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Epenthesis And Syncope in Some Arabic Dialects

Seham Elashhab
English Language Center, Um Al-Qura University, Saudi Arabia Kingdom
Corresponding: Seham Elashhab

***Abstract**: Optimality Theory (OT) predicts conspiracy effects where the operation of several rules produce the same phonetic effect. This study investigates the predicted correlation of syncope and epenthesis in four Arabic dialects: Omani, Iraqi, Egyptian, and Sudanese. These four dialects all possess underlying CVCVC sequences where both vowels can be potential targets for syncope, and underlying CCC sequences where epenthesis is possible either between the first and second or between the second and third consonants. In Omani and Iraqi epenthesis works differently from Egyptian and Sudanese. Syncope, which is also attested in all four dialects, works the same in each, taking the input CVCVC, where both syllables are light, to CVCC. Notice, however, that while both syncope and epenthesis are governed by the same output constraint in Iraqi and Omani, fulfilling the prediction of a conspiracy effect, in Egyptian and Sudanese the outputs are governed by distinct output constraints, and the predicted conspiracy is not observed.*

***Keywords:** optimality- conspiracy- Arabic- dialects- syncope- epenthesis- Omani- Iraqi- Egyptian- Sudanese*

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I . Introduction

Optimality Theory (OT) predicts conspiracy effects where the operation of several seemingly disparate rules produce the same phonetic effect. A classic case is Yawelmani epenthesis and syncope (Kisseberth 1970). The goal of this paper is to tackle both epenthesis and syncope within the framework of Optimality theory. This study investigates the predicted correlation of epenthesis and syncope in four Arabic dialects (Egyptian, Sudanese. Omani and Iraqi). The syncope and epenthesis phenomena of all four dialects have been well described. These four dialects crucially possess underlyingly CVCVC sequences where both vowels could be targets for syncope, and underlying CCC sequences where epenthesis is possible either between the first and second or between the second and third consonants. The discussion will be couched in the syllable alignment theory of Mester and Padgett (1994). They observe that the directional theory of syllabification of Itô (1986-1989) can be captured in terms of Generalized Alignment (McCarthy & Prince 1993). They propose the constraint Align-L (σ, PrWd) for Iraqi Arabic, where violations are counted in moras, to account for the realization of an input CCC sequence as CVCC (also found in Omani). On the other hand, the constraint Align-R (σ, PrWd) accounts for the realization of an input CCC sequence as CCVC in Egyptian (and also in Sudanese). However, syncope which is also attested in all four dialects, works the same in each, taking the input CVCVC where both syllables are light to CVCC. This output can be assured by the same constraint that predicts the output for Omani and Iraqi epenthesis, namely align-L (σ, PrWd). Notice, however, that while both epenthesis and syncope are governed by the same output constraint in Iraqi and Omani, fulfilling the prediction of a conspiracy effect, in Egyptian and Sudanese the outputs are governed by distinct output constraints, and the conspiracy that is proved in yawelmani case by Kisseberth (1970), is not observed here. Thus, the purpose of this paper is to investigate how epenthesis and syncope processes work on the three consonant clusters in Arabic, and if there is a correlation between the outputs of epenthesis and syncope in the four Arabic dialects. Following Mester & Padgett (1994), and Wiltshire (1994) who propose using syllable alignment to account for epenthesis, I found that the OT prediction of a conspiracy effect between epenthesis and syncope outputs is met in Omani and Iraqi but not in Sudanese and Egyptian Arabic. This is a problem for OT that does not involve opacity, and therefore cannot be addressed by appealing to sympathy theory (MacCarthy 1999).

The outline of this paper is as follows. In section two, I review the proposals of Mester & Padgett (1994) and Wiltshire (1994) who use syllable alignment to account for epenthesis in two Arabic dialects, and I discuss the prediction of symmetry between the outputs of epenthesis and syncope in Optimality Theory. In section three, I illustrate how the symmetry is found to be true in Omani and Iraqi but not in Egyptian or Sudanese Arabic. After discussing these findings, section four will conclude the paper.

II. Syllable Alignment

Epenthesis is one of the processes that are used to avoid the three consecutive consonant sequences in several Arabic dialects. The process of epenthesis is characterized by using specific constraints and a distinct ranking of the relevant constraints (Archangeli 1997, and Kager 1999), Mester and Padgett (1994) proposed using syllable alignment constraints to account for epenthesis patterns in two Arabic dialects. The dialects that they analyzed were Iraqi and Egyptian Arabic. In order to understand the alignment constraints that Mester and Padgett proposed, one should first be aware of the serial approach of directional syllabification that Itô (1989) proposed to consider epenthesis in these same two dialects. I have applied this approach on the four dialects under consideration, and I found that the four dialects differ in the position in which the insertion occurs. In Egyptian and Sudanese Arabic, epenthesis occurs between the second and the third consonant, while in Iraqi and Omani Arabic, it occurs between the first and the second consonant in a CCC sequence. Thus, regarding epenthesis, Egyptian and Sudanese Arabic are located under the same category while Iraqi and Omani are located under a different one as illustrated below.

