Syllable Weight in Amharic

Hannah Sande and Andrew Hedding

1. Introduction

In the typology of syllable weight systems, coda consonants often play a role in

determining syllable weight. There are languages in which all coda consonants are moraic

(Type A languages), and those where no coda consonants are moraic (Type B languages).

(1) Syllable weight systems (from Davis 2011a)

Type A Languages		Type B Languages	
a. Heavy	Light	b. Heavy	Light
CVV	CV	CVV	CV
CVC			CVC

Examples of Type A languages are Latin and Lake Miwok (Tranel 1991); an example of

Type B is Khalkha (Bosson 1964, Walker 1996). Hayes's version of Moraic Theory

(1989), in which geminates but not other consonants are underlyingly moraic, predicts the

existence of both Type A and B languages, but it also predicts a third type of system

(Type C), namely languages that classify CVC syllables as light unless the coda is a

geminate, CVG[1]. There have been very few convincing cases of such a system in the

literature (Tranel 1991, Davis 2011b). A number of languages such as Fula (Davis 2011b,

citing Sherer 1994 and Paradis 1988) and Seto (Kiparsky 2008, Davis 2011b) offer

evidence that geminates are underlyingly moraic; however, the only attested systems

where CVG syllables act heavy while CVC syllables act light are Cahuilla (Hayes 1989)

and San'ani Arabic (Watson 2002, Davis 2011b).

Here we propose that Amharic, a Semitic language spoken in Ethiopia, fits this

pattern (Type C), supporting the typology of coda-consonant syllable weight systems

predicted by Hayes (1989)'s Moraic Theory. Based on data collected through eight

months of elicitation-based fieldwork, we demonstrate that two independent processes of

the language, stress and reduplication, serve as evidence that in Amharic geminate codas,

but not other codas, are moraic.

We begin in Section 2 with relevant phonological background on Amharic. We

then turn to evidence that geminate codas, but not other codas, are moraic in this

language. This evidence comes from the stress system, presented in Section 3, and a

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1   There is also a fourth type of syllable weight system in which sonorant codas are moraic but obstruent
    codas are not (Zec 1995), which we will not treat in this paper.

productive reduplication process, presented in Section 4. We conclude in Section 5 with a

discussion of typological and theoretical implications of our findings.

2. Phonological Background of Amharic

The consonant inventory of Amharic given in (2) is based on our work, plus the

conventions set forth by Armbruster (1908), Cohen (1970), and Mullen (1986). All

voiceless stops, affricates, and /s/ have ejective counterparts. In addition, all consonants

except /h/ have contrastive geminate counterparts.

(2) Amharic consonant inventory

	Bilabial	Alveo-palatal	Palatal	Velar	Glottal
Plosive	p p' b	t t' d		k k' g	
Nasal	m	n	ɲ		
Fricative	f	s s' z	ʃ ʒ		h
Affricate		c c' j			
Approximant			y	w	
Lat. Approx.		l r			

Geminates in Amharic distinguish both lexical items, (3a-b), and grammatical functions,

as in (3c). There are no word- or stem-initial geminates.

(3) Geminate minimal pairs

      a. **gäna**   'still'   **gänna**   'Christmas'

      b. **alä**   'he said'   **allä**   'there is'

      c. **mäwäräd**   'to be embarrassed'   **mäwwäräd**   'to embarrass'

The vowel inventory is given in (4), where we list seven contrastive vowels.

(4) Amharic vowel inventory

i	ɨ	u
e		o
ä	a	

While Mullen (1986) suggests there may be a vowel length contrast in Amharic, we have

found no evidence for contrastive long vowels. Diphthongs pattern with short vowels.

Thus, when comparing syllable weight, we distinguish three types of syllables: (C)V,

(C)VC, and (C)VG, where G is the first half of or a full geminate consonant and no

syllable need have an onset.

Codas can contain two consonants or the entirety of a geminate only when word-

final. We assume the final consonant is extrametrical, and that all syllables are limited to

a single coda consonant. This holds for geminate codas as well, so that only the first half

of a geminate can surface in coda position unless the geminate is word-final.

