The Stress-Epenthesis Opacity in Palestinian Arabic*

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- The main theme of this presentation is to explore a monostratal account of the stress-epenthesis opacity in Palestinian Arabic (PA).

- Along the way, I will explain another account, the multi-stratal system of Kiparsky (2000,2003).

- My monostratal alternative will rely on the combination of two assumptions: (i) that weightless nuclei are banned in the language, and (ii) that epenthetic vowels may not be moraic. I will take it that the constraint in (ii) is violable, and show data where it is violated in PA (and also in Mohawk and Passamaquoddy – see Appendix).

- Finally I argue that the interaction of epenthesis and prothesis in PA present a challenge to Kiparsky's account.

1 Background

1.1 The PA Stress System

- Stress in PA falls on the final syllable if it is superheavy (CVCC, CV:C, or CV:V), on the penult if it is heavy (CVC or CV:), and on the antepenultimate otherwise.

- Examples in (1).

  (1)

Final stress	Penultimate	Antepenultimate
ʃa.ba.káːt	ḍa.rɑ.bát.kom	ʔá.la.mak
"nets"	"she hit you.PL"	"your.SG pen"
bɑ.rɑː.míːl	mak.táb.kom	ʃáː.fa.to
"barrels"	"your.PL desk"	"she saw him"
wɑːs.ṭáːt	ṭɑːl.bít.na	ʔáːr.me.to
"connections"	"our student.FEM"	"his sign"

1.2 Epenthesis

- Epenthesis in PA applies when (a group of) consonant clusters appear syllable/word-finally.

- The simplest cases, exemplified here in the /ʔakl/ paradigm ("food" - column 3), are best illustrated next to (a) cases where no epenthesis takes place, e.g. /dars/ "lesson", column 2, and (b) next to cases that contain a vowel underlyingly, e.g. /ʔalam/ "pen", column 1.

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(2)

	Column 1 "pen"	Column 2 "lesson"	Column 3 "food"	Column 4 "desk"	Column 5 "desks"
Bare	ʔálam	dars	ʔák[ɪ]l	máktab	maká:tɪb
GEN.1sg	ʔálami	dársi	ʔákli	máktabi	maká:tbi
GEN.2sg.m	ʔálamak	dársak	ʔáklak	máktabak	maká:tbak
GEN.2sg.f	ʔálamɪk	dársɪk	ʔáklɪk	máktabɪk	maká:tbɪk
GEN.3sg.m	ʔálamo	dárso	ʔáklo	máktabo	maká:tbo
GEN.3sg.f	ʔalámha	dársha	ʔák[ɪ]lha	maktábha	maka:tíbha
GEN.1pl	ʔalámna	dársna	ʔák[ɪ]lna	maktábna	maka:tíbna
GEN.2pl	ʔalámkom	dárskom	ʔák[ɪ]lkom	maktábkom	maka:tíbkom
GEN.3pl	ʔalámhom	dárshom	ʔák[ɪ]lhom	maktábhom	maka:tíbhom

- Columns 1 and 2 show the predicted stress pattern: stress falls on the penult when it is heavy, and on the antepenult otherwise.

- This pattern, however, does not hold of the forms in column 3, where stress seems to skip the heavy penults (e.g. in plurals) and lands instead on the antepenultimate syllable: **epenthetic vowel is invisible to stress.**

- Epenthesis repairs certain consonant clusters: Cluster Condition ≫ DEP-IO[1]:

/ʔaklkom/	CLUSTER-C	DEP-IO
a. ʔakl.kom	*!	
b. ʔak.lkom	*!	
c. ☞ ʔakɪlkom		*

- Of course, if we blend this hierarchy with the stress hierarchy, we will derive penultimate stress, which is wrong.

- This is an example of opacity: we see the environment that a process is known to apply in, but we do not see the effects of the process.

The rule-based solution

- Assign stress before applying epenthesis:

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[1]Though it seems that in most cases the "Cluster Condition" can be substituted with the more plausible Sonority Sequencing Principle, it is not true that they all can, as McCarthy correctly notes. Obvious examples include the forms /ʕɪlm/ → [ʕɪlm], *ʕɪlm "science", and farm → [farɪm], *farm "mincing".

	transparent	opaque
	/ʔalamkom/	/ʔaklkom/
stress:	ʔalámkom	ʔáklkom
epenthesis:	–	ʔákɪlkom
	[ʔalámkom]	[ʔákɪlkom]

2   Stratal OT

- Similar logic rule ordering: stress first, then epenthesis.

- Kiparsky's derivational approach, the Lexical Phonology/Morphology OT (LPM-OT), divides the grammar into different morphological levels: **stem**, **word**, and **post-lexical**.

- Possessive markers like /-na/ and /-kom/ are visible to stress assignment. If they are external to the stem, then stress assignment must apply at the word level or postlexically.

- Opacity demands that epenthesis come later than stress assignment, i.e. at the post-lexical level.

- So, stress is a lexical process, and epenthesis is post-lexical.

