Weight-dependent infixing reduplication in Amharic*

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1 Introduction

- Amharic (Semitic)[Ethiopia] uses a unique infixing reduplication strategy that poses interesting problems for current approaches to reduplication.
- The plural morpheme on adjectives and the iterative marker on verbs can surface as an infixing reduplicant CV, but *only in words containing a geminate consonant.*
  - CV$\underline{\text{C}_i.\text{C}_i}$VC $\gg$ CV.$\mathbf{C}_i\mathbf{V}\underline{\text{C}_i.\text{C}_i}$VC.
- Yu (2003, 2007) posits a list of possible infix targets based on two competing criteria: *salience* and *reliability.*
  - Edge pivots: left- or rightmost consonant, vowel, or syllable
  - Prominence pivots: Stressed vowel, syllable, or foot
- Amharic infixing reduplication targets heavy syllables (those ending in geminates).
- Heavy syllables are not predicted to be a possible infixation target.
- **Goals:**
  - Describe the infixing reduplication pattern in Amharic adjectives and verbs.
  - Demonstrate that using cross-linguistically motivated constraints we can account for the Amharic infixing reduplication pattern without stipulating that it is an infix or a reduplicant, and without positing a templatic morpheme.
  - Modify our hypothesis of possible infixation pivots to account for the Amharic data.
- **Data:**
  - Amharic (Semitic) is spoken by roughly 21,000,000 people and is the national language of Ethiopia, but has surprisingly little existing documentation.
  - The data presented here comes from original work with two native speakers of Amharic from September 2012 to July 2013 in Minneapolis, Minnesota.

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2 Stress, weight, and reduplication

2.1 Phonemic inventory

- All consonants except the glottal ones can surface as either singletons or geminates.
- Geminates in Amharic can be lexical or grammatical.

(1) **Geminate minimal pairs**

a.	gäna	'still'	gänna	'Christmas'
b.	alä	'he said'	allä	'there is'
c.	bära	'bald'	bärra	'it lit up'
d.	mäwäräd	'to be embarrassed'	mäwwäräd	'to embarrass (s.o else)'

- Many Amharic stops (voiceless stops, affricates, and /s/) have ejective counterparts.

(2) **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			

- There are either five or eight vowels in Amharic; in certain dialects the central vowels are allophones of the front vowels. In other dialects they are distinct phonemes.

(3) **Amharic Vowel Inventory**

i	ɨ	u
e	ə	o
ä	a	

- Epenthetic central vowels are common to break up clusters. The choice of central vowel is determined by the height of the preceding vowel in the word.

2.2 Amharic syllable structure and stress

- For our purposes, the relevant syllable types distinguished in Amharic are those closed by geminates (G), and those not closed by geminates.
- Onset clusters of up to two consonants are allowed as long as they obey the syllable hierarchy.
- Coda clusters are only allowed word finally.
- Geminates can only surface entirely within the same syllable coda when word final

(4) **Maximal syllables**

a. CCVC(C) b. CCVG(G)

- **The default stress pattern** in Amharic involves alternating odd numbered syllables.
- To account for this, I propose binary trochees starting at the left edge of a word (Sande and Hedding, 2014).
- Here I mark all stress as primary, because there is no obvious phonetic or impressionistic reason to distinguish primary from secondary stress.
- The acoustic correlates of stress are length, intensity, and to a lesser extent pitch.

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

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 (your body)'
f.	('t'ä.rä.)('p'e.za)	'table'
g.	('as.da.)('ka.käl).ku	'I arranged it'
h.	('jä.tä.)('kä.fä.)('tä.wɨn).bɨr	'the open door'

- In words with an odd number of syllables, 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.
- Stress is not morpheme-dependent. It is postlexical and applies to words, not roots or particular morphemes.

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

a.	('mä.tʃ'uh)	'to yell'
b.	('tʃ'u.hät)	'a yell'
c.	('ɨj.jä.)('tʃ'u.hä.)näw	'he is yelling'

- **Constraints to account for default stress:**

  Align-L(Ft,Wd) (McCarthy and Prince, 1993)
  Assign one violation for every syllable which separates the left edge of a foot from the left edge of the prosodic word.

  Ft-Bin(arity) (Prince and Smolensky, 1993)
  Assign one violation for every non-binary foot.