3. Amharic Stress

The previous literature on Amharic stress is almost non-existent. Hudson (1997: 460)

says "Stress is not prominent in Amharic". Leslau (2000: 16) concurs, "It is safe to state

that the last syllable is not stressed," and, "the syllable preceding a geminated syllable is

likely to be stressed." Mullen (1986) says that all coda consonants contribute to syllable

weight in Amharic, and that all heavy syllables are stressed. While our findings are

consistent with these comments by Hudson and Leslau, and partially so with the claims

of Mullen, we articulate a full account of Amharic stress backed up by acoustic data.

3.1 The Basic Stress Pattern

The phonetic correlates of stress in Amharic are pitch and intensity. Stress was initially

determined impressionistically, and later acoustic measurements were taken in Praat to

confirm our impressionistic judgments. Specifically, based on 1003 recorded words from

texts and sentence elicitation tasks, we found that the syllables we claim to be stressed

are highly statistically significantly distinct ($p < .005$) in pitch, length, and intensity than

unstressed syllables.

The basic stress pattern in Amharic involves alternating odd-numbered syllable

stress. We capture this default stress pattern with binary, trochaic feet aligned to the left

edge of a word as seen in (5). It is important to note that none of the words in (5, 6) that

show the basic stress pattern contain geminate consonants. Here stressed syllables are

underlined, feet are parenthesized, syllables are separated by dots. There is no acoustic

reason to think that one stressed syllable carries primary stress and the others secondary,

so all stressed syllables are marked the same way here.

(5) Default stress pattern

        a.   Even syllable words

i.   <u>(mät'.fat)</u>   'to vanish'

ii. <u>(do.ro)</u>   'chicken'

        b.   Three syllable words

i.   <u>(mät.räf)</u>.räf   'to overflow'

ii. <u>(k'o.fi)</u>.ya   'hat'

        c.   Four syllable words

i.   <u>(mäʃ.k'ä)</u>.<u>(da.däm)</u>   'to race'

ii. <u>(t'ä.rä)</u>.<u>(p'e.za)</u>   'table'

        d. Five + syllable words

i.   <u>(as.da)</u>.<u>(ka.käl)</u>.ku   'I arranged (my schedule)'

ii. <u>(yä.tä)</u>.<u>(kä.fä)</u>.<u>(ta.wɨn)</u> bɨr   'the open door'

Stress is word-level, and does not distinguish affixes from stems. This is shown in (6),

where the stem is c'uh. As seen below, c'uh is stressed when in an odd numbered syllable

(6b, c), but not otherwise (6a).

(6) Stress is not stem dependent

    a. <u>(mä.**c'uh**</u>)   'to yell'

    b. <u>(**c'u.h**</u>ät)   'a yell'

    c. <u>(ɨy.yä)</u>.<u>(**c'u.h**</u>ä) näw   'he is yelling'

The default stress system holds in Amharic no matter whether the syllables in a word are

open or closed: (as.da).(ka.käl).ku, *(as.da).ka.(käl.ku). We consistently see initial stress,

and stress on every-other syllable after that. In words with an odd number of syllables,

final stress is not observed, so we assume that final odd-parity syllables are unfooted,

resulting in word-final lapse (5b).

3.2 Geminates Attract Stress

Geminates are quite common in Amharic, both lexically and grammatically. Without

exception, syllables closed by geminate consonants are stressed. This overrides the

default stress pattern described above and can lead to multiple consecutive stressed

syllables, final stress, and lack of initial stress, none of which otherwise occurs in the

language. In (7–9) we see how geminates interrupt the default stress pattern.

(7) Syllables closed by geminates are always stressed
> a.   se.(tocc)   'women'
> b.   mä.(c'äm.mär)   'to add an ingredient to something'
> c.   (wiʃ.ʃa).(occ)   'dogs'

(8) Consecutive stressed syllables
> a.   (bäl).(lac.cɨhʷ)
>   'y'all ate'
> b.   (ɨy.yä).(tät).(t'al).(lal).(lac.cɨhʷ) näw
>   'you (pl.) are hating each other'
> c.   (läm).(mɨn).(nät.tä).(mam.mä).(näb.bät)
>   'to him in whom we believe'

(9) Final stress
> (c'a.räs).(wall) 'he finished'   vs.   (c'a.rä).säc 'she finished'

In a four syllable word ending in a geminate, σ.σ.σ.σ_G, we'd expect the geminate to be stressed, but then for the default pattern described in 3.1 to take over, forming trochees from the left edge: (σ̲.σ).σ.(σ_G). Instead, we find that all feet are aligned to the final geminate and we get initial rather than medial lapse: σ.(σ̲.σ).(σ_G).

