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Constraint Interactions in Jordanian Arabic Phonotactics: An Optimality-Theoretic Approach

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Abstract
This study presents a constraint-based analysis of Jordanian Arabic phonotactics within the Optimality Theory framework. The corpus providing the database for the study is restricted to Karak Arabic, a variety spoken in the Karak Governorate in the middle part of Jordan. Historically and geographically, Karak Arabic belongs to Levantine Arabic varieties spoken in what was known as Greater Syria. The variety under analysis distinguishes itself from most other Arabic or even Jordanian varieties in several features. Chief among them are the opacity in word final non-geminate complex codas, the adherence of complex codas to the Sonority Sequencing Principle, and the presence of a rarely found ultra-heavy syllable. In spite of the shared approach, this paper, to a great extent, deviates from other studies conducted on some Levantine dialects (Adra, 1999; Abuabbas, 2003, to name but two) in some core arguments and analytical procedures, which are, consequently, reflected in the type and ranking of the universal constraints even when handling similar data. The paper presents a thorough analysis of and answers to three major debatable issues: (i) assignment of unlicensed segments to semisyllables, (ii) representation of geminates, and (iii) reduction of unlicensed segments in ultra-heavy syllables by morphology.

1. Introduction
As is typical in all fields of grammar, phonological theory is primarily dedicated to the notion of well-formedness. It is, then, rather obvious that retaining the underlyingly well-formed inputs and repairing the ill-formed ones are the two ultimate goals of the phonological formula. To these ends, and in order to keep up with the aspirations of Universal Grammar, enthusiastic phonological efforts have been paid to move from the segmental level, where paths of world languages diverge, to the upper prosodic levels, where such paths converge. By so doing, and in order to capture as many generalizations as possible, a weighty part of phonology research has been directed to prosodic structures such as moras, syllables, feet, etc. The syllable,

which received little significant attention in *The Sound Pattern of English* and the previous literature, has become a top-ranked target of the recent phonology agenda. The importance of the syllable stems from the roles it plays in phonological generalizations including phonotactic patterns, phonological processes and suprasegmentals. In undertaking research into phonotactic patterns, it is, thus, necessary to resort first and basically to the syllable types that a language allows or phonetically surfaces.

Arabic phonology, in general, has been a subject of ongoing research during the last few decades. Much of such research has been devoted to issues related to the syllable structure, sonority scale, stress placement, syllable weight and syllabification (Irshid, 1984; Alghazo, 1987; Abu-Salim 1982; Abu Mansour 1995; Adra, 1999, to name just a few). A quick glance at such studies shows that Arabic varieties differ considerably with respect to the details on syllable and syllabification. Yet, similarities largely outweigh the differences in most accounts. A syllable in Arabic, no matter what the variety is, must be composed of a vowel (either short or long) and an onset. However, coda in nearly all varieties of Arabic, on the other hand, ranges from zero to two consonants. Differences in the dialectal features that show up phonetically make variation among Arabic varieties with respect to how to repair ill-formed heterogeneous clusters created by new phonetic environments bound to occur. Such variation anticipates different constraint interactions among Arabic varieties.

With the advent of the Optimality Theory (OT, henceforth) came the realization that the differences among dialects or even languages can be accounted for in terms of sets of violable constraints. A view that underlies much of the modern research on phonology within the OT framework is that languages' adherence to universal constraints is almost always never absolute, and variations among varieties can be accounted for not by positing new or different rules as was the case under the umbrella of earlier models, but rather by proposing a hierarchical system of both violable and ranked constraints. Language-specific rules, within this model, are "attained through the language-specific ranking of the crucially violable constraints, the substance of which is ideally conceived of as universal" (Roca and Johnson, 1999:584-585). Optimal or winner selection depends solely on satisfaction of the topranked constraints whose violation results in ruling out the other candidate in question.

Several recent studies utilizing OT have been conducted on Arabic varieties (Abu Mansour, 1995; Adra, 1999; Mobaidin, 1999, Boudlal, 2001, among others). Findings of such studies show that Arabic varieties have some undominated constraints in common. The violation of the onset constraint, for instance, results in elimination of the candidate in question in nearly all these varieties. Adherence to sonority and complex margin constraints, on the other hand, is subject to significant variation. However, some features are still debatable and looking for further investigation. In their application of OT to some similar data of different Arabic dialects, Abu Mansour (1995) and Mobaidin (1999) have expressed contradictory views about the

Parse-C constraint, which does not allow for a consonant to be deleted in a proper environment. Abu Mansour (1995) states firmly that the Parse-C constraint is undominated due to the unique role a consonant plays in Arabic. Mobaidin (1999), on the other hand, argues vehemently against Abu Mansour's assumption which, he maintains, is unmotivated. For him, the Parse-C constraint can be dominated by other constraints.

In the following sections, an attempt is made to present a constraint-based description and analysis of the phonotactics of Karak Arabic (KA, henceforth), a dialect spoken in the Karak Governorate in the middle part of Jordan. The material used for exemplification throughout the paper is restricted to KA. The primary informant of the data is the author, who is a native speaker of this particular variety. However, several other native-speaker informants participated in minor roles related to the opaque diversity in the realization of complex codas. To gain a transparent picture of the phonology of the target variety, a deliberate attempt has been made to follow the patterns of the populations rather than individuals. So, variations attributed to socioeconomic, hypercorrection or interdialectal reasons have been excluded from consideration.

2. Margins in KA: The Data

To elucidate the discussion and for ease of reference, the data is divided into four parts, representing simple and complex margins that show up phonetically in KA. These are shown in (1) through (4). Still, a few other examples not listed below will be occasionally used for expository purposes. Unlike Classical Arabic, Modern Standard Arabic (CA, MSA, henceforth, respectively) and some other vernaculars, where onset never branches, KA, as shown below, surfaces with branching onsets phrase/utterance initially. Again, KA differs from most other Arabic or even Jordanian varieties such as Ajloun Arabic–a dialect spoken in the northern part of Jordan- in that the sequence CVCxCz (where Cx is more sonorous than Cz) does surface both word-medially and word-finally. Finally, a slightly less familiar ultrheavy type of syllables--largely ignored in the literature of Arabic phonology--comes up phonetically in KA.

(1) Simple Onsets

Sound	W. initially	Gloss	Sound	W. medially	Gloss
/b/	bint	girl	/b/	la.ban	yoghurt
/t/	taaj	crown	/t/	ša.tam	curse
/θ/	θa.man	price	/θ/	maθ.wa	destiny
/ð/	ðu.rah	corn	/ð/	mu.ðiiʕ	broadcaster
/s/	sa.laam	peace	/s/	mu.raa.sil	correspondent
/f/	fann	art	/f/	ma.far	escape

(2) Complex Onsets

Clusters	W. initially	Gloss	Clusters	W. initially	Gloss
/bl/	blaad.na	our country	/bt/	ktaab	book
/dm/	dmuuʕ	tears	/ms/	msam.mam	poisoned
/d□l/	d□luud	skins	/md/	/mdam.mar/	collapsed/ broken
/sl/	slaaẖ	weapon	/md□/	md□am.mad	frozen
/tm/	tmalmal	complained	/sd/	sduud	dams
/kθ/	kθiir	many/much	/tb/	tbuh	reveal

