An Optimality-theoretic Approach to Weight of Superheavy Syllables in Qassimi Arabic

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Abstract

The ultimate purpose of this paper is to investigate the distribution of superheavy syllables (i.e. CVVC and CVCC) in Qassimi Arabic (QA), a sub-dialect of Najdi Arabic, which is mainly spoken in central Saudi Arabia, particularly, in the cities of Qassim Region. In order to do this, an Optimality-theoretic account is used to account for the moraic structures of these superheavy syllables. In general, the study finds out that CVVC and CVCC are both allowed to surface in Qassimi Arabic in final and non-final positions. Furthermore, using mora-sharing analysis (Broselow 1992; Broselow et al. 1995 and 1997; Watson 2007), the study observes the occurrence of CVVC and CVCC both in word-finally and word-internally. In particular, the study maintains that by proposing the dominant of (MORAICCODA) constraint over (FINAL-C-μ) constraint, the analysis of mora-sharing is superior to that of extrametricality. Thus, the paper suggests that the notion that all coda consonants in Arabic are moraic, including the last consonants of final-CVC syllables (Broselow et al. 1997).

Keywords: MORAICCODA, mora-sharing, Qassimi Arabic, superheavy syllables

1. Introduction

The current paper investigates the distribution and weight of superheavy syllables in Qassimi Arabic (henceforth, QA), a sub-dialect of Najdi Arabic spoken in the cities of Qassim Region. This region is located in the central of Saudi Arabia. Qassim is 220 miles from Riyadh and has a population of around 1,009,543 people. QA is distinct from both Modern Standard Arabic (MSA) and Classical Arabic (CA) (Note 1). Analyzing the distribution of superheavy syllables in Arabic dialects has received much attention for the past two decades (Broselow 1992; Broselow *et al*. 1995 and 1997; Abu-Mansour 1992; Farwaneh 1992 and 1995; Almohana 1994; Watson 2007; Kiparsky 2003; Bamakhramah 2009; among others). The main results obtained from the previous studies have shown that most Arabic dialects permit the occurrence of final superheavy syllables. However, these studies have found that the Arabic dialects differ in allowing non-final superheavy syllables. For instance, Abu-Mansour (1992) noted that non-final superheavy syllables are prohibited in Meccan Arabic, and vowel epenthesis is utilized to block the potential occurrence of non-final-CVVC syllables. Likewise, Broselow (1992) found that speakers of Lower Egypt tend to shorten long vowels in internal-CVVC syllables, which results in preventing non-final-CVVC syllables from the surface. On the other hand, Broselow *et al.* (1995) found that a range of Arabic dialects allow CVVC to occur word-internally (for example, Sudanese, Iraqi, Syrian, Lebanese). It is noteworthy to mention that internal-CVVC syllables are more likely to occur in most Arabic verities in comparison to internal-CVCC syllables, which are usually avoided by vowel epenthesis between the final consonants (Farwaneh 1992; Broselow 1992; Broselow *et al*. 1995).

However, the controversial matter attracting most scholars is the treatment of non-final superheavy syllables in terms of their moraic structures. Almost all researchers have agreed that internal-CVVC and CVCC syllables constitute two moras (Broselow 1992; Kiparsky 2003; Watson 2002 and 2007). This argument is attributed to the assumption that stress position in most Arabic dialects depends mainly on the weight of the syllables, i.e. the heavy syllable attracts stress. However, heavy syllables are bi-moraic (not more). This means that Arabic exhibits ‘a [two]-way distinction [monomoraic and bimoraic] in syllable weight’ (Broselow *et al.* 1995: 120). Thus, it is not necessary to analyze non-final superheavy syllables as trimoraic.

In order to account for bimoracity, last consonants (Cs) in CVVC and CVCC need to be excluded from contributing to the weight to syllables. In fact, the previous studies differ in the treatment of the last consonants in final and non-final CVVC and CVCC in terms of their moraic structures. First, the last consonants in final CVVC and CVCC are treated as extrasyllabics (adjoined to prosodic words, Kenstowicz 1994; Kiparsky 2003); as extrametricals (adjoined to syllable nodes, McCarthy and Prince 1990); and as degenerate syllables (unfilled segments, Selkirk 1981; Farwaneh 1995). Second, last Cs in non-final CVVC and CVCC are analyzed as semisyllables (unsyllabified moras, Kiparsky 2003) or as mora-sharing (the last C adjoins to the preceding mora, Broselow 1992; Broselow *et al*. 1995 and 1997; Watson 2007). In fact, Broselow *et al* (1997) hold the view that mora-sharing solution applies to last Cs in final and non-final CVVC and CVCC. This view is based mainly on a phonetic fact showing that all coda consonants should be dominated by a mora.

