Rules or Constraints? A Cross Methodological Comparison of Approaches to 'Syncope' and 'Vowel Shortening' in Cairene Arabic

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This study cross-compares three basic phonological approaches to syncope and vowel shortening in Cairene Arabic. The phenomena addressed have been examined within the rule-based, autosegmental and Optimality Theory frameworks with the aim of assessing the effectiveness and shortcomings of using inviolable rules vis-à-vis universal violable constraints. Findings show that the strict application of the general rules and principles within the rule-based and autosegmental approaches often results in some ill-formed output. This, therefore, rationalizes the frequent resort to language-specific rules to account for particular grammatical constructions. Optimality Theory, on the other hand, compels no language-specific restrictions on the input as the optimal form is not emanated by principles or parameters. Rather, it is derived by satisfying the maximum number or incurring the least violations of the relevant universal constraints. Accordingly, principles and generalizations are expressed more straightforwardly and economically with the constraint-based approach of Optimality Theory.

Keywords: *Cairene Arabic, constraints, phonology, syncope, vowel shortening*

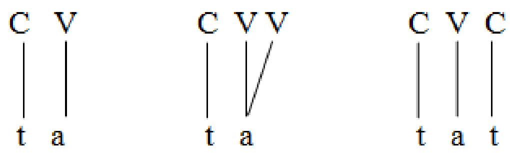
1. Introduction

Along with the well-formedness notion, the phonological theory is fundamentally devoted to adequately describing the mental representation and basic units of human speech sounds and explaining how the sound patterns of all languages are underlyingly the same and superficially different (cf. Baković 2013). Consequently, much of phonological research and theorizing during the past five decades has focused on phonological universals and the transition from the area of divergence at the segmental level to the area of convergence at the higher-order prosodic units such as syllables and feet.

A glance at literature on syllable shows the evolution of numerous theories and frameworks since the launch of generative phonology by Chomsky & Halle in 1968. Despite the absence of any significant role for syllable in *The Sound Pattern of English*, the subsequent literature on phonology clearly indicates the central role of syllable in the phonological theory, in general, and phonotactics, in particular. This explains the emergence of several theories primarily dedicated to account for syllable structure such as the skeletal tier theory, the templatic theory and the moraic theory.

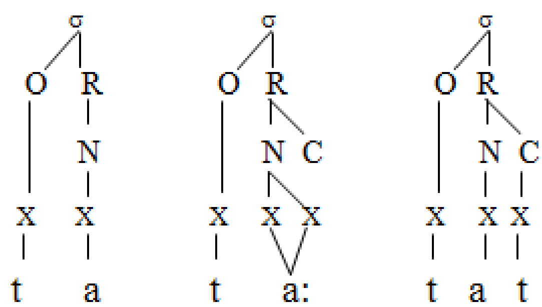
The theory of skeletal tier is divided into two models, viz., the CV model and the X-slot model. The CV tier, which was originally proposed by McCarthy (1979), is depicted in (1).

(1) CV Theory



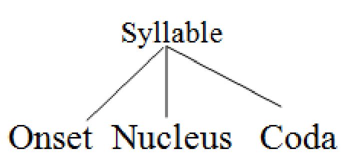
However, the CV model, which does not account for several phenomena, including V-lengthening, was challenged by the X-slot theory. Levin (1985) and Lowenstamm & Kaye (1986) replaced the symbols C and V with a uniform sequence of Xs, as shown in (2).

(2) X-Slot Theory



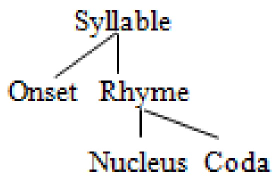
Two main proposals were suggested with regard to the syllable internal structure, namely the level and branching syllable structures. According to the level syllable model, the syllable has a flat structure. The onset comprises the consonant(s) to the left of the nucleus while the nucleus comprises the peak of the syllable. The coda, on the other hand, is made up of the consonant(s) to the right of the nucleus.

(3)



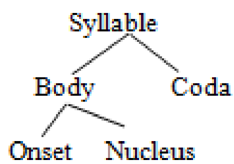
Unlike the level syllable structure, the branching syllable structure has gained much attention in the literature. Two branching syllable structures were, however, proposed in the literature viz., the onset-rhyme model and the body-structure model. The onset-rhyme structure, which gained the most support in the recent literature, is depicted in (4).

(4)



This model was proposed and adopted by Selkrik (1978, 1982) and Halle & Vergnaud (1980) as a linguistic universal drawing on the observed phonotactic constraints that hold between nucleus and coda. The body-syllable structure, which was adopted by several pioneering linguists, including McCarthy (1979) and Iverson & Wheeler (1989), is represented in (5).