- Assume that STRESS contains all the stress-related constraints, and Ident(stress) blocks stress change from input to output.

- Then:

  – To block epenthesis at the WORD level, and assign stress:

  DEP-IO ≫ Cluster Condition, STRESS ≫ Ident(stress)

  – To block stress change at the POST-LEXICAL level, and apply epenthesis:

  Cluster Condition ≫ DEP-IO, Ident(stress) ≫ STRESS

  (3)   Word

/ʔaklkom/		DEP-IO	STRESS	CLUSTER-C	Ident(stress)
a. ☞	ʔáklkom			*	
b.	ʔákɪlkom	*!	*		
c.	ʔakílkom	*!			
/ʔalamkom/		DEP-IO	STRESS	CLUSTER-C	Ident(stress)
a. ☞	ʔalámkom				
b.	ʔálamkom		*!		

(4) | Post-Lexical |

/ʔáklkom/		CLUSTER-C	DEP-IO	Ident(stress)	STRESS
a.	ʔáklkom	*!			
b. ☞	ʔákɪlkom		*		*
c.	ʔakílkom		*	*!	

3   More data – Prothesis in PA

- The process of vowel insertion that I will call prothesis is shown in (5), (See Abu-Salim (1980)).

(5)

    a. /ktiːr/ → [ktiːr] "a lot/plentiful" (*no vowel insertion*)

    b. /mábna#kbiːr/ → [mábnakbiːr] "a big building" (*no vowel insertion*)

    c. /ktaːb#mniːħ/ → [ktaːb‖ɪ‖mniːħ] "a good book"

    d. /ṭiːn#ktiːr/ → [ṭiːn‖ɪ‖ktiːr] "a lot of mud"

    e. /beːt#kbiːr/ → [beːt‖ɪ‖kbiːr] "a big house"

    f. /ʔarḍ#kbiːre/ → [ʔar(*ɪ)ḍ‖ɪ‖kbiːre] "a large land" (cf. [ʔarḍ]/*[ʔarɪḍ])

    g. /ʔakl#ktiːr/ → [ʔak(ɪ)l‖ɪ‖ktiːr] "a lot of food"

    h. /katabt#mniːħ/ → [katab(ɪ)t‖ɪ‖mniːh] "I wrote well"

- Two notes on prothesis:

  (i) Does not apply post-pausally, as shown in (5a). Whenever a CC-initial word appears at the beginning of a phrase, the CC-cluster is preserved.

  (ii) Applies regardless of the sonority profile of the initial CC cluster.

- The sort of markedness that prothesis repairs must be different from the markedness of final CC clusters. We may see this more clearly when we compare the constructions /ʤaħʃ#mona/ "Mona's mule" with /rɑːħ#ʃmaːl/ "he went left". The two pairs contain identical CCC clusters, ħʃm, but it is only when the onset is complex that prothesis takes place.

    (6) a. /ʤaħʃ#mona/ → ʤaħʃmona

          b. /rɑːħ#ʃmaːl/ → rɑːħɪʃmaːl

- This shows that initial complex clusters are only tolerated in PA when they appear post-pausally, which may indicate that in PA consonants can be extraprosodic only when they appear after a pause.

- So, a word-initial CC sequence is allowed only when the first consonant is not syllabified, and this is possible only post-pausally.

Why is this relevant?

- Prothesis is of interest to us because its activity relaxes the need to epenthesize word-internally when the word-final CC cluster is marked.

- For example the word for "food", /ʔakl/ undergoes epenthesis obligatorily in isolation, (→ [ʔakɪl]/*ʔakl) but when followed by another CC-initial word, prothesis allows for the final CC cluster in ʔakl to be reparsed and separated into a one-consonant coda and one-consonant onset, making word-internal epenthesis optional. This is exemplified in (5g,h).

  (5)   g.   /ʔakl#ktiːr/ → [ʔakl‍ɪ‍ktiːr] "a lot of food"
            → [ʔak(ɪ)l‍ɪ‍ktiːr]
       h.   /katabt#mniːħ/ → [katabt‍ɪ‍mniːh] "I wrote well"
            → [katab(ɪ)t‍ɪ‍mniːh]

- In these cases, epenthesis is optional.

4   A monostratal account

- The idea in a nutshell: epenthetic vowels cannot be moraic.

- Experimental findings by Gouskova and Hall (2010) show that in Lebanese Arabic, epenthetic vowels are shorter than their lexical look-a-likes. This is the first piece of the jigsaw.

- The second piece is Alderete's (1999) Head-dependence solution to opacity in Dakota, Selayarese, and Yimas.

- The third piece is the general dislike towards open high vowels in PA: these vowels are syncopated in open light syllables, and epenthetic vowels never appear in open syllables. This may be due to a general principle against short, light vowels in open syllables.

- The fourth (see appendix) is data from Mohawk and Passamaquoddy (Hagstrom 1997).

4.1   Head-Dependence

- Alderete's HEAD-DEP.

