

Sequential Constraints on Geminate Verbal Roots in Arabic*

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Abstract

In this article the co-occurrence restrictions on the distribution of radicals in geminate verbal roots in Arabic are dealt with in some detail, taking into consideration both the place and manner of articulation of the consonants composing the root. It is concluded that such roots are better treated as biliteral, rather than triliteral, due to the parallelism between the constraints on the distribution of consonants in the first two positions in triliteral non-geminate verbal roots.

1. Introduction

Greenberg's (1950)¹ fundamental study of the patterning of trilateral verbal root morphemes in the Semitic languages, Classical Arabic (CA) in particular, provides researchers with a thorough statistical analysis of the distribution of consonants in the three root positions and the co-occurrence restrictions holding among root consonants in the first and second, first and third, and second and third positions. It has pointed out, among other things, that adjacent identical consonants are possible only in the second and third positions. Thus, verbs like ?amma (root = ?-m-m) 'to lead (s.o.) in prayer' and ba33a (root = b-3-3) 'to spread' occur in Arabic, whereas verbs having identical consonants in the first and second root positions do not occur.²

In this article I do something along the same line of investigation, but I focus on a dialect of Arabic that is generally referred to as Modern Standard Arabic (MSA). It is assumed here that the co-occurrence restrictions on the distribution of consonants in the verbal root in CA, as described in Greenberg (1950), are still applicable, but not necessarily 100%, to MSA. I, therefore, do not intend to duplicate Greenberg's statistical analysis here. Rather, I will try to complement that analysis by considering a subset of verbal roots, the so-called 'geminate' or 'doubled' roots, in which the second and third root positions are occupied by the same consonant, in an attempt to uncover the co-occurrence restrictions existing between the consonant occupying the first root position and that in the second and third root positions. The paper will further address the questions of whether geminate verbal roots are trilateral or biliteral, and how they are to be represented in the lexicon.

The data for this study comes from a number of sources that can be considered as representatives of the variety of Arabic under investigation. Three main works were consulted: Anis et al (1972)³, Wehr (1974)⁴, and Baalbaki (1991)⁵. Only data common to these sources was considered, in an attempt to limit the scope of the paper to MSA. Consequently, a total of 293 geminate verbal roots were subjected to the statistical analyses presented in the following sections. (A complete list of these roots is found in the Appendix).

Table 1 below, summarizes all existing combinations of consonants in geminate roots.⁶ The rows refer to the consonants occupying the first root position, and the columns to the geminate consonants occupying the second and third root positions. For ease of reference, I will refer to the first root position as the first part, and to the second and third root positions as the second part, of the geminate root.

Table 1: Co-occurrence of consonants in positions I and II of geminate roots

1/2	b	m	f	3	Z	C	t	T	d	D	s	S	z	i	n	r	\$	j	y	k	x	G	w	q	H	9	h	?
b	-	-	-	+	+	+	+	-	+	-	+	+	+	+	+	+	+	+	-	+	-	-	-	+	-	-	-	
m	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	
f	-	+	-	-	-	-	+	-	-	+	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Z	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
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i	+	+	+	-	+	-	+	-	+	-	-	+	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	
n	-	+	+	-	-	-	+	-	+	+	-	+	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	
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\$	+	+	+	-	-	-	+	-	+	+	-	+	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	
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?	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

The distribution of consonants in the two parts of the geminate root is not arbitrary. A close examination of Table 1 shows that this distribution is governed by some constraints pertaining to the place and to the manner of articulation of consonants occupying the two parts of the geminate root. One of the generalizations which can be made at this point is that identical consonants do not co-occur in the two parts of the geminate root. This is also applicable to positions I and II of non-geminate verbal roots in both CA (Greenberg: 433) and MSA (see Table 3 below).⁷

The place and manner of articulation constraints on geminate roots are presented in sections 2 and 3, respectively. In section 4 an attempt is made to answer the two questions raised above in light of the findings of the preceding sections. Throughout the study a comparison is made between the constraints on geminate roots and those on positions I and II, on the one hand, and I and III, on the other, of non-geminate verbal roots in MSA.

2. Place-of-articulation constraints

Table 2 below, gives a summary of all occurring combinations of consonants in parts I and II of the geminate root. The cover symbols B, LD, DL, A, AP, P, V, U, PH and GL are used to stand for the following places of articulation, respectively: bilabial, labiodental, dental, alveolar, alveopalatal, palatal, velar, uvular, pharyngeal, and glottal.

Table 2: Frequency of Consonant Clusters in Geminate Roots

	B	LD	DL	A	AP	P	V	U	PH	GL
B	0	0	3	18	4	0	1	1	1	0
LD	1	0	0	7	2	0	2	0	1	0
DL	2	0	0	5	1	0	0	0	0	0
A	18	9	3	36	7	1	9	5	4	0
AP	4	2	3	13	2	0	3	1	2	0
P	1	0	0	0	0	0	0	0	0	0
V	6	3	4	27	3	1	0	0	1	0
U	2	1	1	10	1	0	0	0	1	0
PH	4	2	3	18	4	2	2	2	0	0
GL	4	2	1	11	3	0	0	0	1	1

This table shows that sequences of consonants having the same place of articulation in the two parts of the root are not common; only A-A, AP-AP, and GL-GL sequences of consonants are found. The sequences B-LD, and LD-DL, and vice versa, do not occur either, except for LD-B, since they share the same articulator and the same place of articulation, respectively. This conclusion is in

line with one of Greenberg's generalizations concerning the distribution of consonants in positions I and II of trilateral non-geminate verbal roots in CA, where homorganic consonants are excluded (p. 431).

