The image of a segment

Jean Lowenstamm

1. Introduction.

Configurations resulting from palatalization are notoriously ambiguous as to whether they should be described as one segment, say ...k^{y}..., or a cluster of two segments, say ...ky... This paper documents the case of the Southern Ethio-semitic language Chaha for the correct description of which, it is argued, both types are required. The first section introduces background information on the data under discussion. Several theoretical assumptions are laid out in section 2, and a format for the representation of feminine singular palatalization is proposed in section 3. In section 4, the challenging behavior of reduplicated biradicals is examined, and a way of construing it is offered in section 5. Section 6 contains a number of concluding remarks.

2. The a–final verbs of Chaha.

Chaha, as other Southern Ethio-Semitic languages, did not retain the Proto-Semitic gutturals (Leslau 1957,1960). Instead, an a (underscored in (1a)) appears where other Semitic languages (1b,c,d,e) display the original guttural:[1]

(1)	a.	b.	c.	d.	e.	f.
	Chaha	Ge'ez	Tigrinya	Arabic	Hebrew	Gloss
	qäTa	qäS9a		qaTa9a	qaTa9	cut
	xäda		käd9e	xasa9a		betray
	b^{w}äka		bäx^{w}9e			ferment
	gäfa	gäf9a	gäf9e	žafa9a		push
	käpa		käb9e			fold
	däfa	däf9a	däf9e	dafa9a		push
	säma	säm9a	säm9e	sami9a	šama9	hear

[1] To simplify the discussion, the data in (1) - 3rd ms.sg. Perfective forms - is limited to cases where Chaha a corresponds to the voiced fricative pharyngeal 9 of other Semitic languages in root-final position. See Leslau (1957) for a richer set of examples. q is an ejective k; T is an ejective t; S is an ejective s;C^{w} indicates labialization; C^{y} indicates palatalization of a velar, e.g. g^{y}, k^{y}; C, c, j are the palatoalveolar stridents resulting from the palatalization of coronals T, t, and d, respectively; š and ž are the palatalized versions of s, and z, respectively.

In the next two sections, I introduce and discuss two crucial representational hypotheses.

3. The Vowel System and Syllable Structure.

Following Lowenstamm (1991), I take the vowel system of Ethio-semitic, hence of Chaha, to be as in (2) where all five peripheral vowels are long, whereas the two central vowels, ɨ and ä, are short.[2] – the 6th order vowel of the Ethiopian syllabary – is the epenthetic vowel, whereas ä – the first order vowel of the syllabary – is the short a of the system.

(2)

i:		ɨ		u:
	e:		o:	
		ä		
		a:		

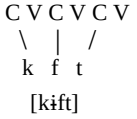
Moreover, following Guerssel & Lowenstamm (in preparation), Kaye et al. (1990), and Lowenstamm (1996), I assume a representational format for binyanim whereby syllable structure reduces to a sequence of strictly alternating consonantal and vocalic positions, viz. C V C V...

The view of length put forth in (2) receives independent support from Chaha when coupled with syllable structure as construed just above. Thus, consider two apparently very dissimilar forms, the Masculine Singular Imperative [kɨft], from sound root √kft in (3a), and the corresponding formation from an a–final root, √bdA, in (3b).[3]

(3) a. kɨft “open !, ms.”
b. bɨda “take away !, ms.”

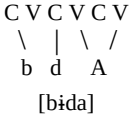
Under the length hypothesis inherent in (2), and the representational format advocated for syllable structure, both types of roots can be mapped onto one and the same template, as seen in (4), a significant result as a unique characterization of the Jussive/Imperative stem is now available.

(4) a.



[kɨft]

b.



[bɨda]

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[2] See Praetorius (1886) and Dillmann (1907) for the length contrast. For more recent studies crucially relying on (2), see Berhane (1991), Lowenstamm & Prunet (1987), Ségéral (1995), Rose (1996). For arguments against the length contrast, see Buckley (1997), Ullendorff (1955).

[3] The A of √bdA is an element in the sense of Kaye et al. (1985). Further examples of roots involving "bare elements", in Chaha and in other semitic languages, are √mUt "die", √rUT "run" √bkI "cry", √sTI "drink", etc.

4. Feminine Formation and Palatalization.[4]

How are such forms affected by Singular Feminine Formation ? The Feminine singular marker takes the form of a floating I looking for a suitable landing site, and affecting a representation similar to that of the Masculine, essentially as proposed by McCarthy (1983). The coronals appearing in C_2 position in (5a,b) and the velars in the same position in (5c,d) are suitable landing sites. Palatalization ensues. The labials in C_2 of (5e,f,g,h) are not suitable docking sites and the Feminine marker looks further to the left: a) the root-initial velars of (5e,f) can sustain palatalization; not so with the root-initial coronals of (5g,h) – a very crucial point to be returned to momentarily – and a vowel i appears next to the intial coronal, instead.

