

Amharic infixing reduplication: Support for a stratal approach to morphophonology*

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1 Introduction

Amharic (Semitic) [Ethiopia] seems to present two typological singularities:

1. The syllable weight system undeniably treats coda geminates but not other codas as moraic (Sande and Hedding to appear).
 2. There seems to be a cross-linguistically unique infixing reduplication pattern. **The adjectival plural and frequentative verbal infixes only surface in words containing heavy syllables.**
- Because only syllables closed by geminates are heavy, this reduplication pattern could be described on the surface as targeting geminates or heavy syllables:

(1) **Infixing Reduplication apparently targets heavy syllables (geminates)**

Schema: CVC_i.C_iVC CV.C_iVC_i.C_iVC

Example: rädʒdʒim tall rädʒadʒdʒim tall.PL

- **Problem:** Geminate consonants and heavy syllables are not attested infixation pivots (Yu 2003, 2007).
 - Edge pivots: left- or rightmost consonant, vowel, or syllable
 - Prominence pivots: Stressed vowel, syllable, or foot
- Amharic infixing reduplication appears to target heavy syllables (those ending in geminates).
- If this is true, Amharic is the first attested language to do so.

In this talk:

1. I describe the infixing reduplication pattern in Amharic adjectives and verbs.
2. I demonstrate that a Stratal OT account of infixing reduplication in Amharic avoids stipulating the otherwise unattested pattern of geminates or heavy syllables as an infixation target.
 - * Instead, infixation targets stem-level stressed syllables, which include only heavy syllables.

- **The data** in this talk comes from original work with two speakers from Debre Zeyit, Ethiopia (also called Bishoftu). This data show certain consistent differences from previously attested patterns. When relevant to the analysis, they will be pointed out here.

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2 Syllable weight overview

Simply put, only syllables with a geminate in coda position are heavy in Amharic.

- There are no long vowels in the language, and vowel length does not contribute to weight.
- Syllables may contain only one onset consonant and one coda consonant. Word-finally we see complex codas, and I assume the final consonant of a word is extrametrical.
- **Stress:** The default stress pattern for standard Amharic is not consistently described in the literature:
 - The final syllable is not likely to be stressed, though the syllable preceding a geminate is (Leslau 2000:16).
 - Stress is not prominent, but the plural suffix /-otʃtʃ/ may be stressed (Hudson 1997:460).
 - There may be multiple (primary) stresses in words containing geminates (Armbruster 1908).
 - Codas in general contribute to weight (Mullen 1986).
- The following data were collected from my speakers. Many of the generalizations are consistent with what is previously described, with key differences.
- **The default stress pattern** of the language involves alternating syllable stress (higher pitch and intensity) beginning at the left edge of the word.
- In words of odd-numbered syllables, the final syllable is not stressed.

(2) Alternating stresses from the left edge

- | | | |
|----|------------------------|----------------------|
| a. | ('mät.fät) | 'to vanish' |
| b. | ('do.ro) | 'chicken' |
| c. | ('mät.räf).räf | 'to overflow' |
| d. | ('k'o.fi).ja | 'hat' |
| e. | ('män.k'ä.)('sa.k'äs) | 'to move' |
| f. | ('t'ä.rä.)('p'e.za) | 'table' |
| g. | ('as.da.)('ka.käl).ku | 'I arranged (trans)' |

- I analyze this default stress pattern as involving binary left-aligned trochees.
- **Heavy syllables, those ending in geminates, are always stressed**, throwing off the default pattern. Syllables ending in a geminate are underlined.

(3) Geminates are always stressed

- | | | |
|----|---|---------------------------------|
| a. | se.('totʃtʃ) | 'women' |
| b. | mä.('tʃäm.mär) | 'to add' |
| c. | ('wɪʃ.fä.)('wotʃtʃ) | 'dogs' |
| d. | ('ti.säb.)('ral.litʃ) | 'she breaks (trans)' |
| e. | ji.('säb.ra.)('wall) | 'he will break (trans)' |
| f. | ('ij.jä.)('tät.)('t'al.)('lal.)('latʃ.tʃih ^w) | 'you all are hating each other' |

- Only syllables with geminate codas and not other codas attract stress.
- Throughout this talk I will only consider candidates that are well-formed based on the syllable weight and stress patterns described here.

3 Plural adjective infixing reduplication

- Adjectives agree in number with nouns.
- The default plural affix on adjectives is the suffix /-otʃtʃ/, identical to the nominal plural suffix.