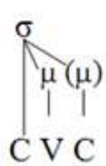
(5)



The association between the nucleus and the onset in this model aroused considerable disagreement over the syllable weight as it was noticed in the subsequent literature that the onset does not contribute to the syllable weight (Hyman 1985; McCarthy & Prince 1995; and Hayes 1989). Such debate obviously hastened the emergence of the moraic theory.

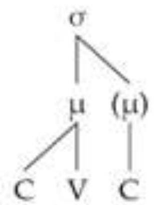
Associating segments with weight constitutes the most profound difference between the skeletal tier theory and the moraic theory. Instead of dividing syllables into onset and rhyme under the umbrella of the X-slot theory, syllables are divided into mora or weight units. According to this theory, a light syllable consists of one mora while a heavy syllable is at least bimoraic. The brackets around the mora of the coda in (6) indicate that the weight of the coda (moraic or non-moraic) is context-dependent (weight-by-position) based on a language specific basis (Topintzi 2011).

(6)



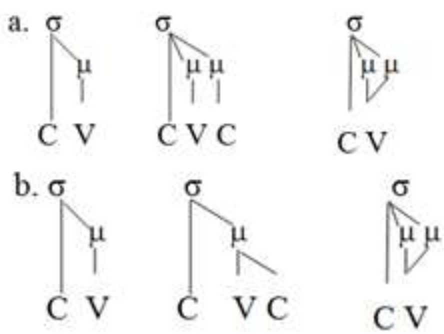
A survey of literature also shows some disagreement as to where the onset associates and whether or not it is extramoraic. For Hayes (1989), the onset is non-moraic and directly adjoins to the syllable node as in (6) whereas it attaches to (and shares the same mora with) the following nucleus, as shown in Figure (7) (Hyman 1985; Itô 1986, to name but a few). Support for the existence of onset weight also comes from Topintzi (2006, 2010).

(7)



Nevertheless, there are some differences between rhyme-weight and nucleus-weight languages, as depicted in (8a) and (8b), respectively (Ewen & van der Hulst 2001: 151).

(8)



Two significant findings emerge from the figures in (8). First, the initial consonants are always extramoraic. Also, unlike rhyme-weight languages, the final consonant in nucleus-weight languages does not associate with a separate mora. The marked variations across languages and dialects and the inability of the previous approach to adapt to these dissimilarities were the chief reason underlying the need for a new model of grammatical representation that is capable to accommodate such variations (Vihman & Croft 2007). This rationalized the emergence of the template-based approach.

The templatic theory of syllabification proposed by Itô (1986, 1989) attempts to integrate "well-formedness conditions on syllable structure into syllabification algorithm built around directional template matching" (Frampton 2008: 228). Syllabification, based on this theory, proceeds by mapping segmental units onto a given template. It is still crucial to point out that syllable structure is assigned in one single direction. So, a consonant that does not fit the template condition is prosodically unrealized or unlicensed (Martínez-Gil 1991: 554). As such, unlicensed segments are either deleted or rescued via vowel epenthesis. However, the systematic and significant exceptions to rule-based theories, which are always accounted for by proposing language specific rules, provided a fertile ground for the evolvement of the constraint-based approach of Optimality Theory (OT, henceforth).

Unlike rule-based and autosegmental theories, syllable well-formedness within the OT framework is governed by a set of universal constraints. Language specific rules are, however, accounted for by different hierarchical ranking of constraints. In OT, the relation between the phonemic form and the phonetic form is mediated by two formal mechanisms called *GEN(erator)* and *EVAL(uator)*. GEN, on the one hand, creates a set of output candidates that will undergo the comparison and judgment of the EVAL. All candidates are simultaneously evaluated for whether or not they are in accord with the set of constraints included in the tables. Since OT depends on comparison, then the candidate's first violation(s) cannot tell whether it is optimal or not. However, the output is chosen from the set of candidates created by the GEN (regardless the number of such candidates) (Prince & Smolensky 1993). Languages' adherence to universal constraints is 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 (e.g. Prince & Smolensky 1993; Tranel 1995; Btoosh 2006).

This study attempts to shed light on syncope and vowel shortening in CA within the framework of the traditional approach, X-slot theory, moraic theory and OT. To gain a transparent picture of the target phonological phenomena, a deliberate attempt has been made to ensure that the same examples are used throughout the study. Moreover, in conformity with the aims posited above, close attention has been paid to how each approach accounts for the exceptions to the general rules with the aim of delineating the best approach in terms of ease, consistency, economy and highest conformity to general, invariant principles cross-linguistically.