  Ft-Form-T(rochaic) (Prince and Smolensky, 1993)
  Assign one violation for every non-trochaic foot (the leftmost syllable of a foot must be stressed).

  Parse (Prince and Smolensky, 1993)
  Assign one violation for every syllable not parsed by a foot.

(7) **OT constraint ranking for default Amharic stress**

Align-L(Ft,Wd), Ft-Bin, FtForm-T
|
Parse

- **Geminates** are quite common in Amharic.
- Syllables ending in geminates are heavy syllables in Amharic, while all other syllable types are not (Sande and Hedding, 2014).
- Heavy syllables attract stress, throwing off the default pattern presented above.

(8) **Amharic stress as attracted to heavy syllables**

a.	sej.(ˈtotʃtʃ)	'women'
b.	mä.(ˈtʃäm.mär)	'to add an ingredient to'
c.	(ˈwɨʃ.ʃa.)(ˈotʃtʃ)	'dogs'
d.	(ˈtɨ.säb.)(ˈral.lɨtʃ)	'she breaks chairs'
e.	tä.(ˈgag.ga.)(ˈrätʃ.tʃä.)(ˈwal.lɨtʃ)	'she will bake them'

- Without exception, syllables that end in geminate consonants are stressed in Amharic.
- This overrides the default stress pattern and leads to consecutive stresses, final stress, and lack of initial stress, none of which we find in the default pattern.
- Only syllables closed by geminates, and not other closed syllables, attract stress.

(9) **Clash**

a.	(ˈbäl.)(ˈlatʃ.tʃɨhʷ)	'y'all ate'
b.	(ˈɨj.jä.)(ˈtät.)(ˈt'al.)(ˈlal.)(ˈlatʃ.tʃɨhʷ) ˈ**ɨj.j**ä.ˈtä**t.ˈt**'a**l.ˈl**a**l.ˈl**a**tʃ.tʃ**ɨhʷ	'you all are hating each other'
c.	(ˈläm.)(ˈmɨn).(ˈnät.tä.)(ˈmam.mä.)(ˈnäb.bät)	'to the one that we believe in'

(10) **Final Stress**

a.	(ˈtʃ'a.räs.)(.ˈwall)	'he finished'
b.	(.ˈtʃ'a.rä.)sätʃ	'she finished'

(11) **No initial stress**

a.	ji.(ˈsäb.ra.)(ˈwall)	'he will break it'
b.	*(ˈji.säb.)ra.(ˈwall)	
c.	k'o.(ˈfi.ja.)(ˈotʃtʃ)	'hats'
d.	kä.(ˈgag.gä.)(rä.tʃɨ.)läɲ	'if she baked for me'

- To account for syllables ending in geminates always being stressed, I posit the Weight-to-Stress Principle (WSP) is at play in Amharic.
- WSP must be undominated; without exception CVG(G) syllables are stressed.

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

- WSP must outrank *Clash, FtBin, and AlignL(Ft,Wd).

(12) **WSP≫*Clash**

(ˈbäl.)(ˈlatʃ.tʃɨhʷ) 'y'all ate.'

(13) **WSP≫FtBin**

(ˈɨj.jä.)(ˈtät.)(ˈt'al.)(ˈlal.)(ˈlatʃ.tʃɨhʷ) 'y'all hate each other'

(14) **WSP≫AlignL(Ft,Wd)**

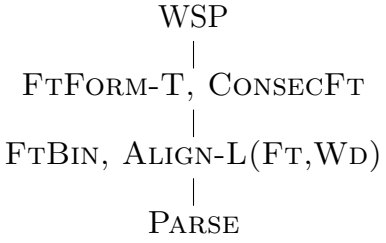
mä.(ˈtʃäm.mär) 'to add an ingredient to'

- An undominated WSP constraint accounts for the fact that Amharic prefers for all heavy syllables to be stressed at the expense of clash, monosyllabic feet, final stress, and lack of initial stress.
- There is one final stress mystery left to account for:

(15) **Why no initial stress?**
a. ji.(ˈsäb.ra.)(ˈwall) 'he will break it'
b. *(ˈji.säb.)ra.(ˈwall)

(16) **Consec(utive)Ft**
Assign one violation for every unfooted syllable which separates two feet.