(10) Feet align to syllables closed by geminates
        a. **yi.(s̲ä̲b̲.̲r̲a̲).(w̲a̲l̲l̲), *(y̲i̲.säb).ra.(w̲a̲l̲l̲)** 'he will break (s.thg)'
        b. **k'o.(f̲i̲.̲y̲a̲.)-(o̲c̲c̲), *(k̲'̲o̲.fi).ya.(o̲c̲c̲)** 'hats'

If there is a geminate in a word, every alternating syllable is stressed, beginning with the geminate and spreading both left and right. That is, feet align to the syllable containing the geminate instead of aligning to the left edge of the word as predicted by the default stress pattern. When there is more than one geminate in the word, all syllables containing geminates are stressed and footed first. When no further binary, trochaic feet can be formed, remaining syllables are left unparsed, thus unstressed.

(11) Foot formation around geminates
        a. **tä.(g̲a̲g̲.̲g̲ä̲).rä.(w̲a̲l̲.̲l̲ɨ̲c̲)**   'she will bake it'
        b. **ɨ.(f̲ä̲l̲.̲l̲ɨ̲).ga.(t̲a̲l̲.̲l̲a̲).hu**   'she needs me'

We refer to syllables closed by a geminate as *heavy* and we claim that they are bimoraic. The conventional approach to quantity-sensitive stress is via mora count: stress assignment is sensitive to the number of moras in a syllable in a quantity sensitive language (e.g., Hyman 1985, Davis 2011a). This is just what we find in Amharic in that

syllables closed by geminates attract stress while other closed syllables do not. That is, non-geminate codas are not moraic.

Based on speech error elicitation Rose & King (2007:467) show that "speakers presented with nonce words consistently stressed alternate syllables and geminated following them." In many ways their findings are consistent with our data; however, the fact that speakers created geminates inside stressed syllables suggests that all stressed syllables must be heavy in Amharic. Our data show that not all stressed Amharic syllables are heavy, but that every heavy syllable must carry stress (cf. Weight-to-Stress Principle (Prince 1990)).

3.3 Summarizing Amharic Stress

The default stress pattern in Amharic can be described as forming left-aligned, trochaic, binary feet with no final stress. Exceptions to this stress pattern occur when geminates are present. Syllables closed by geminates are heavy, attracting stress even if the result is stress clash, a stressed final syllable, or the lack of initial stress. Other closed syllables are treated as light because they do not attract stress in the same way.

4. Adjectival Reduplication in Amharic

In this section, we show how partial reduplication of adjectives demonstrates the

difference between syllables closed by a geminate and other CVC syllables.

4.1 Previous Literature on Adjectival Reduplication

Leslau (1995) describes a partial reduplication pattern that occurs in Amharic adjectives:

"in the adjectives the 2d radical may be reduplicated and geminated" (p. 175). While he

correctly states that partial reduplication of adjectives is used to create agreement with

plural nouns, he provides no generalization about which words can undergo this type of

reduplication. As we describe in this section, only words that contain a geminate in the

singular undergo partial reduplication in the plural. Leslau focuses on describing

epenthesis between the geminate and the reduplicant, which follows the basic rules of

epenthetic vowels in the language. Rose (2003) and Schluter (2008) analyze a similar

partial reduplication pattern in Amharic *frequentative* verbs, but do not mention adjectival

reduplication. In this paper we focus on partial reduplication of adjectives to demonstrate

the weight distinction between CVC and CVG syllables.

4.2 Describing Adjectival Reduplication in Amharic

  Adjectives in Amharic agree in number with the nouns that they modify. They are

normally inflected with the plural marker (-occ).