(3) Simple Coda

Sound	W. initially	Gloss	Sound	W. finally	Gloss
/b/	baab.ha	her door	/k/	baa.bak	your door
/t/	fit.neh	seduction	/m/	kaam.lih	complete (f)
/θ/	muθ.mir	fruitful	/θ/	ħa.raθ	plow
/d□/	mad□.ruuħ	injured	/d̠/	ma.rad̠	disease
/ð/	mað.buuħ	killed	/ʕ/	mu.ðiiʕ	broadcaster
/s/	mus.lim	Muslim	/t̠/	mat̠.tat̠	rubber

(4) Complex Coda

Clusters	W. medially	Gloss	Clusters	W. finally	Gloss
/rd/	?ard. na	our land	/ms/	šams	sun
/nt/	bint.hum	their daughter	/bb/	rabb	God
/ft/	šift.ku	I saw you (pl.)	/lb/	kalb	dog
/rd/	ward	roses	/md/	ħamd	praise
/bb/	rabb.ki	your (f.sg.) God	/lm/	ħilm	dream
/ʕt/	biʕt.hum	I sold them	/mm/	ʕaamm	general

3. Syllable structure in KA

The examples above show ample similarities between what the data present and the findings of previous research conducted on Arabic varieties (particularly on Levantine dialects) in the underlying properties of syllables. Yet, significant minor differences still appear. This should not mean that minor differences do not count. Drawing on the data (1)-(4), it is straightforward to figure out the four patterns of the syllable inventory of KA, shown in (5).

(5)

(a) Core syllables CV
(b) Heavy syllables: CVC, CVV and CCVC
(c) Extra-heavy syllables: CVVC, CVCC and CCVVC
(d) Ultra-heavy syllable: CVVCC

In terms of syllable weight, it should be made clear that the final -C becomes weightless/non-moraic in a prepause position. Irrespective of their types, syllables in KA are maximally bimoraic. While it may be the case that syllable types that appear phonetically in KA are, to a great extent, similar to those that surface in other Arabic varieties, it is not necessarily the case that constraint interactions are similar.

4. Lexical and Post-lexical Syllabification

In the OT account, syllable structures are governed by a set of constraints, which are, in turn, divided into two basic subtypes, viz., Markedness and Faithfulness (Prince and Smolensky, 1993), as shown in (6).

(6)

(a) Markedness Constraints: those impose conditions on the well-formedness of the output (the universally unmarked features).

(b) Faithfulness Constraints: those impose the exact preservation of the input in the output.

Knowing the constraints related to a language is definitely insufficient by itself to enable one to select the winning candidate. Rather, such knowledge must be accompanied by an understanding of which constraints a language favors most and which constraints are of less importance. It is to these ends that the following sections are addressed.

4.1 Onsets

4.1.1 Simple Onsets:

As far as onset is concerned, Arabic, in general, seems to be in full compliance with universal default or unmarked setting, where a syllable always begins with C. The major challenge that Arabic faces in this regard is how to prevent onsetless syllables from surfacing. In order to cope with this problem, the language resorts to either of two processes: onset-motivated epenthesis or onset-motivated resyllabification. Consider (7) for illustration.

(7)

No.	UR	SR	Gloss	Process
a.	šift+ak	šif.tak	I saw you	onset-motivated resyllabification
b.	aħmad	?aħmad	Proper N.	onset-motivated epenthesis

In both examples, the underlyingly onsetless syllable surfaces with an onset by either resyllabifying the second member of the previous syllable coda as the onset of the following underlyingly onsetless syllable as in (7a) or by C-insertion, whereby a glottal stop is epenthesized to fill in the empty slot as in (7b). Whichever of these solutions is adopted, it means that KA, like all other Arabic varieties, requires that there be at least a consonant in the prevocalic position. Under no circumstances might the onset have more than two branches, however. As such, the maximal syllable template in KA has the following form: C(X)V(X)(C). Accordingly, this form requires that an onset be present at all costs and branching onset remains possible. This template also anticipates that KA prefers breaching DEP-IO (shown in (8)), which prohibits epenthesis, as long as a syllable suffers from the onset vacuum and no other input segment can occupy the Onset slot.

(8) DEP-IO

Every segment of the output has a correspondent in the intput (prohibits phonological epenthesis) (McCarthy and Prince, 1995)

(9) ONS

Every syllable has an onset (Prince and Smolensky, 1993)

The tableau in (10) shows that the interaction between ONS and DEP-IO constraints finishes up in favor of the markedness constraints (ONS). As such, ONS dominates DEP-IO.

(10) Onset-Motivated Epenthesis: ONS interaction with DEP-IO.

ONSET>>DEP-IO

/aħmad/	ONS	DEP-IO
a. aħmad	*!	
b. ☞?+aħmad		*

Tableau (1)

The grammar of the variety being considered penalizes the first candidate and eliminates it from consideration due to its violation of the undominated ONS. Note that the winner has avoided the contravention of the top-ranked ONS by breaching the low-ranked nonfatal constraint (DEP-IO). Though the epenthetic glottal stop has no input correspondent--and thus, it represents an unpleasant resort for a language that endeavors to be faithful--it still remains the best option to rescue the optimal candidate.

The examples in 2 show that the second member of branching coda resyllabifies as the onset of the following onsetless syllable. The question that immediately arises is whether onset is preferred over a non-branching coda. On the basis of the above examples, there is a general regulatory principle governing the syllabification of the final -C in the coda of the first syllable as the Onset of the following new vowel-initial suffix or word even if such a coda is non-branching. Tableau (2) demonstrates the specialty of ONS in Arabic and what such a specialty yields concerning the breach of ALIGN (R) constraint.

(11)

ONS>>ALIGH (R),

/baIt+ak/	ONS	ALIGN (R)
a. baIt.ak	*!	
b. ☞baI.tak		*

Tableau (2)

(12) ALIGN (R)

Align root morpheme boundaries with syllable boundaries at both edges. (Yip, 1994)

The contest between candidates "a" and "b" is plainly decided in favor of the latter though it incurs a violation of the low-ranked constraint (ALIGHN (R)). The failing candidate (a) averts a violation of the ALIGN (R) but, unfortunately, at the expense of the top-ranked ONS. Due to the continuous syllabification process, the second and the more harmonic candidate incurs an ALIGN (R) violation in order to avoid the violation of the high-ranked constraint. When closely examined, continuous syllabification is triggered by an obligatory phonological necessity. That is, to satisfy the top-ranked constraints (ONS) and to repair the ill-formed newly formed syllable.

To a notable degree, the analysis provided so far on lexical onsets is generally true postlexically. An extremely tiny difference appears in the substitution of ALIGN (R) with ALIGN (W) shown in 13. Other operations are congruent, however.

(13) ALIGN (W)

Align the right edge of a word with the right edge of a syllable.

(Harris and Gussmann, 2003)

(14)

ONS>>ALIGHN (W),

/baIt# #aħmad/	ONS	ALIGN (W)
a. baIt.aħ.mad	*!	
b. ☞baI.taħ.mad		*

Tableau (3)

A similarity seems to exist between Tableau (2) and Tableau (3) with regard to the breaching of alignment constraints. Satisfying the ONS imposes a negative, but quite tolerable, consequence on the optimals in both cases. In short, both ALIGN (R) and ALIGN (W) are quite dominated in Arabic.