(17) **Final stress ranking**



- **Stress Summary:**
  - Default: Left-aligned trochees.
  - When geminates are present: heavy syllables (those closed by geminates) are stressed, and trochees form around them.

2.3 Infixing reduplication

2.3.1 Adjectives

- Adjectives agree in number with nouns.
- The normal plural affix on adjectives is the suffix /-otʃtʃ/.

(18) **Adjectives agree with nouns in number**
a. (ˈta.katʃ) saw 'lazy person'
b. (ˈta.ka.)(ˈtʃ-otʃtʃ) sa.(ˈw-otʃtʃ) 'lazy people'

- When adjectives contain a geminate, however, a different plural allomorph surfaces: infixing reduplication which surfaces in the syllable closed by a geminate.

(19) **Reduplication in plural adjectives containing a geminate**

(ˈrädʒ.dʒäm) sau	'tall person'	rä.(ˈdʒadʒ.dʒäm) sau.-(ˈotʃtʃ)	'tall people'
(ˈatʃ.tʃɨr)	'short'	a.(ˈtʃatʃ.tʃɨr)	'short (PL)'
(ˈtɨl.lɨk')	'big'	tɨ.(ˈlɨl.lɨk')	'big (PL)'
(ˈwɨff.ram)	'fat'	wɨ.(ˈfɨff.ram)	'fat (PL)
(ˈsaf.fi)	'wide'	sa.(ˈfaf.fi)	'wide (PL)'

- Adjectives without a geminate, like *'ta.katʃ* and *'k'on.dʒo*, cannot be pluralized with the reduplicative allomorph.

(20) **Adjectives without a geminate cannot reduplicate for pluralization**

a.	(ˈk'on.dʒo) saw	'beautiful person'
b.	*k'o.(ˈnonn.dʒo) sa.(ˈw-otʃtʃ)	'beautiful people'
c.	(ˈk'on.dʒo.)(ˈ-otʃtʃ) sa.(ˈw-otʃtʃ)	'beautiful people'

- So, we see suppletive adjectival plural allomorphs: /-otʃtʃ/ and RED.

2.3.2 Verbs

- The iterative morpheme in Amharic surfaces as a reduplicative infix in verbs.
- However, just like the plural marker on adjectives, the iterative reduplication morpheme can only surface in verbs whose stems contain a geminate.
  - To express an iterative meaning for verbs without geminates, a periphrastic construction must be used.
- There is no semantic reason why verbs that contain a geminate should be able to take an iterative meaning while others cannot.

(21) **Verbal iterative infixing reduplication**

a.	(ˈsäb.bä.)rä	'break'	sä.(ˈbab.bä.)rä	'break in pieces, over and over'
b.	(ˈläw.wä).tä	'change'	lä.(ˈwaw.wä.)tä	'change over and over'

- Unlike the adjectival plural, there is no alternative iterative allomorph, resulting in ineffability.

3 Deriving Amharic reduplication via constraints

- **Option 1:**
  - The adjectival plural infix is always CV, so we could imagine the input is a CV template.
  - Since it always targets the first geminate in a word, we could posit a constraint ALIGNL(RED,GEMINATE) which aligns the reduplicant to the geminate.
  - Problems: We know of no other language where the infix targets heavy syllables or geminates, so this constraint seems unmotivated.
  - If it is possible to derive the correct output based on purely phonologically optimizing constraints, we may not need to specify a CV template.
- **Option 2:**
  - Perhaps the reduplicative allomorph is phonologically optimizing, and we can derive it with well-motivated constraints called for elsewhere in the grammar.
  - **Question:** Can we derive the reduplicative plural allomorph via constraints without the following stipulations?
    - The morpheme is a reduplicant
    - The morpheme is always CV (a mora)

– I provide a standard OT constraint ranking, demonstrating that we need not stipulate a CV template, nor need we stipulate that the infix is a reduplicant.

– We must, however, specify that the plural morpheme targets heavy syllables.

- **Reduplicant shape:** The reduplicant is always CV: rä**dʒa**dʒ.dʒäm

  – A CV shape allows the morpheme to be realized in a phonotactically well-formed word while adding the minimum number of segments.

    ***Struc(ture)** (Prince and Smolensky, 1993)
    Assign one violation for each segment present in the output.

    RealizeMorph(eme) (Kurisu, 2001)
    Assign one violation for each input morpheme that is not phonologically realized in the output.