  (7)   HEAD-DEP: Every vowel in the output prosodic head has a correspondent in the input.

- Applied to PA in Kager (1999). Shown to be insufficient in Kiparsky (2000): epenthesis is invisible in stress assignment: If an epenthetic segment appears in a position that is not predicted to carry stress, even in transparent cases, Kager's account will predict that stress follow the transparent assignment pattern.

- In other words, the stress-epenthesis interaction is opaque, on Kager's account, only when the epenthetic vowel lands in a position that attracts stress in non-epenthetic cases. Kiparsky shows that this prediction is incorrect, given the datum in (8).

(8) /katabt/ → [katábɪt], *kátabɪt   "I wrote"

- (8) is problematic for the head-dependence solution because the epenthetic vowel is not stressed in either of the two output candidates, so neither candidate will incur a violation of HEAD-DEP.

- The choice between the two forms will therefore depend on the other active constraints, making the evaluation virtually the same as one where the final syllable is headed by a non-epenthetic vowel. So we predict, as we do in transparent cases, that stress falls on the antepenult, which is incorrect.

4.2 Banning Moraic epenthesis

- I propose that we issue a ban on *moraic* epenthetic vowels.

4.2.1 Moraic DEP?

- If epenthesis is one instance of zero-to-nonzero input-to-output mapping, then (as I mentioned above) stressing epenthetic vowels incurs a graver violation of the same principle, since stressed vowels are longer than unstressed ones.

- Moraifying epenthetic vowels may be viewed as a similar violation, since assigning weight (however it is represented) to a segment that has no input correspondent is likely to create greater durational difference than leaving the vowel unmoraified.

- To put it differently, supposing that an equal amount of weight is assigned to an epenthetic vowel as that assigned to a non-epenthetic one, we would have no immediate reason to predict any durational difference between the two. But this conflicts with the findings of Gouskova and Hall (2010), whose experimental work shows that in Lebanese Arabic, a closely related dialect, epenthetic vowels are distinctly shorter than non-epenthetic ones.

4.2.2 Syncope of short high vowels

- Additional support comes from syncope. PA is one of many Levantine dialects in which short high vowels are deleted in certain contexts, specifically, when they appear in open, unstressed syllables (with exceptions that we will see in Section 4.3).

- This seems to be a phonetic requirement: open syllables are headed by longer vowels than closed syllables (Broselow et al.), and high vowels are in general weaker than non-high vowels (Selkirk 1984; Parker 2002).

- So an open light syllable that is headed by a high vowel is more marked than a syllable headed by a low vowel, because in the former the nucleus needs to reach a duration that is comparable to the longer nucleus of the latter. This difference in markedness is reflected in PA syncope, illustrated in (9).

(9) a. /fɪrɪħna/ → [frɪħna] "we were happy"
     b. /ʃɪrɪbna/ → [ʃrɪbna] "we drank"
     c. /faraʃna/ → [faraʃna] "we furnished" *fraʃna
     d. /ʃaraħna/ → [ʃaraħna] "we explained" *ʃraħna

- In (9a,b), the initial syllable of the input, which is open and headed by a high vowel, is syncopated in the output. Kager derives the syncope by ranking the markedness constraint *i-light above MAX-IO, where, as mentioned in Section 3, *i-light marks a violation for every high vowel that appears in a light syllable. The interplay between the constraints is shown in (10).

(10)

/fɪrɪħna/	*i-light	MAX-IO
a.　　　fɪrɪħna	*!	
b.　☞　frɪħna		*

- If epenthetic vowels are shorter than high vowels, we would predict that their distribution be at least as restricted as that of high vowels, and we find that this is true: epenthetic vowels never appear in open syllables (the only exception is cases of faith to isolated forms, to which I return in Section 4.3).

- Most cases of epenthesis that I have discussed here are cases in which a CC cluster appears syllable-finally, and in all of these cases the inserted vowel will create a closed syllable that takes the first consonant as its onset, and the second as its coda: /ʔaklkom/ → [ʔakɪl.kom], *ʔak.lɪ.kom. The blocked output candidate contains an epenthetic vowel in an open syllable, and is therefore ruled out in favor of ʔakɪl.kom, in which the weightless vowel shares the burden of filling a time-slot with a coda consonant.

How are weightless vowels handled?

- This will depend on whether weightless nuclei are allowed. Here I pursue the possibility of banning them.

- Since epenthetic vowels violate DEP-IO(μ), no epenthetic vowel can head a syllable.

- Given an input like /ʔaklkom/, the fully faithful candidate will lose due to the CLUSTER-C, and among the repaired candidates, two will contain a syllable headed by the epenthetic vowel: in one of them the vowel is moraic, which violates DEP-IO(μ), and in the other the vowel is left unmoraified, which violates the constraint against weightless nuclei.

- These three candidates are shown in (11a-c), respectively.