To conclude, syllables in KA are in full compliance with the default onset constraint. However, if a syllable has no segment to fill up the onset slot in the underlying representation, the language resorts to either onset-motivated epenthesis process or an onset- motivated resyllabification process to repair such a syllable. Based on this, ONS dominates DEP-IO/ FILLIONS. Clearly, then, onset is required in all optimal outputs. This conclusion matches the Onset Theorem:

(15) Onset Theorem

If ONS dominates either PARSE or FILLI^{ONS,} onsets are required in all syllables of optimal outputs. (Prince and Smolensky, 2004:262).

4.1.2 Complex Onsets

The complete adherence of KA to the universal default setting of ONS should not belie some other marked features of the dialect. One aspect that needs further elaboration here is the presence of complex onsets, a sequence that seems to be totally proscribed in CA, MSA and some other vernaculars such as Egyptian Arabic.

Given that the universal markedness constraint *COMPLEX prohibits branching onset (see 16), complications are, then, inevitable. For the purpose of this paper, *COMPLEX will be used to stand for both complex margins of a syllable (*COMPLEX ONS and *COMPLEX COD). It is fairly clear that complex onsets arise in most of Arabic varieties due to the elision of the underlying unstressed high short nucleus in open syllables. But before we move on, it is crucial to note two things about complex onsets. First, they are restricted to phrase/utterance initial positions. As expected, then, these clusters are banned from surfacing not only word medially, but also across word boundaries as illustrated below. Second, since they surface as a result of the weak nucleus elision, complex onsets are derived rather than natural and, thus, they are not part of the underlying input. As far as syllable well-formedness is concerned, onset clusters oftentimes go against the Sonority Sequence Principle (SON, hereafter) (e.g. *msammam* 'poisoned', *lbaan* 'gum' and *ktaab* 'book',etc.) as shown in (17). It is necessary to note that the constraints introduced so far, however, are themselves insufficient to derive the optimal in words such as these. This implies that resorting to further new constraints is a must, if precisely the optimal candidate is to be selected.

(16) *COMPLEX
Syllables have at most one consonant at edge. (Archangeli, 1997)

(17) SON
In a syllable, sonority increases toward the peak and decreases toward the margins. (Morelli, 2003)

As it turns out, the frequent violation of ONS by initial consonant clusters, together with what Hyman (1990) states concerning Syllable Exhaustivity (all segments belong to syllables) makes consonant clusters in KA a bit problematic (see 18). Stated somewhat differently, branching onsets in words such as *msammam* and *lbaan* are unacceptable since they incur double violations, viz., SON and *COMPLEX. Earlier dominant approaches used to resort to extrasyllabicity, which operates at word edges, to resolve such problems and to rescue unlicensed segments (Ito, 1986; Watson, 1999, to name but few). Scheer (2004: 420) for example argues that extrasyllabicity "may be detected by the simple fact that the syllabification algorithm is unable to parse a given sequence." However, such a solution can never be the optimum simply because extrasyllabicity, in the OT tenet, is regarded as underparsing and, thus, a violation of the MAX-C-IO constraint. It is worth mentioning that MAX-C-IO (19), which enforces that input consonants must have output correspondents, is a high-ranked constraint in KA and other Arabic dialects, too.

(18) EXH(AUSTIVITY)
No category immediately dominates a constituent more than one level beneath (Selkirk, 1995)

(19) MAX-C-IO

Input consonants must have output correspondents. ('No consonant deletion.')
(Max(imality) replaces PARSE in Prince and Smolensky's (1993) model)

To escape the difficulties imposed by consonant clusters in the onset node, a new constraint that has the function of extrasyllabicity and is, at the same time, harmonic to OT principles should be introduced soon. For this purpose, it is suggested that the first member of the branching onset (in the examples exhibited above), which is neither syllabified nor extrametrical, is assigned to a semisyllable, whereby the unlicensed segment is adjoined directly to the prosodic word (PW, hereafter). When closely tested, a semisyllable totally satisfies the undominated constraints MAX-C-IO and SON.

Although semisyllables sound quite good to account for unlicensed segments, their use does not go unchallenged. A firm ban on semisyllables's use arises immediately from the violation of the Strict Layer Hypothesis, which holds that a prosodic constituent in a domain is to be properly contained in a domain of the next higher level (Selkirk, 1984). In terms of the OT tenets, this hypothesis is interpreted as a constraint as in (20). However, if a semisyllable is the last resort and a marginal segment otherwise remains unlicensed, then the threat of being unsyllabified should be given priority over the violation of SL. From the OT perspective, the ban on semisyllables is resolved via the very basic principle of OT: 'constraints are violable'.

(20) SL

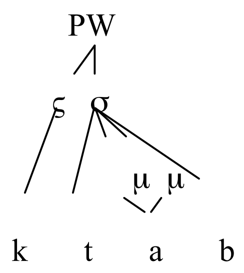
A prosodic constituent of level C immediately dominates only constituents of the level C-1.

Thus, there appear to be compelling reasons to recognize this type of syllable though it, in essence, contradicts sharply the universal syllable criteria. The relatively new emergence of this kind of syllable into the phonological scene should not belie the superior universal status it has gained, however. Semisyllables, according to Kiparsky (2003:156), have several properties:

a. Unstressed, toneless, or reduced tonal contrasts
b. Reduced segmental inventory
c. Can be less harmonic than syllable nuclei
d. Restricted shape (e.g., no onset, or no branching onset, no coda)
e. Sometimes restricted to peripheral position (typically word edges)
f. Prosodically invisible
g. Can be subject to minimum sonority requirement

While semisyllables are dominated by moras in Kiparsky (2003), this paper endorses the moraless view of semisyllables (MaCarthy, 2003; Cho and King, 2003, among others). Drawing on this, the non-natural form *ktaab* 'book' is schematically represented in (21). Following Cho and King (2003), I use the final position sigma to stand for semisyllables and the ordinary sigma for major syllables.

(21)



Example (21) encapsulates desirable and undesirable results concurrently. What is most desirable about this representation is the semisyllable's accountability for the nonharmonic clusters. As such, the first member of clusters in *ktaab* is adjoined directly to the prosodic word, a procedure that sounds more harmonic to OT than extrasyllabicity. The undesirable result relates to the violation of SL. Due to the low ranking status of the SL, the desirable results vastly outweigh the undesirable ones. It follows from this analysis that resolving the unlicensed segment by PW-adjunction satisfies the topranked constraints SON and MAX-C-IO.

Before proceeding, we should pause a little to ask whether or not there are any alternative analyses or solutions to the problem of unlicensed segments raised above. No doubt, there is no simple unified answer to this question since such a postulation ultimately depends on the target variety. Yet, there are at least two potential analyses that might be reasonably suggested here to account for unlicensed segments. The first analysis favors consonant underparsing (deletion) over the involvement of semisyllables. This alternative, as shortly to be discussed below, can never be satisfactory in nearly all varieties of Arabic due to the ban imposed on this option by MAX-C-IO.

The second potential solution, on the other hand, argues for faithfulness, that is to retain the underlying weak nucleus [i] (*ki.taab*) in the surface representation. It is now quite clear that the motive behind utterance initial clusters in words such as *ktaab* and *blaad* is the elision of the weak nucleus. It was pointed out earlier that weak nuclei cannot stand in open syllables in most Arabic varieties including KA. Straightforwardly, then, onset consonant clusters are environmentally conditioned by syllable and vowel types. This makes explicit the idea that *ki.taab*, which is the very optimal candidate in CA and MSA, is ruled out from candidacy by incurring a violation of the fatal Weak Nucleus constraint (*WN, hence after). *WN (formulated as *,i] σ in Kenstowicz (1995)) is one of the cyclic steps required in the syllabification and continuous syllabification processes in all Arabic varieties.