2.1. Epenthesis and directionality of syllabification in Arabic

Epenthesis is the insertion of a segment into a word in a position in which no segment was previously present (Kager 1999). According to Angoujard (1990), the purpose of this process is to separate the clusters of three consecutive consonants which are hard to pronounce.

CCC → CCVC Egyptian and Sudanese
CCC → CVCC Omani and Iraqi

The following examples from the four dialects illustrate the epenthesis process. Omani data are taken from a native speaker of Omani, the informant is a male graduate student. Iraqi data are based on Majdi (1992) and Broselow (1990). The data of Egyptian are based on Davis and Zawaydeh (1997). The Sudanese data are collected from a Sudanese professor in a Libyan university. (9 stands for voiced pharyngeal fricative).

(1) Omani: CCC → CVCC
a. /9ašb+hum/ → [9a.š**u**b.hum] 'their grass'
b. /ξabt+kum/ → [ξa.b**u**t.kum] 'your control (pl)'
c. /tabx+kum/ → [ta.b**u**x.kum] 'your cooking (pl)'
d. /la9b+hum/ → [la.9**u**b.hum] 'thier playing'

(2) Iraqi: CCC → CVCC
a. /bint+ha/ → [bi.n**i**t.ha] 'her daughter'
b. /gil+t-la/ → [gi.l**i**t.la] 'I said to him'
c. /ruħ+t-la/ → [ru.ħ**i**t.la] 'I went to him'
d. /bint+na/ → [bi.n**i**t.na] 'our daughter'
e. /šuf+t-hum/ → [šu.f**i**t.hum] 'I saw them'

(3) Egyptian: CCC → CCVC
a. /bint+ha/ → [bin.t**a.**ha] 'her daughter'
b. /?ul+t-lu/ → [?ul.t**i.**lu] 'I said to him'
c. /ruħ+t-lak/ → [ruħ.t**i**.lak] 'I went to you'

(4) Sudanese: CCC → CCVC
a. /bank+na/ → [ban.k**a.**na] 'our bank'
b. /?akl+na/ → [?ak.l**a.**na] 'our food'
c. /Tefl+ha/ → [Tif.l**a**.ha] 'her child'
d. /šuf+t+ha/ → [šuf.t**a**.ha] 'I saw her'

In order to account for these differences in epenthesis, according to Itô's (1989) discussion of Egyptian and Iraqi Arabic, Egyptian and Sudanese are different from Iraqi and Omani Arabic in the direction of syllabification. In Egyptian and Sudanese, syllabification works from left to right, while in Iraqi and Omani it goes from right to left. Itô's account of epenthesis assumes that each vowel in the syllable joins the consonant which is directly to its left to form a mora. Hence, a mora can dominate a CV sequence. In addition, every consonant that is not joined with a vowel forms a mora on its own. Then, moras are grouped into syllables. The scanning process could either start from the left or the right edge of the word. In Egyptian and Sudanese Arabic, syllabification of moras works from left to right. In (5) the forms from (1b) ?ultilu in Egyptian and (2b) ?aklana in Sudanese demonstrate how this system works:

(5) Left to right

	Egyptian			Sudanese	
UR: /?ultlu/ ‘I said to him’			/?aklna/ ‘our food’		
PR: [?ultilu]			[?aklana]		
		[?ultilu]			[?aklana]
(a)	(b)	(c)	(d)	(e)	(f)
μ μ μ μ	μ μ μ μ	μ μ μ μ	μ μ μ μ	μ μ μ μ	μ μ μ μ
? u l t l u __	? u l t l u __	? u l t[i] l u	? a k l n a __	? a k l na __	? a k l[a] n a

Examples (5a, 5d) show the representation before syllabification takes place. In (5b), the /t/ stranded between two consonants cannot form a syllable on its own. Consequently, a vowel is inserted in (5c). The same process takes place in (5e) in which the /l/ stranded between two consonants cannot form a syllable on its own. As a result, a vowel inserted after the stranded consonant /l/ in (5f). In (5c & 5f) a vowel is inserted to the right of the stranded consonants /t/ and /l/, so that these two consonants can be incorporated into syllables. Finally (5c & 5f) reflect the full syllabification in Egyptian and Sudanese Arabic.

Considering the different vowels that are inserted in these four dialects, I would like to point out that there is an assimilation rule exemplified in this case of epenthesis in Omani, Egyptian and Sudanese that changes the normal quality of the inserted vowel [i] to [a] before the suffix ha (third person singular feminine), and to [u] before the suffix hum (third person plural). The issue of the exact quality of the epenthetic vowel is beyond the scope of this paper.

In contrast, in Iraqi and Omani the same process is applied but in the opposite direction. Syllabification is from right to left. The forms giltla from (4b) in Iraqi and 9asbhum from (3a) in Omani show how this system works.