(11)

	/ʔaklkom/	CLUSTER-C	DEP-IO	*EMPTYN	*COMPLEX	DEP(μ)	SSP
a.	ʔakl.kom	*!					
b.	ʔa.kɪl.kom		*			*!	
c.	ʔa.kɪl.kom		*	*!			
d. ☞	ʔakɪl.kom		*				*
e.	ʔa.kɪlkom		*		*!		

- (11d,e) are the parses in which the epenthetic vowel is parsed into a syllable headed by another vowel, which for our purposes makes the form disyllabic.

7

- If we assume that

  - each syllable contains at most one onset and at most one coda,

  - the onset must precede the nucleus, and coda must follow the nucleus,

- then [kɪlkom] will contain a complex onset, which breaks the phonotactic rules of PA, as we saw in our discussion of prothesis.

- This is not a problem in (11d), in which the epenthetic vowel separates the bad cluster just enough to evade a phonotactic violation.

- In cases where epenthesis breaks up a final CC cluster, as in /katabt/ → [katabɪt], the winning parse will be ka.tabɪt, and since the final consonant is extramoraic, the footed part of the final syllable will exclude both the final consonant and the epenthetic vowel, producing ka.(tab)ɪt.

  (12)
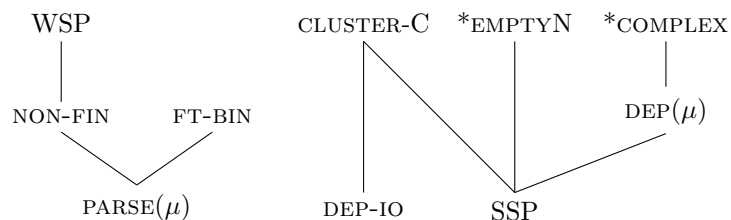
4.2.3 Exceptions: Moraic Epenthesis

- There is only one known group of PA examples in which an epenthetic vowel attracts stress.

- The epenthetic vowel is visible in PA when it breaks up a four-consonant cluster, instead of the more common two/three-consonant clusters.

- These four-consonant clusters arise word-internally when a verb that ends in two consonants is followed by any of the CC-initial dative clitics: /lha/, /lna/, /lkom/, /lhom/ (3sg.fem.dat, 1pl.dat, 2pl.dat, and 3pl.dat, respectively). An example is shown in (13).

  (13) /katabt+lha/ → [katabtílha] *katábtɪlha "I wrote for her"

- It is important to note that an epenthetic vowel preceding the same clitics will be invisible to stress if the verb stem ends with a single consonant, as shown in (14).

  (14) a. /katab+lha/ → [katábɪlha] *katabílha "He wrote for her"
        b. /fataħ+lna/ → [fatáħɪlna] *fataħílna "He opened (it) for us"

- The epenthetic vowel in (13) is assigned a mora, in violation of DEP-IO(μ).

- But this means that leaving it unmoraified creates problems that do not arise in cases like (14).

- The problem is that any parse of the epenthetic vowel in which it is treated as weightless will either create disallowed onsets, or super-duper heavy syllables.

- Consider the possible parses of katabtılha, shown in (15).

  (15)   a. ka.tab.tılha
          b. ka.tabtıl.ha

- (15a) violates *COMPLEX in the same way that ʔa.kılkom does.

- (15b) does not, but because the epenthetic vowel is not moraic, each of the consonants [b], [t], and [l] will have to be parsed as a coda, and since by assumption coda consonants are moraic, each of the consonants will project a mora of its own, creating a quadro-moraic syllable together with the nucleus [a].

- To rule this out, we need only invoke a constraint on syllable size: tri-moraic syllables are permitted, but quadro-moraic syllables are not[2,3].

- Assigning a mora to the epenthetic vowel will circumvent the problem encountered in (15b), but it will incur a violation of DEP-IO(μ). In order to make this the optimal outcome, we rank *σ_{μ^4} and *COMPLEX above DEP-IO(μ). The competition is shown in (16).

(16)

/katabtlha/		*COMPLEX	*σ_{μ^4}	DEP-IO(μ)
a.	ka.tabtıl.ha		*!	
b.	ka.tab.tılha	*!		
c. ☞	ka.tab.tıl.ha			*

(17)
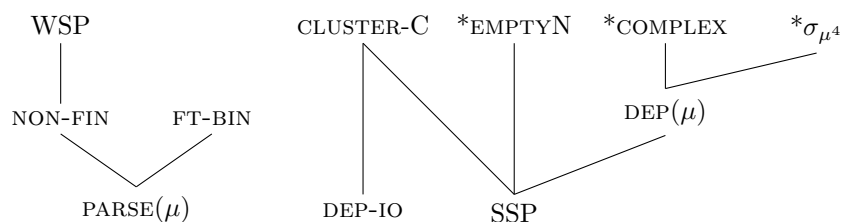
- In contrast, the cases where the epenthetic vowel breaks up a tri-consonantal cluster, VCCCV, will not require moraifying the vowel, since leaving it unmoraified will allow for the parse VCɪC.CV, which incurs no violations of *σ_{μ^4}.