(22) *WN

A high short vowel in an open unstressed syllable must be deleted.

(Mobaidin, 1999:194)

Note that for the underlying *WN to be unable to surface phonetically puts language faithfulness in jeopardy again. Recall that KA in Tableau (1) favors markedness (ONS) over faithfulness (DEP-IO) when it comes to onsetless syllables. Now we see that it favors violating the faithfulness MAX-V-IO constraint which would retain the vocalic segments present underlyingly.

(23) MAX-V-IO

Input vowels must have output correspondents. (‘No vowel deletion.’)

(Kager, 1999)

To keep the size of the problem under control, all alternatives suggested so far will be evaluated simultaneously to select the most harmonic candidate. A typical conflict situation between the candidates that represent the possible solutions is shown in (24).

(24)

MAX-C-IO, *WN, SON, *COMPLEX>>MAX-V-IO, SL

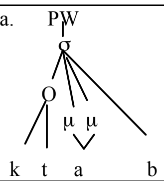
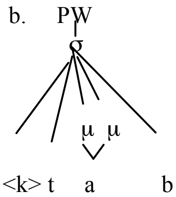
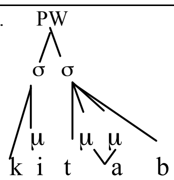
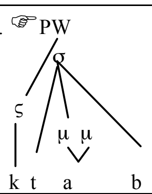
/ki.taab/	MAX-C-IO	*WN	SON	*COMPLEX	MAX-V-IO	SL
a. 			*!	*	*	
b. 	*!				*	
c. 		*!				
d. ☞ 					*	*

Tableau (4)

Though it is in complete harmony with the obligatory *WN and MAX-C-IO constraints, the first candidate shows weak adherence to the rules of the target variety by breaching two top-ranked constraints, viz., SON and *COMPLEX. This, therefore, explains the exclusion of this candidate from the race. Consonant underparsing advocated by the second candidate (b) seems to be unsound since there is no evidence that a consonant is deleted in KA, even in proper environments. In terms of the widespread assumptions about the specialty of consonants in Arabic, in general, this analysis poses a serious problem. Support for this initial conclusion comes from Abu Mansour (1995) who argues that due to their anomalous function in Arabic, consonants are not subject to deletion for any reasons.

Of the four candidates generated above, (24c) is the most contentious. In a variety that endeavors to keep the surface representation faithful to the underlying representation, it is expected that candidate (c) could be the winner. Nevertheless, candidate (c) fails tosurvive by incurring a fatal violation of *WN. Needless to say, the complete adherence of candidate (c) to all other top and low-ranked constraints does not suffice for it to survive. In the context of *WN and MAX-C-IO, Tableau (4) synopsizes two critical accounts for word-initial clusters not only in KA but in other Arabic vernaculars, as well: (i) the inability of the weak nucleus to stand in an open unstressed syllable, and (ii) the intolerance of the violation of MAX-C-IO constraint. Such a view is strongly supported by many researchers (Abu Salim, 1982; Al-Ghazo, 1987; Abu Mansour, 1995, to name but a few). Neglecting this well-established reality, particularly in the literature of the small family (Levantine Arabic) to which KA belongs undoubtedly leads a candidate astray. The most favorable result obtained in Tableau (4) has been already anticipated. The last candidate (d) wins the race by satisfying the top constraints in spite of incurring two simultaneous violations of MAX-V-IO and SL.

As is hopefully apparent, the oddity and unacceptability of the first three alternative analyses provided above stem from their explosive breaching of the essence of four undominated constraints, viz., SON, MAX-C-IO, *WN and *COMPLEX. Consequently, for the candidate in Arabic, in general, and KA, in particular, to be precisely selected, semisyllables must be operative.

The preceding paragraphs have extensively discussed alternative analyses to account for the representation of (21). One question has been deliberately left aside: is it possible to assign the second member of consonant clusters (in *ktaab*) to a semisyllable and to leave the Onset slot to be filled by the first member [k]? The constraints introduced, until now, might not be ready to provide a clear-cut answer to this question. At least, there is no evidence to the contrary. Yet, such a proposal is entirely ruled out by the high-ranked ALIGN-EDGE-ς constraint (as shown in (25).

(25) ALIGN-EDGE-ς

Align semisyllables to a morpheme edge.

(Cho and King, 2003)

(26) ALIGN-EDGE-ς>>MAX-V-IO, SL

/ki.taab/	ALIGN-EDGE-ς	MAX-V-IO	SL
a. k.t.aab	*!	*	*
b. ☞k.taab		*	*

Tableau (5)

What Tableau (5) suggests is that the assignment of the second segment in the branching onset of the first candidate to a semisyllable contradicts the goal for which semisyllables have been proposed. Recall that semisyllables get involved only to syllabify unlicensed segments. So, the first candidate is ruled out by incurring a violation of ALIGN-EDGE-ς since it is the first rather than the second member of the cluster that is unlicensed. The optimal (b) averts such a fate by the total adherence to the high-ranked constraint, ALIGN-EDGE-ς.

The above controversial arguments push to the fore the question of whether or not branching onsets are allowed word medially or post lexically. As a step toward providing an answer to this question, an attempt is made here to provide syllabification of bi-, tri-, and tetraconsonantal clusters both lexically and post lexically. (27) lays the point out.

(27)

I. Morpheme boundaries			II. Word boundaries		
Cons. clusters	Syllabification	Syllabic transcription	Cons. clusters	Syllabification	Syllabic transcription
a.CV*CC*VC	CVC.CVC	nim/rak	a. CVV# #CCVVC	CVVC.CVVC	yaak/laab
b. i.CV*CxCy*CV* ii. CV*CCC*V	CVCC. CV CV.CVC.CV	šift/ha hi/mil/na	b. CVVC# #CCVVC	CVV.CVC.CV	baa/ʕik/taab
c. CVCCCCV	CVC.CVC.CV	qul/til/ha	c. CVCC# #CCVC	VC.CVC.CVVC	biʕ/tik/taab

*if Cx is more sonorous than Cy or if they are geminates

On the basis of the medial consonant clusters exhibited in (27 I), it seems that more than one analysis is needed to account for the divergence in the number and degree of the sonority of the consonants involved. It is fairly obvious that the previous analysis can account for biconsonantal clusters and triconsonatal clusters that adhere to SON (a) and (bi). However, triconsonantal clusters that violate SON (27bii) and tetraconsonantal clusters (27Ic) behave differently by creating a new syllable whose nucleus is an epenthetic vowel.

Drawing on the surface representation (syllabified forms) shown in (27bii and c), the new nucleus is epenthesized between the penultimate and the antepenultimate consonants. As a result, the penultimate C becomes the coda of the newly established syllable and the antepenultimate C (whether it is the 1st of 2nd consonant in the original cluster) becomes the onset of the newly formed syllable.

The tedious parsability of the medial clusters provided above gives rise to an argument for assigning the two unlicensed medial consonants (-C2C3-) in tetraconsonantal clusters (e.g. gultlha) to adjacent semisyllables or a branching semisyllable. If correct, this analysis will account for the entire problem. Kiparsky (2003: 163-177) argues against these ideas: "…we must assume that some constraint prohibits two adjacent semisyllables. This has a further consequence: the two middle consonants of a medial four consonant cannot be licensed as semisyllables…in Arabic two adjacent unsyllabified moras must form a syllable, forcing epenthesis of a nucleus." On the basis of Kiparsky's arguments, I propose the following constraint:

(28) ςς=σ

Two adjacent semisyllables must form a major syllable.