2. Syllable structure in CA

Three syllable patterns surface in CA: light CV, heavy CVC and CVV, and superheavy CVVC and CVCC. It is noteworthy that the final C in CVC, CVCC and CVVC is extrasyllabic or invisible word finally. It is also worth mentioning that superheavy syllables occur only in word or phrase-final position (Aquil 2013).

Given the syllable patterns shown above, it is evident that onsetless syllables are banned from surfacing in this variety. Likewise, consonant clusters are banned word-initially or medially. So, in order to avoid having onsetless syllables at word level, CA resorts to glottal stop epenthesis or resyllabification to fill in the empty slot. CA also turns to resyllabification to avoid having consonant clusters across word-boundaries since utterance is the syllabification domain in Arabic, in general, as shown in (9).

(9)

	UR		SR	Process
a.	akbar 'bigger'	→	?ak.bar	onset-motivated epenthesis

b. kalb+ak → kal.bak onset-motivated resyllabification
dog your
'your dog'

c. katabt- l- ha→ ka.tab.til.ha phrasal resyllabification
wrote-1sg.mas. to her
'I wrote to her'

3. Syncope and vowel shortening in CA

Like other Arabic varieties, CA exhibits syncope and vowel length alternation phenomena. Syncope in CA refers to a general phonological process, whereby a high vowel deletes in a non-final monomoraic syllable that is flanked by vowel-final syllables across words (Watson (2007). However, it should be made obvious that syncope in all Arabic dialects that do not allow complex margins (such as CA) is not context-free. Rather, the syncopated vowel should be preceded by an open syllable (Kenstowicz 1980; Watson 2002, to name but a few).

(10)

a. fih**i̲**m l- gawaab → fih.mil.ga.waab
understood 3sg. mas. the answer
'he understood the answer'

b. ʃir**i̲**b l- ʕasiir → ʃir.bil.ʕa.siir
drank 3sg.mas. the juice
'he drank the juice'

Syncope in CA also takes place within a phonological word when a vowel-initial suffix is added.

(11)

a. libis+u → lib.su
dressed 3pl.mas.
'they dressed up'

b. ʃir**i̲**b+u → ʃir.bu
drank 3pl.mas.
'they drank'

Despite the attested deletion of the short vowels in non-final monomoraic syllables, it is yet quite noticeable that the syncopation of high short vowels is more common than low short ones. A close look at literature of Arabic varieties shows a distinction between differential and nondifferential dialects. Differential dialects are those varieties that delete unstressed high vowels while nondifferential ones delete all short vowels whether high or low (Cantineau 1939). CA belongs to the first group (differential dialects). Unlike syncope, which rules out marked but not ill-formed structures, vowel shortening is utilized in CA to prevent ill-formed syllables from surfacing.

Vowel shortening refers to the reduction of long vowels in closed non-final syllables. Research on Arabic has demonstrated the existence of both phenomena in Arabic varieties (McCarthy 1979; Kenstowicz & Abdulkareem 1980; Abu Salim 1982; Irshid 1984; Alghazo 1987; Abu Mansour 1995; Farawneh 1995; Watson 2007, among others). It is yet noteworthy that vowel shortening and syncope usually coexist in the same grammar so as to improve the foot shape (Gouskova 2003: 86). Further evidence in favor of this argument is provided by examples such as the ones in (12).

(12)

a. naadim + iin → nad.miin
regretful 3pl.mas.
'they are regretful'

b. ṣaaħib+u → ṣaħ.bu
friend his
'his friend'

3.1 *Syncope and vowel shortening in CA: A cross comparison of approaches*

3.1.1 *A rule-based approach*

Irrespective of whether syncope is triggered by a markedness constraint that disfavors weak nucleus syllables (Mobaidin 1999; Gouskova 2003, among others) or by economy so as to reduce the number of monomoraic syllables, it is still essential to point out that this process is not constraint free, as formalized in (13).

(13)

$$\left\{\begin{bmatrix} \text{V} \\ +\text{high} \\ -\text{stress} \end{bmatrix}\right\} \longrightarrow \varnothing \,/\, \text{VC}\ \_\_\ \text{CV}$$

Building on this rule, only unstressed high short vowels are subject to deletion if they occur in a nonbranching rhyme preceded by an open syllable. In context of stress, it is essential to mention that stress in CA is predictable and governed by weight, as shown in (14).