(12) Suffixing adjectival plural marker

a.	**takac**		**sau**
	lazy		person
	'lazy person'		
b.	**takac-occ**		**sau-occ**
	lazy-PL		person-PL
	'lazy people'		

A significant proportion of adjectives in the language contain geminates, and these

adjectives obligatorily use an alternative strategy to mark the plural, namely partial

reduplication. This reduplication can be combined with the nominal plural marker /-occ/,

with no apparent distinction in meaning. Adjectives containing geminates *must*

reduplicate when describing a plural noun—see the ungrammatical form in (13d)—and

they can optionally also take the plural suffix /-occ/, (13c).

(13) Reduplicating adjectival plural marker

a.	**räjjɨm**		**sau**
	tall		person
	'tall person'		
b.	**räjajjɨm**		**sau-occ**
	<u>PL</u>.tall		person-PL
	'tall people'		
c.	**räjajjɨm-occ**		**sau-occ**
	<u>PL</u>.tall-PL		person-PL
	'tall person'		
d.	***räjjɨm-occ**		**sau-occ**
	tall-PL		person-PL
	'tall people'		

The underlying geminate consonant is reduplicated, and the reduplicant surfaces as a

singleton in the onset of the heavy syllable (the one closed by a geminate). The

reduplicated singleton is separated from the geminate by an epenthetic central vowel that

is the same height as the preceding vowel in the word.

There are two known exceptions to the generalization that adjectives containing

geminates must reduplicate in the plural: täbbab 'narrow', and kallal 'light (in weight).'

These two words do not undergo reduplication in the plural: *täbabbab, *kalallal. We

believe this is because of the identity between the second and third radicals in täbbab and

kallal, where reduplication would lead to a sequence of three consonants with identical

features. A non-exhaustive list of adjectives that undergo such reduplication is given in

(14). For clarity, the reduplicant is underlined in the plural form of the adjectives.

(14) Reduplicating adjectives

räjjɨm	'tall'	rä<u>ja</u>jjɨm	'tall (pl.)'
acc'ɨr	'short'	a<u>ca</u>cc'ɨr	'short (pl.)'
tɨllɨk'	'big'	tɨ<u>lɨ</u>llɨk'	'big (pl.)'
tɨnniʃ	'small'	tɨ<u>nɨ</u>nniʃ	'small (pl.)'
saffi	'wide'	sa<u>fa</u>ffi	'wide (pl.)'
k'accɨn	'skinny'	k'a<u>ca</u>ccɨn	'skinny (pl.)'
addɨs	'new'	a<u>da</u>ddɨs	'new (pl.)'
dämmak'	'bright'	dä<u>ma</u>mmak'	'bright (pl.)'
kabbad	'difficult'	ka<u>ba</u>bbad	'difficult (pl.)'
hayyal	'powerful'	ha<u>ya</u>yyal	'powerful (pl.)'
tallak'	'older'	ta<u>la</u>llak'	'older (pl.)'
tannaʃ	'younger'	ta<u>na</u>nnaʃ	'younger (pl.)'

Adjectives that do not contain a geminate do not undergo this type of reduplication.

Example (15) shows CVC syllables do not function the same way as CVG syllables, and

cannot reduplicate to create a plural.

(15) Pluralizing adjectives without geminates
        a.   `k'onjo sau`   'beautiful person'
                    beautiful person
        b.   `k'onj-occ sau-occ`   'beautiful people'
                    beautiful-PL person-PL
        c.   `*k'onanjo sau(-occ), * k'onannjo sau(-occ)`

4.3 Reduplication Summary

Adjectives that contain a geminate must reduplicate it in order to become a plural.

Because only geminate codas undergo reduplication, this illustrates a significant

difference between geminate and non-geminate codas. Any complete analysis of geminate

reduplication has to take into account the fact that only stems containing geminates

license reduplication. We claim that this occurs because geminate codas in Amharic are

heavy and underlyingly moraic while non-geminate codas are not.

5. Discussion

We have shown that geminate codas in Amharic are moraic but other codas are not.

Syllables closed by a geminate attract stress, overriding the default stress pattern of the

language. The fact that only geminate codas attract stress suggests that the syllables

containing them are heavy (bimoraic), with one mora being contributed by the vowel

nucleus, and the second by the geminate coda. In the reduplication domain, we see that

only words containing geminates license reduplication and the infixing reduplicant must

surface in the syllable ending in a geminate. If we think of heavy syllables as prominent,

then this phenomenon in Amharic is similar to instances of infixation targeting prominent

syllables in other languages such as Chamorro (Topping and Dungca 1973, McCarthy

and Prince 1994, Klein 1997).