(4) Adjectival plural suffix

- a. takatʃ saw
lazy person
'Lazy person'
- b. takatʃ(-otʃtʃ) saw-otʃtʃ
lazy-PL person-PL
'Lazy people'
- c. k'ondʒo saw
beautiful person
'Beautiful person'
- d. k'ondʒo(-otʃtʃ) saw-otʃtʃ
beautiful-PL person-PL
'Beautiful people'

- When an adjective contains a heavy syllable, however, a different plural morpheme surfaces:
a reduplicative infix surfacing inside the heavy syllable.

(5) Reduplicative infix in plural adjectives containing heavy syllables

- | | | | | | | | | |
|----|------------------------|-----|------------------|------|-------------------------|-----|--------------------|---------------|
| a. | (<u>rädʒ</u> .dʒim) | saw | 'tall person' | rä. | (<u>dʒadʒ</u> .dʒim) | sa. | (w- <u>otʃtʃ</u>) | 'tall people' |
| b. | (<u>atʃ</u> .tʃ'ir) | | 'short' | a. | (<u>tʃ</u> 'atʃ.tʃ'ir) | | | 'short (PL)' |
| c. | (<u>tɪl</u> .lik') | | 'big' | tɪ. | (<u>ɪl</u> .lik') | | | 'big (PL)' |
| d. | (<u>säf</u> .fi) | | 'wide' | sä. | (<u>faf</u> .fi) | | | 'wide (PL)' |
| e. | (<u>k'atʃ</u> .tʃ'in) | | 'skinny' | k'a. | (<u>tʃatʃ</u> .tʃ'in) | | | 'skinny (PL)' |
| f. | (<u>ad</u> .dis) | | 'new' | a. | (<u>dad</u> .dis) | | | 'new (PL)' |
| g. | (<u>däm</u> .mak') | | 'bright' | dä. | (<u>mam</u> .mak') | | | 'bright (PL)' |
| h. | (<u>käb</u> .bad) | | heavy, difficult | kä. | (<u>bab</u> .bad) | | | heavy (PL) |

- The following properties are always true of the reduplicative infix:
 - It has the shape CV
 - It surfaces inside the heavy syllable
 - The C of the reduplicant has identical features to the geminate of the heavy syllable
 - The V of the reduplicant is always central (like all epenthetic Vs in Amharic)
 - In standard Amharic, this pattern is unique to geminates in second-to-last root consonant position:
dägg + PL ≠ *dägagg
- It is impossible for the reduplicative infix to surface in an adjective without a heavy syllable: *ta^{ka}katʃ, *k'o^{no}ndʒo.
- Plural adjectives with heavy syllables must surface with the reduplicative infix, and may also surface with the suffix /-otʃtʃ/: rädʒadʒdʒim^(otʃtʃ), *rädʒdʒim^{otʃtʃ}.
- We see two adjectival plural morphemes, the suffix /-otʃtʃ/ and infixing reduplication.

4 Frequentative verbal infixing reduplication

- The iterative morpheme, often called *frequentative* in the Amharic literature, surfaces as a reduplicative infix in verbs.
- Just like the plural marker on adjectives, the iterative reduplication morpheme can only surface in verbs whose stems contain a geminate¹.
 - To express an iterative meaning for verbs without geminates, a periphrastic construction is used.
- There is no semantic reason why verbs that contain a geminate should be able to take an iterative meaning while others cannot (cf. (6a,b) where the only difference is the aspect of the verb).

(6) Verbal iterative infixing reduplication

- | | | | | |
|----|-----------------------|--------------|------------------------------|-------------------------|
| a. | (<u>säb</u> .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’ |

- All verbs have a geminate in the perfective stem, so all verbs can reduplicate in the perfective aspect.
- Not all verbs contain a geminate (heavy syllable) in the imperfective stem, thus not all imperfective verbs can undergo reduplication.
- Other forms in which heavy syllables do not always appear include imperatives, jussives, gerunds, participles, verbal nouns and instrumentals (Leslau 2000).
- Though some verbal prefixes and suffixes contain geminates (7), only stem geminates, underlined, can be the target of reduplication:

(7) Infixing in verbs with heavy syllable affixes

Non-iterative	Gloss	Iterative	*Iterative
säbbär-atʃtʃ-əhu	‘you all broke’	sä bb är-atʃtʃ-əhu	*säbbär-atʃ atʃ tʃ-əhu
ijjä-käbbädä	‘they are becoming heavy’	ijjä-kä bb ädä	*ijj jj ä-käbbädä

- Unlike the adjectival plural, there is no morphological alternative to express the iterative.