(6) Right to Left

	Iraqi			Omani	
UR:/giltla/ ‘I said to him’			/9ašbhum/ ‘their grass’		
PR: [gilitla]			[9ašubhum]		
	[gilitla]			[9aš ubhum]	
(a)	(b)	(c)	(d)	(e)	(f)
μ μ μ μ	μ μ μ μ	μ μ μ μ	μ μ μ μ μ	μ μ μ μ μ	μ μ μ μ μ
g i l t la __	gil t la __	g i l[i] t l a	9 a š b h u m __	9a š b h u m __	9 a š[u] b h u m

Examples (6a & 6d) show the representation before syllabification takes place. In (6b) above, the mora /t/ is not adjacent to a vowel so is unable to form a syllable on its own or with one of the adjacent consonants. Consequently, a vowel is inserted immediately to its left, since syllabification is from right to left is shown in (6c). Hence, the preceding /l/ forms the onset of the syllable containing the inserted vowel and /t/. The same process takes place in (6e) where /b/ is located between two consonants. As a result, in (6f) a vowel is inserted immediately before it, because syllabification in Omani goes from right to left. Then, the preceding /š/forms the onset of the new syllable containing the epenthetic vowel and /b/.

Consequently, one of the benefits of the directionality hypothesis is that it accounts for the location of the epenthetic vowel in a CCC sequence. Mester and Padgett (1994) tried to explain these directionality effects within the framework of Optimality Theory. Their basic premise was to apply the alignment idea that McCarthy and Prince (1993) used for foot directionality to directional syllabification. Such an alignment constraint requires that the edge of every syllable in the prosodic word be aligned with a prosodic word edge. Thus, there could be two types of syllable alignment constraints. One that aligns the syllable to the left edge of the word, and another that aligns the syllable to the right edge of the word. These are formalized in (7) and (8) respectively, (Zawaydeh & Davis 1997).

(7) Align-L (σ, Pr Wd):

Every syllable must be aligned with the left edge of some prosodic word.

(8) Align-R (σ, Pr Wd):

Every syllable must be aligned with the right edge of some prosodic word.

Before reviewing how these alignment constraints function in Arabic dialects, a quick review of the constraints that interact with these alignment constraints is in order. Wiltshire (1994) accounts for the differences in epenthesis locations between Egyptian and Iraqi Arabic by using the constraints Onset (every syllable must have an Onset), Max C (consonants must be parsed), No Complex (avoid cluster in Onset and Codas), Parse Morph (every morpheme must be parsed, also proposed by Abu-Mansour (1995), Dep-V (avoid epenthesis), Max V (every vowel must be parsed), and No Coda (avoid Codas). The first four constraints are usually inviolable in Arabic. With regards to the rankings of these constraints, Onset, Max C, Parse Morph and No Complex have to be very high ranked because onsets or codas are always obligatory, consonants cannot be deleted and complex onsets or codas are never permitted. No Coda has to be low ranked because Codas are permitted. Dep-V has to be lower ranked than No Complex but higher ranked than No Coda because epenthesis is permitted to break up a potential onset or coda cluster (No Complex outranks Dep-V), but epenthesis does not occur if there is a single consonant in the coda (Dep-V outranks No Coda). The full ranking would be as in (9) (>> means outranks):

(9) No Complex >> Dep-V >> No Coda.

2.2. Epenthesis in Omani and Iraqi Arabic

Tables 1, 2 & 3 below show how syll-Align-L succeeds in accounting for the epenthesis pattern in Iraqi and Omani Arabic. With regards to the ranking of this constraint, it is lower than the undominated constraints No Complex, Onset, and Max C.

Table 1. /bint+ha/ → [bi.nit.ha] "her daughter".

/bint-ha/	No Complex Onset, Max C	Dep-V	Align-L(σ, Pr Wd) 1 2 3	No Coda
a. bint. ha	*! (No Complex)		μμμ	*
b. bin. ta. ha		*	μμ μμμ!	*
☞ c. bi. nit. ha		*	μ μμμ	*

Table 1 illustrates that the first candidate is eliminated because of its violation of the high ranking No Complex. Thus, the choice between the candidates that are left (b, c) is determined by Align-L (σ, Pr Wd) since they are each equal with respect to the constraints Dep-V and No Coda. According to Mester and Padgett (1994), syllable alignment constraints like Align-L (σ, Pr Wd) are evaluated in terms of mora violations. To clarify mora violations in alignment constraints, I will explain in detail how the third candidate won over the second one. For the second candidate, bin.ta.ha, since we are dealing with Align-L (σ, Pr Wd) we start with the first syllable and we count how many moras the left edge of the first syllable is away from the left edge of the prosodic word. Thus, since the first syllable bin is aligned naturally with the left edge, it does not have any mora violations. the second syllable ta is two moras away from the left edge of the prosodic word (these two moras are the moras of the nucleus and the Coda of the previous syllable bin). The third syllable ha is three moras away (these are the moras of the epenthetic vowel and the moras of the nucleus and coda of bin). Thus, the total number of mora violations that this candidate has is five. If we turn to the next candidate, bi. nit. ha, we notice that the second syllable has one mora violation while the third syllable has three mora violations. Since the number of mora violations that this candidate has is less than for candidate (b), it is the optimal candidate.

