Class 9
Morphological Doubling Theory (Inkelas & Zoll 2005)

6/6/2023

1 Introduction

- Inkelas & Zoll (2005) [IZ] propose "Morphological Doubling Theory" [MDT] as an alternative to BRCT for analyzing reduplication, which *they say* is more restrictive than BRCT.
  - They spend a lot of time arguing that a lot of McCarthy & Prince's (1995) data is wrong (and they're probably right about a bunch of that), and therefore that you don't need BR-correspondence.
  - While they may or may not succeed at avoiding needing BR-correspondence, they do so only at the expense of creating a completely unrestrictive theory in every other respect.

1.1 Overview of MDT

- MDT's view of reduplication:
  - Reduplication is *not* the result of duplication/copying/correspondence in the **phonology** (1a).
  - Reduplication is (exclusively) the result of double insertion of morphological constituents in the **morphology** (1b), followed by (not-so-)special phonological treatment.

(1) Possible means of duplication (IZ:2)

a. Phonological: $\{X\} \xrightarrow{\text{Spellout}} /x/ \xrightarrow[\text{Copying}]{\text{Phonological}} [x\text{-}x]$

b. Morphological: $\{X\} \xrightarrow[\text{Duplication}]{\text{Morphosyntactic}} \{X\}\{X\} \xrightarrow{\text{Spellout}}$ /x-x/ $\rightarrow [x\text{-}x]$

- IZ claim that the phonological properties of reduplication as a whole are not really any different than other sorts of morphologically-conditioned phonology.
  - i.e., the only mechanisms you need in order to capture the phonological properties of reduplication are those which you independently need in order to capture more run-of-the-mill morphophonology.

→ There should be no special (phonological) mechanisms for reduplication, namely BR correspondence.
  - The sorts of patterns that would require BR correspondence (in MDT) don't actually exist.
    - Much of the data we thought needed BR correspondence is based on incorrect analyses.
    - This is clear when you look at reduplication in the context of the language's larger morphological system.
  - ⋆ Their mantra is basically: *look at the rest of the morphology.*
    - When you do that, some of the patterns which look weird on their face are actually not weird for that language.

⇒ One problematic issue for MDT:
  - They claim that all the types of phonological processes that apply in reduplication apply (in equivalent frequency) in non-reduplicative morphologically-conditioned phonology.
  - This is baldly not the case w.r.t. to **truncation** (cf. Urbanczyk 2008), which must apply ubiquitously in reduplication but almost never applies in other morphological constructions (other than hypocoristics).

1.2 Sign Based Morphology

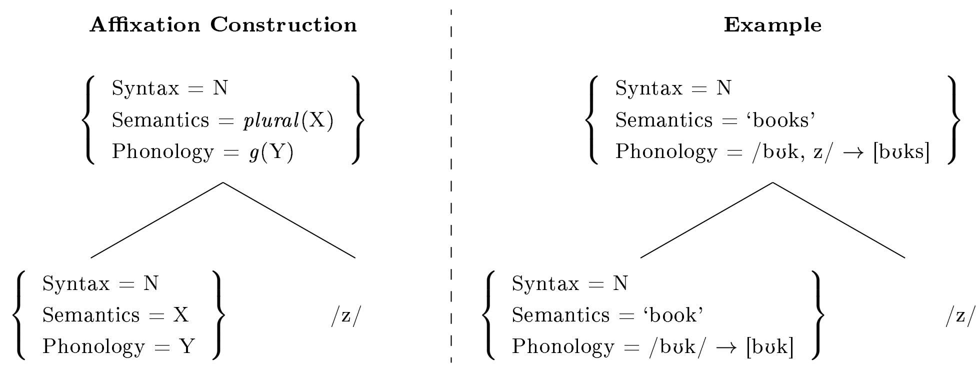
- MDT is based on Sign-Based Morphology (SBM; Orgun 1996, 1999, *et seq.*). SBM is a version of Construction Grammar. Words (and morphological constituents) are instances of "constructions":