An argument given in support of the attempt made to remove violations of phonotactic constraints comes from Sommerstein (1999:86): "One possibility to regard phonotactically motivated rules not …as instructions to do something to an input of certain form, but as instructions to remove certain violations of a phonotactic constraint."

The alternative analysis, adjoining the two onset consonant clusters to a branching semisyllable needs to be subjected to scrutiny. There are at least two convenient reasons for rejecting such a proposal. First, the idea of a branching onset is itself unsound since semisyllables are onsetless (Kiparsky, 2003: 163). Second, even if a branching semisyllable is allowed (as argued by Cho and King, 2003), the idea remains banned since consonant clusters in semisyllbles are well-formed (observing SON) and more often than not such clusters in KA are not well-formed (e.g. *hilm-t-na* 'our dream'). An illustration of how candidates generated according to the two-part argument (assigning the unlicensed segments to adjacent semisyllables or a branching semisyllable) would interplay is shown schematically in Tableau (6).

(29)

*3μ, ςς=σ>> SL, DEP-IO

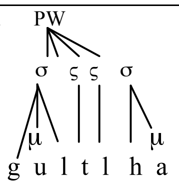
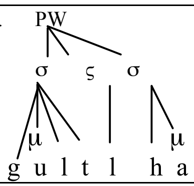
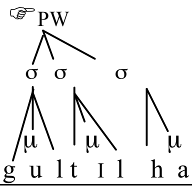
/qultlha/	*3μ	ςς=σ	SL	DEP-IO
a. 		*!	**	
b. 	*!		*	
c. ☞ 				*

Tableau (6)

On initial inspection, it seems that the results obtained in Tableau (6) reinforce the conclusion arrived at earlier in both (21) and Tableau (4), and they, concurrently, reject the above two-part alternative. The first candidate is eliminated by ςς=σ. Candidate (b), on the other hand, is ruled out by *3μ. What makes candidate (c) win the race is the ability to escape the top-ranked constraints via creating a major syllable out of the two unlicensed segments (adjacent semisyllables).

Again, (27) makes another point pretty explicit. It is noteworthy here that branching onsets surface neither at morpheme boundaries nor across word boundaries. The data also offer the possibility of deciding that the ban on non-branching onsets post-lexically stems from the continuous resyllabification of the first member of heterogeneous onset clusters as the coda of the preceding already standing syllable (e.g. 27II a) or as the coda of the newly formed syllable (e.g. 27II b and c). However, no such process takes place when the second syllable or word begins with a non-branching onset. Recall that complex onsets are always banned unless a weak nucleus is certain to surface otherwise. Once that is certain to happen, KA, like other Levantine Arabic dialects, prefers the violation of both DEP-IO and ALIGN (W) over the phonetic appearance of the weak nucleus. It is necessary to mention that Abuabbas (2003: 90) indicates that branching onsets wordmedially are possible. As far as I can tell, all Levantine dialects, to which both Ajloun and Karak Arabic belong, have no branching onsets except utterance initially. With the given background, a couple of observations can be deduced. First, the first member of the branching onset in the examples in (27IIc) cannot be assigned to a semisyllable since semisyllables are banned post-lexically (Kiparsky, 2003). Second, the epenthetic short high vowel utilized to break consonant clusters word medially--as shown in Tableau (4)-- is still operative post lexically (27II c). To put the observations into effect, SL is no longer dominated, as shown in Tableau (7).

The evaluation of the candidates in Tableau (7) is quite revealing. It provides a fertile ground to explain how SL operates post-lexically. While low-ranked at lexical level, SL is quite undominated post-lexically. To have a constraint that is violable in one context and inviolable in the other is, of course, one of the most basic properties of OT doctrine. Further, it will shortly be made manifest that extra- and ultra-heavy syllables are ruled out by weight (*3μ) unless the last consonantal segments in such syllables are assigned to semisyllables or converted into a major syllable.

(30) *3μ

No trimoraic syllables.

(Karger, 1999)

(31)

*COMPLEX, SL, *WN, *3μ >>ALIGN (W), MAX-V-IO DEP-IO

Input/baaʕ + kitaab/	*COMPLEX	SL	*WN	*3μ	ALIGN (W)	MAX-V-IO	DEP -IO
a. baaʕ.ktaab	*!					*	
b. baaʕ. k.taab		*!		*			
c. baaʕ. ki.taab			*!				
d. ☞baa. ʕik.taab					*	*	*

Tableau (7)

The comparison between the candidates highlights some core properties of the competing faithful and unfaithful candidates. Candidate (a) is eliminated due to its violation of highranked *COMPLEX (since branching onsets are allowed only phrase/utterance initially); although candidate (b) respects this constraint it is eliminated because of its violation of SL and *3μ. Being faithful to the input alone does not guarantee winning the race. This explains the elimination of the third candidate in spite of its complete adherence to all high- and low-ranked constraints. Candidate (d), on the other hand, wins the race by creating a new syllable whose nucleus is an epenthetic short high vowel. In the context of Tableau (7), we should also note that unmotivated branching onsets cannot stand, as exhibited in (a).

Hopefully the evidence considered so far has been sufficient to establish the fact that a prerequisite of being the winner in KA, in particular, is to adhere completely to ONS in all positions. Again, branching onsets might win the race if and only if they occur phraseinitially and a weak nucleus would otherwise be certain to surface phonetically.

While constraints controlling onset distribution are important in governing the phonotactic patterns that are present in a language, they are absolutely not the only constraints that might be required to account for both edges of syllables. Rather it is essential, at this juncture, to introduce the second half of the formula, viz., coda constraints. Due to the resyllabification process common in all varieties of Arabic, the performance of onset constraints sometimes remains provisional awaiting coda constraints to take their share, and vice versa. In spite of the numerous shared features governing codas among Arabic varieties, diversity, as shown below, is still enormous.

4.2 Codas

4.2.1 Simple Coda

An initial inspection of the second half of the data in 2 shows that simple and complex codas come up both word-medially and word-finally. Codaless syllables, on the other hand, surface in these same phonetic environments. To gain an explicit picture about codas in this variety, an attempt is made below to go gradually through the syllabification process of codas in different environments. Recall that one of the tactics employed by Arabic to get the onset slot filled for the underlyingly onsetless syllables is by resyllabifying the last -C of the immediately preceding syllable as the onset of onsetless syllable. As far as codas are concerned, perhaps the most immediately obvious feature of nearly all Arabic varieties, from the OT perspective, is their frequent violation of –COD constraint:

(32) -COD

A syllable must not have a coda

(Prince and Smolensky, 1993)

When it comes to confrontation over the optimal candidate, it becomes clear that the winner pays little attention to -COD in all Arabic varieties. Thus, the optimal wins the race once it satisfies the top ranked constraint, irrespective of whether or not it adheres to –COD. Tableau (8) lays this point out.

(33)

ONS>>-COD

/θaman /	ONS	-COD
a. ☞θa.man		*
b. θam. an	*!	**

Tableau (8)

We must resist a preliminary conclusion that might predict that Arabic adheres to –COD even though the interaction shown above somewhat behaves as if this happens. The syllabification of the medial consonant in –VCV- as the onset of the second syllable does not reflect KA's adherence to –COD, but rather it reflects its adherence to ONS. The consistent findings concerning the syllabification of consonant clusters presented above, together with the data in (3), clarify a fact about the low-ranking status of the –COD in this variety.

