Conference on Weight in Phonetics and Phonology
CUNY Phonology Forum, January 16-17, 2014

On the Weight of Edge Geminates

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1. Issues in the typology of geminate consonants

a. The typology of geminate positioning (Thurgood 1993; Pajak 2009; Kraehenmann 2011; Dmitrieva 2012) : General finding: Intervocalic is the preferred location for geminates. With respect to word edges, the consensus is that word-final geminates are more common that word-initial geminates. (Note: In an experimental study with Russian, English and Italian speakers, Dmitrieva found that word-initial geminates were more perceptually distinct than word-final geminates.)

b. Typology of geminate consonant type preference (Thurgood 1993, Morén 1999; Kawahara 2007; Kraehenmann 2011): findings are often contradictory. For example, Kawahara (2007) suggests a preference for sonorants to be geminate while Morén (1999) maintains that there are no universal preferences (i.e. implicational universals) regarding geminate consonant type. In terms of frequency of occurrence, Kraehenmann observes that geminates nasals and geminate voiceless stops are the most frequently occurring typologically. In word-initial position geminate stops are the most frequently occurring.

c. Typology of geminate weight -- Davis (2011), assumes moraic theory (Hayes 1989)

i. Languages in which geminates pattern like other coda consonants with respect to syllable weight (Tranel 1991, equal weight for codas) , whether as moraic or nonmoraic

ii. Languages in which geminates always pattern as moraic (even when other codas are not moraic (Davis 2003)

iii. Languages in which geminates are not weight-bearing even when other coda consonants are moraic, (Baker 1997; Ngalakgan; moraic elements must have their own place features)

2. Typology of edge geminates

a. With respect to weight, do edge geminates patterns as moraic (heavy) or not?

b. The relationship between edge geminates and edge clusters. Languages with initial geminates may or may not have initial consonant clusters. Similarly, languages with final geminates may or may not have final clusters.

i. In languages that have edge geminates and edge clusters, do the geminates and clusters pattern the same way with respect to weight or can geminates be special?

ii. In languages that have edge geminates but no edge corresponding edge clusters, are the edge geminates more likely or less likely to be moraic (heavy)?

iii. In languages that have both initial and final geminates, how do the edge geminates pattern with respect to weight?

3. Related issues:

a. Does it matter whether the edge geminate is derived or underlyingly present?

b. Do nasal+homorganic clusters (partial geminates) pattern like an edge geminate?

4. Instantiation chart for final geminates

Final Geminates	Final Clusters		
	None	Moraic	Non-moraic
Moraic	(1) Baghdadi Arabic, Hadrami Arabic	(2) Cairene Arabic / Ponapean, Wolof (heavy NC; NC is only final cluster); Swiss German	(3) Amharic??
Non-moraic	(4) ---	(5) ---	(6) Hungarian

5. Instantiation chart for initial geminates

Initial Geminates	Initial Clusters		
	None	Moraic	Non-moraic
Moraic	(7) Pat.Malay, Trukese, Woleaian	(8) Ponapean Cypriot Greek*	(9) Shuri Japanese
Non-moraic	(10) ---	(11) ---	(12)Leti, Swiss German Baghdadi Arabic

Exemplification – final geminates

6. Pattern 1, Moraic final geminates in a language that does not otherwise allow for final consonant clusters: Some Arabic dialects such as Hadhrami Arabic (Bamakhramah 2009) and Baghdadi Arabic (Blanc 1964, Youssef 2013)

7. Evidence for moraicity of geminates: quantity-sensitive stress, bimoraic minimal words

8. Hadhrami dialect as spoken in the town of Ghayl Bawazir near the south coast of Yemen (Bamakhramah 2009, personal communication), consonant clusters are avoided in word-final position, but word-final geminates are allowed

a. /gird/ --- [gírid] 'monkey' ([gírd-i] 'my monkey')
b. /bint/ --- [bínit] 'girl' ([bínt-i] 'my girl')
c. [rább] 'Lord'
d. [ʔaxáff] 'lighter/lightest'

9. Baghdadi Arabic -- Blanc (1964) reports that Muslim and Christian varieties avoid final consonant clusters, but final geminates are common.

a. /ward/ -- [wáred] 'flowers'
b. /sabt/ --- [sábet] 'Saturday'
c. [sádd] 'he shut'
d. [yendázz] 'he will be sent'

10. Pattern 2: Moraic final geminates in a language in which final clusters are moraic

11. Swiss German (Kraehenmann 2001:113) – Monosyllabic words must be bimoraic. /CVC/ words become [CVVC]; /CVCC/ surface as [CVCC] whether it ends in a cluster or geminate.

12. Cairene Arabic (e.g. Davis and Ragheb to appear) -- a wide range of phenomena show that word-final consonant clusters and word-final geminates pattern as moraic (as opposed to a single final consonant).