(5) Feminine palatalization of a–final Imperatives

	Root	masc.	fem.	
a.	qTA	qɨTa	qɨCä	
b.	xdA	xɨda	xɨjä	
c.	b^{w}kA	b^{w}ɨka	b^{w}ɨk^{y}ä	
d.	fkA "leave"	fɨka	fɨk^{y}ä	
e.	gfA	gɨfa	g^{y}ɨfä	
f.	kbA	kɨba	k^{y}ɨbä	
g.	smA	sɨma	simä	*šɨmä
h.	dfA	dɨfa	difä	*jɨfä

The careful reader will have noticed that a corollary always accompanies palatalization, viz. shortening into ä of the final a. Thus, Masculines are always a–final, whereas Feminines are always ä–final. This change of a to ä, subsequent to Palatalization, is of central importance.

One last piece of information has to be adduced regarding the representation of palatalization. I argue in Lowenstamm (in preparation) that Chaha palatalization does not exclusively affect a segment of the root tier, a scenario represented in (6a). Rather, the palatalizing agent, I, claims a consonantal position of its own to the right of the palatalized segment. That is, the palatalized consonants discussed here are, for all intent and purposes, clusters, as shown in (6b).

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[4] Singular Feminine Palatalization in Chaha is a rich and complex phenomenon, a full discussion of which is precluded in the context of this short paper. For a more encompassing account incorporating the analysis presented here, see Lowenstamm (in press, in preparation). Feminine Formation of the type discussed in this paper can be observed in the Imperfective and Jussive/Imperative paradigms, although examples will be adduced from the latter paradigm, only.

(6) a. . . . C V C . . .
|
... {dI$_{Fem}$}

[...j...]

b. . . . C V C . . .
| |
... {d I$_{Fem}$}

[...j...]

Consider the, now, straightforward derivation of a Masculine/Feminine alternation such as [qɨTa] (7a) vs. [qɨCä], the ingredients of which appear in (7b).

(7) a. C V C V C V
\ | \ /
q T A

b. C V C V C V
\ | \ /
q T A + I

I, the Feminine marker, identifies the immediate vicinity of the rightmost coronal segment as a suitable docking site, (8). In the process of forming the {TI} cluster, though, I has claimed the binyan-final consonantal position, a slot formerly straddled by the double association of A in (7). A no longer being able to branch, **ä**, the short version of **a** is heard.

(8) C V C V C V
| | | \
q {T I} A

[qCä]

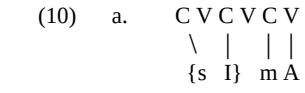
The non-local manifestation of the same phenomenon is of considerable interest. Consider the case of (5g,h). In (9), I have given the underlying representation of [sɨma] "listen !, ms." (9a), and [simä] "listen !, fem." (9b).

(9) a. C V C V C V
\ | \ /
s m A

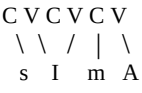
b. C V C V C V
\ | \ /
s m A + I

A labial is not a suitable docking site; neither is a root-initial coronal, two simple facts about Chaha. As a result, no consonant palatalization is observed, cf. (10a). Instead, a long **i:** is heard. If long vowels are to be represented as I have advocated, then the medial C position to which **m** is linked in (9a,b), is now straddled by **i:**, in (10b). Accordingly, **m** must move to the rightmost binyanic C position, once more inhibiting branching of A. This is shown in (10b), too.[5]

[5] In this account, there is no multiple exponence as suggested in Rose (1997). Rather, the feminine marker is realized once (in the form of the palatalization of a consonant, or as a front vowel), and centralization of a into ä is a mere consequence of the introduction of foreign segmental material into the stem.

(10) a.


*[šɨmä]

b.


[simä]

The striking fact about [sɨma] and [simä] is that, in each case, one and only one long vowel can be accomodated at a time. The exact location of that vowel matters little: it can appear to the right of C_2 as in [sɨma̲], or to the left of C_2 as in [s̲imä]. What does matter is that two peripheral/long vowels, such as in hypothetical *[s̲ima̲], cannot coexist. It is easy to see from (9a) and (10b) why the binyan is saturated by one single long vowel. It remains a challenge under any other analysis.

Generalizing from this example, I submit that (11) obtains.