Semisyllables, which have just shown outstanding capabilities in the syllabification and rescue of branching onsets, still prove themselves to be influential players in the syllabification of codas, especially when we get introduced to the reality that KA preserves the long vowel of CVVC and the complex codas of CVCC in both junctures and prepause positions. Unless the final -C in each of these forms is assigned to a semisyallble, the entire syllable will be ruled out by *3μ constraint in juncture. Consider the example exhibited in (34).

(34)

*3μ, *COMPLEX>>SL, -COD

/šaaf+na/	*3μ	*COMPLEX	SL	-COD
a. ☞šaa.f.na			*	
b. šaaf.na	*!			*
c. šaa.fna		*!		

Tableau (9)

Given the fact that KA maintains extraheavy syllables in nonfinal positions, it is, accordingly, apparent that the optimal candidate (a) is going to be ruled out by the *3μ unless the last -C in the first syllable is assigned to a semisyllable, as has just been mentioned. Candidate (b) is ruled out by incurring a violation of the top-ranked constraint *3μ. The last candidate has successfully avoided the high-ranked *3μ, but at the expense of the immediate fatal constraint.

While a coda at both morpheme boundaries and across word boundaries resyllabifies as the onset of the following onsetless syllable, no such process takes place if the following word begins with a consonant. This reinforces the already deeply rooted fact that Arabic sacrifices coda on the altar of onset.

4.2.2 Complex Coda

As was briefly pointed out earlier, natural and derived complex codas turn up phonetically in KA both word-medially and word-finally. It is as well to mention that

Arabic varieties are likely to be enormously divided over the articulation of branching codas. CVCC in Bani Hasan Arabic, for instance, surfaces word-medially as a result of weak nucleus elision. In Makkan Arabic, according to Abu Mansour (1995: 2), vowel elision is blocked if it creates a non-final CVCC, even at the cost of the presence of the weak nucleus however. In Ajloun Arabic (Al-Ghazo, 1987 and Abuabbas, 2003), on the other hand, complex codas are restricted to geminates.

Complex codas in KA distinguish themselves from complex onsets in their adherence to the SON. While examining the opacity in complex codas in the informants' speech, it became apparent that some clusters do violate SON (e.g. ?amr 'order', habs 'prison', etc.). However, by examining the pronunciation of these words in the output of other native-speaker informants, who also have not, up to then, lived outside Karak Governorate, it was obvious that a vowel almost always breaks up such clusters. In conformity with the aims posited earlier—to follow the patterns of populations rather than individuals—no attention is paid here to such violation since it does not represent the population's norm. As a prelude to the discussion of codas in KA, it must be made clear that the occurrence of complex codas in this dialect is inconsistent since an epenthetic vowel may unconditionally break the same clusters in the same phonetic environment irrespective of the adherence of such clusters to SON. The alternations present in this dialect lead to postulate two different surface representations for one and the same input, as illustrated in (35).

(35)

UR	SR 1	SR 2
bint	bint	binit

How can we give formal recognition of this observation? It is apparent that we are facing an opaque case. Kiparsky (1973: 79) sheds light on this phenomenon.

A phonological rule P of the form *A→ B*/ *C _ D* is opaque if there are surface structures with any of the following characteristics:

(36)

a. Instances of *A* in the environment *C _ D*
b. Instances of *B* derived by P that occur in the environments other than *C_D*.
c. Instances of *B* not derived by - that occur in the environment *C___D.*

In light of Kipasky's observation above, a question that remains to be answered is which of the two alternative realizations of complex codas in KA is to be adopted as the basic form for the purposes of this study. For consistency, this paper favors the faithful natural alternation with complex codas -C1C2 (where C1 is more sonorous than C2). As illustrated below, the syllabification of the medial clusters is another feature that makes KA different not only from some other Arabic varieties but from some other Jordanian varieties, as well.

In the *Prosodic Theory of Epenthesis*, Itô (1986:241-251) argues that medial triconsonantal clusters in Iraqi Arabic and Egyptian Arabic surface differently as shown in (37).

(37)

a. Cairene Arabic: Ø → V/ Ć_ (where Ć stands for the stray consonant)

b. Iraqi Arabic : Ø →V/ _Ć

With this in mind, the same VCCCV sequence in KA surfaces in two different ways. The examples in (27) indicate that the medial triconsonantal clusters in KA are resolved by either of the two representations shown in (38).

(38)

Input	SR1	SR2
cvcccv	cvcc.cv	cv.cVc.cv

It should be made clear that complex coda (SR1) occurs as long as C1 is more sonorous than C2 or if C1 and C2 are geminates. However, the opaque case discussed above makes (SR2) obligatory if C1 is less sonorous than C2 and a possibility in all other cases (except geminates). On the basis of (SR2), non-final CVCC sequence resolves in CV.CVC. This definitely anticipates the possibility of having an unstressed high short vowel (weak nucleus) in open syllables, as illustrated in (39).

(39)

UR	SR 1	SR 2
/bint+na/	b**í**nt.na	bi.n**í**t.na

Before we move on, a critical question pushed to the fore by (39) should be assumed: what prevents SR2 (bi.nit.na) from being eliminated by *WN? A straightforward answer says that *WN is undominated if the syllable that has the short high vowel is underlyingly unstressed (e.g. /kit**áa**b/→ kt**áa**b) and dominated if underlyingly stressed (e.g. /b**í**nt+na/→ bi.n**í**t.na). Stated somewhat differently, *WN is undominated in all positions except when a non-final CVCC is resolved into CV.CVC according to (38SR2) above. Tableau (10) lays this point out. Note that the tableau also demonstrates the asymmetry between KA and the above exemplified varieties (Cairene Arabic and Iraqi Arabic) with regard to the syllabification of the triconsonantals.

(40)

SON,*COMPLEX>>*WN, DEP-IO

/bint+na/	SON	*COMLEX	*WN	DEP-IO
a. ☞ bin.t. na				
b. bin. tna		*!		
c. ☞ bi. nit. na			*	*

Tableau (10)

In terms of minimal violation, candidate (a) is preferred over (c), which incurs two violations. Due to its violation of SON and *COMPLEX, candidate (b) is eliminated from the race.

Advancing to the next tableau, it becomes clear that a coda never branches for more than two slots. This restriction, together with what has been previously mentioned concerning the ban on semisyllables post-lexically, leaves one option in front of the resolution of tetraconsonantal clusters VCCCCV that is, via an epenthetic vowel between the antepenultimate and penultimate consonants. So, the –VCCCCV- sequence across word boundaries is syllabified as –VC.CVC.CV and never as –VCCC.CV or –VCC.CCV. Regard Tableau (11) for further illustration.