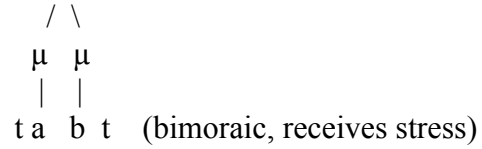
a. Stress -- CVC syllables are heavy in penultimate position but not in final position
i. [mak.táb.na] 'our office' ii. [ká.tab] 'he wrote' iii. [mu.hán.dis] 'engineer'

b. a syllable with a final cluster always attracts the stress
iv. [maf.hímʃ] 'he didn't understsand' v. [ka.tábt] 'I wrote'

c, a syllable with a final geminate always attracts the stress
vi. [ʔaxáff] 'lightest' vii. [ʔamáll] most boring

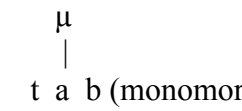
13. Mora structure

a. [ka.tábt] 'I wrote' (Final)Syllable (μ = mora)



(bimoraic, receives stress)

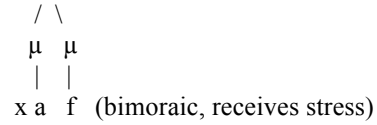
b. [ká.tab] 'he wrote' (Final)Syllable



(monomoraic, does not receive stress)

c. [ʔa.xáff] 'lightest' with a word-final geminate

(Final) Syllable



(bimoraic, receives stress)

14. Minimal word constraint and loanwords -- Cairene Arabic does not allow for monormoraic CVC content words; only birmoraic CVCC words occur where CC can be a gemnate.

a. [ʔult] 'I said' b. [ʔism] 'name' c. [nuSS] 'half'

15. Monosyllabic loanwords with final consonant clusters are borrowed as such and have stress on the final syllable.

	English	Cairene	English	Cairene
a.	film	film	b. bank	bank

16. Monosyllabic CVC loanwords are often borrowed with a final geminate

	English	Cairene	English	Cairene
a.	(seven) up	ʔabb	b. book (purse)	búkk

(compare with the borrowing of "plastic" as [bi.lás.tik])

17. Ponapean (Goodman 1995, Kennedy 2003):
Word final clusters: homorganic nasal obstruent clusters and sonorant geminates
Weight behavior: Pattern as moraic
Evidence: Long vowels can occur before a word-final singleton consonant but not before a geminate (or NC cluster) (Goodman 1995:67-68).

a. [koos] 'bent, bumped'
b. [kuul] 'to suck on, as sugar cane'
c. [mall] 'clearing in the forest' *[maall]
d. [rom^{w}m^{w}] 'calm'
e. [m^{w}anč] 'late' *[m^{w}aanč]

18. Wolof (Bell 2003)
Word final clusters: geminates and Nasal+voiceless obstruent
Weight behavior: Pattern as moraic
Evidence: long vowels can occur before a singleton consonant but not before geminates or NC
a [baat] 'neck'
b. [uul] 'to be black'
c. [bokk] 'to share'
d. [fatt] 'to spoil'
e. [samp] 'to plant'
f. [jant] 'sun''

g. The stress pattern problem: stress falls on the initial syllable unless the 2nd syllable has a long vowel and the initial syllable has a short vowel; in such a case stress is on the second syllable. The presence of a geminate or cluster (i.e. a moraic consonant) is irrelevant. Bell (2003) nonetheless argues for the moraic account of Wolof clusters and geminates. It is just that the stress rule is only sensitive to vocalic moras. (Other evidence for the moraic account comes from morphological gemination)

19. Pattern 3: Moraic final geminates in a language in which final clusters are not moraic
Possible exemplification: Amharic (Sande and Hedding 2014) -- Amharic has final geminates and final clusters. Amharic stress is described as not being that prominent, but Sande and Hedding (2014) present evidence for stress being assigned by trochaic footing from the left edge of the word, with no stress on the final syllable. But in words that have a geminate, stress is attracted to the syllable that has the geminate as part of the coda. This includes a word-final syllable. That is, if a word-final syllable ends in a geminate, it attracts the stress; but if it ends in a consonant cluster, it does not attract stress. They analyze geminates (including word-final geminates) as being moraic while final consonant clusters are not.

20. Pattern 4: Nonmoraic final geminates in a language that lacks final clusters of any type:
We do not have examples; do they occur

21. Pattern 5: Nonmoraic final geminates in a language that has moraic final clusters:
We do not have examples; do they occur? The Ngalkgan pattern mentioned in (1ciii) implies that their existence may be probable.