Although the sequence A-A is possible in the two parts of the geminate root, a close examination of Table 1 above, reveals that the two consonants differ, in general, in their manner of articulation. The consonant /T/, for instance, co-occurs only with the sonorants /n/, /l/, and /r/; /d/ co-occurs only with the fricative /s/ and the sonorants /n/, /l/, and /r/; /s/ co-occurs only with the stop /d/ and the sonorants /n/, /l/, and /r/; /z/ co-occurs only with the stop /t/ and the sonorants /n/, /l/, and /r/; and /S/ co-occurs only with the stop /d/ and the sonorants /l/ and /r/. The only exception to this generalization is the stop /D/ which co-occurs with the stop /d/ in Daadda 'to be opposed to' in addition to the sonorants /n/, /l/, and /r/. The sonorants /n/, /l/, and /r/, on the other hand, co-occur only with obstruents, except for /r/ which also co-occurs with /n/ in ranna 'to ring'.

The distribution of the three consonants /n/, /l/, and /r/ in the Arabic verbal root, as observed above, is noteworthy and may suggest a unified manner of articulation for them. In fact, they are treated as a natural class of liquids in Greenberg (p. 441), and the MSA data examined in this article may be used as further evidence for this unified treatment.

The sequence AP-AP in the geminate root is possible provided the two consonants are not identical, as mentioned above. Therefore, only \$-j and j-\$ occur, as in \$ajja 'to break' and Ja\$\$a 'to grind'.

Table 2 also shows that the second part of the root may not be occupied by a glottal consonant, the only exception being ?-h in ?ahha 'to moan, sigh, groan', and that when the first part is occupied by the palatal /y/, the second part is occupied only by the bilabial /m/.

It is worth noting here that the place-of-articulation constraints on the distribution of consonants in the two parts of the geminate root are comparable to similar constraints on the distribution of consonants in positions I and II of trilateral non-geminate verbal roots in MSA. For purposes of this comparison, all occurring combinations of consonants in positions I and II of trilateral non-geminate verbal roots were collected⁸. These are summarized in Table 3 below.

Table 3: Distribution of consonants in positions I and II of trilateral non-geminate verbal roots

1/2	b	m	f	3	Z	C	t	T	d	D	s	S	z	I	n	r	\$	j	y	k	x	G	w	q	H	9	h	?
b	-	-	-	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
m	-	-	-	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
f	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Z	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
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I	+	+	+	+	+	+	-	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
n	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
r	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
\$	+	+	+	-	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
j	+	+	+	+	+	-	+	-	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
y	+	+	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
k	+	+	+	+	+	+	+	-	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
x	+	+	+	+	+	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
G	+	+	+	+	+	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
w	+	+	+	+	+	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
q	+	+	+	-	-	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
H	+	+	+	+	+	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
9	+	+	+	+	+	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
h	+	+	+	-	-	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
?	+	+	+	+	+	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	

A close examination of this table shows that the distribution of consonants in positions I and II of non-geminate roots in MSA is comparable to that in CA, on the one hand, and to that in the two parts of the geminate root in MSA, on the other. First, there are no roots having identical consonants in positions I and II, except for d-d-y in daadaa 'to pamper, spoil (a child), (cf. Greenberg: 436). Second, consonants having the same place of articulation are not frequent in positions I and II. The following sequences do not occur at all: B-B, LD-LD, DL-DL, P-P, V-V, and Ph-PH.⁹ In the case of the non-sonorant alveolar consonants, the A-A sequences do not, in general, occur; there are, however, some exceptions, which are: d-d (1 example), d-s (2 examples), D-d (1 example), s-t (2 examples), s-T (5 examples), s-d (6 examples), and S-d (8 examples).

We notice here, as in the case of the occurring A-A sequences in the geminate root, that the two consonants, except for d-d and D-d, differ in their manner of articulation, a stop in the first position followed by a fricative, or vice versa.

As for the sonorant alveolars (/n/, /l/, and /r/), the A-A sequences in positions I and II of the non-geminate root do not occur, except for the sequence r-n (4 examples). Again, the parallelism between the behavior of this class of sounds in geminate and non-geminate roots in MSA, on the one hand, and its behavior in non-geminate roots in MSA and CA, on the other, is obvious (cf. Greenberg: 441). This conclusion may further support Greenberg's unified treatment of /n/, /l/, and /r/ as a natural class of liquids.

In the case of GL-GL sequences, only ?-h occurs in two roots, ?-h-b and ?-h-l (cf. Greenberg: 437).

Third, consonants having close places of articulation are also not very frequent in positions I and II of trilateral non-geminate verbal roots in MSA. The following sequences do not occur at all: B-LD, LD-B, P-AP, and P-V. The sequence DL-A occurs only when the second consonant is one of the sonorants /n/, /l/, or /r/. The same observation applies to the opposite sequence A-DL, with the exception of d-3 in the single root d-3-r 'to become obsolete'. This is in line with one of Greenberg's general conclusions, namely the tendency for consonants in CA not to occur in the same root if they belong to the same class (back consonants, liquids, front consonants, or labials) (p. 449).

The place-of-articulation constraints on the distribution of consonants in the two parts of the geminate root, on the other hand, are less related to constraints on consonants occupying positions I and III of trilateral non-geminate roots. As mentioned in Greenberg, patterning is far less rigorous in this case. In Arabic it breaks down almost completely, (p. 442). This is, of course, expected since the two consonants are not adjacent.

Table 4 below, displays all existing combinations of consonants in positions I and III of trilateral non-geminate verbal roots in MSA.¹⁰

Table 4: Distribution of consonants in positions I and II of trilateral non-geminate verbal roots

1/3	b	m	f	3	Z	C	t	T	d	D	s	S	z	l	n	r	\$	j	y	k	x	G	w	q	H	9	h	?
b	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
m	-	-	-	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
f	-	+	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Z	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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T	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
d	+	+	+	+	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
D	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
s	+	+	+	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
S	+	+	+	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
z	+	+	+	-	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
l	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
n	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
r	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
\$	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
j	+	+	+	+	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
y	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
k	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
x	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
G	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
w	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
q	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
H	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
9	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
h	+	+	+	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
?	+	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

This table shows, among other things, that identical consonants are possible in both positions, as in the following examples: bawwaba (root = b-w-b) 'to classify', 3alla3a (root = 3-1-3) 'to triple', darida (root = d-r-d) 'to become toothless', and salisa (root = s-1-s) 'to become smooth'. Homorganic consonants are also more frequent in these positions, as in the following examples: barama (root = b-r-m) 'to twist', Tarada (root = T-r-d) 'to dismiss', DaGaTa (root = D-G-T) 'to press', lawwana (root = l-w-n) 'to color', raHala (root = r-H-l) 'to depart', kamaxa (root = k-m-x) 'to be haughty', hada?a (root = h-d-?) 'to be quiet', and ?ahaba (root = ?-h-b) 'to pay attention', among others.

