Unifying Prosodic and Segmental Repair: Metathesis and Epenthesis in Uab Meto

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1 Overview

- Languages differ on how they enforce syllable structure and prosodic requirements
- Some languages prefer epenthesis: Levantine Arabic epenthesizes to avoid CCC clusters (Gouskova 2009)

(1) (Gouskova 2009) **Levantine Arabic**

a.	/katab-t-l-a/	ka.tá.bi̲t.la	'I wrote to him'	cf. katábt 'I wrote'
b.	/ʔalf-na/	ʔa.lí̲f.na	'our thousand'	cf. ʔálf 'thousand'
c.	/ʔibn-na/	ʔi.bi̲n.na	'our son'	cf. ʔíb.n-i 'my son'

- Other languages truncate: Samoan shortens long vowels in order to avoid HL syllable sequences (Zuraw 2018: e10)

(2) (Zuraw 2018: e10) **Samoan**

a.	maaloo(lóo)	'rest [verb]'	maaloo(ló-a)	'rest.erg'
b.	too(fáa)	'sleep (polite)'	too(fá-ŋa)	'bedding'

- In Uab Meto (Austronesian; West Timor, Indonesia) is a language that prefers **metathesis**

(3) **Uab Meto**

a.	mɛ͡ɔp	'work'	ʔa-mɛpo-t	'worker'
b.	ʔo͡ɛl	'younger sibling'	ʔolɛ-f	's.o.'s younger sibling'
c.	sonaf	'palace'	sonfa-m	'palace-and'
d.	ma͡ʊn	'chicken'	manu	'chicken (phrase final)'

- This is similar to Rotuman (McCarthy 2000, Churchward 1940, a.o.) , but with a crucial difference: these changes are conditioned almost entirely by syllable well-formedness and stress (cf. Blevins & Garrett 1998, Heinz 2005 for similar proposals)
- **Proposal:** Uab Meto is a language that has metathesis as its preferred form of repair, even over epenthesis and deletion
- However, Uab Meto metathesis is limited: it only occurs at the ends of roots and initial syllables can never metathesize

- This patterns alongside a variety of faithfulness-violating mutations that occur in these final syllables (e.g. consonant deletion, consonant epenthesis)

- All data in this talk come from my own fieldwork in Bijaepunu, West Timor in the summers of 2018 and 2019

2 Metathesis is the preferred repair

- Word-final consonant clusters (*CC#) are never possible in Uab Meto

- These clusters are preferentially resolved with metathesis, not epenthesis

- I introduce three constraints, *CC#, DEP, and LIN

(4) *CC#: Assign one violation for each CC cluster that is word-final

(5) DEP: Every element in the output has a correspondent in the input. (McCarthy & Prince 1994: 9)

(6) LIN: S_1 reflects the precedence structure of S_2 and vice versa (No Metathesis)
Let $x, y \in S_1$ and $x', y' \in S_2$. If $x \Re x'$ and $y \Re y'$, then x precedes ($<$) y iff x' precedes ($<$) y'.
(McCarthy & Prince 1995:123)

- Consider a word like [manikin-t] 'the cold', derived from the root /manikin/ 'cold'

(7)

/manikin-t/	*CC#	DEP	LIN
a. maˈnikin-t	*!		
b. maˈnikin-at		*!	
☞ c. maˈnikni-t			*

- However, metathesis can't occur in root-initial positions

  - I interpret this as a type of prosodic neutralization (Steriade 1994) / root-initial faithfulness constraint (Beckman 1998)
  - This restriction may follow from stress: when assigned, it docks on the underlying penultimate vowel of the root

- To capture this non-initial requirement, I introduce ANCHORING-INITIAL, which militates against faithfulness violations like metathesis in the initial syllable of a root

(8) ANCHORING-INITIAL: Assign one violation for each faithfulness (DEP, LIN, MAX) violation that occurs prior to the first V of a root.[1] (cf. ANCHORING-IO, McCarthy & Prince 1995)

- We can see this the word [bsoʔ-at] '(a) dance' with the UR /bsoʔ-t/

(9)

/bsoʔ-t/	*CC#	ANCHOR-INITIAL	DEP	LIN
a. ˈbsoʔ-t	*!			
☞ b. ˈbsoʔ-at			*	
c. ˈbsʔo-t		*!		*

- Thus, we only see epenthesis when metathesis is otherwise ruled out

[1] Monosyllables cannot metathesize.