Table 2. /gilt+la/ → [gi.lit.la] 'I said to him'

/giltla/	NoComplex Onset, Max C	Dep-V	Align-L (σ, Pr Wd) 1 2 3	No Coda
a. gilt. la	*! (No Complex)		μμμ	*
b. gil. ti. la		*	μμ μμμ!	*
☞ c. gi. lit. la		*	μ μμμ	*

Table 3. /9ašb+hum/ → [9a.šub.hum] 'their grass'

/9ašbhum/	No Complex Onset, Max C	Dep-V	Aligna-L (σ, Pr Wd) 1 2 3	No Coda
a. 9ašb. hum	*!(No Complex)		μμμ	**
b. 9aš. bu. hum		*	μμ μμμ!	**

Table 3 illustrates that candidate (a) which is 9ašbhum is ruled out because it violates one of the highest-ranking constraints, No Complex (Coda). The rivalry is between the last two candidates. The last candidate wins because it has a fewer number of mora violations with respect to the syllable alignment constraint. Thus. the output for epenthesis is CVCC.

2.3. Epenthesis in Egyptian and Sudanese

In Egyptian and Sudanese, epenthesis occurs after the second consonant in a three-consonant cluster rather than after the first as in Iraqi and Omani. Tableau 4 shows how the wrong candidate wins if we use the same alignment constraint that we used for Iraqi and Omani Arabic (Align-L (σ, Pr Wd)).
(☻ means unintended winning candidate, while (☹) means the optimal candidate that cannot win).

Table 4. /bint+ha/ ⟶ [bin.ta.ha] "her daughter"

/bint+ha/	No Complex Onset, Max C	Dep-V	Align-L (σ, Pr Wd) 1 2 3	No Coda
a. bint. ha	*! (No Complex)		μμμ	*
☹b. bin. ta. ha		*	μμ μμμ!	*
☻ c. bi. nit. ha		*	μ μμμ	*

Hence, it seems that the constraint that is needed for Egyptian and Sudanese should be Align-R (σ, Pr Wd), rather than Align-L (σ, Pr Wd). Table 5 & 6 below illustrates this for Egyptian.

Table 5. /bint+ha/ ⟶ [bintaha] "her daughter"

/bint. ha/	No Complex Onset, Max C	Dep-V	Align-R (σ, Pr Wd) 1 2 3	No Coda
a. bint. ha	*! (No Complex)		μ	*
☞ b. bin. ta. ha		*	μμ μ	*
c. bi. nit. ha		*	μμμ μ!	*

In the application of the Syll-Align-R constraint in Tableau 4, the second candidate has three mora violations because the right edge of its first syllable is two moras away from the right edge of the word, and the right edge of its second syllable is one mora away from the right edge of the word. The third candidate has a larger number of mora violations because the right edge of its first syllable is three moras away from the right edge of the word, and the right edge of the second syllable is one mora away from the right edge of the word. Thus, the candidate that wins is (b).

Table 6. /?ult+lu/ ⟶ [?ul.t**i**.lu] 'I said to him'

/?ultlu/	No Complex Onset, Max C	Dep-V	Align-R (σ, Pr Wd) 1 2 3	No Coda
a. ?ult. lu	*! (No Complex)		μ	*
☞ b. ?ul. ti. lu		*	μμ μ	*
c. ?u. lit. lu		*	μμμ μ!	*

As illustrated in the data of Sudanese, a low vowel is inserted following the second consonant in a sequence of three consecutive consonants. Table 7 illustrates that the syllable alignment constraint needed to account for epenthesis in this dialect is the Align-R constraint.

Table 7 /?akl+na/ ⟶ [?ak.l**a**.na] 'our food'

/?akl+na/	No Complex Onset, Max C	Dep-V	Align-R (σ, Pr Wd) 1 2 3	No Coda

a. ?akl. na	*!		μ	*
☞ b. ?ak. la. na		*	μμ μ	*
c. ?a.kal. na		*	μμμ μ	*

III. SYNCOPE IN ARABIC

As mentioned above, epenthesis in Arabic should be studied with syncope because these two processes may conspire to create similar output configurations. For example, if a dialect has underlyingly a three-consecutive consonant sequence (CCC), then the shape that results from epenthesis whether it is CVCC or CCVC should be the same as that which results from syncope given the right input. Thus, if the optimal candidate for epenthesis in an underlying CCC sequence is CVCC, then the optimal candidate for an underlying CVCVC sequence in which both vowels are possible targets for syncope should also be CVCC but not CCVC. In other words, there might be a correspondence between the output of epenthesis and the output of syncope.

In this section, I illustrate the data of syncope, then I argue that syllable alignment constraints that are used to account for different epenthesis patterns in Arabic dialects posited above account as well for different syncope patterns across the same dialects with different rankings.