To sum up, it can be seen that the place-of-articulation constraints on the co-occurrence of consonants in geminate roots are more closely related to constraints on the co-occurrence of consonants in positions I and II than to constraints on the co-occurrence of consonants in positions I and III of non-geminate roots in MSA.

3. Manner-of-articulation constraints

A close examination of Table 2 also reveals that there are some manner-of-articulation constraints on the distribution of consonants in the two parts of the geminate root in MSA. These are summarized below:

a) Stop + Stop

There are no sequences of stops having the same place of articulation or even a close one in the two parts of the geminate root. The following sequences of stops do not occur at all: B-B, A-A, V-V, V-U, U-U, and GL-GL. The only exception to this generalization is the sequence D-d in the word Daadda mentioned above. In addition, the glottal /ʔ/¹¹ does not occur in the second part of the geminate root regardless of the consonant in the first part. The stop + stop sequences occurring in the two parts of the geminate root are summarized in Table 5 below:

Table 5: Stop + Stop Clusters

	b	t	T	d	D	k	q	ʔ
b	-	+	-	+	-	-	+	-
t	+	-	-	-	-	+	-	-
T	+	-	-	-	-	-	+	-
d	+	-	-	-	-	+	+	-
D	+	-	-	+	-	-	-	-
k	+	+	-	+	+	-	-	-
q	+	+	+	+	+	-	-	-
ʔ	+	-	-	+	-	-	-	-

b) Stop + Fricative

There are generally no stop + fricative sequences having the same place of articulation, the only exceptions being d-s in *dassa* 'to insert' and ?-h in *?a hha* 'to moan, sigh, groan'. The sequences B-LD and U-V, which have close places of articulation, do not occur, either. Moreover, the fricatives /G/ and /h/ do not occur in the second part of the root regardless of the stop in the first part. The stop + fricative sequences occurring in the two parts of the geminate root are summarized in Table 6 below:

Table 6: Stop + Fricative Clusters

	f	ʒ	Z	C	s	S	z	\$	x	G	H	9	h
b	-	+	+	+	+	+	+	+	+	-	+	-	-
t	+	-	-	-	-	-	-	-	+	-	-	-	-
T	+	-	-	-	-	-	-	-	-	-	-	-	-
d	+	-	-	-	+	-	-	-	-	-	-	+	-
D	-	-	-	-	-	-	-	-	+	-	-	-	-
k	+	+	-	+	-	-	+	+	-	-	+	-	-
q	+	+	-	-	+	+	+	+	-	-	+	-	-
?	+	+	-	-	+	-	+	-	-	-	+	-	+

Of the remaining stop-initial sequences, nasals, liquids, and affricates generally occur in the second part of the root, whereas glides do not occur at all in this position.

c) Fricative + Stop

Table 7 below, summarizes all occurring fricative + stop sequences in the two parts of the geminate root:

Table 7: Fricative + Stop Clusters

	b	t	T	d	D	k	q	?
f	-	+	-	-	+	+	-	-
ʒ	-	-	-	-	-	-	-	-
Z	+	-	-	-	-	-	-	-
C	-	-	-	-	-	-	-	-
s	+	-	-	+	-	+	-	-
S	+	-	-	+	-	+	-	-
z	-	+	-	-	-	-	+	-
\$	+	+	+	+	-	+	+	-
x	+	-	+	+	+	-	-	-
G	+	+	+	+	+	-	-	-
H	+	+	+	+	+	+	+	-
9	+	-	-	+	+	+	+	-
h	+	-	-	+	+	-	-	-

This table shows that the labiodental /f/ does not co-occur with the bilabial stop /b/, the dental /ʒ/ and /C/ do not occur in the first part of the root regardless of the stop in the second part, and that the dental /Z/ co-occurs only with the stop /b/. The table also shows that the velar fricatives /x/ and /G/ and the glottal /h/ do not co-occur with the back stops /k/ and /q/. Moreover, the glottal /ʔ/ does not occur in the second part of the root regardless of the fricative in the first part.

d) Fricative + Fricative

There are more constraints on the co-occurrence of fricatives in the two parts of the geminate root, as shown in Table 8:

Table 8: Fricative + Fricative Clusters

	f	ʒ	Z	C	s	S	z	\$	x	G	H	9	h
f	-	-	-	-	-	+	+	+	+	-	+	-	-
ʒ	-	-	-	-	-	-	-	-	-	-	-	-	-
Z	-	-	-	-	-	-	-	-	-	-	-	-	-
C	-	-	-	-	-	-	-	-	-	-	-	-	-
s	+	-	-	-	-	-	-	-	-	-	+	-	-
S	+	-	-	-	-	-	-	-	-	-	+	-	-
z	+	-	-	-	-	-	-	-	-	-	-	-	-
\$	+	-	+	-	-	-	-	-	+	-	+	+	-
x	+	-	-	-	+	+	+	+	-	-	-	-	-
G	+	+	+	-	-	+	+	+	-	-	-	-	-
H	+	+	+	+	+	+	+	+	-	-	-	-	-
9	+	-	-	-	+	+	+	+	-	-	-	-	-
h	+	-	-	-	+	-	+	+	-	-	-	-	-