- Another example of this occurs in [ˈkan-am] 'your name'
- Metathesis can't occur because it would violate initial syllable faithfulness (ANCHOR-INITIAL), and so epenthesis occurs instead

(10)

/kan-m/	*CC#	ANCHOR-INITIAL	DEP	LIN
a. ˈkan-m	*!			
☞ b. ˈkan-am			*	
c. ˈkna-m		*!		*

- n.b. kna is an acceptable onset: e.g. knapan 'butterfly', knik 'horn', etc.
- Once words have more than one syllable, we see that metathesis is favored over epenthesis (e.g. sonaf 'palace' → sonfa-m 'and the palace')

(11)

/so.naf-m/	*CC#	ANCHOR-INITIAL	DEP	LIN
a. ˈsonaf-m	*!			
☞ b. ˈsonfa-m				*
c. ˈsonaf-am			*!	
d. ˈsnofa-m		*!		**

3 Metathesis optimizes stress

- Stress is fixed in Uab Meto: it occurs on the penultimate vowel of the root
- But, Uab Meto has a general preference for this stress to also align with the penult of the phonological word
  - The result: roots metathesize in order to have the penult of the root and the penult of the word coincide
  - Upon metathesis, VV sequences coalesce into diphthongs
  - Metathesis thus can reduce the syllable count at the end of roots

3.1 An account of stress

- This section builds some preliminaries before showing how metathesis and stress interact
- I pursue a footless account of stress, following Gordon (2002)

(12) ONESTRESS$_{\varphi P}$: Assign one violation for each intonational phrase that does not have one and exactly one stress. (cf. CULMINATIVITY in **?** 1989, **?**, Gordon, 2002)

(13) NONFIN$_{\omega}$: Stress does not fall on the final syllable of a phonological word. (A final syllable does not have a level 1 grid mark.) (Gordon 2002: 501)

(14) ALIGN(X$_1$,R)$_{\omega}$: Assign one violation for each stress that does not occur in the rightmost syllable of a phonological word. (Gordon, 2002: 498)

- Together, these mean that stress is assigned to the penultimate vowel in monomorphemic words

- For an example, take the word [ˈkolo] 'bird' – we see penultimate stress from NONFIN » ALIGN(X_1,R)

(15)

/kolo/	ONESTRESS	NONFIN	ALIGN(X_1,R)
a. kolo	*!		
☞ b. ˈkolo			*
c. koˈlo		*!	

- Since ONESTRESS outranks NONFIN, monosyllabic words may receive stress
- An example of this is [ˈnaʔ] 'blood'

(16)

/naʔ/	ONESTRESS	NONFIN	ALIGN(X_1,R)
a. naʔ	*!		
☞ b. ˈnaʔ		*	

- Uab Meto generally prefers for all syllables to have onsets

(17) ONSET: Assign one violation for each vowel without an onset. (Ito 1989, Prince & Smolensky 1993)

- But, ONSET in Uab Meto is dominated: certain stress requirements (NONFIN) can condition onsetless syllables
- We see this in the diphthongization pattern in /meo/ 'cat – in isolation, it appears as disyllabic [me.o]

(18)

/meo/	ONESTRESS	NONFIN	ALIGN(X_1,R)	ONSET
a. me.o	*!			*
☞ b. ˈme.o			*	*
c. ˈmeo͡		*!		

- But, if you add mora-bearing suffixes, ONSET snaps back into action and we get diphthongization
- An example of this is [meo͡-nu] 'cats' (cf. [me.o] 'cat')

(19)

/meo-nu/	ONESTRESS	NONFIN	ALIGN(X_1,R)	ONSET
a. me.o-nu	*!			*
b. ˈme.o-nu			**!	*
c. me.ˈo-nu			*	*!
☞ d. ˈmeo͡-nu			*	

- So, Uab Meto stress prefers word-penultimate position

3.2 Metathesis and stress

- Caveat: Uab Meto stress can never occur on non-roots
- This creates a conflict in the grammar: stress prefers to surface in word-penultimate position, but is also fixed on the underlying penultimate vowel of the root

- An example of this is with the word [ʔa-ˈbsoʔ-t-in-e] 'dancers' (cf. /bsoʔ/ 'dance (root)')
- This word does not have penultimate stress, but it can't be shifted any farther rightwards onto those suffixes nor can the root itself be modified due to initial syllable faith requirements
- In non-monosyllabic roots, Uab Meto repairs this type of conflict with metathesis on the root
- This has the effect of reducing root syllable count (and thus also ALIGN(X_1,R) violations)
- An example of this is with the word [ˈkokes] 'bread'

(20) [ˈkokes] receives penultimate stress in isolation

/kokes/	ONESTRESS	NONFIN	ALIGN(X_1,R)
a. kokes	*!		
☞ b. ˈkokes			*
c. koˈkes		*!	