22. Pattern 6: Nonmoriac final geminates in a language where final clusters are nonmoraic
Exemplification: Hungarian (Ringen and Vago 2011; also Siptár and Törkenczy 2000) -- Hungarian has final geminates and consonant clusters, but there does not seem to be evidence that requires coda consonants to be moraic. Final geminates seem to pattern like final clusters (e.g. both trigger epenthesis when a suffix initial coronal consonant is added) showing no evidence that they should be moraic

Exemplification -- Initial Geminates

23. Pattern 7, Moraic initial geminates in a language that does not otherwise allow for initial consonant clusters

24. Exemplification: Pattani Malay (Topintzi 2008, 2010, 2011)

Stress – primary stress is word-final unless the word begins with a geminate where it is initial.

a. [à.lɛ́] 'road, path' b. [m:á.tɔ̀] 'jewelry'

Compensatory lengthening: Deletion of an initial CV syllable results in gemination

c. [buwi] ~ [w:i] 'give' d. [sɨdadu] ~ [d:adu] 'police

25. Exemplification: Trukese or Chuukese (Davis and Torretta 1998; Davis 1999 and references cited therein; see also Hart 1991, Muller 2001 and Kennedy 2003):
Word-initial geminates; Word initial clusters: None
Weight behavior: Pattern as moraic
Evidence: Complex phonological interaction that requires geminates to be moraic
Note: Geminates occur initially and word-medially, but not in word-final position. A word can end in a single consonant but there are no word-internal codas other than the first part of a geminate.

The moraicity of geminates in Trukese (Chuukese)

26.	Underlying Representation	Output Form	Gloss	1st pers. poss.
	a. /omosu/	[omos]	turban shell	[omosu-y]
	b. /məkɨre/	[məkɨre]	head	[məkɨre-y]
	c. /piseki/	[pisek]	goods	[piseki-y]
	d. /sæfeye/	[sæfey]	medicine	[sæfeye-y]
	e. /səkɨri/	[səkɨr]	back	[səkɨri-y]
27.	a. /pečee/	[peče]	foot	[pečee-y]
	b. /tikkaa/	[tikka]	coconut oil	[tikkaa-y]
	c. /etiruu/	[etiru]	coconut matting	[etiruu-y]
	d. /čuučuu/	[čuuču]	urine	[čuučuu-y]

28.	Underlying Representation	Output Form	Gloss	-n = relational suffix
	a. /tipe/	[tiip]	emotions	[tipe-n]
	b. /čɨkɨ/	[čɨɨk]	basket	[čɨkɨ-n]
	c. /pəkə/	[pəək]	chip	[pəkə-n]
	d. /ača/	[aač]	handle, stem	[ača-n]
	e. /wutu/	[wuut]	interior	[wutu-n]

29.	Underlying Representation	Output Form	Gloss	*output
	a. /maa/	[maa]	behavior	*ma
	b. /təə/	[təə]	islet	*tə
	c. /oo/	[oo]	omen	*o
	d. /soo/	[soo]	precipitate	*so

30.	Underlying Representation	Output Form	Gloss	-n = relational suffix
	a. /ttoo/	[tto]	clam sp.	[ttoo-n]
	b. /kkææ/	[kkæ]	taro sp.	[kkææ-n]
	c. /čča/	[čča]	blood	[čča-n]
	d. /ssɔɔ/	[ssɔ]	thwart of a canoe	[ssɔɔ-n]

31.	Underlying Representation	Output Form	Gloss	-n = relational suffix
	a. /ffəne/	[ffən]	advice	[ffəne-n]
	b. /nnəti/	[nnət]	shrub sp.	[nnəti-n]
	c. /ttoŋa/	[ttoŋ]	love	[ttoŋa-n]

32.	Underlying Representation	Output Form	Gloss	2nd pers. poss.
	a. /tikitti/	[tikit]	fresh water eel	[tikitti-m^{w}]
	b. /tirap^{w}p^{w}e/	[tirap^{w}]	drum	[tirap^{w}p^{w}e-m^{w}]
	c. /roonaakke/	[roonaak]	row lock	[roonaakke-m^{w}]

33.					
	a. /kunnu/	[kkun]	*[kun]	turning	[kunnu-m^{w}]
	b. /fitta/	[ffit]	*[fit]	package	[fitta-m^{w}]
	c. /čočča/	[ččoč]	*[čoč]	armful	[čočča-m^{w}]

34.			
	a. /eppi/	[eep]	yam
	b. /ičči/	[iič]	a start
	c. /op^{w}p^{w}u/	[oop^{w}]	pompano sp.

35.			
	a. /wutta/	[wuut]	meeting house
	b. /wučča/	[wuuč]	bottom of a paddle canoe
	c. /wasse/	[waas]	watch (clock)

36. Pattern 8, Moraic initial geminates in a language that has moraic initial consonant clusters
Exemplification: Cypriot Greek:
Armosti (2011) – Cypriot has initial geminates and a variety of initial clusters. Armosti maintains that all initial geminates and all initial clusters that stop + sonorant pattern as moraic.