According to Trask (1996), syncope is the loss of a segment from the interior of a word.
The term is most commonly applied to vowel deletion. Syncope in all Arabic dialects under consideration deletes the vowel of the second of two consecutive light syllables as illustrated in (10).
(10) CVCVC ⟶ CVCC Omani, Iraqi, Egyptian and Sudanese.
The following are some examples from the four dialects illustrating the application of syncope. Omani data are taken from a native speaker of Omani. the data of Iraqi are taken from an Iraqi female informant, whereas the data of Egyptian are based on Zawaydeh and Davis (1997). The data of Sudanese are taken from a Sudanese university professor in a Libya. This data will be analyzed below.

(11) Omani: CVCVC ⟶ CVCC
a. /ma+ ras**a**m+ak/ ⟶ [ma.ras.mak] ‘he didn’t draw you’
b. /ma+gab**a**l+ak/ ⟶ [ma.gab.lak] 'he didn't meet you'
c. /rak**a**b+u/ ⟶ [rak.bu] ‘they rode’
d. /ma+sim**a**9+ak/ ⟶ [ma.sim.9ak] 'he didn't hear you'
e. /ma+9az**a**m+ak/ ⟶ [ma.9az.mak] 'he didn't invite you'

(12) Iraqi: CVCVC ⟶ CVCC
a. /rib**a**ħ+at/ ⟶ [rib.ħat] ‘she won’
b. /ma+yiðak**i**r+uun/ ⟶ [ma.yi.ðak.ruun] ‘they don’t study’
c. /la+tisaf**i**r+uun/ ⟶ [la.ti.saf.ruun] 'don 't travel'
d. /ma+tigad**i**r+uun/ ⟶ [ma.ti.gad.ruun] 'you don 't respect'

(13) Egyptian: CVCVC ⟶ CVCC
a. /ma+b**i**nisma9+š/ ⟶ [mab.nis.ma9š] ‘we do not hear’
b. /ma+bin**i**targim+š/ ⟶ [ma.bin.tar.gimš] ‘we don’t translate’
c. /ma+b**i**nit9ab+š/ ⟶ [mab.nit.9abš] `we don’t get tired`
d. /ma+bin**i**kassar+š/ ⟶ [ma.bin.kas.sarš] `we don’t break`

(14) Sudanese: CVCVC ⟶ CVCC
a. /fih**i**m+u/ ⟶ [fih.mu] ‘they understood’
b. /ma+ bit**i**ħas**i**b+u/ ⟶ [ma.bit.ħas.bu] ‘don’t make an account with him’
c. /la+t**i**sar**i**ħ+u/ ⟶ [lat.sar. ħu] 'don't tell him the truth'
d. /bit**i**šar**i**k+u/ ⟶ [bit.šar.ku] `share it with him`

To account for the syncope data in Arabic, I hypothesize that I need two more constraints. First, I need a constraint that allows syncope to occur. Second, I need a constraint that would explain why a certain vowel would be deleted in a certain environment, but not in another environment. The first constraint that I posit is *Light Light (a sequence of two light syllables is not permitted). The reason for proposing such a constraint is that there is a general tendency in Arabic dialects to disfavor two adjacent light syllables (Zawaydeh and Davis 1997). In such a situation, the question is why there is a tendency for the second vowel to be deleted when there are two potential target vowels for deletion.

At this point, I would like to discuss the reason for choosing the *Light Light constraint and not some other possible constraints. There are two other possible constraints that may be relevant. The first one is *Open Open which is used by Zawaydeh and Davis (1997). This constraint bans having two open syllables. The open syllables could either be light or heavy open syllables. However, according to my observations deletion happens only with light open syllables, but not with heavy open syllables. The other possible constraint that I could use is the NO [i] constraint, which was used independently by Abu Mansour (1995) and Kager (1999). However, the *Light Light constraint remains a better choice because NO [i] works only with some Arabic dialects. Not all Arabic dialects ban only a light high vowel in an open unstressed syllable. Some dialects like Omani Arabic would also delete other vowels in open syllables. Other dialects might delete vowels although they are stressed. Since I am dealing with several different Arabic dialects, it is better to use the *Light Light constraint because it can capture the general observation that two light syllables are disfavored in Arabic.

To continue now with the discussion of the constraints that are needed to account for syncope in Arabic dialects; the second constraint that is needed is Max V (every vowel must be parsed). If this constraint is ranked below *Light Light, then the deletion of the vowel will be permitted. Thus, the relevant ranking would be as in (10).
(15) No Complex>> *Light Light >>Max V

As illustrated by the data, the second vowel is deleted when there are two adjacent light syllables. Therefore, the output of CVCVC in the four dialects under consideration is CVCC. The following tableaux show that the alignment constraint needed to account for syncope in the four dialects is Align-L (σ, Pr Wd).

3.1. Syncope in Omani Arabic

Regarding the syncope example in (11c) there is only one target for deletion in this word, which is the vowel in the middle syllable. The deletion of the first vowel would result in a No Complex violation, and the deletion of the last vowel would result in a Parse Morpheme violation. Thus, the only vowel that could be deleted is the second vowel. Since the alignment constraint has no role in this type of deletion, now I will move to examine the first form (11a).