> "*In SBM constructions (and meta-constructions) are grammatical primitives, elaborated versions of phrase-structure rules which encode the semantic, syntactic, and phonological mappings between daughters and mothers.*" (IZ:12)

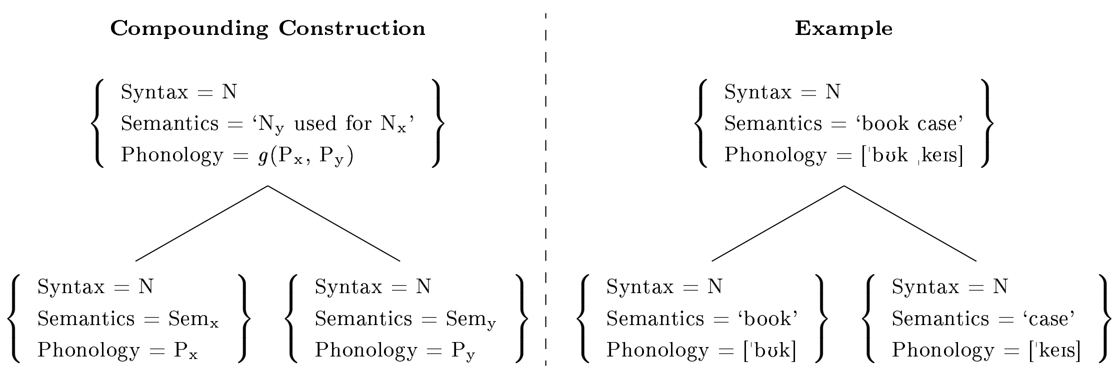
- Constructions are nodes in the morphological tree.
  - They make specific demands about the (morpho)syntax and semantics of what they contain (≈ what they select for).
  - They are characterized by a (morpho)syntax and semantics that they result in.
  - They have a particular, potentially unique phonology ("cophonology").

- The construction for the English plural is given in (2), and the construction for English noun-noun compounding is given in (3).

(2) SBM representation of plural in English (IZ:13)



(3) SBM representation of noun-noun compounding in English (IZ:13)



- The top node is called the "**mother**" node, the bottom nodes are called "**daughter**" nodes.

- IZ assert that what makes a construction "reduplicative" is when the mother node subcategorizes for daughters that each have the same semantic specification.
  → Reduplication is essentially compounding (like the construction in (3)), but both daughters are specified as **{Semantics = '$\mathbf{Sem_x}$'}**.

1.3 Cophonology Theory

- Phonology is handled by "Cophonology Theory" (Inkelas, Orgun, & Zoll 1997, Inkelas & Zoll 2007).
  - Each morphological construction is indexed to a particular phonology — its "cophonology".
  - There is no necessary connection between different cophonologies in a language; they can be characterized by completely different properties.

(4) Reduplicative construction with distinct cophonologies

Reduplicative Construction

$$\left\{ \begin{array}{l} \text{Syntax} = \text{A} \\ \text{Semantics} = \text{B} \\ \textbf{Phonology} = \Phi_k(\Phi_i(\textsc{d}),\, \Phi_j(\textsc{d})) \end{array} \right\}_{\text{M}}$$

$$\left\{ \begin{array}{l} \text{Syntax} = \text{X} \\ \text{Semantics} = \text{Y} \\ \textbf{Phonology} = \boxed{\Phi_i(\textsc{d})} \end{array} \right\}_{\text{D}} \qquad \left\{ \begin{array}{l} \text{Syntax} = \text{X} \\ \text{Semantics} = \text{Y} \\ \textbf{Phonology} = \boxed{\Phi_j(\textsc{d})} \end{array} \right\}_{\text{D}}$$

- This means that the two daughters can be passed on to the mother node with different phonological outputs, even though they had *the same phonological inputs.*
- The mother node cophonology then determines how the (potentially distinct) outputs of the daughter cophonologies get concatenated.
  - But the mother node applies the same phonology to both daughter outputs.