5 A Stratal OT approach

Here I present a Stratal OT account (Kiparsky 2000, 2008) of Amharic infixing reduplication. An analysis of this data must account for the following:

1. The position of the reduplicative infix inside stem heavy syllables.
2. The reduplicant shape as CV.
3. The features of the reduplicant C as identical to the geminate consonant of the heavy syllable.
4. The choice of the correct morpheme (infix or suffix) in the case of adjectives.
 - For the proposed analysis, the relevant strata during which constraint evaluation takes place are the stem level and the word level.

¹This pattern holds for my consultants, but presents some differences from what has been previously said in the Amharic literature. Rose (2003); Leslau (2000) and their predecessors describe a pattern where penultimate root radicals can reduplicate to form the frequentative, regardless of whether a heavy syllable is present. I continue describing the facts for my two consultants, though for an analysis of frequentative reduplication in standard Amharic, see Rose (2003).

5.1 The position of the reduplicative infix

- Heavy syllables and geminates are not attested infixation pivots (Yu 2003, 2007).
- However, *stressed syllables* are attested targets of infixation; see Ulwa (McCarthy and Prince 1993) and Chamorro (Topping and Dungca 1973; Klein 1997).

(8) Chamorro infixation targets the stressed syllable (Yu 2003 citing Topping and Dungca 1973:259)

Noncontinuative	Gloss	Continuative	Gloss
'saga	'stay'	'sasaga	'staying'
hu'gando	'play'	hu'gagando	'playing'
'taitai	'read'	'tataitai	'reading'
'eggaʔ	'watch'	'eʔeggaʔ	'watching'

- To account for infixation targeting stressed syllables, we could posit a constraint such as ALIGN-L(PLURAL, 'σ), which aligns a morpheme to a stressed syllable.

– **Align-L(Morpheme, 'σ)**: Assign one violation for every segment separating the left edge of X morpheme from the left edge of a stressed syllable².

- Because only geminates are underlyingly moraic in Amharic, and all bimoraic syllables are stressed, at the stem level of analysis the only stressed syllables are the heavy ones, those ending in geminates.
- The pattern of left-aligned trochees is a surface phenomenon, which applies at the word level.
- So at the stem level we have ALIGN-L(PLURAL, 'σ) ranked above a constraint on strict adjacency and immediate precedence from the input to the output, CONTIGUITY (McCarthy and Prince 1993).

(9) ALIGN-L(PLURAL, 'σ) ≫ CONTIGUITY (Stem Level)

rädʒdʒim + PL(RED)	ALIGN-L(PLURAL, 'σ)	CONTIGUITY
☞ a. rä'dʒadʒdʒim		*
b. ra-rädʒdʒim	*!	

(10) CONTIGUITY ≫ ALIGN-L(PLURAL, 'σ) (Word Level)

rä'dʒadʒdʒim + PL(otʃtʃ)	CONTIGUITY	ALIGN-L(PLURAL, 'σ)
☞ a. rä.'dʒadʒ.dʒi.m-otʃtʃ		*
b. rä.'dʒ-otʃ.'tʃ-adʒ.dʒim	*!	

- If a constraint like ALIGN-L(PLURAL, 'σ) was highly ranked at the word level, we could imagine /-otʃtʃ/ as an infix, or affix heavy syllables as the target of infixation: *säbbär-atʃatʃtʃ-əhu.
- Thus, at the word level, ALIGN-L(PLURAL, 'σ) must be dominated by CONTIGUITY.
- This constraint ranking gets us the fact that only stem-level geminates can be the target of reduplicative infixation in Amharic.
- By aligning the plural morpheme to stressed syllables at the stem level, we avoid stipulating that the target of infixation in Amharic is a heavy syllable or a geminate, two otherwise unattested phenomena (cf. Yu 2003, 2007's typology).

²In general, morpheme-specific constraints are disallowed in Stratal OT; however, prosodic alignment constraints are an exception to this rule (Bermúdez-Otero 2012)

5.2 The reduplicant shape

The reduplicant in Amharic surfaces as a CV.

- A constraint ensuring that each morpheme is pronounced rules out a zero-morph.
- Constraints against additional structure penalize larger reduplicants, constraints on well-formed syllables penalize shorter ones.
 - **RealizeMorph(eme)** (Kurusu 2001)
Assign one violation for each input morpheme that is not phonologically realized in the output.
 - ***Struc(ture)** (Prince and Smolensky 1993)
Assign one violation for each segment present in the output.
- Constraints regulating well-formed syllables rule out a C or V infix (cf. section 2).

(11) REALIZEMORPH \gg *STRUC (Stem Level)

räd3d3im + PL(RED)	REALIZEMORPH	*STRUC
☞ a. rä('d3ad3.d3im)		8
b. ('räd3.d3im)	*!	6
c. ('räd3.)'d3ad3.d3im)		9!