(14) Word-stress patterns in CA

a. A final superheavy (CVCC or CVVC) syllable is stressed.

i. ?a'kalt
ate 1sg.mas.
'I ate'

ii. miħ'raab
'niche'

b. If the last syllable is not superheavy, stress the penultimate heavy syllable.

i. ʃi'ribti
drank 2sg.fem. (intonational question)
'did you drink?'

ii. iʃta?'t-illak
longed 1sg.mas.-for you
'I longed for you'

c. Otherwise, stress falls on either the penult or the antepenult whichever is separated from a preceding heavy syllable (or word boundary) by an even number of light syllables, including zero".

i. ?in'katabat
it (fem.) was written
'it was written'

ii. 'kataba
wrote 3sg.mas.
'he wrote'

However, stress is assigned to the penultimate syllable in the third person feminine singular inflectional form of the perfective syllable with a V(C) object suffix and in a plural with the template CiCiCa or CuCuCa (Watson 2007).

(15)

i. kata'bitu
wrote 3sg.fem. it
'she wrote it'

ii. ɣi'riba
‘crows’

The examples in (16) below show that syncope takes place at word level when a vowel-initial suffix is added. It should be, however, made obvious that syncope must be averted if it leads to impermissible structures, as shown in the examples sketched in (16a).

(16)

a. Syncope Inhibited	b. (Input) →	(output) Syncope Obligatory
i. fih**i**m understood 3sg.mas. ‘he understood.’	i. fihim+u → understood 3pl.ma ‘they understood’	fi**h.m**u
ii. bit**i**ktib write 3sg.fem. ‘she is writing/writes’	ii. ʃufit+ak → saw 2sg.mas. ‘I saw you’	ʃu**f**.**t**ak
iii. ?uxt**i**na sister our ‘our sister’	iii. biyakil+u → eat 3pl.mas. ‘they are eating’	bi.ya**k.l**u

Note that it is banned to delete the high short [i] in (16ai) ‘fihim’ since this leads to a violation of the scale of sonority as [m] is more sonorous than [h]. So, it is impossible for [m] to be syllabified as a coda of the preceding syllable. Also, it is disallowed to syllabify the [h] as the coda of the first syllable since this renders the second syllable onsetless. Over and above, the deletion of the unstressed high short vowel in (16a ii & iii) is inadmissible as this leads to a non-permissible structure.

The following examples show that syncope also applies at phrase level due to resyllabification across word boundaries.

(17)

i. sim**i**ʕ + l- kalaam → sim**.ʕi**l.ka.laam
obeyed 3sg.mas. the advice
‘he obeyed the instructions/advice’

ii. naam + k**i**θiir → naa.mik. θiir
slept 3sg.mas. much
‘he slept much”

A closer look at the data above shows that CA, which does not allow CCC sequence, prefers vowel insertion rather than segment deletion to rescue the unlicensed segments. Epenthesis in CA can be expressed in the following rule.

(18)

$$\varnothing \longrightarrow \left\{\begin{matrix} V \\ \begin{bmatrix} +\text{high} \\ -\text{stress} \end{bmatrix} \end{matrix}\right\} / \ C.C\text{-}C$$

Despite the seeming complementarity of syncope and epenthesis, they are plainly triggered by different reasons. While epenthesis breaks up a marked consonant cluster, syncope, which deletes a medial, typically unaccented vowel, is induced by economy. Nevertheless, syncope often occurs as a result of epenthesis, as shown below.

Epenthesis, which projects a mora to the right of an unstressed syllable, is, thus, a repair operation since the pre-epenthesis form does not conform to the basic syllable structure of CA. A look at the resyllabification of the examples above displays the interaction between epenthesis and syncope as the first feeds the second. Nevertheless, epenthesis is not the only repair strategy in CA. Rather, most Arabic varieties, including CA, employ vowel shortening to avoid impermissible syllable structures.

Shortening of input long vowels in non-final syllables is a must in all CV dialects, most varieties spoken in Egypt and the Libyan desert, including CA, since these dialects do not license three mora syllables (Kiparsky 2003). Thus, CVVC syllables are eliminated by shortening the input vowel, as formalized in (19).

(19)

$$\{V{:}\} \longrightarrow V / \_\_ \ C]_{\sigma}$$

In the examples presented below, it is easy to notice not only the rules applied to the underlying form, but also the interactions among such rules. For instance, the epenthetic vowel sometimes creates an environment that makes vowel syncopation possible, as in (20a). Therefore, accounting for the structural change presented above requires rule ordering due to the obvious feeding relation among such rules.