This table shows that the dental /ʒ/, /Z/ and /C/ do not occur in the first part of the root regardless of the fricative in the second part, and that /G/ and /h/ do not occur in the second part regardless of the fricative in the first. The table also shows that the following sequences do not co-occur in the two parts of the geminate root: A-DL, A-A, A -AP, A -V, A P-A, AP-AP, V-V, V-PH, PH-V, PH-PH, GL-D L, GL-V, and GL-PH. Most of these sequences have either the same place of articulation or a close one.

e) The remaining sequences of a fricative plus an affricate, a nasal, a liquid, or a glide do not seem to follow any general pattern. Some of these sequences occur in geminate roots while others do not.

f) The same generalization applies to the affricate /j/ when it is found in the first part of the geminate root: it co-occurs with the stop /d/, most fricatives, the nasals, and the liquids, but it does not co-occur with the glides /w/ and /y/.

g) The nasals and liquids do not co-occur with the glides, either, and only /m/ co-occurs with the liquids.

h) Glides in the first root position are the least frequent. The following sequences are the only ones encountered: w-d, w-z, w-n, and y-m.

i) Sibilant plus sibilant sequences in MSA geminate roots occur only when one part of the root is occupied by the affricate /j/ and the other by a fricative, as in *jazza* 'to shear off' and *jassa* 'to touch, feel', *tazajjaja* 'to vitrify', and *\$ajja* 'to split, cleave, fracture'.

j) Finally, no liquid plus liquid sequences are found in geminate roots in MSA.

Again, comparing these manner-of-articulation constraints to those on triliteral non-geminate roots reveals that the constraints on geminate roots are more similar to those on the first and second than on the first and third radicals of the non-geminate roots. For instance, it is mentioned above that there are no stops having the same place of articulation or even a close one in the two parts of the geminate root. In positions I and II of the non-geminate root we find only two examples of such sequences: d-d and D-d, whereas in positions I and III we find seven such sequences: b-b, T-d, d-d, d-D, D -T, D -d, and q-q. We have also seen that fricative sequences having the same place of articulation or even a close one, such as A-A, AP-A, AP-AP, and V-V, are not possible. The same is true of positions I and II of the non-geminate root, whereas in positions I and III the following sequences are found: s-s, \$-s, \$-S, \$-\$, and x-x. To mention another example, we have seen that liquid sequences do not occur in the two parts of the geminate root. Such sequences do not occur, either, in positions I and II of the non-geminate root, but in positions I and III we find the sequence r-1 in examples such as *ratila* 'to be regular', *rajila* 'to go on foot', and *raHala* 'to depart', among others.

4. Theoretical consequences

There is some disagreement among grammarians and linguists concerning the exact characterization of geminate roots as to whether they are triliteral or biliteral. Traditional grammarians such as Wright (1977)¹², treat such roots as being triliteral with identical second and third radicals, whereas more recent studies, such as McCarthy (1979)¹³, McCarthy and Prince (1990)¹⁴, and Moore (1990)¹⁵, consider these roots as biliteral.

We have seen that the constraints on the distribution of consonants in the two parts of the geminate root are more closely related to constraints on the co-occurrence of consonants in positions I and II rather than I and III of triliteral non-geminate roots. This means that the geminate consonants in the second part of the geminate root behave like the single consonant in the second, but

not the third, position of the trilateral non-geminate root. In other words, if we adopt the position that geminate roots are trilateral in which the second and third radicals are identical, we will expect the constraints on the co-occurrence of the first and second radicals, on the one hand, and the first and third radicals, on the other, to be comparable to the constraints on the co-occurrence of corresponding radicals in trilateral non-geminate roots. But since the constraints on geminate roots are more or less like those on the first two radicals of non-geminate roots, we conclude that such roots are better treated as biliteral rather than trilateral.

The following argument may be cited in favor of this conclusion. As mentioned earlier, Arabic does not allow identical consonants in positions I and II of trilateral roots. This applies to both the surface and underlying representations. But identical consonants are allowed, at least on the surface, in positions II and III of verbal roots. If we maintain the view that geminate verbs are underlyingly trilateral, the Arabic morphological system will be rendered asymmetrical, allowing geminate consonants at the end of the root but not at its beginning. But if we treat geminate verbs as underlyingly biliteral, symmetry in the system will be achieved at no heavy cost. We just follow McCarthy (1986: 208)¹⁶ in subjecting the Arabic roots to the Obligatory Contour Principle (OCP), restated below for convenience:

The Obligatory Contour Principle:

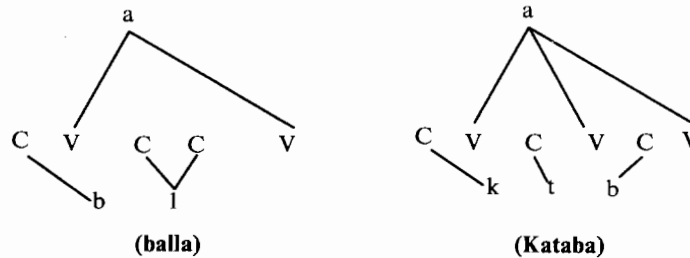
"At the melodic level, adjacent elements are prohibited."

To explain why geminate consonants appear on the surface at the end of the root, but not at its beginning, McCarthy points out that autosegmental spreading in Arabic should always be rightward. (For more details, see McCarthy 1986.)

The following question is raised at this point concerning the underlying representation of geminate roots: Why are these biliteral roots associated with three, rather than two, consonantal slots on the CV tier? This question may be placed within a more general approach towards the minimal and maximal structure of phonological and morphological constituents in Arabic. A number of proposals have been put forward regarding this issue. One of these is mentioned in Abu-Salim (1982: 84)¹⁷, stating that content words are minimally associated with a monosyllabic foot dominating a syllable with a branching rime. In McCarthy and Prince (1990) two other constraints are introduced concerning minimal and maximal structures in Arabic morphology. The first sets a lower limit in terms of feet and moras on the structure of the word or stem: each stem, or word, consists of at least a single foot, or two moras (p. 17). The second constraint, on the other hand, sets an upper limit in terms of syllables on the size of stems: stems consist of at most two syllables (p. 25).