In this paper, we demonstrate that CVVC and CVCC surface finally and non-finally in QA. Furthermore, we support the pervasive argument that most Arabic dialects have maximally bimoraic syllables (cf. Broselow 1992). Finally, by adopting Broselow's (1992) notion of Adjunction-to-Mora and by assuming that all coda consonants in Arabic should be linked to moras (Broselow *et al.* 1997), we argue that final consonants of superheavy syllables (whether occur finally or non-finally) are adjoined to the preceding mora, not to the syllable node nor the prosodic word, an argument that has not been supported sufficiently in the previous research.

The paper comprises five sections, including this section (introduction). Section (2) introduces a brief sketch about the syllable patterns of QA. Section (3) elaborates on the distribution of superheavy syllables in QA and examines syllable weight in QA; while section (4) goes in depth to analyze the data through the framework of Optimality Theory. The conclusion is presented in section (5).

2. Syllable patterns in QA

In terms of the syllable structure, QA has six different syllable patterns as shown in pattern (1):

(1) Examples of syllable patterns in QA:

a- CV [**<u>ki</u>**.tab] 'he wrote'

b- CVC [ki.**tab**] 'he wrote'

c- CVV [**kaa**.tib] (Note 2) 'writer'

d- CVVC [**raaħ**] 'he went'

e- CVCC [**bint**] 'daughter'

f- CCVVC [**ktaab**] 'book'

According to the syllable patterns in (1), the syllables in QA must contain onsets, and initial-vowels are not permitted at all. Moreover, complex onset clusters are not preferable; however, they do occur in specific environments, for instance, as a result of deleting short vowel /i/ when occurred in open unstressed syllable position, as in (1f) /*kita:b*/ > [*kta:b*] 'book' (Ingham 1994). Furthermore, complex codas are allowed within the constraint of Sonority Sequencing Principle (SSP), as in (1e). Finally, two syllables could occur everywhere in the word: CV and CVC, while CVV does not occur finally.

It is obvious from syllable patterns in (1) that QA exhibits three weights of syllables: light (CV), heavy (CVV and CVC), and superheavy (CVVC and CVCC). However, according to the moraic structure of these syllable patterns, their weight is different, as explained in the following sub-section.

3. Distribution of Superheavy Syllables in QA (Note 3)

QA exhibits superheavy syllables in the following environments: (i) at final positions of the words as in (2a), and before consonant-initial suffixes as in (2b).

(2) a) superheavy syllables in word-final positions:

[gilt] 'I said', [raaħ] 'he went', [kɪ.**tabt**] 'I wrote', [kaat.**biin**] 'they.MAS wrote'

b) superheavy syllables before consonant-initial suffixes:

/**ʃaaf** + na/ → [ʃaaf.na] 'he saw us'

/**bint** + na/ → [bint.na] 'our daughter'

Typically, consonant-initial suffixes do retain the occurrence of non-final CVVC or CVCC. Therefore, we contend that the occurrence of CVVC or CVCC in QA is ad hoc to two cases, namely, domain-finally and before consonant-initial suffixes. Moreover, the occurrence of final superheavy syllables CVCC is permissible in QA if obeying SSP, which poses restrictions on the sonority profile in both onset and coda clusters as in [ka.t́abt] 'I wrote'. In the following section, the light will be shed on the weight of these CVVC and CVCC syllables based on the moraic theory.

3.1 Syllable Weight in QA and Relevant Constraints

Mora has been proposed as a weight unit to determine syllable weight. Following moraic structure, only nucleus and codas contribute to mora; onsets do not (Hyman 1985, McCarthy and Prince 1986, Hayes 1989, Broselow 1995). Furthermore, short vowels project one mora and long vowels project two moras. This argument agrees with the syllable building rules proposed by Broselow (1992), who argues that onsets are nonmoraic since they are already daughters of the syllable nodes, while codas constitute moras because they are dominated by mora-levels. Given this basic notion about moraic theory, in this section, we discuss the moraic structure of final and non-final superheavy syllables of QA.