- A highly-ranked MAX-IO constraint prevents input structure from being deleted to satisfy *STRUC.

(12) REALIZEMORPH, MAXIO \gg *STRUC (Stem Level)

räd3d3im + PL(RED)	REALIZEMORPH	MAX-IO	*STRUC
☞ a. rä('d3ad3.d3im)			8
b. ('räd3.d3im)	*!		6
c. ('d3ad3.d3im)		*!*	6

- The above constraint ranking shows that the CV shape of reduplicative infixes is phonologically optimizing and we need not specify it in the input.
- REALIZEMORPH must be ranked lower than MAX-IO at word level, equal to or rerankable with *STRUC in order to make the word-level plural affix /-otʃtʃ/ optional.

(13) MAXIO \gg REALIZEMORPH, *STRUC (Word Level)

rä('d3ad3.d3im) + PL(otʃtʃ)	MAX-IO	REALIZEMORPH	*STRUC
☞ a. rä.('d3ad3.d3i).('m-otʃtʃ)			11
☞ b. rä('d3ad3.d3im)		*	8
c. ('d3ad3.d3i).('m-otʃtʃ)	*!*		9

5.3 The reduplicant features

The infix consonant always shares features with a geminate stem consonant.

- To ensure that the infix consonant shares features with the geminate, I posit a constraint PROMINENCE.
 - **Prominence:** Assign one violation for every output consonant that is not identical to a prominent output consonant.
- A *prominent* segment is one that is moraic. At the stem level the only prominent consonant is the moraic geminate.

- This PROMINENCE constraint could be reworded as a correspondence constraint (Hansson 2001; Rose and Walker 2004) such as CORRCC-PROM. This constraint would be similar to Walker (2005)’s use of strong versus triggers.
 - For simplicity I use PROMINENCE, but I recognize that this is equivalent to a set of Agreement-by-Correspondence style constraints.
- This constraint must be ranked below IDENT-IO (Prince and Smolensky 1993) in order to prevent *all* consonants from surfacing identically to the geminate consonant (14c).
- Additionally, at the stem level PROMINENCE must be ranked *above* a constraint INTEGRITY against the input segment being doubly pronounced (McCarthy and Prince 1995) (14a,b).

(14) IDENT-IO \gg PROMINENCE \gg INTEGRITY (Stem Level)

rädʒdʒim + PL(RED)	IDENT-IO	PROMINENCE	INTEGRITY
☞ a. rä.('dʒadʒ.dʒim)		**	*
b. rä.('tadʒ.dʒim)		***!	
c. dʒä.('dʒadʒ.dʒidʒ)	*!*		***

- The ranking IDENT-IO \gg PROM ensures that only output segments that were not present in the input will surface with features of the prominent segment.
- At the stem level, we see that the ranking IDENT-IO \gg PROM \gg INTEGRITY gives us the correct stem.
- However, at the word level, we do not want consonants (including prominent ones) to correspond with more than one output segment: IDENT-IO \gg INTEGRITY \gg PROM.

(15) IDENT-IO \gg INTEGRITY \gg PROMINENCE (Word Level)

rä.('dʒadʒ.dʒim) + PL(otʃtʃ)	IDENT-IO	INTEGRITY	PROMINENCE
☞ a. rä.('dʒadʒ.dʒi).('m-otʃtʃ)			**
b. dʒä.('dʒadʒ.dʒi).('m-otʃtʃ)	*!	*	*
c. rä.('dʒadʒ.dʒi).ma.('tʃ-otʃtʃ)		*!	***

5.4 Morpheme selection

The reduplicant is the preferred plural morpheme in Amharic.

- There are two adjectival plural morphemes: the reduplicative infix and the suffix /-otʃtʃ/.
- /-otʃtʃ/ is always optional, both in words with and without geminate consonants.
- The reduplicant is never optional. It is required in stems containing geminates and it is impossible in stems without geminates.
- Because the reduplicant is a stem-level affix and /-otʃtʃ/ is a word-level one, a stem must undergo reduplication if possible (cf. Caballero and Inkelas 2013).
- The free ranking of REALIZEMORPH with *STRUC at the word level gives us the optionality of /-otʃtʃ/ (recall (13)).
- We need not specify a PREFER-MORPH constraint like Wolf (2008)’s analysis of suppletive allomorphs in Dyirbal because morpheme selection falls out from our other constraints.

5.5 Summary

The rankings above ensure that the reduplicant is required in stems containing geminates but impossible in those without.