Similar constraints may be proposed to delimit the structure of the verbal

root in Arabic. It can be said that, regardless of the number of radicals in the root, two, three, or four, the root is associated with a structure having a minimum of three consonantal slots on the CV tier. Consequently, a biliteral root such as b-1 'to moisten' and a trilateral root like k-t-b 'to write' will have the following representations within the autosegmental framework (McCarthy 1979):



This condition on minimal-root structure explains why geminate roots are associated with three, rather than two, consonantal slots on the CV tier, which, in turn, explains why such roots are realized with a long second radical that is viewed as being equal to two short ones.

By the same token, one can set an upper limit on the structure of the verbal root in terms of the number of consonantal slots on the CV tier it may be associated with. A quick look at the verb forms occurring in Arabic (see, for instance, McCarthy 1979: 244) reveals that biliteral and trilateral roots are associated with three consonantal slots on the CV tier in some forms, namely forms I, III, IV, VI, VII, VIII, X, and XV, and with four consonantal slots in the remaining forms, i.e., II, V, IX, XI, XII, XIII, and XIV, as in the following examples: Harra (root = H-r) 'to be hot', Hara3a (root = H-r-3) 'to plow', Hallala (root = H-l) 'to analyze', da99ama (root = d-9-m) 'to support', Haaraba (root = H-r-b) 'to fight', ?axbara (root = x-b-r) 'to inform', ta9allama (root = 9-l-m) 'to learn', tasaa?ala (root = s-?-l) 'to ask o.s.', ?infakka (root = f-k) 'to be separated', ?inkasara (root = k-s-r) 'to get broken', ?iltamma (root = l-m) 'to gather', ?iltahama (root = l-h-m) 'to devour', ?ilhaajja (root = l-h-j) 'to curdle', ?istamadda (root = m-d) 'to derive', and ?istalama (root = s-l-m) 'to receive', among others.

Quadrilateral roots, on the other hand, are associated with four consonantal slots in forms I, II, and III, and with five in form IV, as in the following examples: tarjama (root = t-r-j-m) 'to translate', tadaHraja (root = d-H-r-j) 'to roll down', ?islanTaHa (root = s-l-T-H) 'to be wide', and ?idlahamma (root = d-l-h-m) 'to be dark'.

It may be concluded then that the upper limit on the size of the verbal root is five consonantal slots on the CV tier. A general constraint on the minimal and maximal structure of the verbal root may, consequently, be formulated as follows:

Arabic verbal roots are associated minimally with three and maximally with five consonantal slots on the CV tier.

A final note on the percentage of the bi-, tri-, and quadriliteral verbal roots in MSA is in order. In Abu-Salim (ms.)¹⁸, where geminate verbs are treated as a subset of trilateral verbs, the total number of verbal roots was calculated to be 3321, among which 341 were quadriliteral and the remaining 2980 trilateral, including the geminate verbal roots. The appendix at the end of this paper includes 293 geminate verbal roots. When this number is subtracted from the total number of trilateral roots, we are left with 2687 trilateral verbal roots proper. Consequently, the number and percentage of the bi-, tri-, and quadriliteral verbal roots in MSA are as follows:

Root type	Number	Percentage
Bilateral	293	8.82%
Trilateral	2687	80.90%
Quadriliteral	341	10.26%
Total	3321	

5. Conclusion

An attempt has been made in this article to provide more insight into the internal structure of the verbal root in Arabic by considering the co-occurrence restrictions existing among the radicals composing the geminate verbal root. Such studies may be used to provide evidence for or against theoretical proposals made by grammarians and linguists concerning certain issues in the grammars of natural languages. We have seen that the findings of this article may be used to support the claim that geminate verbs in Arabic are basically bilateral rather than trilateral, and that roots are associated with a specific number of consonantal slots on the CV tier.

Notes

1. Greenberg, J., 1950. "The patterning of root morphemes in Semitic," Word 6, 162-181. Reprinted in Al-Ani, S. (ed.), 1978. **Readings in Arabic Linguistics**. Bloomington: Indiana University Linguistics Club.
2. Only one verb having identical consonants in the first and second root positions was found. This verb is daadaa (root = d-d-y) 'to pamper, spoil (a child)'.