QA is a quantity-sensitive dialect that relies on the heaviness of the syllables to determine stress assignment and therefore position (like CA, McCarthy 1979). Consequently, QA exhibits three different kinds of syllables: light (CV), heavy (CVV or CVC) and superheavy (CVVC or CVCC). We argue that stress position in QA plays a major role in determining the number of moras available in final and non-final superheavy syllables. Following the representation of mora suggested by Hayes (1989), he argued that onsets are projected by the syllable nodes whilst nucleus and codas are projected by moras.

Stress falls finally in QA if the word ends with CVVC or CVCC. Otherwise, the rightmost heaviest syllables always attract stress as shown in (3a-n). In the absence of heavy syllables, stress falls on the penultimate syllables in disyllabic words as in (3o); otherwise, the antepenultimates are stressed as exemplified in (3p).

3.2 Stress on Superheavy Syllables

(3) a) [kaat.b́iin] 'they.MAS wrote'

b) [kaat.b́aat] 'they.FEM wrote'

c) [ka.t́abt] 'I wrote'

d) [t́ˤaab.ʕah] 'printer'

e) [kaa.t́abt.hum] 'I wrote them.MAS'

3.3 Stress on Non-Final Heavy Syllables:

f) [tˤaab.ʕ á́a.tah] 'her printers'

g) [kaat.b́at.hum] 'she wrote them.MAS'

h) [ka.t́ab.tu] 'you.MAS wrote'

i) [ḿan.zi.li] 'my home'

j) [ka.tab.t́ii.hin] 'you.FEM wrote them'

k) [ki.t́aa.bi] 'my book'

l) [ŕaa.si] 'my head'

m) [śaa.ma.ħuh] 'he forgave him'

n) [si.jaa.ŕaa.tuh] 'his cars'

3.4 Stress on Light Syllables

o) [ḱi.tab] 'he wrote'

p) [ḱu.tu.bi] 'my books'

Determining the stress of QA was also confirmed acoustically by using Praat Software. The duration, intensity and pitch values of the stress syllable were assigned via waveform analysis in which we calculate the average measurements taken from five adult native speakers of QA as indicated in figures 1 and 2.

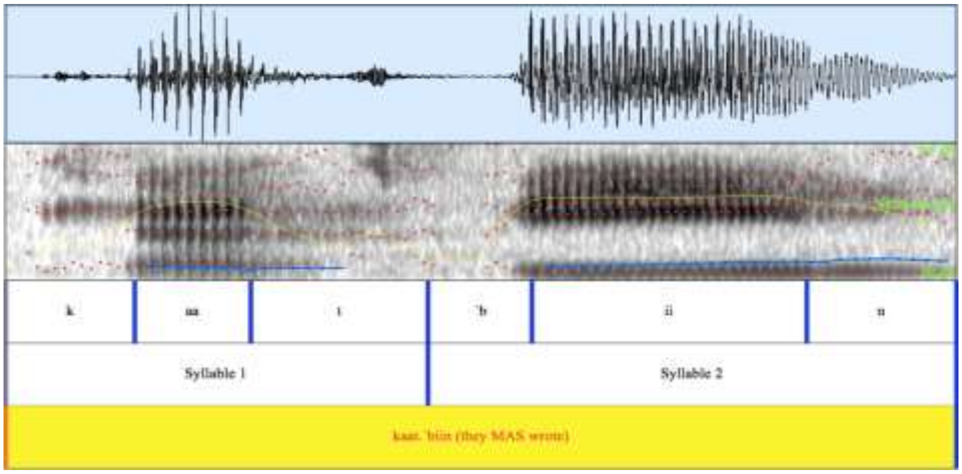


Figure 1. Spectrogram of stressed and unstressed syllables in the word *kaat.b́iin* in QA