(11) Law of Binyanic saturation (LBS)

If the makeup of a binyan involves x consonantal positions, that binyan can accomodate, at most, x:2 long vowels

That is, a triconsonantal binyan will fit no more than one long vowel, a quadriconsonantal binyan will fit no more than two long vowels, etc. LBS follows trivially as a mere consequence of the mode of representation of long vowels advocated here. Its remarkable feature is that the number of long vowels a given binyan can fit can be expressed in terms of the number of its consonantal positions. Again, long vowels do not phonetically identify C positions. Yet, to the extent that they straddle them, they "involve" them no less. Any alternative mode of representation of syllable structure faces the question of whether it can derive LBS.

We now return to our main topic, palatalization in the context of Singular Feminine formation.

5. Quadriradicals and their outstanding behavior.

A subclass of quadriliteral verbs from reduplicated biliteral roots displays puzzling behavior. Quadriliterals from reduplicated biliteral roots are attested in Chaha, as in other semitic languages. Some examples are dɨβätäβä (√db) "patch", dɨfädäfä (√df) "press slightly with the hand", k^{y}ɨfäk^{y}äfä (√k^{y}f) "spray, drizzle", kɨsäkäsä (√ks) "break by force into many pieces", etc.[6]

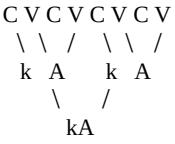
[6] See Petros & Prunet (1994) on quadriliterals from reduplicated biradicals in Chaha.

Of interest to us is the subclass of quadriliterals from reduplicated roots that are both coronal, or velar–initial, and a–final. Two examples of such velar–initial roots are known to me. They appear in (12).[7]

(12)	Root	Gloss	Imp.ms.	Imp.fem.
	√kA	dry up	kaka	$k^{y}ak^{y}ä$
	√qA	dry up	qaqa	$q^{y}aq^{y}ä$

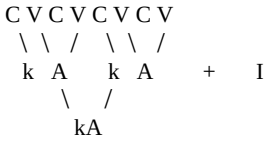
Each time, both instances of the consonant are palatalized, in the feminine. I assume the representations of the ms. and fem. to involve the material in (13a,b) respectively. The representation of reduplicated biradicals, borrowed from McCarthy (1981), explicitly encodes the solidarity of the instances of repeated segmental material, thus providing a framework for the description of across-the-board palatalization.

(13) a.



Masculine

b.

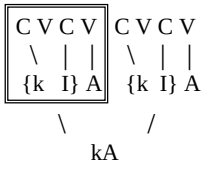


Feminine

The Feminine Imperatives of (12), displaying palatalization and ensuing shortening of a into ä, offer a very serious challenge to the analysis developed to this point. The challenge can be described as follows: in a form such as $k^{y}ak^{y}ä$, the rightmost half (underscored), $k^{y}ak^{y}ä$ is well-formed; on the other hand, the leftmost half(underscored), $k^{y}ak^{y}ä$, is apparently ill-formed, in the sense that palatalization of the initial k does not seem to have taken place at the expense of the following a. That is, everything being equal, $k^{y}ä$... not $k^{y}a$... would have been expected to appear in the first half of the form, as it does in the second. Alternatively, if a is to be heard in the first half of the form, then the preceding k should not be palatalized. The reason is the same in both cases: consonant palatalization and vowel length are in competition for the same portion of the binyan. The representations corresponding to these two expected, but evidently ungrammatical realizations appear in (14a,b) where the relevant sites have been boxed. In (14a), it is shown how palatalization of k should inhibit branching of A, whereas (14b) shows how branching of A should preclude palatalization of the preceding k.

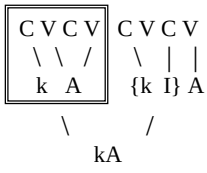
[7] The two forms given here, probably of onomatopoetic origin, are obviously variants of each other. I will let the reader decide whether they count for one example, or two.

(14) a.



*[k^{y}äk^{y}ä]

b.



*[kak^{y}ä]

6. The Image Principle.

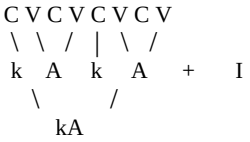
I propose to construe our puzzling instance of "non shortening" palatalization in terms of the effect of a principle given in (15).

(15) The Image Principle

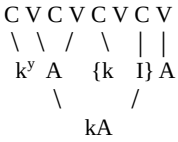
> When a segment stands in a one-to-many relationship with respect to skeletal positions, an alteration affecting the rightmost instance of that segment will be phonetically implemented as many times as the segment is represented, although the syntagmatic configuration characteristic of the alteration will be implemented one time, only.