3. Anis, I., A. Muntasir, A. Sawalhi, & M. Ahmad, 1972. **Al-Mu9jam Al-WaSiiT**, Parts I & II, 2nd edition. Cairo.
4. Wehr, H., 1974. **A Dictionary of Modern Written Arabic**. 3rd Edition, ed. by J. Milton Cowan. Wiesbaden: Otto Harrassowitz. Reprinted by Librairie du Liban.
5. Baalbaki, R., 1991. **Al-Mawrid: A Modern Arabic-English Dictionary**. Beirut: Dar El-Ilm Lilmalayin.
6. The special phonetic symbols used in this paper have the following correspondences:
 - 3 = voiceless interdental fricative
 - Z = voiced interdental fricative
 - C = the emphatic counterpart of /Z/
 - T = the emphatic counterpart of /t/
 - D = the emphatic counterpart of /d/
 - S = the emphatic counterpart of /s/
 - \$ = voiceless alveopalatal fricative
 - j = voiced alveopalatal affricate
 - G = voiced velar fricative
 - H = voiceless pharyngeal fricative
 - 9 = voiced pharyngeal fricative
 The other symbols are used as in the IPA.
7. Based on Wehr 1974.
8. Based on Wehr 1974.
9. Since the only labiodental sound is /f/ and the only palatal sound is /j/ in MSA, the non-occurrence of LD-LD and P-P sequences is also accounted for by the constraint on the non-occurrence of identical consonants in positions I and II of the non-geminate root. Some of the sequences mentioned in section 3 are also accounted for by the same constraint due to the fact that some categories are represented by single sounds. These are the bilabial stop /b/, velar stop /k/, uvular stop /q/, glottal stop /ʔ/, alveopalatal fricative /\$/ , and affricate /j/.
10. Based on Wehr 1974.
11. Here I am assuming that the glottal sound /ʔ/ is phonetically a stop, although phonological evidence presented in Abu-Salim (1988) shows that it is better treated phonologically as a glide. (Cf. Abu-Salim, I. 1988, "On the phonological status of /ʔ/ in Classical Arabic", *Al-Abhath* 36, 71-80).
12. Wright, W., 1977. **A Grammar of the Arabic Language**. Cambridge: Cambridge University Press.
13. McCarthy, J., 1979. **Formal Problems in Semitic Phonology and Morphology**. MIT. (Doctoral Dissertation).
14. McCarthy, J. & A. Prince, 1990. "Prosodic Morphology and Templatic Morphology." In Eid, M. & J. McCarthy (eds.), 1990. **Perspectives on Arabic Linguistics II. Current Issues in Linguistic Theory** 72. Amsterdam: John Benjamins, 1-54.
15. Moore, J., 1990. "Doubled Verbs in Modern Standard Arabic." In Eid & McCarthy, 55-93.
16. McCarthy, J., 1986. "OCP Effects: Gemination and Antigemination." *Linguistic Inquiry* 17, 207-263.
17. Abu-Salim, I., 1982. **A Reanalysis of Some Aspects of Arabic Phonology: a Metrical Approach**. University of Illinois at Urbana-Champaign. (Doctoral Dissertation.)
18. Abu-Salim, I. (ms.), "A Statistical Analysis of Verb Forms in Arabic." To appear in **Linguistica Communicatio**.

Appendix Geminate Verbal Roots in Arabic

	Root	Example	Gloss
1.	?b	?abba	- to long, yearn (for)
2.	?3	?a33a	- to be luxuriant (plant)
3.	?j	ta?aJJaja	- to burn, blaze
4.	?H	?aHHa	- to cough
5.	?d	?adda	- to befall, afflict
6.	?z	?azza	- to simmer; to hum, buzz
7.	?s	?assasa	- to found, establish
8.	?f	ta?affafa	- to grumble
9.	?m	?ammama	- to nationalize
10.	?n	?anna	- to groan, moan (at)
11.	?h	?ahha	- to moan, sigh, groan
12.	bt	?inbatta	- to be cut off, severed
13.	b3	ba33a	- to spread, scatter
14.	bj	bajja	- to cut open, slash open
15.	bH	?abaHHa	- to make hoarse
16.	bx	baxxa	- to snore
17.	bd	baddada	- to scatter, disperse
18.	bZ	baZZa	- to defeat, beat, overcome
19.	br	barra	- to be pious, reverent
20.	bz	bazza	- to bud, burgeon; to surpass
21.	bs	bassa	- to crumble
22.	b\$	ba\$\$a	- to display a friendly mien
23.	bS	baSSa	- to glow, glitter
24.	bC	baCCa	- to spout, gush out
25.	bq	baqqa	- to spout; to eject
26.	bl	?ibtalla	- to become wet
27.	bn	banna	- to stay in
28.	tb	tabba	- to perish
29.	tx	taxxa	- to become sour, ferment
30.	tf	taffa	- to spit
31.	tk	takka	- to tick (clock)
32.	tm	tamma	- to be completed
33.	3j	3ajja	- to flow copiously
34.	3l	3alla	- to tear down, overthrow
35.	jb	jabba	- to cancel, annul
36.	j3	?ijta33a	- to uproot

	Root	Example	Gloss
37.	jx	jaxxa	- to boast, brag
38.	jd	tajaddada	- to be renewed
39.	jZ	jaZZa	- to cut off, clip
40.	jr	?injarra	- to be pulled, drawn
41.	jz	jazza	- to cut off; to shear off
42.	js	tajassasa	- to spy (on)
43.	jS	ja\$\$a	- to grind, crush
44.	jS	jaSSaSa	- to plaster
45.	jf	jaffa	- to dry
46.	jl	jalla	- to be great, lofty
47.	jm	?istajamma	- to recreate, relax, rest
48.	jn	junna	- to become insane
49.	Hb	?aHabba	- to love, like
50.	Ht	Hatta	- to rub off
51.	H3	Ha33a	- to urge
52.	Hj	Haajja	- to argue (with)
53.	Hd	Hadda	- to sharpen; to delimit
54.	HZ	HaZZa	- to cut off; to chop off
55.	Hr	?a Harra	- to heat, warm
56.	Hz	taHazzaza	- to be notched, incised
57.	Hs	Hassa	- to feel
58.	H\$	Ha\$\$a	- to mow, cut
59.	HS	?aHaSSa	- to allot, allocate (to)
60.	HD	HaDDa	- to spur on, incite
61.	HT	?inHaTTa	- to sink, fall; to deteriorate
62.	HC	HaCCa	- to be lucky, fortunate
63.	Hf	Haffa	- to surround
64.	Hq	Haqqaqa	- to realize, achieve
65.	Hk	Hakka	- to rub, scratch
66.	HI	?iHtalla	- to occupy
67.	Hm	?istaHamma	- to bathe
68.	Hn	Hanna	- to long, yearn
69.	Hy	Hayya	- to live; to live to see
70.	xb	xabba	- to amble (animal)
71.	xd	xadda	- to furrow, plow (the ground)
72.	xr	xarra	- to murmur, gurgle; to snore
73.	xz	xazza	- to pierce, stab
74.	xs	xassa	- to be mean; to decrease
75.	x\$	xa\$\$a	- to enter