Tableau 8 below illustrates how when Omani has two light syllables (of CVCV sequence) in which both vowels are targets for deletion, the second vowel gets deleted rather than the first. Thus, the output for syncope is [CVC] rather than [CCV].

Table 8. /ma+rasam-ak/ → [ma.ras.mak] 'he didn't draw you'

/marasamak/	No Comp Onset,Max C	*Light Light	Align-L (σ, Pr Wd) 2 3 4	Max V	No Coda
a. ma. ra. sa. mak		*!	μ μμ μμμ		*
b. mra. sa. mak	*!	*	μ μμ	*	*
c. mar. sa. mak			μμ μμμ	*	**
☞d. ma.ras.mak			μ μμμ	*	**

Table 8 illustrates that the first candidate is eliminated because it violates *Light Light which is a high-ranking constraint. Candidate (b) loses out because it violates the high-ranking constraint No Complex. If we compare candidate (c) and candidate (d), the latter wins because it better satisfies the Align-L (σ, Pr Wd) constraint. In this case syllable alignment plays an important role in selecting the correct form (d).

3.2. Syncope in Iraqi Arabic

The data in (12) illustrate the syncope phenomenon in Iraqi Arabic. The derivation of the feminine in Iraqi Arabic (12a) involves the syncope of the second vowel of the stem because two light syllables are disfavored in this dialect. This is similar to Omani Arabic. In (12a) there is only one target for deletion in this word, which is the second vowel, because the deletion of the first vowel would result in a No Complex violation and the deletion of the last vowel will result in a Parse Morpheme violation. Thus, the alignment constraint has no role in this type of deletion. The example in (12b) is different because there are two possible targets for deletion. Tableau 9 demonstrates how syncope is applied on (12b) in Iraqi Arabic.

Table 9. /ma+biðakir-uun/ → [ma.bi.ðak.ruun] 'They don't study'

/ma+bi. ða.ki.r-uun/	NoCmplex Onset, Max C, Parse Morph	*Light Light	Align-L (σ, Pr Wd) 2 3 4 5	Max V	No Coda
a. ma.bi. ða.ki.ruun		****!	μ μμ μμμ μμμμ		*
b. mab.ða.ki.ruun					

		**	μμ μμμ μμμμ	*	**
☞c. ma.bi.ðak.ruun		**	μ μμ μμμμ	*	**

An examination of table 9 shows that candidate (a) is ruled out because it has more violations of *Light Light constraint. Candidate (b) is eliminated because it has a larger number of mora violations than the last candidate. Thus, candidate (c) is the optimal one as it has less mora violations, so it satisfies the Align-L (σ, Pr Wd) constraint. In light of this analysis, the conclusion for Omani and Iraqi Arabic is that the constraint Align-L (σ, Pr Wd) can account for epenthesis and syncope patterns, thus there is a symmetry between the outputs of epenthesis and syncope as both of them are (CVCC).

3.3. Syncope in Egyptian Arabic

As illustrated by the data in (13a, b), in Egyptian an unstressed high vowel in an open syllable is deleted when it is nonfinal and is preceded by an open syllable. Low vowels, however never delete. To account for the apparent difference between the parsing of high and low vowels I have to explode parse to get two different constraints, one for the high vowels and one for the low vowels. Furthermore, since a low vowel is not deleted in an open syllable, while a high vowel is, then parsing low vowels has to be a constraint that is higher ranked than the constraint of parsing high vowels. Moreover, since a sequence such as a CaCa is allowed phrase medially, Parse Low must be higher ranked than *Light Light. In comparison, since CVCi/u is not allowed phrase medially, Parse High has to be lower ranked than *Light Light.

An interesting situation arises in words like (13b) where there are two consecutive high vowels in open syllables, both of which are legitimate targets for deletion. Either vowel would be a legitimate target for deletion since the deletion of either does not result in a violation of the dominated No Complex. This means that either one of the two consecutive high vowels can be deleted. Considering (13b), /ma-bi. ni. targim-š/, if I delete the first high vowel, I would get the wrong form *[mab. ni. tar. gimš]; whereas, if I delete the second of the two consecutive high vowels, I would get the correct form [ma-bin. tar. gimš]. Thus, I expect that a syllable alignment constraint is active for accounting for this situation. Since the constraint Align-R (σ, Pr Wd) works with epenthesis as shown in Tableau 9, I incorporate this constraint into the analysis of syncope. However, Tableau 10 shows that the syllable alignment constraint that was used to account for epenthesis fails to account for syncope.