Accordingly, Feminine formation proceeds as usual, with its ingredients as in (16a). I, the Feminine marker, forms a cluster with the rightmost velar thus precluding branching of the following A, as shown in (16b). In addition, the leftmost instance of <u>k</u> inherits palatalization without replicating the structural syntagmatic properties of the configuration of which it is merely the exact phonetic image. In other words, {k I} is a cluster, whereas k^{y} occupies no more space than a single segment. As such, it does not cause shortening of the following A.

(16) a.



b.



Interesting confirmation of the operation of the Image Principle – specifically of the differential representation of the two instances of palatalization in (16b) – can be adduced from the behavior of quadriliterals from reduplicated biradicals of the coronal-initial and a–final persuasion. Examples appear in (17).

(17)	Root	Gloss	Imp.ms.	Imp.fem.
	√sA	be lean, skinny	sasa	šašä
	√tA	braid into a rope	tata	cacä
	√TA[8]	talk loudly, pop	ɨnTaTa	ɨnCaCä
			anTaTa	anCaCä
	√zA	act mad	zaza	žažä

Feminine formation proceeds essentially as for [k^{y}ak^{y}ä], as shown below in (18), with similar cooccurrence of palatalization and long a in the first half of the form, viz. šašä, cacä, etc.

(18) a.

```
C V C V C V C V
 \ \  /  |  \  /
 s  A  s  A  +  I
    \     /
      sA
```

b.

```
C V C V C V C V
 \ \  /   \  |  |
 š  A  {s  I} A
    \     /
      sA
```

However, [šašä], [cacä], and the rest of the feminines of (17) provide important additional support for the alleged differential nature of the two instances of palatalization exhibited by those forms. Indeed, reduplicated biradicals involving coronals allow us to observe a striking departure from the general pattern. The reader will recall an interesting distinction between the fate of a root-internal, and a root-initial coronal, in the context of feminine formation: a root-internal coronal "palatalizes" smoothly, whereas a root-initial coronal consistently resists palatalization. The facts are repeated in (19) for convenience.

(19) SUCCESSFUL PALATALIZATION OF ROOT-INTERNAL CORONAL

	Root	Imp.ms.	Imp.fem.
a.	√qTA	qɨTa	qɨCä
b.	√xdA	xɨda	xɨjä

RESISTANCE TO ROOT-INITIAL CORONAL PALATALIZATION

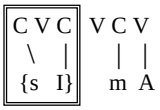
	Root	Imp.ms.	Imp.fem.
c.	√smA	sɨma	simä / *šɨmä
d.	√dfA	dɨfa	difä / *jɨfä

In contradistinction with the facts just recalled, [šašä], [cacä] and the forms of (17), display initial palatalization in violation of what appears to be a well-established generalization. This departure from the general pattern can now be rationalized in terms of the Image Principle: the impossible root-initial palatalized coronal has the form of the boxed portion of (20a), repeated from

[8] This root is attested in the n+ and an+ stems, only. Again, see Petros & Prunet (1994) for valuable discussion of such stems.

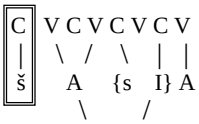
(10a); whereas the initial š of [šašä], boxed in (20b), being the mere phonetic image of the cluster configuration to its right, is not barred from appearing in root-initial position; neither does it interfer with the branching of A.

(20) a.



*[šɨmä]

b.



sA

7. Concluding remarks.

Two observations are in order in the concluding section of this note. The first observation has to do with the vocalism of the forms under discussion in the preceding section: if the initial s of [šašä] is monosegmental as argued above, it cannot be expected to cause shortening of the following a; on the other hand, shortening of the leftmost a might have been expected for another reason: a might have shortened to conform to the realization of the segment of which it is the image, viz. the rightmost a. However, another careful look at (20b) will bring out the crucial difference between the fates of the rightmost s and the rightmost a of [sasa] when acted upon by Feminine formation: the rightmost coronal has become part of a new configuration (enclosed in curly brackets) at the segmental level; whereas no such new segmental configuration is formed (hence transmitted) in the case of the rightmost a. The second observation has to do with the status of the operation whereby the initial coronal has become a monosegmental palatoalveolar in order to remain the faithful phonetic image of the segment directly affected by Feminine formation. Space limitations will only make it possible to raise the question: is such an operation structure preserving in the sense of classical phonemic analysis ? That is, is a possible segmental image in a given language necessarily a member of the set of "underlying" segments of that language ?[9]

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[9] See Lowenstamm (in preparation) for a positive answer to this question, including reappraisal of the famous “OCP examples” of across-the-board palatalization in deaf verbs in McCarthy's seminal 1983 paper, such as ms. sdd/fem. sjj "drive cattle" from √sd.

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