5.1 Languages That Provide Evidence for Geminates as Inherently Moraic

Moraic Theory, which we adopt, predicts that geminates are inherently moraic while

other codas are not (Hayes 1989). Davis (2011b) discusses a number of languages that

support this claim in that they allow CVVC syllables but disallow CVVG syllables: Seto

(Estonian), Fula (Atlantic, disputed), Koya (Dravidian), and certain dialects of Arabic

(Semitic). Here we discuss the details of two such cases: Seto and Fula.

Seto has iambic feet requiring three moras (Kiparsky 2008). In disyllabic feet that

would otherwise be only bimoraic, vowel lengthening occurs to satisfy the three-mora

requirement: CV.CVC à CV.CVVC. However, if the second syllable of the foot is closed

by a geminate, CV.CVG, the expected vowel lengthening does not occur. Presumably, a

CV.CVG foot is already trimoraic with each vowel being moraic and the geminate

contributing the third mora, and thus it does not need to add a vowel to meet its mora requirement. This serves as evidence that geminates are underlyingly moraic in Seto. It is important to note, moreover, that Seto's avoidance of CVVG syllables is further evidence that geminates are underlyingly moraic.

Quite like Seto, Fula avoids CVVG syllables but allows CVVC syllables. CVVC syllables are permitted, if not common in the language (16), but when we would expect to see a CVVG syllable, we instead get degemination, resulting in CVVC, as in the plural forms in (17).

(16) CVVC in Fula (Davis 2011b, citing Sherer 1994:176)

a.	**kaakt-ɛ**	**kaak.tɛ**	'spittle'
b.	**caak-ri**	**caak.ri**	'couscous'

(17) CVVG in Fula is not permitted (Davis 2011b, citing Paradis 1988)

	Singular	Plural	Gloss
a.	**lɛw**	**lebb-i**	'month'
b.	**lɛf**	**lepp-i**	'ribbon'
c.	**laaw**	**laab-i, *laabb-i**	'road'
d.	**lɛɛs**	**lɛɛc-ɛ, *lɛɛcc-ɛ**	'bed'

Seto and Fula, which avoid CVVG but not CVVC syllables, serve as evidence that there is an inherent weight difference between geminates and other coda consonants (Davis 2011b: 12, Kiparsky 2008). We now turn to languages of the Amharic type, in which surface geminate codas are treated as heavy with respect to stress, while other surface codas pattern with light CV syllables.

5.2 Languages in which CVG but not CVC syllables are heavy

5.2.1. SAN'ANI ARABIC

In some dialects of Arabic, final CVC syllables do not attract stress, whereas final CVG

syllables do (Davis 2011a: 129, Davis 2011b: 8). In San'ani Arabic, spoken in Yemen,

CVG syllables pattern as heavy when it comes to stress assignment in the same way that

CVV syllables do, but CVC syllables pattern differently (Watson 2002, Davis 2011b). All

final consonants are extrametrical. In a word containing CVV or CVG syllables, stress is

assigned to the rightmost one of them (20a-d). However, in words without CVV or CVG

syllables, CVC syllables are weighted as heavier than CV syllables. If there is a CVC

syllable in the final three syllables, the rightmost one is stressed (18e-i), otherwise, the

first CV is stressed (18j-l). This provides cogent evidence for a three-level weight system

where CVG and CVV outweigh CVC, but CVC still outweighs CV.

(18) San'ani stress assignment (Watson 2002: 81-82)

a. yi.**pib**.bu	'they (m) love/like'
b. mu.**say**.yi.la.ti	'my recorder'
c. **daw**.wart	'I/you (m.sg) looked for'
d. **saa**.fart	'I/you (m.sg) traveled'
e. mak.**tuub**	'office'
f. da.**rast**	'I/you (m.sg) learnt'
g. saa.fa.**rat**	'she traveled'
h. mi.**gam**.bar	'sitting'
i. **mad**.ra.sih	'school'
j. **li**.bi.sat	'she wore/put on'
k. **ka**.tab	'he wrote'
l. **ra**.ga.ba.tih	'his neck'

It seems that Weight-by-Position, the requirement that coda consonants be linked to a

mora, only applies in San'ani Arabic when there are no underlyingly bimoraic syllables

(CVV or CVG) present.