Table 10. /ma-bi. n**i**. targim-š/ ⟶ [mabintargimš] 'we don't translate'

/mabinitargimš/	No Complex	parse Low	*Light Light	Align-R (σ, Pr Wd) 1 2 3 4	Parse High	No Coda
a. ma.bi.ni.tar.gimš			*!	μμμμμμ μμμμμ μμμμ μμ		**
b. mabn. tar. gimš	*!			μμμμ μμ	**	***
☻c. mab.ni.tar.gimš				μμμμμ μμμμ μμ	*	***
☹d. ma.bin.tar.gimš				μμμμμμ μμμμ μμ!	*	***

In Table 10, the most faithful candidate, which is (a), is eliminated because it contains a sequence of light syllables thus violating *Light Light. Candidate (b) where both high vowels are deleted is ruled out because it violates high-ranking No Complex. The choice then is between (c) and (d) which tie on all the constraints except the alignment constraint. From this analysis it is clear that the alignment constraint Align-R (σ, Pr Wd) is needed to account for epenthesis. When we incorporate this into the analysis of /ma- bi. ni. targim-š/ the wrong candidate (c) is selected rather than the actual occurring candidate (d) as seen in Tableau 10. In order for (d) to be the winning candidate, I would need the alignment constraint Align L (σ, Pr Wd). In Table 11, I illustrate how the Align-L (σ, Pr Wd) can correctly capture the Egyptian syncope pattern.

Table 11. /ma+bin**i**targim-š/ ⟶ [ma.bin.tar.gimš] 'we don't translate'

/mabinitargimš/	No Complex	Parse Low	*Light Light	Align-L (σ, Pr Wd) 2 3 4 5	Parse Hi	No Coda
a. ma.bi.ni.tar.gimš			*!	μ μμ μμμ μμμμμ		**
b. mabn. tar. gimš	*!			μμμ μμμμμ	**	***

c. mab.ni.tar.gimš				μμ μμμ μμμμμ!	*	***
☞ d. ma.bin.tar.gimš				μ μμμ μμμμμ	*	***

Thus, what we have in Egyptian Arabic is an alignment paradox. The alignment constraint that accounts for epenthesis (Align-R (σ, Pr Wd)) in Tableau 9 is not the alignment constraint that accounts for syncope (Align-L in Tableau 11). Hence, Egyptian Arabic fails to display the expected output symmetry between epenthesis and syncope.

As a further observation regarding the alignment analysis for syncope, the alignment constraint is used in Table 11 (Align-L (σ, Pr Wd)) to account for cases where there are two potential targets for deletions is also the relevant alignment constraint needed to account for cases where there is only one realistic target for deletions in the form (13a), in which /ma-bi.ni.sma9-š/ is realized as [mabnisma9š]. In comparing (13a) /ma-bi.ni.sma9-š/ with (13b) /ma.bi.ni.targim-š/, (shown in Table 11), for instance, the only high vowel that is a realistic target for deletion in (13a) is the /i/ that follows /b/; the deletion of the /i/ that follows /n/ would result in an impermissible sequence of three consecutive consonants. However, in (13b) /ma.bi.ni.targimš/, both the /i/ after /b/, and the /i/ after /n/ are realistic targets for deletion since the deletion of either of them does not result in a three consonant sequence. As we have seen, though, it is the /i/ after the /n/ that is deleted in (13b), reflecting Align-L (σ, Pr Wd) as in Table 11. Table 12 demonstrates how the use of the same constraints of tableau 11 can also account for the form in (13a) [ma+bnisma9-š].

Table 12. /ma+b**i**nisma9-š/ ⟶ [mab.nis.ma9š] 'we don't hear'

/ma+bi. nis. ma9-š/	No Complex	Parse Low	*Light Light	Align-L (σ, Pr Wd) 2 3 4	Parse Hi	No Coda
a. ma. bi. nis. ma9š			*!	μ μμ μμμμ		**
b. mbi. nis. ma9š	*!			μ μμμ		**
c. ma. bins. ma9š	*!			μ μμμμ	*	**
☞ d. mab. nis. ma9š				μμ μμμμ	*	***

In Table 12, candidate (a) is the most faithful one. However, it violates *Light Light and so is eliminated. Candidates (b), (c) and (d) do not violate *Light Light. However, (b) and (c) are both ruled out because the deletion of either the first vowel as in (b) or the third vowel as in (c) results in a violation of undominated No Complex. Hence, the winning candidate is (d) in which the second vowel is deleted. Its deletion does not result in a violation of No Complex and the output respects *Light Light. It is worth emphasizing that in the comparison of the winning candidate in Tableau 12 (the underlying form of which is /ma. bi. ni. sma9-š/) with that in table 11 (the underlying form of which is /ma. bi. ni. targim-š/) the /i/ that is deleted in the winning candidate in Tableau 12 is the one that is part of the prefix /bi/; whereas, in Table 11, the /i/ that is deleted is the one that is part of the prefix /ni/ and not /bi/ even though the deletion of the /i/ after /b/ would not result in a violation of No Complex. Although, the winning candidates in Table 11 and 12 have different vowels that are deleted, both types of cases involving syncope can be handled uniformly with the same ranking of constraints.

3.4. Syncope in Sudanese Arabic

In Sudanese Arabic as in Egyptian, a high vowel is deleted in the environment between two open syllables. Table 13 illustrates the syncope pattern in Sudanese Arabic. The example in Table 13 is a good one because it shows two instances of syncope in the same word, one in the first half of the word (ma.bi.t**i**.ħa) and the other in the second half of the word (ħas**i**bu). In the first half of the word, there are two targets for deletion (the two high vowels), and in the second half of the word there is one target for deletion.