(41)

*COMPLEX, SL, *3μ>>MAX-V-IO, DEP-IO

/biʕt# #kitaab/	*COMPLEX	SL	*3μ	MAX-V-IO	DEP-IO
a. biʕt. ki.taab	*!		*		
b. biʕt.k.taab	*!	*	*	*	
c. ☞biʕ.tik.taab				*	*

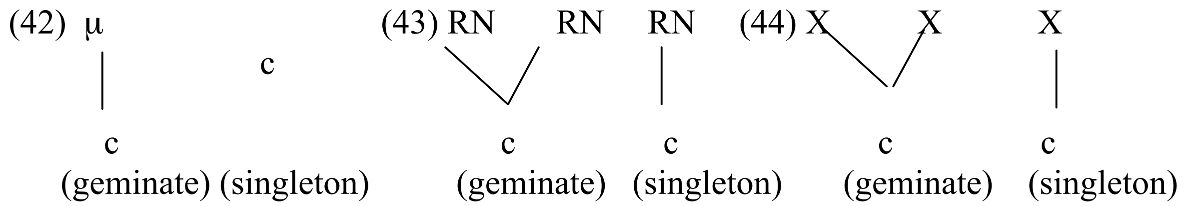
Tableau (11)

The first candidate (with complex margin word boundaries and weak nucleus) is the only fully faithful candidate in Tableau (11); but, nevertheless, it is eliminated on account of the violation incurred by preserving the weak nucleus in proscribed environments. The second candidate (b) (with a complex coda word boundary and a semisyllable post-lexically) is excluded by simultaneous violation of the three top constraints: *COMPLEX, SL and *3μ. Candidate (c) (with a newly formed syllable, whose peak is an epenthetic vowel) adheres to the high-ranked constraints by breaching the two dominated constraints, namely, DEP-IO and ALIGN (W). Recall that DEP-IO and ALIGN (R) are also dominated lexically.

Complex codas should not by any means be handled apart from geminates, which distinguish themselves from other branching codas in, at least, three features: (i) violation of SON, (ii) inalterability and (ii) inseparability.

4.2.3 Geminates

The central dilemma facing one when it comes to complex codas relates primarily to geminates. The first and probably the most difficult task in this regard is how geminates are represented. Davis (2003) surveys three notable competing theories in this regard. The first one argues for the moraic theory of geminates. For Hayes (1989), only a geminate consonant is underlyingly moraic. This explicitly indicates that a single consonant is not, as shown in (42).



Selkirk (1990) advocates the two-root node theory of geminates. According to this theory, a geminate consonant is represented underlyingly as two linked root nodes while a single consonant is linked to only one node. Consider (43) above for further illustration. Clements and Keyser (1983) and Hayes (1989), on the other hand, argue that a geminate is represented as a consonant linked to two skeletal slots, while a single consonant is linked to a single skeletal slot, as exhibited in (44)

A close look at the literature shows moraic theory to be the choice for dealing with geminates in most studies, including those recently conducted on Arabic (Adra, 1999, Abuabbas, 2003. among others). Yet, this paper endorses the two root theory, which views geminates as a cluster of consonants, in spite of the definite violation of SON and *COMPLEX. The preference of this theory over the moraic theory is attributed to its desirable outcomes that cannot be attained by the competing theory. Chief among them are its ability to satisfy top-ranked constraints *MORA and W-MIN, as shown in (45).

(45) *MORA

A mora can not be in a final word.

(Lorentz, 1996)

By turning to an OT account, we should first figure out the operative constraints needed for the purpose of winner selection. A general key assumption is that geminates are marked crosslinguistically and, thus, they are prohibited (Crowhurst, 2001:578). It is clear that geminates violate SON, *COMPLEX and the Obligatory Contour Principle. However, their frequent occurrence word-medially and wordfinally makes the *GEM constraint freely tolerated in Arabic, in general:

(46) *GEM

Geminates are prohibited

(Boudlal, 2003)

The primary constraint on geminates is derived from Kenstowicz and Pyle (1973) and Kenstowicz (1999), who argue that geminates resist both separation and alteration. This, of course, gives rise to the IDENT-IO [GEM] constraint, shown in (47).

(47) IDENT-IO [GEM]

Output correspondent of an input [gem] are also [gem].

(Adra, 1999)

Among the candidates provided in Tableau (12) (48a) is eliminated because it incurs two fatal violations, namely, SON and *COMPLEX. The undominated IDENT-IO [GEM] rules out the candidacy of the second alternative (48b).

(48)

IDENT-IO [GEM], SON, *COMPLEX>>SL, DEP-IO, *GEM

/rabb/	IDENT-IO [GEM]	SON	*COMPLEX	SL	DEP-IO	*GEM
a. rabb		*!	*			*
b. ra.bIb	*!				*	
c. ☞rab.b				*		

Tableau (12)

Once more, KA furnishes concrete evidence that geminates under no circumstances are liable for modification. Again, if the analysis posited above failed to assign the second member of the geminates to a semisyllable in (48c), such an analysis would unquestionably incur a violation of the harsh *COMPLEX and SON simultaneously. Before engaging into some residual issues, let us pause a little to consider some further evidence about degemination.

Perhaps, what makes the two-root theory special here is its successful accountability for word minimality requirement in varieties where the last consonantal member of a coda word finally is extrasyllabic. Up to now it has not been entirely clear what happens if degemination occurs in words such as *rabb*. This process is totally blocked by the Word Minimality constraint:

(49) W-MIN

A prosodic word contains at least two moras.

(50)

MAX-C-IO,W-MIN,>>SL

/rabb/	MAX-C-IO	W-MIN	SL
a. ☞rab.b			*
b. rab	*!	*	

Tableau (13)

It is notable that candidate (a) contrasts with (b) in its adherence to the MAX-C-IO and W-MIN. Degemination, as previously anticipated, has led the second candidate (50b) astray since the resultant form is far below satisfying W-MIN constraint. Likewise, MAX-C-IO harshly penalizes degemination.

We are now in a position to examine other, often more complex and residual cases of gemination. In his dissertation, Abuabbas (2003: 114-118) argues that Ajloun Arabic surfaces some problematic sets of words, such as the following:

(51)

ʕamm/ʕaam/ʕaamm	'parental uncle'/ 'year'/'general'
sadd/saad/saadd	'he blocked'/ 'prevailed'/ ''is blocking'
d□add/d□aad/d□aadd	'really'/ 'gave generously' / 'serious'
barr/baar/baarr	'land'/ 'went bad' / 'good to his parents'

The first two words in each set, he argues, are not problematic since they do not violate the phonological rules of the language. However, the third example in each set (CVVCC) is problematic since it incurs a violation of syllable well-formedness, shown in (52).

(52) μμ

A syllable is maximally bimoraic

(Samek-Lodovici, 1992)

The problem of a CVVCC sequence, which also surfaces in KA, has not received due attention in previous research conducted on modern Arabic dialects. It is possible to attribute the huge ignorance of such a syllable type in the literature of Arabic phonology to two reasons. First, some researchers (i.e. Abu Salim, 1982: 10) believe that this type of syllable does not show up phonetically in all modern Arabic dialects. Second, it is also quite possible to attribute the ignorance of such a syllable type to the widespread neutralization process, whereby long vowels and consonants are shortened in prepause positions (Holes, 2004: 61-62). Al-Ghazo (1987) argues that this type does not surface in his dialect due to a degemination rule that resolves such a form into a more common type.

In his attempt to deal with such a problematic issue, Abuabbas (2003: 115) has proposed different postulations: (i) a vowel-shortening rule that would reduce the number of moras in each word, (ii) an epenthesis rule between the members of geminate, and (iii) a degemination process. However, after several worthy attempts, he concluded that "This problem will not be pursued any further and will be left for further investigation." (p.117).