    Max-IO (Prince and Smolensky, 1993)
    Assign one violation for each input segment that is not realized in the output.

(22) **RealizeMorph, MaxIO≫*Struc**

rädʒdʒäm + Pl	RealizeMorph	Max-IO	*Struc
☞a. rä(ˈdʒadʒ.dʒäm)			********
b. (ˈrädʒ.dʒäm)	*!		******
c. (ˈdʒadʒ.dʒäm)		*!*	******

- **Reduplicant features:** The consonant in the reduplicant is always identitcal in features to the geminate consonant: rä**dʒ**adʒdʒäm

- **Ident(Sr,Sl)** (Rose and Walker, 2004; Yu, 2005)
  Let Sr be a segment in the output and Sl be any corresponding segment of Sr such that Sl precedes Sr in the sequence of segments in the output (L≫R). Assign one violation for a mismatch in features between Sr and Sl.

  Locality (Riggle, 2004; Yu, 2005)
  Assign one violation for every segment that intervenes between two corresponding segments.

(23) **Ident(SrSl), Locality** ≫ *dʒ

rädʒdʒäm + Pl	SrSl	Locality	*dʒ
☞a. rä(ˈ**dʒ**$_i$ **a**dʒ.dʒ$_i$äm)			***
b. rä(ˈ**m**$_i$ adʒdʒäm$_i$)		*!	**
c. rä**t**$_i$adʒdʒ$_j$äm	*!		**
d. rä**t**$_i$adʒdʒ$_i$äm	*!		**

- **Reduplicant location:** The plural morpheme always surfaces inside the heavy (stressed) syllable, the one closed by a geminate.

  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.

– Is there an alternative way to derive the fact that the reduplicant surfaces in the heavy syllable?

- **Which allomorph to choose:** Amharic prefers the reduplicant plural morpheme to /-otʃtʃ/ whenever possible.

  – We do not need a constraint like the one below.

  PREFER-RED(UPLICANT) (Wolf, 2008)
  Assign one violation if the morpheme is not realized as a reduplicant.

  – Instead, it falls out from ranking the constraints we have already motivated.

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

räd͡zd͡zäm + PL	ALIGN-L(PL, $\sigma_{\mu\mu}$)	REALIZE	*STRUC
☞a. rä.(ˈd͡zad͡z.d͡zäm)			********
b. (ˈräd͡z.d͡zä.)(ˈmotʃtʃ)			*********!

- **How to get /-otʃtʃ/ in words without a geminate:**

  – When there is no input heavy syllable, how do we ensure the plural suffix /-otʃtʃ/ rather than the creation of a new geminate?

  k'ond͡zo-otʃtʃ, *k'ononnd͡zo

  *NEWGEM(INATE) (Łubowicz, 2003)
  Assign one violation for every output geminate not present in the input.

- **Final ranking**

(25) **Final ranking diagram**

MAX-IO, IDENT(SRSL), LOCALITY, ALIGN-L, *NEWGEM
|
REALIZEMORPH
|
*STRUC

4 Alternatives to consider in future work

- Here I present an analysis of Amharic stress and infixing reduplication in standard OT (Prince and Smolensky, 1993).

- One could imagine a stratal analysis of this data, where at the stem level, heavy syllables are stressed, then at the word level all other stresses are assigned and syllables are footed.

- Future work: combine ideas from the OT analysis in section 3 with lexical strata in a Stratal OT analysis of Amharic stress and reduplication (Kiparsky, 2000, 2008).

5 Conclusions

- We have seen that Amharic has a unique infixing reduplication pattern, where reduplicants only surface in the presence of a geminate.
- With highly motivated, typologically sound constraints, we can avoid stipulating that the morpheme is a reduplicant and that it has a CV template.
- We must still specify that the plural morpheme targets heavy syllables.
- Heavy syllables are not predicted to be a possible infixation pivot based on Yu (2003)'s typology of infixation.
  - Yu (2003, 2007) posits a list of possible infix targets based on two competing criteria: *salience* and *reliability*.
    - Edge pivots: left- or rightmost consonant, vowel, or syllable
    - Prominence pivots: Stressed vowel, syllable, or foot
- **Modification to list of infix pivots:** If a morpheme has suppletive allomorphs, one of those allomorphs can have a non-salient and/or non-reliable target.

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