5.2.2. CAHUILLA

Stress in Cahuilla, an Uto-Aztecan language, involves alternating stressed syllables

beginning at the left edge of the word where CVC behaves the same as CV. By contrast

CVG and CVV syllables pattern together with respect to stress and foot formation in a

way distinct from CVC.

When only CV and CVC syllables are present, we see a clean, alternating syllable

stress pattern; however, when CVG and CVV syllables are present, they are stressed and

so is the syllable immediately following them, throwing off the clean alternating pattern.

(19) Stress in Cahuilla (Hayes 1995)

a.	ˈta.ka.ˌli.cem	'one-eyed ones'
b.	ˈce.xi.ˌwen	'it is clear'
c.	ˈqaːn.ˌki.cem	'palo verde (pl.)'
d.	ˈcex.ˌxi.wen	'it is very clear'

Among the languages of the world for which syllable structure has been well described,

the two discussed in this section are the only languages known to have a clear distinction

between the weight of CVG syllables and CVC syllables where phonological properties

such as stress provide evidence that CVG patterns as heavy but CVC does not. This is

less clear for San'ani Arabic than for Cahuilla, since one could analyze the San'ani

system as a three-tiered weight system, where CVV, CVG > > CVC > > CV.

Based on the data presented above we claim that Amharic is a third such

language where CVG patterns as heavy while CVC patterns with light (CV) syllables.

Crucially, in phonological and morphological phenomena that are affected by weight

there is a marked difference in behavior between CVC and CVG. Amharic is distinct

from Cahuilla and San'ani Arabic because there are no contrastive CVV syllables in

Amharic, making CVG syllables the only heavy syllables. A fourth possible case of such

a language is Pattani Malay (Gordon, this volume), where syllable *initial* geminates add

to weight and heavy syllables attract stress.

We accept the generalization that geminates are underlyingly moraic in all languages

and thus CVG syllables are inherently bimoraic (heavy). We thus adopt the position of

Davis (2011b: 21, 2014), who claims, "there is one specific universal representation of

geminates (i.e. the underlying moraic weight representation), and apparent

counterexamples to it are explained by constraints that act on surface forms."

5.3 Implications for theories of Syllable Weight

The combination of Moraic Theory (McCarthy 1986; Hayes 1989; Ito 1989) and Weight-

by-Position (Hayes 1989) predicts that there should be languages where geminates but

not other codas are moraic, thereby making syllables heavy and attracting stress and other

phonological processes. Tranel (1991) asserts that such a system is unattested; however,

Davis (2011) provides two such examples (San'ani Arabic and Cahuilla) and we have

provided a third here.

Tranel's (1991: 293) prosodic length analysis, the "Principle of Equal Weight for

Codas" (PEWC), holds, "Coda portions of geminate consonants behave in the same way

as other coda consonants with respect to syllable weight." He claims that geminates

should not be represented as moraic, but only as linked to two positions (coda C and

onset C, for example). That is, they are prosodically long, filling the length of two

segments, but they are not moraic.

The table in (20) below shows the predictions of Moraic Theory and the PEWC,

which differ in whether a language with heavy CVG but light CVC syllables should exist.

(20) Predictions of Moraic Theory and PEWC

[CVG]	[CVC]	Moraic Theory	PEWC
1. Heavy	Heavy	yes	yes
2. Light	Light	no	yes
3. Heavy	Light	yes	no
4. Light	Heavy	no	no

Amharic provides a clear example of language type 3, supporting the predictions of

Moraic Theory and clearly contradicting the Principle of Equal Weight for Codas. CVG

syllables attract stress whereas CVC syllables do not, and reduplication is only licensed

in the presence of a CVG syllable.

In-depth study of syllable weight in underdocumented languages could unearth

additional syllable weight systems like the one described here for Amharic. Tranel (1991)

claims that such a system does not exist, and Davis (2011a) states that they are rare.

Perhaps these systems are not, in fact, altogether rare crosslinguistically, but rather have

not yet been adequately recognized and described.

