Epenthesis in Egyptian and Iraqi Arabic: An Output-Output Correspondence Analysis

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1 Introduction

Observation: Egyptian and Iraqi Arabic both epenthesize /i/ to repair illicit CCC clusters, but the epenthesis site differs between the two variaties (Broselow, 1980; Farwaneh, 1996; Kiparsky, 2003; among others).

(1) Egyptian: /ʔul + t + la/ → [ʔultila]
Iraqi: /gil + t + la/ → [gilitla]

Previous analyses of differences in epenthesis site rely on directionality and syllabification, considerations that account for the data only indirectly, and that are not otherwise motivated.

Solution: An Output-Output Paradigm Correspondence analysis repairs CCC clusters without employing directional syllabification, but instead by using constraints that favor paradigm uniformity.

- There are countless spoken varieties of Arabic; empirical coverage here is of the standard Egyptian (Mitchell, 1960; McGuirk, 1986) and Iraqi (Erwin, 1963, 1969) varieties.

Roadmap:

2 The Data

- Egyptian allows word-final CC clusters but prohibits them word-initially; Iraqi allows word-initial CC clusters but prohibits them word-finally.

(2) **Egyptian**
a. /flu:s/ → [filu:s]
b./ʔalb/ → [ʔalb]
c. /xamr/ → [xamr]

Iraqi
d. /flu:s/ → [flu:s]
e. /ʔism/ → [ʔisim]
f. /kalb/ → [kalib]

- CCC clusters
  - Verbal affixation (and other morphological processes) can lead to CCC clusters in the input.
  - Both Egyptian and Iraqi Arabic prohibit CCC clusters from surfacing.
  - When there is a CCC cluster in the input, a vowel is epenthesized to repair the illicit structure.
  - Egyptian and Iraqi differ in epenthesis site: CCiC or CiCC, respectively.

(3) **Egyptian**

a. /fihim + t + ni/ → [fihimtini]
understand.PAST + 2SM + me
you understood me

b. /ma + katab + t + ʃ/ → [makatabtiʃ]
NEG + write.PAST + 1SG + NEG
I didn't write

c. /ʔul + t + la/ → [ʔultila]
say.PAST + 1SG + to her
I told her

Iraqi

d. /raħ + n + naam/ → [raħinnam]
FUT + 1PL + sleep
WE'RE GOING TO SLEEP

e. /hal + ktaab/ → [haliktaab]
this + book
THIS BOOK

f. /gil + t + la/ → [gilitla]
say.PAST + 1SG + to her
I told her

3 Previous Analyses

- **Directional syllabification** (Itô, 1989; Farwaneh, 1996): words are syllabified from one end of the word to the other, epenthesizing along the way to repair illicit structures if necessary; different directions predict different epenthesis sites

(4) **Egyptian**: L-R syllabification
ʔul-t-la
(ʔul)t_la
(ʔul)t_(la)
(ʔul)(ti)(la)

(5) **Iraqi**: R-L syllabification
gil-t-la
gil_t(la)
(gi)l_t(la)
(gi)(lit)(la)

- **Syllable alignment** (Rose, 2000): a gradient OT alignment constraint favors candidates whose syllables are closest to one edge or the other of the prosodic word; interacts with markedness constraints to predict epenthesis site

(6) ALIGN(σ-Edge, PrWd-Edge): Every syllable must be aligned with the edge of some prosodic word.
  - one violation assigned for every mora separating a syllable from the given word edge
  - nuclei and codas are moraic

(7) *CCC: Assign one violation for each sequence of three consecutive consonants.

(8) **Egyptian**: *CCC »ALIGN-R(σ, PrWd)

/ʔul + t + la/	*CCC	ALIGN-R(σ, PrWd)
→a. ʔultila		σ1 σ2 σ3 μ μ μ
b. ʔulitla		σ1 σ2 σ3 μ μ μ! μ
c. ʔultla	*!	

(9) **Iraqi**: *CCC »ALIGN-L(σ, PrWd)

/gil + t + la/	*CCC	ALIGN-L(σ, PrWd)
→a. gilitla		σ1 σ2 σ3 μ μ μ μ
b. giltila		σ1 σ2 σ3 μ μ! μ μ μ
c. giltla	*!	