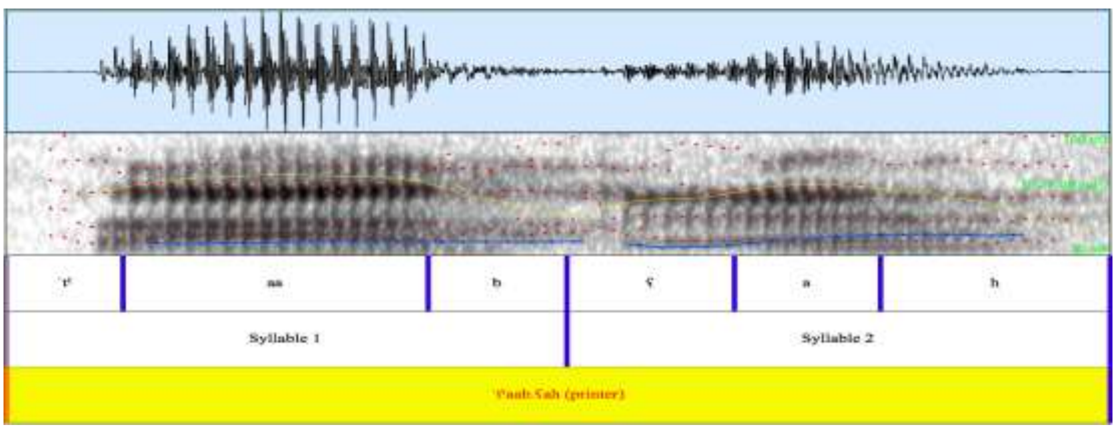


Figure 2. Spectrogram of stressed and unstressed syllables in the word *t́ˤaab.ʕah* in QA

From acoustic perspective, there are three common acoustic cues that are related to the classification of stress. These cues include the duration of the syllable as measured in (ms), overall of loudness/intensity of the syllable as measured in dB (decibels), and the pitch (F0) as measured in (Hertz) (Cruttenden, 1997). It has been claimed that the stressed vowel tends to be longer in duration, higher/louder in intensity, and higher in pitch than unstressed one (Kert, 1975; Wilbur et al., 2007). Thus, the average of the previous acoustic measurements was taken for each vowel in order to confirm if the intensity, duration and pitch correlate with the placement of the stress in Qassimi Arabic. Accordingly, the stress in QA is consistent with the trend measurements found in the literature. For example, but not limited, consider the following table for the comparisons of average measurements between stressed and unstressed syllables in a word of QA (measurements of stressed syllables in bold).

Table 1. Comparisons of average measurements in (ms, dB, Hz) for stressed and unstressed syllables in QA

Word	Duration (ms)	Loudness/intensity (dB)	Pitch/f0 (Hz)
[**ḿan**.zi.li]	**107**, 60, 76	**76**, 70, 72	**145**, 118, 124
[kaat.**b́iin**]	103, **189**	74, **76**	129, **137**
[ki.**t́abt**]	53, **99**	63, **75**	141, **128**
[**t́ˤaab**.ʕah]	**138**, 78	**79**, 71	**134**, 122
[**śaa**.ma.ħuh]	**154**, 64, 93	**76**, 71, 69	**131**, 115, 126
[si.jaa.**ŕaa**.tuh]	76, 101, **158**, 86	71, 74, **77**, 68	135, 128, **129**, 125
[ˈ**ʃaaf**.na]	**156**, 136	**77**, 69	**142**, 126

By virtue of the moraic structure proposed earlier and based on the fact that QA is a quantity-sensitive language that relies mainly on syllable weight to identify stress positions, several major aspects of stress in QA could be noticed from the examples in (3): (i) stress never falls finally unless the final syllables are superheavy; (ii) in the absence of final-superheavy syllables and due to the fact that final-CVV syllables do not occur in QA, non-final rightmost heavy syllables attract stress; (iii) stress falls on non-final (but not final) CVC syllables; and (iv) non-final superheavy syllables do not attract stress if followed by non-final heavy syllables.

Coda consonants are underlyingly non-moraic; but, the rule WEIGHT-BY-POSITION assigns moras to coda consonants (Hayes 1989). This rule assures that all final consonants in closed syllables are associated with moras. Although Hayes (1989) argued that CVC is heavy syllables, they do not attract stress in QA once showing up word-finally. Such an observation indicates that they are weightless due to the argument that final C is extrametrical (McCarthy and Prince 1990). However, non-final CVC syllables are heavy as they attract stress as in (3g and 3h). This pattern can be evaluated as an interaction between two constraints given in (4) below:

(4) a. WEIGHT-BY-POSITION (WBP): Codas are moraic

b. FINAL-C-μ: the final consonant is weightless.