	Root	Example	Gloss
76.	xS	?ixtaSSa	- to specialize (in)
77.	xD	xaDDa	- to shake; to frighten
78.	xT	taxaTtaTa	- to be striped
79.	xf	?istaxaffa	- to find light
80.	xl	?axalla	- to break, breach
81.	xm	xamma	- to rot, putrify, decay
82.	xn	xanna	- to twang, speak nasally
83.	db	dabbaba	- to sharpen, point
84.	dj	tadajjaja	- to be heavily armed
85.	dr	darra	- to flow copiously
86.	ds	?indassa	- to slip (into)
87.	d9	da99a	- to rebuff, turn down
88.	df	daffa	- to flap the wings (bird)
89.	dq	?indaqqa	- to be pounded, ground, crushed
90.	dk	dakka	- to make flat, to destroy
91.	dl	dallala	- to pamper
92.	dm	damma	- to coat, smear
93.	dn	danna	- to buzz, hum; to drone
94.	Zb	Zabba	- to drive away, chase away
95.	Zr	Zarra	- to strew, scatter; to sprinkle
96.	Zl	?aZalla	- to degrade
97.	Zm	Zamma	- to blame, criticize
98.	rb	rabba	- to be master; to rule, govern
99.	r3	ra33a	- to be ragged, worn (clothes)
100.	rj	rajja	- to convulse, shake, rock
101.	rx	raxxa	- to mix with water, dilute
102.	rd	raddada	- to repeat, reiterate
103.	rZ	raZZa	- to spray, sprinkle; to drizzle
104.	rz	razza	- to insert
105.	r\$	ra\$\$a	- to spatter; to sprinkle
106.	rS	taraaSSa	- to compact, press together
107.	rD	?inraDDa	- to be bruised
108.	rf	raffa	- to flicker; to flap the wings
109.	rq	?istaraqqa	- to enslave
110.	rk	rakka	- to be weak, feeble
111.	rm	rammama	- to repair, overhaul
112.	rn	ranna	- to resound; to ring
113.	zt	zatta	- to throw
114.	zj	tazajjaja	- to vitrify

	Root	Example	Gloss
115.	zr	zarrara	- to button
116.	zf	zaffa	- to hurry; to conduct in solemn procession
117.	zq	zaqqa	- to feed its young (of a bird)
118.	zl	?azalla	- to stumble, trip
119.	zm	zamma	- to tie up, fasten
120.	zn	zanna	- to buzz, drone (insect)
121.	zy	tazayyaa	- to dress (in)
122.	sb	sabba	- to insult, call names
123.	sH	saHHa	- to flow down
124.	sd	?insadda	- to be blocked (up)
125.	sr	?asarra	- to hide, conceal
126.	sf	saffa	- to swallow, take
127.	sk	sakka	- to lock, bolt; to mint, coin
128.	sl	?istalla	- to unsheathe, draw, pull out
129.	sm	tasammama	- to be poisoned
130.	sn	sannana	- to indent, jag
131.	\$b	\$abba	- to grow up
132.	\$t	ta\$attata	- to scatter, disperse
133.	\$j	\$ajja	- to split, cleave, fracture
134.	\$H	\$aHHa	- to become short, run out
135.	\$x	\$axxa	- to urinate, piss
136.	\$d	?i\$stadda	- to intensify
137.	\$Z	\$aZZa	- to be irregular, be an exception
138.	\$r	\$arra	- to be bad, evil
139.	\$T	\$aTTa	- to deviate (from), digress
140.	\$9	?a\$a99a	- to radiate
141.	\$f	?i\$staffa	- to drink up, drain, empty
142.	\$q	?i\$staqqa	- to derive
143.	\$k	\$akka	- to pierce, to suspect
144.	\$l	\$alla	- to become crippled
145.	\$m	\$amma	- to smell
146.	\$n	\$anna	- to make a raid
147.	Sb	Sabba	- to pour
148.	SH	SaHHa	- to be healthy, to be all right
149.	Sd	Sadda	- to turn away, to prevent
150.	Sr	Sarra	- to chirp, to creak
151.	Sf	?i\$Staffa	- to line up, align
152.	Sk	?i\$Takka	- to chatter
153.	Sl	Salla	- to ring, clink, clatter



	Root	Example	Gloss
154.	Sm	taSamma	- to turn a deaf ear (to)
155.	Db	?aDabba	- to become foggy
156.	Dj	Dajja	- to be noisy
157.	Dx	Daxxa	- to spurt, spout; to pump
158.	Dd	taDaadda	- to contradict one another
159.	Dr	taDarrara	- to be damaged, harmed, injured
160.	Di	Dalla	- to go astray
161.	Dm	?inDamma	- to join
162.	Dn	Danna	- to be sparing or stingy
163.	Tb	?istaTabba	- to seek medical advice
164.	Tr	Tarra	- to sharpen; to sprout
165.	Tf	Taffa	- to make deficient or scanty
166.	Tq	Taqqa	- to crack, pop; to explode
167.	Tl	?aTalla	- to command, tower over; to appear
168.	Tm	Tamma	- to overflow, flood
169.	Tn	Tanna	- to ring, sound; to hum, buzz
170.	Cl	Calla	- to be (come); to continue to do
171.	Cn	Canna	- to think, believe
172.	9b	9abba	- to drink in large draughts
173.	9j	9ajja	- to cry, yell; to swarm (with)
174.	9d	?ista9adda	- to get ready
175.	9r	9arra	- to be a shame; to disgrace
176.	9z	9azzaza	- to reinforce
177.	9s	9assa	- to patrol by night
178.	9\$	9a\$\$a\$a	- to build a nest
179.	9S	9aSSa	- to become hard, harden
180.	9D	9aDDa	- to bite
181.	9f	9affa	- to refrain (from); to be chaste
182.	9q	9aqqq	- to cleave; to be disobedient
183.	9k	9akka	- to be sultry, muggy (day)
184.	9l	9allala	- to justify
185.	9m	9amma	- to become general; to comprise
186.	9n	9anna	- to present itself; to arise
187.	9y	9ayya	- to be incapable
188.	Gb	Gabba	- to visit at intervals
189.	Gt	Gatta	- to press, choke; to dip, plunge
190.	G3	Ga33a	- to be mean, meager; to fester
191.	GZ	GaZZa	- to fester, suppurate (wound)
192.	Gr	?istaGarra	- to take by surprise