Limitations

- While the above analyses derive the correct results, they require an additional computation in the derivation:
  1. Syllabify directionally
  2. Fix syllabification/alignment with epenthesis
- Furthermore, in these analyses, the output form results as a byproduct of syllabification.
  - Farwaneh (1996): no reference to the markedness violation (*CCC)
  - Rose (2000): ALIGN constraint repairs CCC by way of syllabification and alignment, not phonotactic constraints
- I therefore argue for analysis not based on syllabification.

4 Output-Output Correspondence

- "[W]ords in a paradigm are required to be phonologically identical by constraints on an identity relation between the two surface words." (Benua, 1997, p. 27)
- Example (Benua, 1997): name truncation in some varieties of American English

  (10) *ær]σ: [ær] may not surface at the word boundary

  (11) *pær
  lær (< læri "Larry")

- In the Output-Output (OO) Correspondence analysis, the markedness constraint is outranked by a constraint that favors phonological faithfulness between vowels in related forms.

  (12) OO-IDENT[BK]: Vowels in a derived form must match corresponding vowels in the base form with respect to backness.

- Paradigm members are evaluated together, with x. and x′. forming one paradigm candidate.
  - Candidate paradigms are sometimes represented with both/all members in the same tableau. For clarity, the two are separated here, following Benua (1997).
- Priority of the Base: the morphological base must never undergo phonological changes in order to accommodate the phonology of the derived form.
  - OO-Correspondence is a type of Optimal Paradigms analysis (McCarthy, 2005) that explicitly references a base and its derivative, as opposed to two forms that are morphologically related but not derived from one another.
  - Unlike stratal/cyclic OT approaches (Kiparsky, 2000, 2008), an OO-Correspondence analysis explicitly requires that the morphological base, the form to which the derived form must be faithful, exist as an output form in the language.

(13) OO-IDENT[BK] »*ær]σ »IO-IDENT[BK]

Base form

/læɹi/	OO-IDENT[BK]	*ær]σ	IO-IDENT[BK]
a. la.ɹi			*!
b. la.ɹi			*!
c. læ.ɹi			
→ d. læ.ɹi			

Derived form

/læɹi - TRUNC/	OO-IDENT[BK]	*ær]σ	IO-IDENT[BK]
a′. laɹ			*
b′. læɹ	*	*	
c′. laɹ	*!		*
→ d′. læɹ		*	

5 OO-Correspondence in Arabic Epenthesis

- I argue that an OO-Correspondence analysis best accounts for difference in epenthesis site.
- The inflected verb form without an object affix functions as the morphological base.

(14) **Egyptian**

a. /ʔul + t/ → [ʔult]
say.PAST + 1SG
I said

b. /ʔul + t + la/ → [ʔultila]
say.PAST + 1SG + to her
I told her

Iraqi

c. /gil + t/ → [gilit]
say.PAST + 1SG
I said

d. /gil + t + la/ → [gilitla]
say.PAST + 1SG + to her
I told her

- In Egyptian the [lt] is intact in both forms; in Iraqi, there is an epenthetic vowel between [lt] in both forms.

(15) BD-CONT[1]: Segments that are contiguous in the base must also be contiguous in the derivative.

(16) IO-DEP(V): Every vowel in the output must have a corresponding vowel in the input.

(17) *CC#: Assign one violation for each word-final consonant cluster.

[1]The BD notation denotes that the two output forms in question are the morphological base and its derivative, respectively.

(18) Egyptian: BD-Cont, *CCC »IO-Dep(V) »*CC#

Base form

/ ʔul + t/	BD-Cont	*CCC	IO-Dep(V)	*CC#
→ a. ʔul-t				*
b. ʔul-t				*
c. ʔul-t				*
d. ʔul-t				*
e. ʔul-i-t			*!W	L
f. ʔul-i-t			*!W	L
g. ʔul-i-t			*!W	L
h. ʔul-i-t			*!W	L

Derived form

/ ʔul + t + la/	BD-Cont	*CCC	IO-Dep(V)	*CC#
→ a′. ʔul-t-i-la			*	
b′. ʔul-i-t-i-la	*!W		**W	
c′. ʔul-t-la		*!W	L	
d′. ʔul-i-t-la	*!W		*∼	
e′. ʔul-t-i-la	*W		*∼	
f′. ʔul-i-t-i-la			**W	
g′. ʔul-t-la	*W	*W	L	
h′. ʔul-i-t-la			*∼	

- By reranking the constraints, we derive the attested output for Iraqi.