(5) Reduplication in Banoni (IZ:15–16); e.g. $\sqrt{}$*resi* 'grate coconut' → *re-resi* 'coconut grater'

Reduplicative Construction

$$\left\{ \begin{array}{l} \text{Syntax} = \text{N} \\ \text{Semantics} = \text{`used while } y\text{-ing'} \\ \text{Phonology} = \textit{concatenate daughters} \end{array} \right\}_{\text{M}}$$

$$\left\{ \begin{array}{l} \text{Syntax} = \text{V} \\ \text{Semantics} = y \\ \text{Phonology} = \textit{truncation} \end{array} \right\}_{\text{D}} \qquad \left\{ \begin{array}{l} \text{Syntax} = \text{V} \\ \text{Semantics} = y \\ \text{Phonology} = \textit{identity} \end{array} \right\}_{\text{D}}$$

Example

$$\left\{ \begin{array}{l} \text{Syntax} = \text{N} \\ \text{Semantics} = \text{`coconut grater'} \\ \text{Phonology} = /\text{re, resi}/ \to [\text{re-resi}] \end{array} \right\}_{\text{M}}$$

$$\left\{ \begin{array}{l} \text{Syntax} = \text{V} \\ \text{Semantics} = \text{`grate coconut'} \\ \text{Phonology} = /\text{resi}/ \to [\text{re}] \end{array} \right\}_{\text{D}} \qquad \left\{ \begin{array}{l} \text{Syntax} = \text{V} \\ \text{Semantics} = \text{`grate coconut'} \\ \text{Phonology} = /\text{resi}/ \to [\text{resi}] \end{array} \right\}_{\text{D}}$$

- In this framework, partial reduplication is to be understood as a construction that calls for semantic identity of its daughters, and has **truncation phonology** for one daughter but not the other.

⋆ IZ give no rationale for why reduplicative constructions so frequently have truncation of one daughter, but other constructions (e.g. simple affixation) so rarely do.
  - ○ It thus feels like this may be missing an important point...

- Non-transparent reduplication-phonology interactions basically result from the fact that different phonological grammars can hold at different nodes.

1.4 Reduplication-Phonology Interactions

- MDT eschews BR correspondence, but for more principled reasons than most of the other alternatives we've looked at:
  - ○ "Base" and "reduplicant" are (at least for phonological purposes) simply different, unrelated morphological constituents.
  - → The morphology requires them to be identical as a matter of sub-categorization, but this is already checked and done with before phonology comes into the picture.

- MDT can thus not handle certain types of interactions that quintessentially rely on BR faithfulness:
    - ▪ Back-copying
    - ▪ Overapplication of junctural phonology
  - ○ IZ argue that no such cases exist.
    - ▪ But unlike McCarthy, Kimper, & Mullin (2012) and others, IZ actually take the time to really argue against the claimed cases of these sorts of effects.
    - ▪ Their arguments are largely reasonable.

- MDT can handle other types of reduplicative opacity, namely normal overapplication (including "allophonic" overapplication) and underapplication.
  - ○ They do this by stipulating — or, in certain cases, demonstrating via independent evidence — that the triggers are copied morphologically and subsequently truncated, such that it is always just opacified normal application.
- The phonology is handled derivationally, so opacity works the same way it does in Stratal OT:
  - ○ Phonology applies normally at a lower node.
  - ○ Then a process at a subsequent node removes the context (overapplication ≈ counterbleeding) or introduces the context (underapplication ≈ counterfeeding).
  - ○ (Or the process simply doesn't apply at the relevant node.)

- Also, they have to also claim that reduplicant shape alternations cannot be dependent on conditions at the base-reduplicant juncture (only by conditions of the input), unless it can be derived consistently by the phonology of the "mother node".
  - → Ponapean (Zukoff 2022) and Tawala (Haugen & Hicks Kennard 2011, Zukoff 2022) are exactly such cases. (Maybe also Ancient Greek?)
  - ○ But turns out, MDT can generate these, just with an even greater loss of restrictiveness.

