic restrictions on Amharic words.

In order to account for the fact that the reduplicant consonant shares features with the geminate consonant in the same word, I posit the ranking IDENT(SRSL), LOCALITY  $\gg$  \*d<sub>3</sub>. This ensures that the geminate and reduplicant consonants correspond and are identical, ruling out candidates with any alternative reduplicant consonant.

The reduplicative infix always surfaces within the heavy syllable. I use the undominated constraint ALIGN-L(PL,  $\sigma_{\mu\mu}$ ) to account for this. Any candidate where the plural morpheme surfaces in a light syllable will violate this constraint.

Because the constraint is undominated, those candidates will automatically be ruled out.

In order to ensure that the infixing plural allomorph cannot surface when the input does not contain a geminate consonant, I posit the constraint \*NEWGEM. This ensures that an input without a geminate consonant cannot geminate one of its input singletons in order to create a heavy syllable. This would satisfy the Alignment constraint, ALIGN-L(PL,  $\sigma_{\mu\mu}$ ), which specifies that the reduplicant aligns to a heavy syllable; however, creating a new geminate is entirely disallowed.

The final constraint ranking is given in (49).

(49) **Final constraint ranking in inputs containing geminates**<sup>7</sup>

| rädʒdʒäm + PL                                    | MAX | SRSL | LOC | ALIGN-L | *NG | REALIZE | *STRUC |
|--|-----|------|-----|---------|-----|---------|--------|
| ☞ a. rä.(dʒ <sub>i</sub> adʒ.dʒ <sub>i</sub> äm) |     |      |     |         |     |         | 8      |
| b. (rädʒ.dʒä.)(motʃtʃ)                           |     |      |     |         |     |         | 9!     |
| c. (rädʒ.dʒäm)                                   |     |      |     |         |     | *!      | 6      |
| d. (rä.dʒa.)dʒäm                                 |     |      |     | *!      |     |         | 7      |
| e. rä.(m <sub>i</sub> adʒ.dʒäm <sub>i</sub> )    |     |      | *!  |         |     |         | 8      |
| f. rä.(t <sub>i</sub> adʒ.dʒäm)                  |     | *!   |     |         |     |         | 8      |
| g. (dʒ <sub>i</sub> adʒ.dʒ <sub>i</sub> äm)      | *!  |      |     |         |     |         | 6      |

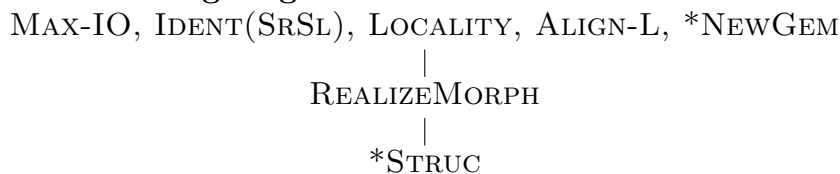
(50) **Final constraint ranking in inputs without geminates**

| takatʃ + PL                                  | MAX | SRSL | LOC | ALIGN-L | *NG | REALIZE | *STRUC |
|--|-----|------|-----|---------|-----|---------|--------|
| ☞ a. ('ta.ka.)(tʃotʃtʃ)                      |     |      |     |         |     |         | 8      |
| b. ('ta.katʃ)                                |     |      |     |         |     | *!      | 6      |
| c. ta.(k <sub>i</sub> ak.k <sub>i</sub> atʃ) |     |      |     |         | *!  |         | 8      |
| d. ('ta.k <sub>i</sub> a.)k <sub>i</sub> atʃ |     |      |     | *!      |     |         | 7      |

The constraints in the tableaux above predict the correct output forms, where the reduplicative allomorph surfaces in words with input geminates and the suffix allomorph surfaces elsewhere.

The final ranking is shown in (51).

(51) **Final ranking diagram**



The above constraints account for the Amharic data without specifying an input template, and without specifying that the input morpheme is a reduplicant.

<sup>7</sup>I leave out the discussion of why REALIZEMORPH must crucially be ranked by ALIGN and other constraints, since it is relevant for verbal infixation and not for adjectival reduplication. However, the ranking is reflected in the tableaux in (49, 50, 51).

Additionally, we avoid specifying preference for one morpheme over another. We do, however, have to specify a landing site of heavy syllables, with the constraint ALIGN-L(PL,  $\sigma_{\mu\mu}$ ). This bears on the typology of infixation landing sites, discussed further in section 5.

## 5 Discussion and conclusion

We have seen that Amharic has a unique infixing reduplication pattern, where reduplicants only surface in the presence of a geminate. This reduplicative infixation strategy is found in the plural morpheme on adjectives and the iterative morpheme on verbs. For both the plural and the iterative, the reduplicative infix is the preferred output strategy. However, the infix can only surface in words containing heavy syllables. If the word does not contain a heavy syllable, the infix cannot surface and an alternative strategy must be used to convey the same meaning. For the adjectival plural morpheme, there is a backup allomorph, a suffix /-otʃtʃ/, used in case the adjective in question does not contain an input geminate. For the verbal iterative morpheme, there is no alternative allomorph; one must periphrase in order to get the same iterative meaning on verbs that do not contain geminates.

In section 4, I showed that the shape and features of the reduplicative infix are phonologically optimizing. We do not have to specify in the input that the morpheme is a reduplicant, nor that it has a CV or prosodic template. I have also shown that in order to ensure that the infix surfaces in a heavy syllable, we must specify the landing site of the plural morpheme; we cannot derive it via alternative phonologically optimizing constraints. Instead, we need a constraint that aligns the plural (or iterative) morpheme to a heavy syllable (cf. 42).

Because Amharic infixing reduplication targets heavy syllables, it poses a challenge for Yu (2007)'s typology of infixation pivots. He claims that the competing pressures for infixes to be salient and to be realizable in every word result in infixation pivots crosslinguistically targeting linear, segmental or prosodic positions that are present in every word. I repeat Yu's list of possible pivots from (31) in (52).

(52) **Yu's infixation pivots** (Yu 2003:195)

- Edge pivots: left- or rightmost consonant, vowel, or syllable
- Prominence pivots: Stressed vowel, syllable, or foot

Heavy syllables are the target of infixation in Amharic; however, they are not on Yu's list of possible infixation pivots. Furthermore, his claim that infixes target elements that every word has does not hold in Amharic, since not every word in



Amharic contains a heavy syllable. Heavy syllables are prominent positions within a word; however, they are not present in every word. It seems that in Amharic the pressure for an infix to be salient, in a prominent position, outweighs the pressure for that target landing site to be present in every word.

The Amharic data presented here does not neatly fit into Yu (2007)'s typology of infix pivots; it requires an adjustment to our understanding of the typology of infixation. To account for this, I posit the following modification to Yu (2007)'s list of infixation pivots: if a morpheme has suppletive allomorphs, one allomorph may be an infix with very specific restrictions on its pivot, as long as the alternative allomorph has a reliable pivot likely to be present in every word. This modification allows for infixes to target elements not present in all words (such as heavy syllables), as long as there is a backup strategy to step in in case the specific environment for infixation does not hold. This addition to Yu's infixation typology accounts for the Amharic data and predicts other instances of infixation cross-linguistically with pivots not reliably found in all words.

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