REFERENCES

Armbruster, C. H. 1908. *Initia Amharica: An Introduction to Spoken Amharic*. Cambridge: University Press.

Bosson, James E. 1964. *Modern Mongolian*. Bloomington: Indiana University.

Cohen, Marcel. 1970. *Traité de langue amharique (abyssinie),* 2nd edition. Paris: Institut d'Ethnologie, Université de Paris.

Davis, Stuart. 2011a. Geminates. In *The Blackwell Companion to Phonology, vol. 2*, ed. by Marc van Oostendorp et al., pp. 837-859. Oxford: Wiley-Blackwell.

Davis, Stuart. 2011b. Quantity. In *The Handbook of Phonological Theory, 2nd edition*, ed. by John Goldsmith, Jason Riggle, and Alan C. L. Yu, pp. 103-140. Oxford: Wiley-Blackwell.

Gordon, Matthew. 2016. Syllable weight: a typological and theoretical overview. In *Syllable weight in African languages* (this volume), ed. by Paul Newman.

Hayes, Bruce. 1989. Compensatory lengthening in moraic phonology. *Linguistic Inquiry* 20: 253-306.

Hayes, Bruce. 1995. *Metrical Stress Theory: Principles and Case Studies*. Chicago: University of Chicago Press.

Hudson, Grover. 1997. Amharic and Argobba. In *The Semitic Languages*, ed. by Robert Hetzron, pp. 457-485. Abingdon, Oxon: Routledge.

Hyman, Larry M. 1985. *A Theory of Phonological Weight*. (Publications in Language Sciences, 19) Dordrecht: Foris.

Kiparsky, Paul. 2008. Weight and length. Paper presented at City University of New York [CUNY] Conference on the Syllable.

Klein, Thomas B. 1997. Output constraints and prosodic correspondence in chamorro reduplication. *Linguistic Inquiry* 28: 707-715.

Leslau, Wolf. 1995. *Reference Grammar of Amharic.* Wiesbaden: Harrassowitz.

Leslau, Wolf. 2000. *Introductory Grammar of Amharic*. Wiesbaden: Harrassowitz.

McCarthy, John J. 1986. OCP effects: Gemination and antigemination. *Linguistic Inquiry* 17: 207-263.

McCarthy, John J., and Alan Prince. 1994. Two lectures on prosodic morphology. Papers presented at the OTS/HIL Workshop on Prosodic Morphology, Utrecht [Netherlands].

Mullen, Dana. 1986. *Issues in the Morphology and Phonology of Amharic: The Lexical Generation of Clitics*. Ph.D. dissertation, University of Ottowa.

Newman, Paul. 1972. Syllable weight as a phonological variable. *Studies in African Linguistics* 3: 301-323. [Abridged version in this volume].

Prince Alan. 1990. Quantitative consequences of rhythmic organization. Chicago Linguistics Socity 26.2: 355-398.

Rose, Sharon. 2003. The formation of Ethiopic Semitic internal reduplication. In *Language Processing and Acquisition in Languages of Semitic, Root-Based Morphology*, ed. by Joseph Shimron, pp. 79-98. Amsterdam: John Benjamins.

Rose, Sharon & King, Lisa. (2007). Speech Error Elicitation and Co-occurrence Restrictions in Two Ethiopian Semitic Languages. *Language and Speech* 50(4), 451-504.

Schluter, Kevin. (2008). Amharic Internal Reduplication and Foot Structure: A Word-Based Approach. *Kansas Working Papers in Linguistics*, Vol. 30, p. 287

Topping, Donald M., and Bernadita C. Dungca. 1973. *Chamorro Reference Grammar*. Honolulu: University of Hawaii Press.

Tranel, Bernard. 1991. CVC light syllables, geminates and moraic theory. *Phonology* 8: 291-302.

Walker, Rachel. 1996. Prominence-driven stress. Unpublished ms, University of California, Santa Cruz. (Available from Rutgers Optimality Archive: http://ruccs.rutgers.edu/roa.html)

Watson, Janet C. E. 2002. *The Phonology and Morphology of Arabic*. Oxford: Oxford University Press.

Zec, Draga. 1995. Sonority constraints on syllable structure. *Phonology* 12: 85-129.