- If we suffix the definite marker -e, then we get [kôeks-e] 'the bread'
- This also results from a requirement against hiatus across morpheme boundaries (*V-V)

(21) *V-V: Assign one violation for each instance of vowel hiatus that crosses a morpheme boundary.

- Metathesis makes disyllabic /kokes/ into [kôeks-], reducing ALIGN(X_1,R) violations by one

(22)

/kokes-e/	*V-V	ALIGN(X_1,R)	DEP	LIN
a. ˈkokes-e		**!		*
b. ˈkokes-je		**!	*	
☞ c. ˈkôèk.s-e		*		*
d. ˈkokse-e	*!	*		

- So, metathesis is a strategy for reducing stress lapses by reducing root syllable count
- Uab Meto is unusual in that it doesn't only care about stress lapses at one edge: it also disprefers left-edge stress lapses
- The best evidence for this occurs in compounds: [fafi] 'pig' becomes [fâif-ʔanaʔ] in the compound 'baby pig'
- I model this with ALIGN(X_1,L)

(23) ALIGN(X_1,L): Assign one violation for each stress that does not occur in the leftmost syllable of a phonological word. (Gordon 2002:498)

- So, in the fâif-ˈʔanaʔ 'baby pig' example, *[fafiˈʔanaʔ] is ruled out by ALIGN(X_1,L)

(24)

/fafi-ˈʔanaʔ/	MAX-V	ALIGN(X_1,L)	DEP	LIN
a. fafiˈʔanaʔ		**!		
☞ b. fâifˈʔanaʔ		*		*
c. fafˈʔanaʔ	*!	*		

- In compounds, we also see a requirement against CCC clusters

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

- Take for instance the compound besi-mnasiʔ 'crocodile (lit. old iron)' – metathesis is blocked by *CCC

(26)

/besi-mnasiʔ/	*CCC	ANCHOR-INITIAL	ALIGN(X_1,L)	LIN
☞ a. besi-ˈmnasiʔ			**	
b. bo͡is-ˈmnasiʔ	*!		*	*
c. bo͡is-ˈmansiʔ		*!	*	**

4 Metathesis and infixation

- Metathesis can never cross morpheme boundaries in Uab Meto
- I model this as *INFIX, a type of LIN that also references morpheme precedence

(27) *INFIX: Don't infix.
If $x, y \in S_1$ and $x \in M_1, y \in M_2$ where $M_1 < M_2$ in S_1, then $x < y$.
(modelled after LIN-OUTSIDE-MORPHEME from Canfield 2015)

- Consider the form [ʔoel-f-am] 'and s.o.'s younger brother', from the root [ʔoel] 'younger brother'
- *INFIX rules out infixation and morpheme rearrangement

(28)

/ʔole-f-m/	*CC#	*INFIX	DEP	LIN
a. ʔo͡el-f-m	*!			*
b. ʔo.le-f-m	*!			
c. ʔol⟨f⟩e-m		*!		*
☞ d. ʔo͡el.-f-am			*	*
e. f-ʔole-m		*!		

- Note that ALIGN(X_1,R) rules out candidates like *[ˈʔole-f-am], so regardless of the UR, we'll get the right output

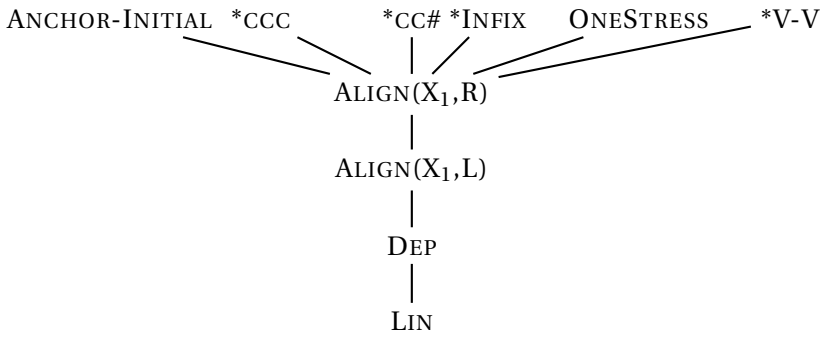
(29)