As far as these problematic words are concerned, I believe none of the attempted postulations to be satisfactory. As for the first and third suggestions, namely, vowel shortening and degemination, evidence to the contrary shows that these words are sometimes (phonetically conditioned) enunciated with fully pronounced vowels or with two timing-slot geminates. Epenthesis, on the other hand, incurs violation of the top-ranked constraints posited earlier, IDENT-IO [GEM], which, in turn, gainsays MAX-C-IO. Hence, none of these propositions might account for the dilemma.

To this end, this paper argues that this type of syllable cannot be naturally approached apart from morphology. Thus, the final unlicensed consonant should be reduced by morphology via proposing that the monosyllabic (CVVCC) sequence is underlyingly bisyllabic CVVCCV(n). As such, the CVVCC sequence is regarded as a derived form created by vowel elision. Note that the optional (n) in the underlying representation

CVVCCV(n) refers to a consistent rule in both CA and MSA where the last C is pronounced [n] if the noun or adjective is indefinite. In sum, this proposal argues that the last consonant is naturally and underlyingly syllabified as an onset of the following morpheme, whose nucleus is the elided vowel.

Support for this proposal stems from the following facts. First, evidence in the literature indicates that CVVCC surfaces only as monosyllabic due to the general rule that deletes a final short vowel in prepause positions (Holes, 2004). Another strong piece of evidence in support of this argument stems from an non-occurrence of this type of syllables (CVVCC) in juncture in both CA and MSA. Second, it is worthwhile to mention that this type of syllables appears only in the default forms of verbal nouns and adjectives (third person singular masculine), where no additional morphemes are required. So, this syllable is resolved into other common types once followed by any morpheme or case either word-medially or word-finally in CA, MSA and KA. This means that the problem of CVVCC sequence is restricted to the third person singular masculine form that lacks the additional obligatory morpheme(s) required in all other forms. Compare the examples exhibited in (53).

(53)

Position	(M).	(F).	Gloss
Prepause (sg)	baarr	baar.rah	good to his/her parents
Prepause (pl)	baar.riin	baar.raat	good to their parents
Juncture (sg)	baarr.na	baar.rit.na	good to us
Juncture (pl)	baar.riin.na	baar.raat.na	good to us

Third, what motives this type of syllable to show up phonetically in KA and all other Arabic varieties that have no vowel shortening or degemination is the unbeatable resistance of MAX-C-IO, which is undominated in this dialect. As a result, KA prefers adjoining the last unlicensed consonant in CVVC-C to the coda over deleting it. To conclude, CVVCC turns up phonetically only after the accompanying vowel has been elided due to the inflectional endings of declension or the phonetic environment (e.g. prepause positions).

Perhaps, this proposition is preferred even to a proposition that presupposes the existence of an empty segment that has no input correspondent. Furthermore, the proposition made above requires no additional constraints to account for any member of the problematic sets of words raised by Abuabbas (2003).

Reduction of extrasyllabic consonants by morphology is not unprecedented in the literature. And in fact, it is presently gaining supporters world wide. Hulst and Ritter (1999: 140-141) argue that the “first and most obvious circumstance in which the postulation of a final empty nucleus is necessary involves the occurrence and distribution of so-called ‘superheavy syllables.’ For them, “the final consonant in VCC and VVC is not tautosyllabic with the preceding VV or VC sequence. Standing by its own, then, it most likely forms an onset, which according to the government phonology licensing principles must be followed by a nucleus.” Scheer (2004) argues that heavy-word final clusters such as *six-th-s* are heteromorphemic in both English and German. To cope with this problem, government phonology, he explains, has provided a particular interpretation to this insight. “Final empty Nuclei are licensed by a device whose source is not identified. This situation is usually referred to as Licensing of final empty Nuclei.” (p.423).

Bear in mind that syllabifying unlicensed segments as semisyllables at the word level in –VC dialects, to which KA belongs, is licensed (Kiparsky, 2003). To account for the syllabification problem of unlicensed segments, I propose that the final two consonants in the CVVCC sequence are assigned to two adjacent semisyllables. At first sight, this proposal might not be so appealing, and it unquestionably gives rise to two major questions. The first question which arises in the wake of the idea of adjacent semisyllables argues that if the assignment of these two unlicensed segments to adjacent semisyllables is correct, then what prevents such semisyllables from converting into a major syllable according to the previously introduced constraint ςς=σ. A plausible answer is that the two adjacent semisyllables are banned from converting into a major syllable in this particular environment by the undominated IDENT-IO [GEM], which can not be violated in nearly all varieties of Arabic.

The second question relates to whether or not the assignment of such unlicensed segments to two adjacent semisyllables incurs a violation of the peripherality condition stated above. The proposition made here avoids violating the peripherality condition, which states that there is at most one semisyllable per morpheme, since the second member of the geminates is syllabified as the onset of the following morpheme, whose nucleus is an elided vowel. Accordingly, the first member of the geminate occupies the morpheme edge of the root and the second occupies the morpheme edge of the following bound morpheme. Nepveu (1994 quoted in Cho and King (2003, 194-195) considers a case in Georgian consonant clusters as a morpheme edge and, thus, it is syllabified as a headless syllable (semisyllable). In this account, the first problematic set of words questioned above (ʕaamm, saadd, jaadd and baarr) will have the following schematic representation in (54). No doubt, the representation for *ʕaamm* ‘general/public’ is applicable to all other problematic cases, as well.

Though it seems, at first glance, more harmonic than even the optimal itself, the first nominee is eliminated by the unforgiving IDENT-IO [GEM]. This provides additional strong evidence in disfavor of geminate separation. After incurring two violations of non-forgiving constraints (MAX-C-IO and *3μ.), the second runner (b) fails to survive and, thus, it is immediately ruled out. After the exclusion of the first two candidates, the decision falls on (54c). More likely, there is no possibility of eliminating the candidate (c) from the race since it is in complete loyalty to the top-ranked constraints.

(54)

IDENT-IO [GEM], MAX-C-IO>> MAX-V-IO, SL, DEP-IO

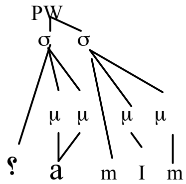
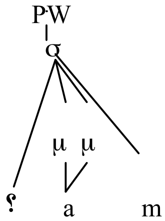
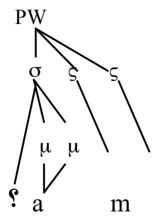
/ʕaamm+V$_{morphem}$/	IDENT-IO [GEM]	MAX-C-IO	MAX-V-IO	SL	DEP-IO
a. 	*!		*		*
b. 	*!	*	*		
c. ☞ 			*	**	

Tableau (14)

The preceding tableaus have attempted to provide an alternative account for unlicensed segments. With the last unlicensed segment in complex margins in the right place, we have hopefully been able to account for the goals posited earlier.

5. Conclusion

This paper has provided a gradual extensive constraint-based analysis of the phonotactics of KA. A comparison of the findings of the present paper and the findings of the previous research conducted on other Arabic varieties provides evidence for the accountability of the dialectal differences by means of a violable set of universal constraints. In the attempt to show the behavior of complex margins with respect to faithfulness and markedness constraints, the paper demonstrates that the adherence of KA to faithfulness constraints is sometimes put in double breaches by two well-known processes, viz., syncope and epenthesis.

The paper has also shed light on and attempted to answer a number of problematic issues concerning complex onsets, complex codas and geminates. And, finally, the paper has furnished concrete evidence concerning KA's preference of preserving marginal unlicensed consonants to consonant underparsing, even in proper environments.

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