- We have accounted for:
 - The position of the reduplicative infix in heavy syllables (stem-level stressed syllables),
 - The shape of the reduplicant as CV,
 - The features of the reduplicated consonant as identical to the geminate,
 - The choice of the correct plural morpheme.
- Crucially, we did not have to specify a constraint that aligns an infix to a heavy syllable or a geminate, which would be typologically unattested.

5.6 An apparent problem

- The addition of the passive/reflexive /t-/ prefix determines whether the stem has gemination of the penultimate consonant or not, so it must be stem-level (Leslau 2000).
- This prefix /t-/ assimilates completely with the initial root consonant in non-perfective forms, creating an initial geminate.
 - One class of verbs (Type B) contains a geminate in the jussive (16a).
 - But Type B verbs do not contain a geminate in the passive jussive (16b). The geminate /ff/ in (16b) is the passive /t-/ combined with the stem-initial /f/.

(16) **Passive /t-/** (Leslau 2000:75)

- | | | | |
|----|-----------|---------------------|------------------------|
| a. | ji'fällig | ‘let him want’ | Type B jussive |
| b. | jiffäläg | ‘let him be wanted’ | Type B passive jussive |

- The bimorphemic geminate created in passive forms is never the target of infixation in Amharic.
- **Problem:** If this prefix is stem-level and creates a geminate, we would expect that geminate to be a possible target of infixation given the proposed analysis: *ji.(**f**af.fä.)läg
- **Solution:** I posit along the lines of Marvin (2002) that morphological operations and morphophonological constraints are evaluated after each syntactic phase (Chomsky 2001), and I claim that the passive /t-/ in Amharic is a phase head³.
- Following Buckley (to appear), I propose that a phase head can influence the shape of a stem without itself being part of that stem. Note that Vocabulary Insertion of the passive, in Distributed Morphology terms (Halle and Marantz 1994), is not necessary to determine the shape of the stem.
- Thus, the passive prefix determines whether the stem will contain a geminate second radical or not, but is not itself part of the stem-level of analysis.

³Further syntactic analysis is needed to determine whether there is further evidence to support this claim.

6 A parallel approach is typologically inferior

While a Stratal OT approach can adequately account for the Amharic infixation data, a parallel account requires stipulation and typologically ungrounded constraints.

- In Parallel OT (Prince and Smolensky 1993), constraints are evaluated only once, as opposed to once at each the stem, word, and phrase levels like in Stratal OT.
- This poses problems for a parallel account of Amharic reduplicative infixation, which surfaces only in *stem* heavy syllables (cf. section 5.1).
- **Problems:**
 - If referring to heavy syllables, how to distinguish stem-level heavy syllables from non-stem heavy syllables in parallel OT?
 - If referring to stressed syllables, how to distinguish the correct stem-level stressed syllable from possible other stem-level stressed syllables at the word level?
 - **Option 1:** Align infixes to stem heavy syllables: $\text{ALIGN-L}(\text{INFIX}, \sigma_{\mu\mu}\text{-STEM})$
 - * This is not ideal from a typological standpoint. We have to align an infix to a heavy syllable, which is not otherwise attested.
 - * We must refer to the stem-level of representation. In Stratal OT, this is built into the system, where as in Parallel OT it is a stipulation.
 - **Option 2:** Align infixes to stressed syllables in the stem: $\text{ALIGN-L}(\text{INFIX}, \sigma\text{-STEM})$
 - * Like Option 1, this constraint must still refer to the stem.
 - * This constraint is not sufficient to ensure that *only* the stem-level heavy syllable will be stressed, since it is possible for multiple stem-level syllables to be stressed on the surface.
- **Takeaway:** Without stipulation and language-specific constraints that challenge existing typologies of infixation (Yu 2003, 2007), we cannot get Amharic plural and frequentative infixes to surface in the correct place in a parallel account: stem-level stressed syllables, surface-level heavy syllables.

7 Conclusions

- Here we have seen that Amharic reduplicative infixation can better be accounted for with a Stratal OT account than a parallel one.
- We have also seen that Amharic’s apparent weight-dependent infixation results from a synthesis of other properties:
 - A syllable weight system where only geminate codas make a syllable heavy,
 - A stress system where heavy syllables attract stress,
 - Stem-level infixation targeting stressed syllables.
- Thus, we can account for this system in a Stratal OT analysis with a combination of well-attested, typologically sound constraints, and without language-specific stipulations.
- Two of the three properties above are typologically rare, thus the combination of these three properties is even more rare, which explains why we don’t see more languages in which infixation appears to target heavy syllables.

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