2 Rationale for cophonology: morphologically-conditioned phonology

- The basis for cophonology theory is the idea that many phonological processes are restricted to applying in particular morphological contexts; i.e.,
  - Some morphemes that create the context for the rule trigger application of the rule
  - Other morphemes that create the context for the rule *don't* trigger application of the rule

- IZ (72–73) give Turkish velar deletion as an example.
  - Stem-final /k/ deletes in intervocalic position (6a)...except when it doesn't (6b).

(6) Turkish velar deletion

a.	Dative suffix: triggers velar deletion		
	Nominative	**Dative**	**Gloss**
	bebek	bebe-e	'baby'
	inek	ine-e	'cow'
b.	Aorist suffix: does not trigger velar deletion		
	Past	**Aorist**	**Gloss**
	gerek-ti	gere**k**-ir	'be necessary'
	bırak-tı	bıra**k**-ır	'leave'

- Assuming that the distinction between which morphemes trigger and which morphemes don't is arbitrary (I'm wondering if there's a consistent distinction between nominal and verbal suffixes correlating with the fact that nouns have bare forms...), then this difference has to be stipulated in the grammar somewhere.

- Phonologically speaking, the difference in behavior can be characterized by a reversal in ranking:

(7) a. Deletion ranking: *VkV ≫ MAX-C
b. Preservation ranking: MAX-C ≫ *VkV

- One way to handle this is to use morphologically indexed constraints (see, e.g., Pater 2009, Becker 2009).
  - One of the constraints gets split into two versions (let's assume its the markedness constraint).
  - Affixes that induce deletion get indexed to the version of the markedness constraint that dominates MAX-C (*VkV_i).
  - Affixes that don't induce deletion get indexed to the version of the markedness constraint that is outranked by MAX-C (*VkV_j or general *VkV).

(8) Turkish with indexed constraints: *VkV_i ≫ MAX-C ≫ *VkV_j

- Or, one could do the indexation directly to the rankings (as in (7)), rather than splitting the constraints.
  → This is cophonology.
  - The construction for each affix that induces deletion has (7a) as part of its mother node cophonology.
  - The construction for each affix that doesn't induce deletion has (7b) as part of its mother node cophonology.

⇒ IZ (also Becker and many others) assert that this sort of morphologically-determined phonology is extremely common (maybe even prevalent) when you really look at a language's morphophonology on the whole.
  - Therefore, going all in on morphological indexation seems to be necessary, rather than a complication.
  - Reduplication is thus just the normal state of affairs — a morphological construction indexed to particular phonology that diverges in certain respects from other constructions in the language.

3 Indonesian stress in MDT

- IZ (102–103, 108–112) provide an analysis of Indonesian reduplication, which exhibits a special stress pattern under one very specific circumstance.

- Compounds normally show stress subordination of the first member (9).

(9) Stress in Compound Forms (McCarthy & Cohn 1998:51; cf. Cohn 1989:188)

a. [càp][pós] 'postmark' (M&C:32)

b. [tùka][cát] 'printer'

c. [polùsi][udára] 'air pollution'

d. [bòm][átom] 'atom bomb'
  i. pəm-{[bòm]}{[atóm]-an} 'bombing'
  ii. pəm-{[bòm]}{[àtom]-án-ña} 'the bombing'

e. [anèka][rágam] 'varied'
  i. kə-{[anèka]}{[ragám]-an} 'variety'
  ii. kə-{[anèka]}{[ràgam]-án-ña} 'the variety'

- In reduplication (which looks kind of like compounding), sometimes you get the expected subordination pattern (10ii), but sometimes you get double primary stress (10i) contrary to the expected pattern.