/ʔole-f-m/	*CC#	ALIGN(X_1,R)	DEP	LIN
a. ˈʔo.le.-f-am		**!	*	
☞ b. ˈʔo͡el.-f-am		*	*	*

- So, although Uab Meto has robust metathesis, it must always occur within a morpheme
- This is crucial data against proposals such as Horwood (2004), which attempt to unify constraints against infixation and constraints against metathesis

4.1 Interim summary

- Metathesis is the preferred repair strategy, but it can't occur before the first vowel of a root
- Metathesis is primarily conditioned by stress and consonant cluster repair
- If metathesis is not possible, epenthesis can occur instead



5 Discussion and Predictions

- Two advantages of this proposal:
  - Final syllables are uniformly "weak" and allow for other types of faithfulness violations in addition to LIN
  - "Larger-scale" phonotactics (i.e. sentence prosody) also cause alternations in surface consonant-vowel orders

5.1 Final syllables allow for other faithfulness violations

- If final syllables are "weak" and can violate LIN, we might expect for other faithfulness violations to be possible
- This is the right prediction: root-final vowels and consonants are subject to other types of repair depending on the prosodic context
- **Deletion of word-final consonants**: underlying word-final consonants delete when the word does not receive stress
- I model this with a MAX-NONFINAL constraint

(30) MAX-NONFINAL: Assign one violation for deletion of anything other than a word-final consonant.

- An example comes from compounding: lelo$\textipa{P}$ 'citrus' becomes l$\widehat{\text{eo}}$l-fu$\widehat{\text{ɟɟ}}$ 'wild citrus' when compounded, deleting the final glottal stop
- I assume that each constituent of the compound is indexed as a phonological word

(31)

/[[lelo$\textipa{P}$]$_\omega$-[fu$\widehat{\text{ɟɟ}}$]$_\omega$]$_\omega$	MAX-NONFINAL	*CCC	ALIGN(X$_1$,L)	MAX	LIN
a. lelo$\textipa{P}$-$\textipa{'}$fu$\widehat{\text{ɟɟ}}$			**!		
b. l$\widehat{\text{eo}}$l$\textipa{P}$-$\textipa{'}$fu$\widehat{\text{ɟɟ}}$		*!	*		*
☞ c. l$\widehat{\text{eo}}$l-$\textipa{'}$fu$\widehat{\text{ɟɟ}}$			*	*	*
d. l$\widehat{\text{eo}}$$\textipa{P}$-$\textipa{'}fu\widehat{\text{ɟɟ}}$	*!		*	*	

- We also see this deletion with suffixes – e.g. [ʔamepot] 'worker' → [ʔa-meop-lele] 'field worker' when compounded

(32)

/[[ʔa-mepo-t]$_\omega$[lele]$_\omega$]$_\omega$/	MAX-NONFINAL	*CCC	ALIGN(X_1,L)	MAX	LIN
a. ʔa-mepo-t-ˈlele			∗∗∗!		
b. ʔa-me͡op-t-ˈlele		∗!	∗∗		∗
☞ c. ʔa-me͡op-ˈlele			∗∗	∗	∗
d. ʔa-me͡o-t-ˈlele	∗!		∗∗	∗	

- In some dialects, word-final vowels also show an alternation
- **Word-final vowels condition consonant epenthesis**: in the Mollo dialect, word-final vowels can strengthen into consonants
- Ask me about these later!

5.2 Prosodically-triggered alternations

- Might expect that other things could trigger metathesis on the sentential level, and they do!
- **Prosodic marking**: Stress is assigned to vP and nP phrases – essentially, most noun-adjective and verb-direct object sequences are domains for stress assignment
- This means that nouns and verbs metathesize when stress lands on the following word

(33) Nominal Domain - Noun Adjective

a. [ma͡ʊn ˈmutiʔ]$_{nP}$ nua
chicken white two
'two white chickens'

b. [ˈmɑnu]$_{nP}$ nua
chicken two
'two chickens'

(34) Verbal Domain - Direct Objects

a. aʊ [ʔ-am baˈkase ʔii]$_{vP}$
1SG 1SG.AGR-look.for horse DEM
'I look for the horse.'

b. baˈkase ʔii aʊ [ˈʔ-ami]$_{vP}$
horse DEM 1SG 1SG.AGR-look.for
'The horse, I look for it.'