(20)

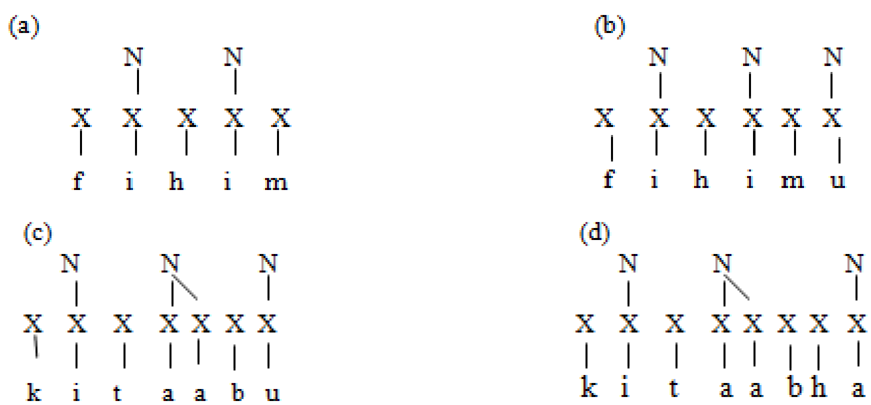
a. # biˤt+kitaab#	b. #kitaab#	c. #kitaab+ha#	d. #ṣaaħib+u#	UR
sold1mas.sg.+ book	*book*	*book her*	*friend his*	
'I sold a book'	*'book'*	*'her book'*	*'his friend'*	
biˤ.ti.ki.taab	N/A	N/A	N/A	Epenthesis
biˤ.tik.taab	N/A	N/A	ṣaaħ-bu	Syncope
N/A	N/A	kitab-ha	ṣaħ-bu	Shortening
biˤ.tik.taab	kitaab	kitab-ha	ṣaħ-bu	SR

Had the rule ordering of epenthesis and syncope been reversed, syncope would not have been applied, as shown in (20). Therefore, vowel syncopation in (20a) applies to the output of the epenthesis rule. The same is true for syncope and vowel shortening, as in (20d). Overall, the examples in (20) empirically demonstrate that epenthesis, syncope and vowel shortening aim to respectively insert, delete and reduce segments and structures that would be otherwise impermissible in this variety.

3.1.2 *An x-slot account*

On the basis of resemblance between the CV and X-Slot models as demonstrated above, it is evident that the latter is an improved version of the former. The x-slot model easily accounts for phonological processes related to timing such as compensatory lengthening. That is, each x-slot represents a timing unit. Therefore, a short sound occupies one x-slot in the rhyme while a long sound occupies two x-slots. Yet, this theory treats onsets and nuclei/codas equally with regard to weight (Elfner 2006). Like other theories that endorse the existence a syllabic skeleton, elements of the segmental tier are associated with elements of the CV-tier in accordance with Universal Association Convention. Associations are also constrained by the Well-formedness Principle (Goldsmith 1976; Watson 2007). Accordingly, crossing association lines are banned. Likewise, association of consonantal elements on the segmental tier with vowels on the CV-tier or vice versa is not allowed. Yet, having an element on one tier associated with two or more elements on the other remains possible (Berendsen 1986). The basic syllable structure is represented in the following figures.

(21) Associate each vowel with a syllable nucleus.

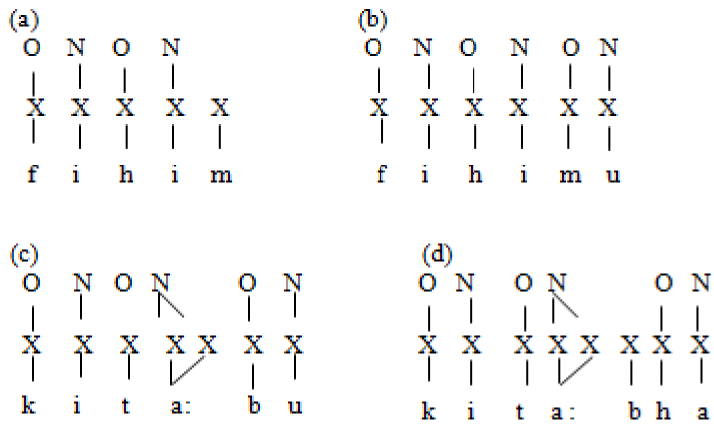


The vocalic slot in each syllable is pre-associated to a nucleus. Also, the examples above show that the vowel element in light syllables is associated with one X in the rhyme while a heavy syllable is associated with two Xs. Next to vowel association, consonants to the left of the nucleus are associated to the onset node.