(10) Stress in reduplicated forms (McCarthy & Cohn 1998:52; cf. Cohn 1989:185)

	i. *Matching*		ii. *Non-matching*	
a.	[búku][búku]	'books'	[bùku][bukú]-ña	'the books'
b.	[wanníta][wanníta]	'women'	[wanìta][wanitá]-an	'womanly' (adj.)
c.	[màsarákat][màsarákat]	'societies'	[màsaràkat][màsarakát]-ña	'the societies'
d.	[minúm-an][minúm-an]	'drinks'	[minùm-an][mìnum-án]-ña	'the drinks'
e.	[hák][hák]	'rights' (M&C:32)	di-[pàs][pás]-kan	'tried on repeatedly'

- This has been analyzed as a BR faithfulness effect (Kenstowicz 1995, McCarthy & Cohn 1998, Stanton & Zukoff 2016).
  - Stress is assigned independently to (i) the first member and (ii) the second member + any suffixes.
  - When there are no suffixes, the stress grammar places stress on the same syllables in both members.
    → Ident[stress degree]-BR ensures that they both have primary stress, contravening the constraint against multiple primary stresses.
  - Where there are suffixes attached to the second member that are not present on the first, the stress grammar places stress on different syllables in the two members.
    → Ident[stress degree]-BR can't be satisfied (because each stressed correspondent will have an unstressed correspondent), so there's nothing to contravene subordination.

- There's evidence that this isn't the right generalization and analysis.
  - Namely, there are two circumstances where both members bear stress on the corresponding syllables but do not match in stress degree:

(11) Matching stress location without matching stress degree (IZ:110)

	i. *Matching*		ii. *Non-matching*	
a.	(cf. [hák][hák]	'rights')	di-[pàs][pás]-kan	'tried on repeatedly'
b.	[kərá][kərá]	'monkeys'	[kərà][kərá]-an	'toy monkey'
c.	[kəcíl][kəcíl]	'small (dist.)'	mə-[ŋəcìl][ŋəcíl]-kan	'to belittle s.t.'

- Stress rules:

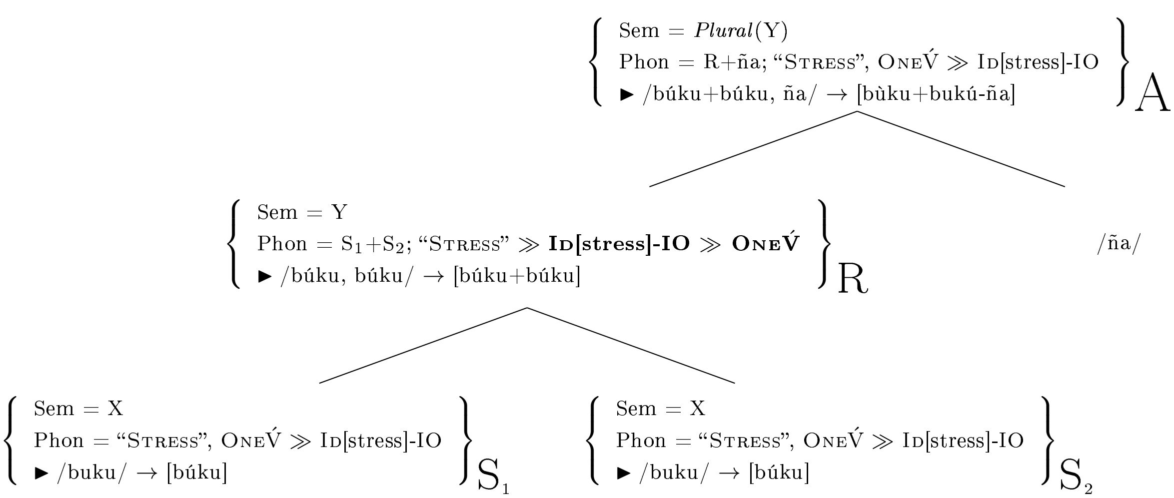
(12) a. Monosyllables are stressed.
b. Disyllables are stressed on the initial (= penult).
c. ə is always unstressed; so, in CəCV(C), stress the final not the penult.