(19) Iraqi: BD-Cont, *CC#, *CCC »IO-Dep(V)

Base form

/gil + t/	BD-Cont	*CC#	*CCC	IO-Dep(V)
→ a. gil-i-t				*
b. gil-i-t				*
c. gil-i-t				*
d. gil-i-t				*
e. gil-t		*!W		L
f. gil-t		*!W		L
g. gil-t		*!W		L
h. gil-t		*!W		L

Derived form

/gil + t + la/	BD-Cont	*CC#	*CCC	IO-Dep(V)
→ a′. gil-i-t-la				*
b′. gil-t-la	*!W		*W	L
c′. gil-i-t-i-la				**!W
d′. gil-t-i-la	*!W			*∼
e′. gil-i-t-la	*W			*∼
f′. gil-t-la			*W	L
g′. gil-i-t-i-la	*W			**W
h′. gil-t-i-la				*∼

- Advantages
  - Attested forms are derived with explicit reference made to illicit structures and their segmental repairs.
    - Both forms are derived using only phonotactic constraints.
  - The derivation does not rely on syllabification.
    - This is in keeping with work on the phonetics/phonology interface that calls into question the traditional notion of the syllable in the phonological grammar (Steriade, 1999).
    - Other recent work has analyzed other phonological processes in Arabic without relying upon syllables (cf. Faust and Ulfsbjorninn (2017) on stress in Palestinian Arabic), suggesting that syllables may be superfluous in some Arabic dialects.
  - This OO-Correspondence analysis is in keeping with analyses of morphological paradigms in other languages (e.g., Benua, 1997, Alderete, 2001, Albright and Kang, 2009, Albright, 2010, among others), suggesting that phonological similarity between a derived form and its base is typologically common.
- Future Work
  - Other varieties of Arabic with epenthetic vowels must be analyzed to determine whether OO-Correspondence constraints are always highest-ranked or rather outranked by other markedness constraints.
  - If the epenthesis site can in fact be derived with no reference to syllables, it remains to be seen whether syllables are active as constituents in the phonological grammar at all.

6 Conclusion

- Vowels are epenthesized to repair illicit CCC structures appear at different sites in Egyptian (CCiC) and Iraqi (CiCC) varieties of Arabic.
- Previous analyses of different epenthesis site have relied upon directional syllabification in different ways, which I argue has theoretical limitations.
  - CCC repairs should be made with explicit reference to the illicit segmental structure.
  - Syllabification requires an additional computation in the derivation, which can and should be avoided.
- OO-Correspondence analyses favor morphological paradigms in which the members are as phonologically similar as possible.
- An OO-Correspondence analysis of Arabic epenthesis accounts for the epenthesis site in Egyptian and Iraqi Arabic without relying on syllabification, but rather simply by maintaining phonological faithfulness between a derived form and its morphological base.

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the epenthetic vowel lands after the second consonant in the cluster, rendering it as the onset of an open syllable, the dialect is classified as an â€˜onsetâ€™ or â€˜CVâ€™ dialect, illustrated as CCC > C.Cv.C. Examples of onset dialects are Egyptian and Saudi (Makkan as described in Abu-Mansour. INTERNET. 1987). On the other hand, inserting the epenthetic vowel before the. second consonant to form a closed syllable, identifies the dialect as a â€˜codaâ€™ or â€˜VCâ€™ dialect, thus CCC > CvC.C, exemplified by the Levantine family, North African varieties and some Gulf dialects.Â out, the output of syncope cannot be syllabified in a manner consistent. with the syllabic constraints of the dialect. The only way to syllabify the.