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[2]In the earlier discussion of the PA syllable types, superheavy syllables were treated as heavy syllables, where the final consonant shared a mora with the preceding moraic segment. On that analysis, even tri-moraic syllables are ruled out. But the ban on quadro-moraic syllables can be easily translated into a ban on tri-consonantal codas, which can be motivated on the grounds that a single timing-slot is short to contain three consonants.

[3]That trimoraic syllables are allowed in Levantine is noted in Kenstowicz and Abdul-Karim (1980).

- Interestingly, when epenthesis follows a CV:C syllable, the syllable is shortened in order to avoid a quadro-moraic syllable, e.g. (18).

  (18) /ʃaaf+lha/ → [ʃafɪlha] *ʃaafɪlha "he saw for her"

- This means that stress will not be penultimate in this case, because the epenthetic vowel is not assigned a mora, as is required by DEP-IO(μ). This prediction is correct. The constraint interaction responsible for this effect is shown in (19).

  (19)

/ʃaaf+lha/		MAX-IO(C)	*σ_{μ^4}	DEP-IO(μ)	MAX-IO(μ)
a.	ʃaafɪl.ha		*!		
b.	ʃaa.fɪl.ha			*!	
c. ☞	ʃafɪl.ha				*
/katabt+lha/		MAX-IO(C)	*σ_{μ^4}	DEP-IO(μ)	MAX-IO(μ)
a.	ka.tabɪl.ha	*!			
b.	ka.tabtɪl.ha		*!		
c. ☞	ka.tab.tɪl.ha			*	

4.3   Accounting for optional epenthesis

4.3.1   Background: Base-Derivative Correspondence

- Arabic cyclic effects (Brame (1974)).

  (20)   a. /fɪhɪm/ → [fíhɪm] "he understood"

       b. /fɪhɪm-na/ → [fhímna] "we understood"

       c. /fɪhɪm-na/ → [fɪhímna] "he understood us"

  (21)   MAX-BD: Every segment in the base must have a correspondent in the derivative.

- To block syncope in /fɪhɪm-na/ "he understood us", we rank MAX-BD higher than *i-light, so that the short vowel in the base [fíhɪm] is kept in the derivative [fɪhímna]. The tableau in (22) shows the constraint interaction, first for "we understood", then for "he understood us".

(22)

/fɪhɪmna/ no base	MAX-BD	*i-light	MAX-IO
a. fɪhɪmna		*!	
b. ☞ fhɪmna			*
/fɪhɪmna/ [fɪhɪm]	MAX-BD	*i-light	MAX-IO
a. fhɪmna	*!		*
b. ☞ fɪhɪmna		*	

4.3.2 Uniform Exponence and Identity to Isolated Forms

- Kenstowicz (1996) extends the notion of into an identity condition between words. I use the interpretation in (23).

  (23) MAX-ISO: Every segment in the isolated form must have a correspondent in the output.

- If MAX-ISO penalizes differences in the realization of a lexical item, then it will penalize those phrasal forms in which prothesis bleeds epenthesis.

- Fulfilling MAX-ISO will require epenthesis, which will cost a violation of DEP-IO.

- So, MAX-ISO = DEP-IO:

  (24)

/ʔakl#ktiːr/	*COMPLEX	CLUSTER-C	DEP-IO	MAX-ISO	*i-light
a. ʔaklktiːr	*!	*			
b. ʔakɪlktiːr	*!				
c. ☞ ʔaklɪktiːr			*	*	
d. ☞ ʔakɪlɪktiːr			**		*

- The tableau in (24) also shows that similarity to words must outrank *i-light, since, clearly, similarity to the isolated form comes at the cost of having a light vowel in an unstressed open syllable.

- **Prediction**: a word that ends with a closed syllable that is headed by a high vowel, such as [ʃírɪb] "he drank", does not result from epenthesis. If the word is followed by a another word that triggers prothesis, we will yet again derive a phrase in which a high vowel heads an unstressed open syllable, e.g. /ʃírɪb#ktiːr/ → [ʃírɪbɪktiːr] "he drank a lot".

- But since the ban on weak high vowels is outranked by MAX-ISO, we predict that in these forms the high vowel always be preserved, which is correct.

(25)

/ʃɪrɪb#ktiːr/		MAX-ISO	*i-light
a.	ʃɪrbɪktiːr	*!	
b. ☞	ʃɪrɪbɪktiːr		*

5 Prothesis and Epenthesis in LPM-OT

Prothesis at the word-level? or post-lexically?

- In short, either.

- Option 1: Prothesis is done without exception at the word level, and is undone post-lexically when the form is post-pausal.

  (26) $\emptyset \rightarrow$ ɪ / #__CC (Lexically)

  V → $\emptyset$ / PAUSE__ (Post-lexically)

  Example 1 [1] /ktiːr/ → ɪktiːr

  [2] ɪktiːr → [ktiːr] (*prothesis is undone*)

  Example 2 [1] /ʔakl#ktiːr/ → ʔakl#ɪktiːr

  [2] ʔakl#ɪktiːr → [ʔakl#ɪktiːr] (*not triggered*)

- Option 2: Prothesis is blocked at the word level, and is required within phrases post-lexically.