Non-final CVC syllables attract stress due to WBP which allows moraic codas. However, WBP is not consistent in all closed syllables since it is dominated by Final-C-μ constraint which requires codas in final-CVC syllables to surface weightless (i.e. non-moraic). Thus, they would not be able to attract stress as they become lighter. Consider the tableau in (5) that shows the interaction of constraints ranking that is given in (4). Candidate (a) is the winner.

(5) FINAL-C-μ >> WBP /kitab/ → [ki.tab] 'he wrote'

μ μ /kitab/	FINAL-C-μ	WBP
μ μ a. ☛ ḱi.ta<b>[4]		*
μ μμ b. ki.t́ab	*!	

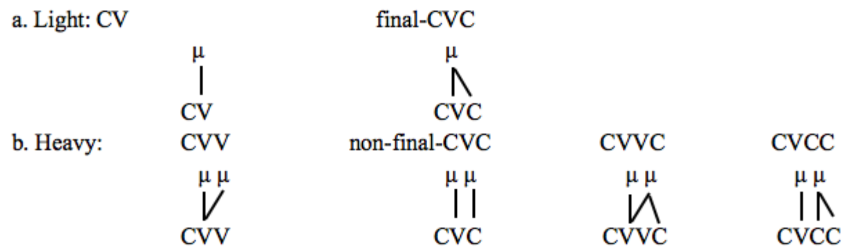
Nonetheless, Broselow *et al*. (1997) reported a phonetic fact that the CV is shorter in duration than final-CVC in Arabic, indicating that coda consonants should be linked to a mora rather than to a syllable node. This phonetic pattern is supported by the fact that heavy syllables (CVV or non-final-CVC) in Arabic "…are about twice the length of [CV] […] and that [final-CVC] […] has about one and a half times the duration of [CV]" (Broselow *et al.* 1997: 63). Since final-CVC syllables do not attract stress, final consonants should not head their mora; rather, they are adjoined to the preceding mora. In this respect, we need to revise the analysis given in tableau (5) and provide an additional constraint MORAICCODA that requires all coda consonants to be linked to a mora (Broselow *et al*. 1997). This constraint is undominated and it dominates the constraint of FINAL-C-μ. Now, consider the following tableau showing that the candidate (a) that shares its second mora with the final consonant is the optimal form (violating the low-ranking constraint NOSHAREDMORA), as opposed to candidate (b), which attaches the final consonant to the syllable node.

(6) MORAICCODA >> FINAL-C-μ >> WBP /kitab/ → [ki.tab] 'he wrote'

μ μ /kitab/	MORAICCODA	FINAL-C-μ	WBP	NOSHAREDMORA
μ μ a. ☛ ḱi.t a b		*	*	*
μ μ b. ḱ i.t a<b>	*!		*	
μ μ μ c. ki.t́ a b		*!		

Based on the previous argument and the fact that non-final superheavy syllables do not attract stress when followed by non-final heavy syllables, it is possible to suggest that CVVC and CVCC are similar to heavy syllables in that they are bimoraic, i.e. the last consonant of CVVC and CVCC does not bear its own mora; rather, it is adjoined to the preceding mora (following the proposal first introduced by Broselow (1992) who called it *Adjunction-to-Mora*, and then *mora-sharing* in Broselow *et al*. 1995; 1997; and Watson 2007). The following structures show the syllables weight in QA in terms of mora count:

(7) **QA syllables weight**:



According to the previous syllable weight in QA, the following section discusses the weight of superheavy syllables in Optimality Theory account.

4. Moraic Structure in an OT Account

With Optimality Theory (OT) proposed by Prince and Smolensky (2004) in place, this section accounts for the moraic structure of syllables in QA. By and large, OT analysis introduces an insight for the explanation of moraic structure in QA. Before analyzing the data in an OT account, it is necessary to introduce the universal unmarked constraints explained in (8a), and the constraints that have to do with the quantity-sensitive condition in (8b): (Note 4)

(8) a. - ***ONSET**: Syllables must have onsets.

- ***I-COMPLEXONSET**: Internal complex onsets are prohibited.

b. - **MAX-μ-IO**: input moras have output correspondents (No deletion of moras)

- **DEP-μ-IO**: output moras have input correspondents (No epenthesis of moras)

- ***3μ** : No trimoraic syllables.

- ***FINAL-C-μ**: Word-final coda consonant is weightless.