	Root	Example	Gloss
193.	Gz	?aGazza	- to be thorny, prickly; to prick
194.	G\$	Ga\$\$a	- to deceive, cheat
195.	GS	?iGtaSSa	- to be overcrowded (with)
196.	GD	GaDDa	- to be fresh, tender; to lower
197.	GT	GaTTa	- to immerse; to snore
198.	Gf	Gaffa	- take unawares; to grab
199.	GI	?istaGalla	- to exploit
200.	Gm	?iGtamma	- to be grieved
201.	Gn	Ganna	- to speak through the nose
202.	Gy	Gayyaya	- to hoist (a flag)
203.	ft	tafattata	- to crumble, break up
204.	fj	?afajja	- to stride; to hurry
205.	fH	faHHa	- to hiss (snake), whistle (storm)
206.	fx	faxxaxa	- to booby-trap
207.	fr	farra	- to flee
208.	fz	?istafazza	- to provoke
209.	f\$	fa\$\$a	- to subside (swelling)
210.	fS	?iftaSSa	- to separate, detach
211.	fD	?infaDDa	- to be opened, unlocked
212.	fk	?infakka	- to be untied, unfastened
213.	fl	?infalla	- to blunt
214.	fm	tafammama	- to anastomose; to inoculate
215.	fn	fannana	- to diversify; to mix
216.	qb	qabbaba	- to dome
217.	qt	qatta	- to misrepresent; to lie
218.	q3	qa33a	- to pull out, uproot
219.	qH	qaHHa	- to cough
220.	qd	qaddada	- to slit
221.	qr	?istaqarra	- to settle down, abide
222.	qz	taqazzaza	- to be disgusted (of)
223.	qs	qassa	- to seek, pursue
224.	q\$	qa\$\$a	- to collect, gather (up)
225.	qS	?iqtaSSa	- to avenge oneself (on)
226.	qD	?aqaDDa	- to deprive (of sleep)
227.	qT	qaTTa	- to carve; to sharpen
228.	qf	qaffa	- to be dry; to wither; to shrink
229.	ql	qalla	- to become less
230.	qm	qamma	- to sweep
231.	qn	qannana	- to legislate; to ration

	Root	Example	Gloss
232.	kb	?inkabba	- to devote o.s. energetically (to)
233.	kt	katta	- to hum softly
234.	k3	ka33a	- to be thick or dense
235.	kH	kaHHa	- to cough
236.	kd	kadda	- to work hard
237.	kr	takarrara	- to recur, reoccur, be repeated
238.	kz	kazzaza	- to tetanize
239.	k\$	ka\$\$a	- to recoil (from)
240.	kD	kaDDa	- to be replete
241.	kC	?iktaCCa	- to be overcrowded
242.	kf	?istakaffa	- to beg
243.	kl	takallala	- to be crowned
244.	km	kammama	- to muzzle
245.	kn	?akanna	- to hide, conceal; to shelter
246.	lb	labba	- to remain, stay; to be sensible
247.	lt	latta	- to pound, bray; to knead
248.	lj	?iltajja	- to rage, surge, (sea)
249.	lH	?alaHHa	- to insist (on)
250.	ld	taladdada	- to turn right and left
251.	lZ	laZZa	- to be sweet, delicious
252.	lz	?iltazza	- to compact, press together
253.	lS	talaSaSa	- to become a thief
254.	lf	?iltaffa	- to wind, coil
255.	lk	lakka	- to hit with the fist, to cuff
256.	lm	lamma	- to gather, collect
257.	mt	matta	- to spread, stretch, extend
258.	mj	majja	- to spit out, to reject
259.	md	?imtadda	- to extend, expand
260.	mr	?istamarra	- to continue, last
261.	mz	?imtazza	- to adsorb
262.	ms	tamaassa	- to be adjacent
263.	m\$	ma\$\$a	- to suck the marrow (from a bone)
264.	mS	?imtaSSa	- to absorb, to suck up
265.	mD	?amaDDa	- to pain, hurt; to torment
266.	mT	tamaTTaTa	- to stretch, extend, expand
267.	ml	malla	- to become bored, fed-up
268.	mn	manna	- to be kind, to do a favor
269.	nd	nadda	- to run away, to slip out
270.	nz	nazza	- to seep, trickle; to vibrate

	Root	Example	Gloss
271.	n\$	na\$\$a	- to sizzle, to drive away flies
272.	nS	naSSa	- to specify, to stipulate
273.	nD	naDDa	- to ripple, drip
274.	nT	naTTa	- to spring, jump
275.	nf	naffa	- to snuff
276.	nq	naqqa	- to croak (frog), to cluck (hen)
277.	nm	namma	- to betray, to sow dissension
278.	hb	habba	- to start moving; to rise
279.	hj	hajja	- to be on fire; to be ablaze
280.	hd	?inghadda	- to be demolished
281.	hr	harra	- to growl, to whimper, whine
282.	hz	?ihtazza	- to shake, tremble
283.	hs	hassa	- to whisper
284.	h\$	ha\$\$a	- to be crisp, to drive away
285.	hD	haDDa	- to walk fast, move briskly
286.	hf	haffa	- to pass swiftly, to blow (wind)
287.	hl	?istahalla	- to begin, start
288.	hm	?ihtamma	- to be concerned (about)
289.	hn	hanna	- to weep, sigh; to long (for)
290.	wd	tawaadda	- to like each other
291.	wz	wazza	- to incite, set against
292.	wn	wanna	- to buzz, hum (bee)
293.	ym	yammana	- to direct, turn

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