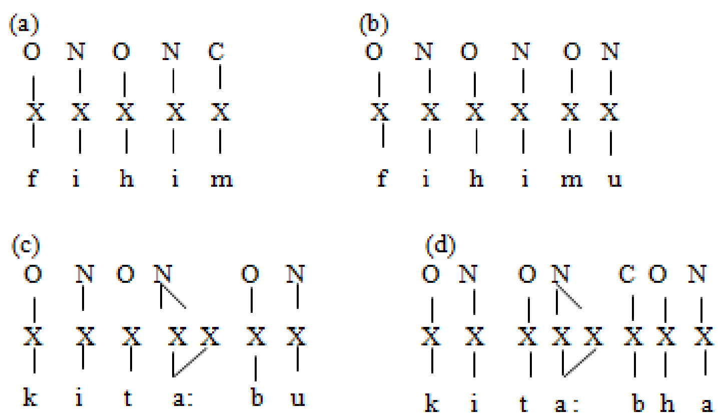
(22)

(i) Onset Syllabification: Associate the segments to the left of the nucleus with an onset.

(ii) Onset Maximization: Maximize the complexity of the onset, subject to relevant constraints.

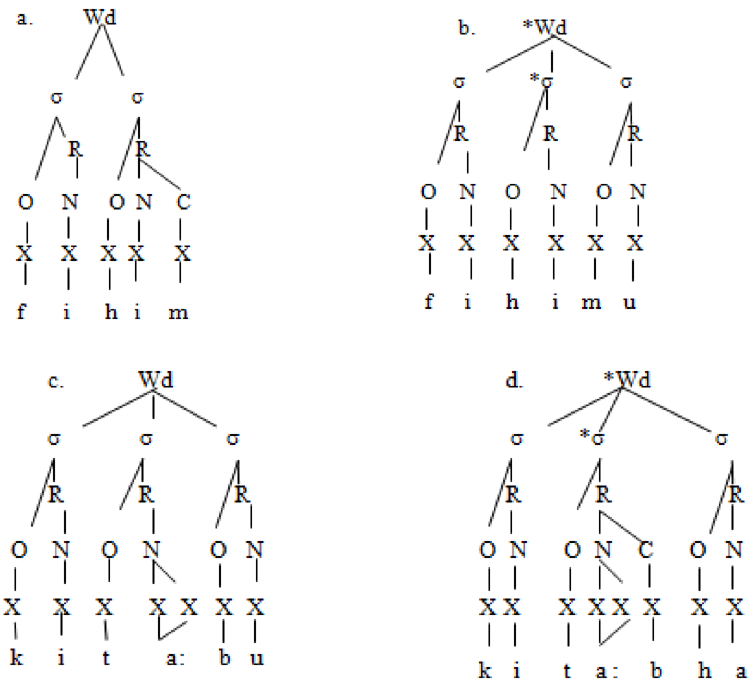


(23) Coda Syllabification: Associate the segments to the right of the nucleus with a coda, subject to relevant constraints.



Thus far in this section, an attempt has been made to apply the universal syllabification rules. However, the strict application of such rules has resulted in some ill-formed output forms, as shown in (24b) and (24d) below.

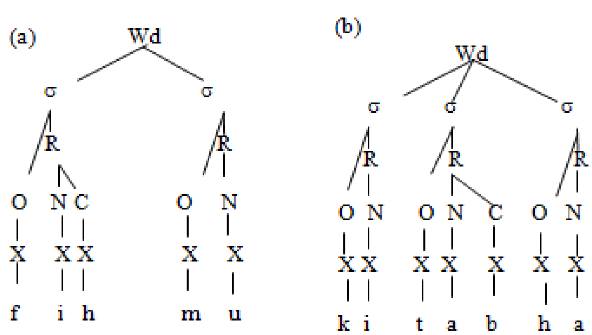
(24)



The ill-formedness of (24b) is attributed to the surfacing of the unstressed high short [i] in a nonbranching rhyme preceded by an open syllable**.** This is definitely not licensed in this variety. As shown in (25a), the ill-formed syllabification of (24b) is rescued by deleting the [i] and associating the [h] to the coda of the preceding syllable. In (24d), however, it is impermissible for CVVC to occur word medially. It is also disallowed to associate the [b] to the onset of the ultimate syllable as this results in an inadmissible syllable: *CCV.

Consequently, in order to avoid having the ill-formed output forms in (24b) and (24d) above, CA resorts to two phonological processes, namely, vowel syncopation as in (25a) and vowel shortening as in (25b). Therefore, syncopation is meant to avoid having a nonbranching rhyme word-medially while vowel shortening serves to avoid having extraheavy syllable word-initially or medially.