Table 13. /ma+bit**i**ħas**i**b-u/ ⟶ [ma.bit.ħas.bu] 'you don't make an account with him'

/ma+bitiħasib+u/	NoComp,Onset, Max C,Parse M	*Light Light	Align-R (σ, Pr Wd) 1 2 3 4	Max V	No Coda
a. mab.ti.ħa.si.bu		*!	μμμμ μμμ μμ μ	*	*
b. ma.bit.ħa.si.bu		*!	μμμμμ μμμ μμ μ	*	*

c. ma.bit.ħa.sib	*!		μμμμμ μμμ μμ	**	**
☹ d. ma.bit.ħas.bu			μμμμμ μμμ μ!	**	**
☻ e. mab.ti.ħas.bu			μμμμ μμμ μ	**	**

One can notice from this table that in both the first and the second candidates only one vowel is deleted. This results in violation of *Light Light in both of them. Hence are they ruled out? The third candidate loses because it violates one of the inviolable constraints in Arabic, Parse Morpheme. The morpheme that the candidate does not parse is the plural suffix "-u". Thus, there is a competition between the last two candidates. The factor that determines which one will win is the syllable alignment constraint. Candidate (e) wins because it has the least number of mora violations. However, this is the unintended candidate. The candidate that should win is candidate (d). This shows that the alignment constraint needed for syncope is the Align-Left constraint, not Align-Right, as shown in Table (14).

Table 14. /ma+biti**i**ħas**i**b-u/ → [ma.bit.ħas.bu] 'you don=t make an account with him'

/mabitiħasibu/	No comp Onset, Parse Morph	*Light Light	Align L (σ, Pr Wd) 2 3 4 5	Max V	No Coda
a. mab.ti.ħa.si.bu		*!	μμμ μμμμ μμμμμ μμμμμμ	*	*
b. ma.bit.ħa.si.bu		*!	μμ μμμμ μμμμμ μμμμμμ	*	*
c. ma.bit.ħa.sib	*!Parse Morph		μμ μμμμ μμμμμ	**	**
☞d.ma.bit.ħas.bu			μμ μμμμ μμμμμμ	**	**
e. mab.ti.ħas.bu			μμμ μμμμ μμμμμμ	**	**

And Sudanese Arabic is that the alignment constraint that accounts for epenthesis. The conclusion for Egyptian is not the same alignment constraint that accounts for syncope. This seems to constitute an alignment asymmetry.

IV. Conclusion

Kisseberth (1970) discovered a conspiracy because he happened to investigate a language (Yawelmani) in which symmetry is observed between epenthesis and syncope. However, by examining a wider range of data this study shows that this is true of some languages but not of others. In this paper, I have investigated the prediction of Optimality Theory that the output of epenthesis and the output of syncope should correspond to each other. This prediction was not supported by Egyptian or Sudanese Arabic. It was, however, supported by Omani and Iraqi Arabic. In the framework of Optimality Theory (Prince & Smolensky 1993), Mester & Padgett (1994) and Wiltshire (1994) observe that the directional theory of syllabification of Itô (1989) can be captured in terms of Generalized Alignment (McCarthy & Prince 1993). Relying on McCarthy and Prince (1993), this study proved that the outputs of epenthesis and syncope in Iraqi and Omani are governed by the same constraint, namely the Syllable-alignment-Left constraint, while in Egyptian and Sudanese the outputs are governed by distinct output constraints, and the predicted conspiracy is not observed.

In Omani and Iraqi Arabic, the Syll-Align-L constraint succeeded in accounting for epenthesis and syncope, since the outputs of both epenthesis and syncope in these two dialects are governed by the same constraint, fulfilling the prediction of a conspiracy effect. Hence, Omani and Iraqi provide concrete evidence that there is symmetry between epenthesis and syncope since their outputs correspond to each other. In contrast, in Egyptian and Sudanese Arabic the outputs are governed by distinct output constraints, and the conspiracy is not observed. This is because the Syll-Align-R constraint that accounts for epenthesis outputs failed in accounting for syncope outputs. In these two dialects, the syllable alignment constraint that was needed for syncope was Syll-Align-L, while, syll-Align-R was needed for epenthesis. Hence, Egyptian and Sudanese Arabic have an alignment paradox. Consequently, Egyptian and Sudanese Arabic both fail to display the output symmetry between epenthesis and syncope. However, relying on Kager (1999), in Egyptian and Sudanese cases, there can be overriding factors (such as the stress rule that may interact with the rule of i-syncope, and the rule of Base- Identity) that mitigate the severity of the prediction. The prediction regarding the output symmetry between epenthesis and syncope is not one made by rule-based derivational approaches to phonology. Consequently, the potential symmetry or lack of it between epenthesis and syncope needs to be thoroughly investigated since Optimality theory and rule-based theories make different predictions regarding this. Therefore, epenthesis and syncope can be subject to different faithfulness constraints and this could make a difference. Thus, further research is needed to investigate these factors and to resolve this paradox.

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