  (27) $\emptyset \rightarrow$ ɪ / [Phrase···#__CC] (Post-lexically)

  Example 1 [1] /ktiːr/ → ktiːr

  [2] ktiːr → [ktiːr] (*not triggered*)

  Example 2 [1] /ʔakl#ktiːr/ → ʔakl#ktiːr

  [2] ʔakl#ktiːr → [ʔakl#ɪktiːr]

5.1 Prothesis and Epenthesis in LPM-OT

- It has already been shown that epenthesis must be applied post-lexically in the LPM-OT account, and the reason was that stress must be applied at the word level, and epenthesis must follow it so that the opaque interaction can be accounted for.

  (28) **Which is better?**

  a. /ʔakl#ɪktiːr/ → [ʔak.lɪk.tiːr] *OR* [ʔakɪ.lɪk.tiːr] (Lexical Prothesis)

  b. /ʔakl#ktiːr/ → [ʔak.lɪk.tiːr] *OR* [ʔa.kɪ.lɪk.tiːr] (Postlexical Prothesis)

- In these cases, the CC cluster is divided across syllables; the prothetic vowel will make available a parse in which the consonants are separated into different syllables (ɪCCV → ɪC.CV).

- This is why epenthesis is suspended before a prothetic vowel: the cluster that requires repair syllable-finally is no longer problematic, because the consonants that appear in it are no longer part of same coda.

- But this means that, if further epenthesis were to apply, there will be more (unnecessary) violations of DEP.

- Why should epenthesis be optional if it doesn't repair anything?

- Deriving the optionality of a process is typically done by locating two constraints that have different favorites from among the two alternating candidates.

- The alternating candidates here are [ʔaklɪktiːr] and [ʔakɪlɪktiːr]. DEP-IO favors the former because it has one fewer epenthetic segment.

- But what favors the latter?

  - **Not faithfulness**, because epenthesis is the only violation that the candidates commit, and the doubly-epenthetic candidate incurs one more of it than the other.
  - **Not markedness**, because it is not obvious what that markedness is. the structure of [ʔaklɪktiːr] is in line with PA phonotactics.
  - **Not faith to output forms**, because this would jeopardize the position of the LPM-OT: if this move were available, then the motivation for deriving opacity from strata weakens.
  - **Not word-sensitive markedness**. What I mean is perhaps another version of CLUSTER-C exists (call it CLUSTER-C_w) that is sensitive not to syllables, but to word boundaries.
  - A form like [ʔaklɪktiːr], while in compliance with the CLUSTER-C, still contains a marked consonant cluster at the right word-edge, and this makes the candidate less harmonic than the candidate in which epenthesis repairs the cluster. The optionality can then result from ranking DEP-IO and CLUSTER-C_w equally with respect to one another, as shown in (29).

  (29) | Post-Lexical | CLUSTER-C ≫ DEP-IO, CLUSTER-C_w

/ʔakl#ɪktiːr/		CLUSTER-C	CLUSTER-C_w	DEP-IO
a. ☞	ʔakl#ɪktiːr		*	
b. ☞	ʔakɪl#ɪktiːr			*

  - But if word-level phonology is part of the system, and if a constraint were to militate against some marked structure at the word-edge, it seems to me that it would most naturally be implemented as a word-level constraint, rather than a post-lexical constraint that is nevertheless sensitive to word-boundaries.

- What about moving epenthesis so that it is optional at the word-level, and obligatory in the postlexical grammar?

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- This would mean ranking DEP-IO equally with respect to CLUSTER-C at the word level.

- The input /ʔakl/ may then be mapped to the fully faithful candidate [ʔakl], or to the epenthesized candidate [ʔakɪl], and postlexically, the former will have to undergo epenthesis because the CLUSTER-C strictly outranks DEP-IO.

- On this solution we correctly predict that only when prothesis takes place, whether at the word-level or postlexically, will epenthesis be obviated. But this gives rise to a problem: if optional epenthesis results from epenthesis at the word level, and if stress is assigned at the word level as well, we incorrectly predict that stress assignment in forms like [katabɪtɪktiːr] ("I wrote a lot") be transparent:

(30)   katabɪtɪktiːr → *kátabɪtɪktiːr

          ↛ ✓katábɪtɪktiːr

6   Conclusion

- I presented a datum that challenges the multi-stratal LPM-OT approach to PA epenthesis.

- The datum consists of case where epenthesis applies (optionally) post-lexically, but for no reason other than faith to output forms.

- I worked out a monostratal alternative that brought together separate observations about PA phonology. Specifically,

  - The prosodic weakness of epenthetic vowels, which is experimentally confirmed in Gouskova and Hall (2010).

  - The absence of epenthetic vowels in open syllables.

- I also noted that epenthesis is visible to stress whenever no legal parse can be generated in which the epenthetic vowel is weightless, (see Appendix for similar patterns in Mohawk and in Passamaquoddy).