(25)

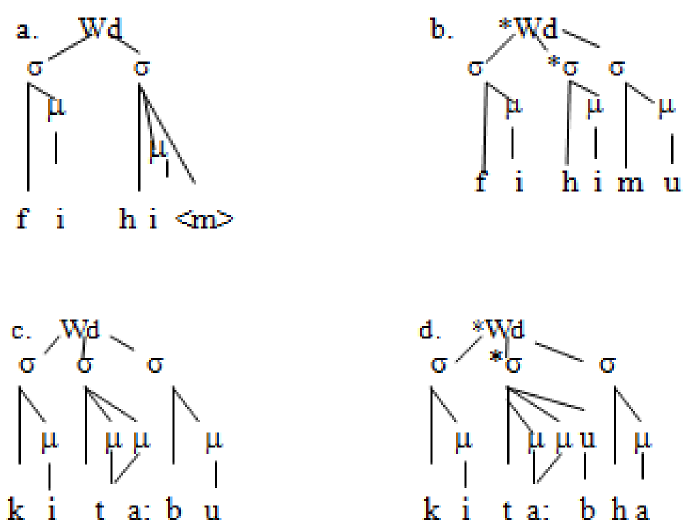


3.1.3 *A moraic analysis*

Unlike the previous syllable models, the moraic theory, which replaces the hierarchical structure of the X-slot skeleton with moras, states that syllable weight functions as a phonological variable. Weight, according to this theory, may vary from one language to another. However, a uniform weight criterion is employed within a given language. Nuclei are weight units or mora positions while onsets are non-moraic. Codas, on the other hand, are not underlyingly moraic. Rather, they become weight units by the Weight-by-Position rule (Hayes 1989). This provides an explanation as to why CVC syllables are considered heavy in certain languages and light in others.

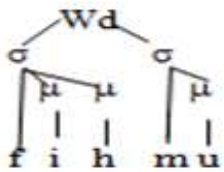
As far as CA is concerned, CV syllables are always light while CVC syllables are only light in the domain-final position. That is, the last C in CVC syllables is always extrametrical in Arabic varieties. Thus far, it is apparent that the moraic theory imposes a syllabification algorithm, which determines how individual segments are to be parsed into a syllable. Moreover, it provides a straightforward account for the issue of segment quantity (how long and short segments are assigned different configurations). Nonetheless, applying the syllabification rules to the input data sometimes results in ill-formed output, as shown in (26).

(26)



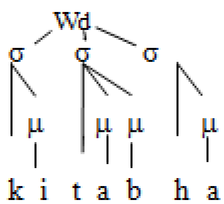
The ill-formedness of (26b) is attributed to a language specific rule which bans the surfacing of a monomoraic syllable (word-medially) if preceded by another monomoraic syllable. For this purpose, Arabic varieties employ vowel syncopation not to repair an ill-formed structure but rather to minimize monomoraic syllables, as depicted in (27).

(27)



Unlike (26b), the ill-formedness of (26d) is ascribed to the surfacing of a trimoraic syllable word-medially. As was illustrated above, CVXC syllables are restricted to word-final position in this variety. To this end, CA resorts to vowel shortening to avoid having a trimoraic syllable word-medially.

(28)



Drawing on the above analysis, syncopating vowels and vowel length alternations are meant to produce syllables that are pronounceable in the language. To be more exact, CA allows for no monomoraic syllables word-medially and no trimoraic syllables word-initially or medially. In the context of superheavy syllables, it should also be noted that the domain-final consonants in superheavy syllables (CVXC) are prosodically licensed, but as extrasyllabic (Watson 2007; Aoun 1979; Hayes 1979, among others).

3.1.4 *An optimality-theoretic account*

Syllable structure, within the OT framework, is governed by markedness and faithfulness constraints. Markedness constraints impose conditions on the output well-formedness while faithfulness constraints impose the exact preservation of the input in the output. As far as onset is concerned, CA, as shown below, is in full compliance with the universal unmarked constraint.

(29) ONS

Every syllable has an onset. (Prince & Smolensky 1993)

In order to prevent the underlyingly onsetless syllables from surfacing in CA, the variety resorts to either epenthesis, whereby a glottal stop is inserted to fill in this empty slot or resyllabification whereby a coda resyllabifies as an onset of the following onsetless syllable. Consequently, CA prefers adhering to the markedness constraint ONS to breaching the faithfulness DEP-IO constraint.

(30) DEP-IO
Every segment of the output has a correspondent in the input (prohibits phonological epenthesis) (McCarthy & Prince 1995)

(31) Input: akbar 'bigger'

Table 1: ONS >>DEP-IO

/akbar/	ONS	DEP-IO
a. ak.bar	*!	
b. ☞?ak.bar		*

The first candidate is ruled out as CA strictly bans onsetless syllables. Despite incurring a violation of the DEP-IO, candidate (b) could win by successfully managing to escape the fatal violation of the top-ranked constraint ONS.