- **NOSHAREDMORA (NSM)**: Moras should be linked to single segments (Broselow *et al.* 1997)

- **MORAICCODAS**: requires that all coda consonants must be dominated by a mora (Broselow *et al.* 1997)

The fact to be accounted for is that final consonants do not count as adding a mora for the purposes of stress assignment. Grossly speaking, there are four major ways to tackle this: the first option would be to maintain that the final C is extrametrical (McCarthy and Prince 1990); the second option is to insert an epenthetic vowel between the last two segments (i.e. VC or CC), as some Arabic dialects do, such as Makka Arabic (Abu-Mansour 1992; Farwaneh 1995); the third is to shorten the vowel length and end up with two moras (Cairene Arabic, Broselow *et al.* 1995); the fourth option is to prevent the final C from heading a mora on its own (Broselow *et al*. 1997). We will discuss each option separately and come up with a set of ranked constraints that match QA grammar so as to account for the occurrence of bimoraic-CVVC and CVCC finally and internally.

First, we will not consider the extrametricality option, owing to its general shortcomings. It is stipulative, amounting to adding a diacritic feature. Furthermore, segments that need to be extrametrical with respect to one process do not necessarily behave as extrametrical with respect to other processes. Also, the final segment is obviously part of the final syllable in the surface form. Lastly, following the argument that all codas in almost all Arabic dialects are linked to a mora (Broselow *et al*. 1995 and 1997), the constraint MORAICCODAS is higher-ranking in QA. Thus, we consider that the option of mora-sharing is superior to extrametrical option in order to avoid the violation of the undominated constraint MORAICCODAS. Conversely, we assume that the constraint *FINAL-C-μ would be violable in order to favor the mora-sharing option.

Second, the faithfulness constraints DEP-μ-IO and MAX-μ-IO are highly ranked in QA. Consequently, inserting or deleting a vowel (mora) is not an acceptable choice in QA. Therefore, neither the extrametricality option nor the epenthesis or shortening are considered. Instead, the moraic approach is supposedly superior, i.e. all coda consonants are dominated by a mora. To account for this analysis, we assume that final and non-final CVVC and CVCC would be analyzed by adjoining the last consonants to the preceding mora. This analysis ranks the constraint NOSHAREDMORA below all other constraints given in (9). Moreover, in consistence with the constraint of bimoracity in each syllable BIMORACITY (Broselow 1992), a constraint that bans trimoraic syllables must be called for. Thus, we stipulate that the constraint *3μ is undominated and that NOSHAREDMORA is a lower-ranking constraint, which in turn permits the surface of CVVC and CVCC domain-finally and non-finally. In this case, we end up with two moras per syllable and assure that segments in codas are dominated by mora levels before they are affiliated by syllable nodes.

(9) ONSET, *I-COMPLEXONSET, MORAICCODAS , *3μ >> *FINAL-C-μ , MAX-μ-IO , DEP-μ-IO >> NOSHAREDMORA (NSM)

As mentioned earlier in section (1), CVVC and CVCC occur finally and non-finally. In the following tableaux, the weight of final CVCC and CVVC is analyzed first in tableaux (10) and (11), and then the analysis of non-final CVCC and CVVC are introduced in the last tableaux (12) and (13). Now consider tableau (10), which shows the weight of final-CVCC:

(10) Final CVCC in QA: /galb/ > [galb] 'heart'

μ / galb /	MORAICCODA	*3μ	*FINAL-C-μ	DEP-V-μ	NSM
μμμ a. ga l b		*!	*		
μμ b. gal.<b>	*!				
μμ c. ☞ gal b			*		*
μμμ d. ga.lab			*	*!	

Candidate (a) is immediately ruled out because it violates the highly-ranked constraint: *3μ. Since MORAICCODA constraint dominates *FINAL-C-μ constraint, candidate (b) is not optimal because of its violation of the undominated constraint MORAICCODA. Although candidate (d) inserts the vowel [a] between the last two consonants to avoid the potential of having a trimoraic syllable, it incurs the fatal violation of the high constraint DEP-V-μ. All candidates violate one of the constraints, even the winner candidate (c); however, the losing candidates cause fatal violations of highly-constraints, while the optimal candidate (c) violates the less serious constraint NSM.