- This is essentially what we saw with compounds

(35) Nominal Domain - Noun Compounds

a. [fa͡if ˈʔanaʔ]$_{nP}$ ʔii
pig baby DEM
'this baby pig'

b. [ˈfafi]$_{nP}$ ʔii
pig DEM
'this pig'

- I expand ONESTRESS to apply to a phonological phrase (φP)

(36) ONESTRESS: A φP has one and only one stress.

- So, if we look at (33) maʊ̯n muti ʔ 'white chicken', we see it works the same as compounds

(37)

/manu muti ʔ/	ONESTRESS	ALIGN(X_1,R)	ALIGN(X_1,L)	LIN
☞ a. maʊ̯n ˈmuti ʔ		*	*	*
b. manu ˈmuti ʔ		*	**!	
c. ˈmanu ˈmuti ʔ	*!	*		
d. maˈnu muti ʔ		**!	*	

- Also like compounds, metathesis is blocked where it would lead to a *CCC cluster within a prosodic (φP) domain

- For instance, although we see metathesis with faut muti ʔ 'white stone', we cannot metathesize in fatu mnasi ʔ 'old stone'

(38) a. [faut ˈmuti ʔ]$_{\varphi P}$ 'white stone' [fatu ˈmnasi ʔ]$_{\varphi P}$ 'old stone' *[faut ˈmnasi ʔ]
b. [bael ˈfeʔu]$_{\varphi P}$ 'new place' [bale ˈmnatu ʔ]$_{\varphi P}$ 'place of gold' *[bael ˈmnatu ʔ]

- So, we revise the *CCC constraint to militate against CCC sequences in any φP, not just those within words

(39)

/fatu mnasi ʔ/	*CCC$_{\varphi P}$	ALIGN(X_1,L)	DEP	LIN
☞ a. fatu ˈmnasi ʔ		**		
b. faʊ̯t ˈmnasi ʔ	*!	*		*
c. faʊ̯ta ˈmnasi ʔ		**	*!	*

- As predicted, adjectives used predicatively (and thus in a separate φP) do not trigger metathesis on the noun

(40) [ˈmanu]$_{nP}$ [ˈmuti ʔ]$_{PredP}$
chicken white
'The chicken is white.'

- Note this is not syntax: adjuncts can optionally trigger metathesis on verbs regardless of adjunct attachment height

5.3 Comparison with Rotuman

- The Uab Meto pattern superficially resembles the well-known case of **Rotuman** (McCarthy 2000, Besnier 1987, Takahashi 2018, Churchward 1940) where metathesis is primarily conditioned by syntactic context

- But Uab Meto is different from what's reported about Rotuman in the literature: CV̂VC stems are reported to receive stress in Rotuman, but they generally do not in Uab Meto

6 Alternatives

6.1 Rule-Based Approaches

- There are several rule-based approaches to Uab Meto metathesis (Steinhauer 1993, 1996; Edwards 2016, 2018) – most rely on direct interaction of syntax and phonology
- But, these approaches do not answer the question of why metathesis is the favored operation for both phonotactic repair and "syntactic" marking
  - This approach has a response: Uab Meto has rigid prosodic requirements, and so metathesis repairs these at the level of both word and phrase

6.2 Harmonic Serialism

- Uab Meto facts are broadly compatible with a Harmonic Serialism Analysis, but there some things that need to be worked out
- Uab Meto metathesis is often a **two-step process**: first, metathesis and second, vowel coalescence into a diphthong (e.g. manu → m$\widehat{\text{au}}$n)
- Takahashi (2018) proposes that there is no metathesis in GEN, and metathesis is the combined result of i. copy-and-delete or ii. fuse-and-fission
- The copy-and-delete approach won't work out-of-the-box because the intermediate stages won't be more harmonic with respect to ALIGN(X_1,L)/ALIGN(X_1,R)
- But, Takahashi's fuse-and-fission approach to metathesis should work, and could help account for consonant insertion cases
- In particular, HS works well if you assume that deletion is a two-step process (McCarthy 2008), and metathesis is deletion of the mora followed by feature re-association

7 Conclusion

- Some languages prefer to repair prosodic phonotactics with metathesis, even if that means also creating diphthongs and syllable codas
- Uab Meto is such a language – metathesis is the preferred repair for optimizing a variety of segmental and prosodic phonotactics
- Due to stringent prosodic requirements in Uab Meto, we see this repair at prosodic levels of both word and phrase

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