As mentioned earlier, CA allows for no monomoraic syllables word-medially. As such, a weak nucleus (*WN) or a high-unstressed short vowel deletes in an open syllable if preceded by an open syllable (Mobaidin 1999; Watson 2002). No doubt, the elision of the weak nucleus results in an inevitable violation of the MAX-V-IO constraint, which prohibits the input vowel deletion. Moreover, it should be reiterated that syncope must not result in impermissible structures, including complex margins.

(32) *WN
A high short vowel in an open unstressed syllable must be deleted if preceded by an open syllable.

(33) MAX-V-IO
Input vowels must have output correspondents. ('No vowel deletion.')
(Kager 1999)

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

(35) Input: fihim+u
understood 3pl.mas.
'they understood'

Table 2: *WN, *COMPLEX >>MAX-V-IO

/fihim+u/	*WN	COMPLEX	MAX-V-IO
a. ☞fih.mu			*
b. fi.hi.mu	*!		
c. fi.hmu		*!	*

Although it is not in harmony with the MAX-V-IO, candidate (a) emerges as the winner by just avoiding the penalty of the top-ranked constraints *WN and *COMPLEX. Candidate (b), on the other hand, is ruled out as it contains a monomoraic syllable word internally. The last candidate is eliminated by the highly ranked *COMPLEX as consonant clusters in this variety are banned except in utterance-final position.

CA, as shown above, allows for no trimoraic syllables word-initially or medially. As a result, it resorts to vowel shortening and extrasyllabicity to avoid having such type of syllables.

(36) *3μ
No trimoraic syllables.
(Kager 1999)

(37) MAX-μ "No shortening"
"For every V that corresponds to V' in the output, every μ that is linked to V has a correspondent μ' linked to V'." (McCarthy & Prince 1995)

(38) Input: kitaab+ha
book her
'her book'

Table 3: *3μ,*COMPLEX >> MAX-μ

/kitaab+ha/	*3μ	*COMPLEX	MAX-μ
a. ki.taab.ha	*!		
b. ☞ki.tab.ha			*
c. ktaab.ha	*!	*	*

Candidate (a) represents a successful attempt to remain faithful to the input form. Yet, it is ruled out as it fatally violates the top-ranked *3μ constraint, which disallows having trimoraic syllables. In spite of not being in harmony with the faithfulness constraint (MAX-μ), the second candidate emerges as the winner by completely satisfying the high-ranked constraints. Candidate (c), the least harmonic among all the competing forms in terms of the number of the incurred violations, is precluded as a consequence of incurring fatal violations against the two top-ranked markedness constraints (*3μ and *COMPLEX).

Syncope also applies to syllables across word boundaries when similar conditions are met, as illustrated in (39).

(39) Input: biʕt + kitaab
sold 1sg.mas. + book
'I sold a book'

Table 4: *WN, *COMPLEX >> DEP-IO, MAX-V-IO

/biʕt+kitaab/	*WN	*COMPLEX	DEP-IO	MAX-V-IO
a. biʕt.ki.taab		*!		
b. ☞ biʕ.tik.taab			*	*
c. biʕ.ti.ktaab		*!	*	*

The grammar of the variety penalizes the first candidate and eliminates it from consideration due to its violation of the *COMPLEX since branching codas are allowed only word or utterance finally. Though the high short vowel in the second syllable in (b) has no input correspondent, epenthesis remains the only phonological process available to rescue the optimal candidate. Accordingly, the winner has sacrificed the low-ranked constraints (DEP-IO and MAX-V-IO) in favor of the top-ranked ones *WN and *COMPLEX. The last candidate, on the other hand, is ruled out by incurring a fatal violation of the *COMPLEX constraint.

4. Conclusion

Despite the superficial diversity among languages at all levels, languages still share quite fundamental similarities, which are attributed to the existence of the innate principles. Using different linguistic approaches, this study examined syncope and vowel shortening in CA. Drawing on the mechanisms and findings of the approaches employed here, it has become obvious that the application of the generalizations and principles does not guarantee correct output due to language specific rules. This, therefore, explains the frequent resort of these theories and approaches to parameters to account for the language specific rules.

Based on how such approaches deal with exceptions and parameters, it is evident that only OT is capable of accounting for parameters under the umbrella of the universal principles without any need to proposing any specific constraints. Thus, the answers provided by the OT are more straightforward and economical than the answers provided by any other approach.

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