(11) Final CVVC in QA: /ʃaaf/ > [ʃaaf] 'he saw'

μμ /ʃaaf/	MORAICCODA	*3μ	*FINAL-C-μ	MAX-μ-V	NSM
μμ μ a. ʃaa f		*!	*		
μ μ b. ʃ a f			*	*!	
μ μ c. ☞ ʃa af			*		*
μμ d. ʃaa <f>	*!				

The losing candidate (a) violates the highly top constraint *3μ. Although candidate (b) avoids the *3μ constraint by means of shortening the long vowel, it is ruled out because it incurs a fatal violation of MAX-μ-V. The suboptimal candidate (d) gets rid of the third mora by leaving the last consonant extrametrical. However, this process causes the final C not be affiliated by a mora, which results in violating the undominated constraint MORAICCODA. The optimal candidate (c) resorts to adjoining the last consonant to the preceding mora and violates the less harmful constraints *FINAL-C-μ and NSM.

It has been concluded from tableaux (10) and (11) that final CVVC and CVCC are bimoraic in QA and their final consonants do not bear their own mora; rather, they are adjoined to the preceding mora (whether vowel or consonant) due to the undominated constraint *3μ, which militates against having more than two moras in each syllable. Furthermore, the constraint NSM must be ranked low as this allows us to account for the occurrence of non-final superheavy syllables in QA, as shown in the next tableaux (12) and (13).

(12) Non-final CVCC in QA: /galb + na/ > [galb.na] 'our heart'

μ μ /galb+na/	I-COMPLEXONSET	MORAICCODA	*3μ	DEP-μ-V	NSM
μ μ μ μ a. ga l b.na			*!		
μ μ μ μ b. ga l.ba.na				*!	
μ μ μ c. gal.bna	*!				
μμ μ d. ☛ga lb.na					*

As shown in the tableau (12), the candidate (a) is ruled out because it includes a trimoraic syllable which incurs a violation of the undominated constraint *3μ. The insertion of a vowel in candidate (b) violates a highly ranked constraint DEP-μ-V. While candidate (c) avoids the trimoracity constraint by moving the last consonant of CVCC to occupy the onset position of the next syllable, it is not in conformity with the top ranked constraint I-COMPLEXONSET as it includes internal onset cluster. The actual optimal output is a candidate (d), which avoids the trimoracity constraint by linking the last consonant of non-final CVCC to the preceding mora.

(13) Non-final CVVC in QA: /ʃaaf + na/ > [ʃaaf.na] 'he saw us'

μ μ /ʃaaf + na/	ONSET	MORAICCODA	*3μ	MAX-μ-V	DEP-μ-V	NSM
μ μ μ μ a. ʃaa f. na			*!			
μ μ μ b. ʃ a f.n a				*!		
μ μ μ c. ʃa af. na						*
μ μ μ μ d. ☛ʃa.a f.na	*!					

In the last tableau, the first candidate (a) assigns a mora to the last consonant, which in turn yields a trimoraic syllable. This, however, incurs a fatal violation to the constraint *3μ. Because QA does not allow shortening of vowel length, candidate (b) fails to be optimal. Although candidate (d) resorts to splitting CVVC into two syllables in order to avoid having three moras, it is ruled out due to the violation of the undominated constraint ONSET, as the second syllable starts with a vowel. The last candidate (c) is chosen because it only violates the low ranked constraint NSM, resulting in not yielding a trimoraic syllable.

5. Conclusion

In an OT-driven framework, the analysis fares better with the occurrence of final and non-final CVCC and CVVC in QA, which could be attributed to the fact that they are bimoraic. Accordingly, the weight of superheavy syllables is similar to the weight of heavy syllables. This has been achieved by adopting the analysis of *mora-sharing*, which assumes the adjunction of the last consonants to the preceding mora, allowing the occurrence of these syllables (CVVC and CVCC) finally and non-finally (Broselow 1992; Broselow *et al*. 1995; 1997; Watson 2007).

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Notes

Note 1. MSA is the language of mass media while CA is the language of the Quran and old Arabic poetry (Watson 2002).

Note 2. Throughout the paper, I use double vowels ‘aa and ii’ to refer to long vowels.

Note 3. It should be noted that due to space constraints, we will discuss only two environments in which superheavy syllables surface in QA; namely, mono-super-heavy syllables (CVVC and CVCC); and when these superheavy syllables suffixed to consonant-initial suffixes.

Note 4. All constraints are adopted from Kager (1999) unless it is indicated.