7   Appendix

7.1   Glide-final forms

- The data in (31) is based on Kenstowicz (1994).

    (31)   a. /dalw/ → [dalu] *dalɪw/daləw/daluw "bucket"

            b. /ʔabw/ → [ʔabu] *ʔabɪw/ʔabəw/ʔabʊw "basement"

            c. /ʤalj/ → [ʤali] *ʤalɪj/ʤaləj "dishwashing"

- Faithfulness to syllabicity (Ident(syll)) is lower than DEP-IO ⇒ vocalization is better than epenthesis.[4]

- Of course, this is permitted only when a glide appears in the cluster; Levantine dialects never allow syllabic consonants, so syllabifying the [l] in /ʔakl/ to generate [ʔak̩l] will not be a successful improvement of the input, since it will incur a violation of the highly ranked *C̩. This is illustrated in (32).

    (32)

/ʔakl/		CLUSTER-C	*C̩	DEP-IO	Ident(syll)
a.	ʔakl	*!			
b.	ʔak̩l		*!		*
c. ☞	ʔakɪl			*	
/dalw/		CLUSTER-C	*C̩	DEP-IO	Ident(syll)
a.	dalw	*!			
b.	dalɪw			*!	
c. ☞	dalu				*

- **Prediction**: In Section 3 it was shown that prothesis must apply to a CC cluster when it is not preceded by a pause.

- It was then shown that while this can bleed the epenthesis process that ordinarily breaks up illegal coda clusters, this latter instance of epenthesis still applies, optionally, in order to maintain identity between words. We showed this interaction of constraints in (24), repeated here as (33).

    (33)

/ʔakl#ktiːr/		*COMPLEX	CLUSTER-C	DEP-IO	MAX-ISO
a.	ʔaklktiːr	*!	*		
b.	ʔakɪlktiːr	*!			
c. ☞	ʔaklɪktiːr			*	*
d. ☞	ʔakɪlɪktiːr			**	

---

[4]I assume here that syllabicity is the feature that distinguished vowels from glides, the former being +syllabic, and the latter -syllabic.

- What happens when the first word ends with a glide?

- Prothesis produces [dalwɪkbiːr], and this will fix both the complex onset and the illegal coda.

- But this output violates MAX-ISO, because the initial word is different from the isolated form [dalu].

- In fact, the output that will satisfy MAX-ISO will make prothesis unnecessary, since the MAX-ISO-compliant candidate [dalukbiːr] already contains a vowel immediately before the complex onset. Words whose final cluster contains a glide are therefore never predicted to undergo prothesis, since in their case MAX-ISO is satisfied by the least costly repair, vocalization, which was not available for words ending in consonantal clusters.

- This prediction is borne out, as is confirmed by the unacceptability of *dalwɪkbiːr, and the grammaticality of [dalukbiːr]. The comparison of the two types of forms, those that end with glides and those that do not, is shown in (34).

(34)

/ʔakl#ktiːr/	*COMPLEX	CLUSTER-C	DEP-IO	MAX-ISO	Ident(syll)
a.　　ʔaklktiːr	*!	*		*	
b.　　ʔakɪlktiːr	*!		*		
c.　☞　ʔaklɪktiːr			*	*	
d.　☞　ʔakɪlɪktiːr			**		
/dalw#kbiːr/	*COMPLEX	CLUSTER-C	DEP-IO	MAX-ISO	Ident(syll)
a.　　dalwkbiːr	*!	*		*	
b.　　dalɪwkbiːr	*!		*	*	
c.　　dalwɪkbiːr			*!	*	
d.　☞　dalukbiːr					*

- Moreover, the relatively high rank of MAX-ISO also guarantees vocalization even when the following word begins with a single consonant.

- Recall that the acceptability of [ʔakɪlɪktiːr], which contains a weak vowel in an open syllable, motivates the ranking where MAX-ISO dominates *i-light.

- But on this ranking, a vocalized output like [dalu]/[ʤalɪ] ("bucket"/"dishwashing") can precede a word that begins with a simple onset, even though the result will place the weak vowel in an open syllable. This is because MAX-ISO, which demands identity to isolated forms, trumps the ban on weak syllables, as (35) shows.
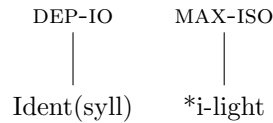
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(35)

/dalw#mona/	MAX-ISO	*i-light
a. dalɪwmona	*!	
b. dalmona	*!	
c. ☞ dalumona		*

7.1.1   An Unsolved Problem

- What happens to glide-final roots when they are followed by genitive clitics.

- Here is our current hierarchy:

(36)

$$
\begin{array}{cc}
\text{DEP-IO} & \text{MAX-ISO} \\
| & | \\
\text{Ident(syll)} & \text{*i-light}
\end{array}
$$

The prediction for an input like /dalwkom/ is therefore that the glide be vocalized, since vocalization is preferable to epenthesis.