37. Exemplification: Ponapean (Goodman 1995, Kennedy 2003)
Word-initial geminates (only nasal, syllabic)
a. [mmet] ‘full’
b. [ŋŋet] ‘to pant’
c. [m̥pek] ‘to look for lice’

38. These initial sequences are considered as moraic by Kennedy (2003) because they reduplicate as CCV when a bimoraic reduplicant is required.
Ponapean durative for monosyllables (p. 78)
a. pa ---> [paa.pa] 'weave'
b. dod ---> [don.dod] 'frequent'
c. tep ---> [tepi.tep] 'begin'

d. duup ---> [du-duup] 'divide'
e. miik ---> [mi.miik] 'suck'
f. pei ---> [pe.pei] 'fight'

g. dune --> [dun.du.ne] ;attach in a sequence' p. 78
h. dilip ---> [din.di.lip] 'mend thatch'
i siped --> [si.pi-si.ped] 'shake out'

j. too.roor --> [to.too.roor] 'be independent' p. 79
k. duu.pek ---> [duu.duu.pek] 'starved'

l. m̥med --> [m̥mi.m̥ped] p. 98 (patterns like example i), not as a single heavy (d)
m. m̥pek ---> [m̥pi.m̥pek] 'to look for lice' *[mpii-mpek]

39. Pattern 9, Moraic initial geminates in a language that has non-moraic initial consonant clusters
Exemplification: Shuri Japanese (Southern Okinawa) Lawrence 2011; Shimoji 2012
Shuri Japanese allows for initial geminates and a limited set of initial clusters all beginning with a glottal stop. The language has a bimoraic minimal word constraint that allows for CCV words to occur only if there is an initial geminate
a. [ccu] ‘person’ b. [kk^{w}a] ‘child’ c. *[ʔwa]

40. Pattern 10, Non-moraic initial geminates in a language that does not otherwise allow for initial consonant clusters: This does not seem to occur.
41. Pattern 11, Non-moraic initial geminates in a language that has moraic initial consonant clusters: This does not seem to occur.

42. Pattern 12, Non-moraic initial geminates in a language that has non-moraic initial consonant clusters: Exemplification, Leti (Hume et al. 1997) and Swiss German (Kraehenmann (2001, Ringen & Vago 2011) : Both Leti and Swiss German have initial geminates and initial clusters. Both languages have a bimoraic minimal word constraint but there are no words in either language that are CCV regardless whether the CC is a cluster or a geminate.

43. Baghdadi Arabic (Blanc 2003, Youssef 2013) -- Baghdadi has initial geminates and initial consonant clusters of almost any type. Syllables with initial geminates do not attract stress in the quantity-sensitive stress system and we don't think they are moraic with respect to the bimoraic minimal word condition.

44. Weight asymmetries between initial and final geminates within the same language:
a. Swiss German and Baghdadi Arabic – final geminates are moraic while initial geminates are not. On the other, the edge geminates of Ponapean (and probably Puluwat, Elbert 1974) seem to be consistently moraic.

45. The case of Tashlhiyt Berber (Dell and Elmedlaoui 1985, 1988; Ridouane 2007, 2008)
Geminates: Word-initial, Word-final, word-medial
Consonant clusters: Yes, word-initial, word-final, word-medial
Weight behavior: Ridouanne (2007) argues against a moraic analysis of Berber geminates and for a two C-slot analysis.
Evidence: Berber geminates pattern like cluster with respect to syllable position. If a member of a consonant cluster is in position to be the peak of a syllable, then it doesn't matter if that consonant is part of a geminate or not.

a. tF.sχt 'you cancelled'
b. tK.kSt 'you took off'

c. ta.zN.k^{w}Tt 'female gazelle'
d. tF.tKt 'You suffered a sprain'

But initial geminates tend not to be syllable peaks:
e. ttsX.xan 'dip (in sauce)
f. ttbD.dal 'exchang
g. tQs.sF 'it shrunk'
h. tK.kSt 'you took off'

i. g^{w}g^{w}tt 'wash it' (What's the syllabification?)

46. The gaps in the typology -- Are they accidental
a. Gap 1: There seem to be no languages possessing a non-moraic edge geminate while lacking a consonant cluster on that edge.
Implicational universal 1: If a language has an edge geminate but no consonant clusters on that edge, then the edge geminate patterns as moraic.

b. Gap 2: There seem to be no languages possessing a non-moraic edge geminate while having a moraic cluster on that edge.
Implicational Universal 2: If a language has an edge geminate that patterns as nonmoraic and allows for consonant clusters on that edge then that cluster must pattern as nonmoraic

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