(37)

/dalwkom/	DEP-IO	MAX-ISO	Ident(syll)	*i-light
a. dalʊwkom	*!			
b. ☞ dalukom			*	*

- This prediction, however, is not correct. Though it is not completely clear to me what the exact properties of the correct output is, intuitively it seems to bear more resemblance to epenthetic forms than to vocalized forms. This is difficult to verify because the qualities of what I claim to be an epenthetic vowel are near-identical to those of the following glide, so the hypothesis that this is another instance of epenthsis must be accompanied by an auxiliary assumption, which is rather plausible, that epenthetic vowels inherit the features of neighboring segments whenever those segments are vocalic. Still, the hierarchy as it stands fails to predict this outcome, since vocalization is the less costly repair.

- A preliminary run of recordings suggests that the medial syllables in these forms is 50% longer than the short syllable in a form like [dalumona], but whether this is indeed the result of vowel insertion or, perhaps, some restricted process of vowel lengthening, remains to be seen.

A Brief Typological Note: Mohawk and Passamaquoddy

7.2   Mohawk

- In Mohawk epenthesis is invisible to stress assignment (Hagstrom 1997, Michelson 1989).

- There is however one exception to the invisibility of epenthesis: the inserted vowel is visible only when it breaks up a cluster of three or more consonants, e.g. (38-39)

(38)   Invisible Epenthesis

    a.   /ʌ-k-r-ʌ-ʔ/ → [ʌ́kerʌʔ] "I will put it into a container"

    b.   /te-k-rik-s/ → [tékeriks] "I put them together"

    c.   /o-nraht-ʔ/ → [ónerahteʔ] "leaf"

(39)   Visible Epenthesis

    a.   /wak-nyak-s/ → [wakényaks] "I get married"

    b.   /s-rho-s/ → [sérhos] "you coat it with something"

    c.   /sa-s-ahkt/ → [sasáhket] "go back!"

- This is a lot like PA. The only difference is that in PA tri-moraic syllables are permissible. So it is only in the special case when an epenthetic vowel breaks up a four-consonant cluster (e.g. /katabtlha/) that no parse can produce an invisible epenthetic vowel and still contain maximally tri-moraic syllables.

- In Mohawk, even trimoraic consonants are disallowed, so DEP-IO(μ) is dominated by both $*\sigma_{\mu^3}$ and $*\sigma_{\mu^4}$. This short comparison is illustrated in (42-43).

(40)   PA: $*\sigma_{\mu^4} \gg$ DEP-IO(μ) $\gg *\sigma_{\mu^3}$

(41)   Mohawk: $*\sigma_{\mu^4} \gg *\sigma_{\mu^3} \gg$ DEP-IO(μ)

(42)

/katabtlha/		*COMPLEX	$*\sigma_{\mu^4}$	DEP-IO(μ)
a.	ka.tabtɪl.ha		*!	
b.	ka.tab.tɪlha	*!		
c. ☞	ka.tab.tɪl.ha			*

(43)

/wak-nyak-s/		*COMPLEX	$*\sigma_{\mu^3}$	DEP-IO(μ)
a.	waken.yaks		*!	
b.	wake.nyaks	*!		
c. ☞	wa.ken.yaks			*

- Elsewhere the epenthetic vowel breaks up CC sequences, and by doing so creates two light syllables. Parsing the weightless epenthetic into a neighboring syllable will not generate a violation of $*\sigma_{\mu^3}$, because a repair is always available in which /VCCV/ is mapped into [VCe.CV], where the first syllable is within the range of weight that the language tolerates.

7.3 Passamaquoddy

- The relevant difference in Passamaquoddy, as Hagstrom claims, is that the schwa that is invisible to stress is not epenthetic. Aside from this detail the story is quite similar to the story in Mohawk: the schwa is invisible to stress except in cases where its invisibility results in a parse that violates the syllable restrictions of the language. Stress in Passamaquoddy (in transparent cases) is placed on the initial syllable, and on even syllables counting from right to left, e.g. (44). Examples of invisible and visible schwas are shown in (45).

  (44)   a. wásis "child"

         b. léwésto "he speaks"

         c. wíkewésto "he likes to talk"

         d. séhtáyewésto "he speaks while walking backwards"

  (45)   a. sókəlan "it pours rain"

         b. pískə́lan "it rains so hard that it is dark to see"

- Setting aside the epenthetic status of the schwa for the moment, its visibility to stress is governed, just as in Mohawk and PA, by syllable well-formedness.

- In (45a) the schwa can be parsed together with the first vowel in one syllable, while the in(45b) the same ploy cannot be taken, since that would produce a tri-moraic syllable. What might distinguish Passamaquoddy from Mohawk and PA is that moraicity in Passamaquoddy is more demanding, since it is not sufficient to simply have an input correspondent in order to project a mora.

- Rather, it seems that a moraic segment must be strictly greater in sonority than the schwa in the hierarchy (Parker's) in (46).

  (46)   low vowels ≫ mid vowels ≫ high vowels ≫ ə

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