1. For reduplicated monosyllabic roots with a monosyllabic suffix ((11a) = (10ii.e)), the root will be stressed in both members.
   → These don't show stress matching.
2. For reduplicated CəCV(C) roots with a monosyllabic suffix (11b,c), the final syllable of the root will be stressed in both members.
   → These don't show stress matching.

⇒ These cases contradict the BR faithfulness analysis.

- IZ give a completely different analysis in MDT, based on placing the stress subordination grammar at different nodes.
  - The subordination cophonology (OneV́ ≫ Id[stress]-IO) is present at the stem construction node (S) and at the affixation construction node (A) [and also at the non-reduplicative compounding node].
  - **But**, the stress preservation cophonology (Id[stress]-IO ≫ OneV́) is present at the reduplication construction node (R).

(13) Stress cophonologies in Indonesian



→ Here's how the analysis works:
  - The primary stresses which are assigned to the independent stems that get concatenated in reduplication are preserved at the point when reduplication happens.
    - If this is the end of the derivation, this double primary stress form will surface as an output.
  - However, if reduplication is further subject to suffixation — which has the subordination cophonology — the second primary stress will get demoted, regardless of whether stress moves in the second member.

- In this analysis (which does a much better job at capturing the data), the special status of primary stress results from special faithfulness to the *input*, not special faithfulness between base and reduplicant.
  - IZ refer to this as "Native Identity", as opposed to "Coerced Identity".

- This special faithfulness is not tied directly to the fact that it is reduplication, but simply to the fact that it is a particular morphological construction, and thus can have special phonology if it wants.
  - This predicts that any type of morphological construction can display special stress properties.
  - This is a reasonable statement given the typology, in which all sorts of different morphemes can induce special stress properties cross-linguistically.

4 Tohono O'odham stress

- The point that stress behavior in reduplication can be tied to more general relations between stress and morphology in a language is illustrated by Tohono O'odham (IZ:129, and sources therein).

- Tohono O'odham has a weird derived environment effect:
  - Primary stress always falls on the initial syllable
  - Secondary stresses on all odd numbered syllables, with one proviso:
    - In derived (≈ morphologically complex) words, odd numbered final syllables bear stress.
    - In underived words (≈ bare roots), odd numbered final syllables **don't** bear stress.

(14) Stress in Tohono O'odham (IZ:129)
  a. Nonderived words: no stress on final syllable
    i. kíː 'house'
    ii. píːba 'pipe'
    iii. ʔásu**gal** 'sugar'
    iv. símin**ǰul** 'cemetery'
  b. Derived words: stress permitted on final syllable
    i. cíkpan-**dàm** 'worker'
    ii. máːginà-kam 'one with a car'
    iii. pímiàndo-**màd** 'adding pepper'

- So, what do we expect to happen in reduplication? Stressed final syllables:

(15) Stress in reduplication (IZ:129)

pí-pibà	'pipes'	(vs. píːba 'pipe')
sí-sminǰùl	'cemeteries'	(vs. síminǰul 'cemetery')
pá-padò	'ducks'	(vs. (presumably) pádo 'duck')
tá-tablò	'shawls'	

- How do we explain this effect in MDT?

(16) a. Root node cophonology: NonFin ≫ *Lapse
  b. All other nodes' cophonology: *Lapse ≫ NonFin

- The point is that one morphological construction can have special phonology against the rest of the language.
  - Here it's roots (or whatever)
  - In Indonesian, it was reduplication
- As far as MDT is concerned, the choice of which construction gets something special is arbitrary and uninteresting.

5 Overapplication in Javanese

- Javanese has a number of overapplication/underapplication processes in reduplication, which (for the most part) can be analyzed using BR correspondence.
  - There are some tricky interactions (which kind of look like back-copying) that may be hard for BRCT; see Wu (2017).
- Alternatively, IZ (§5.1) argue that they can instead be understood in MDT as regular application followed by truncation.

5.1 Data (we've seen all this before)

5.1.1 Javanese *h*-deletion

(17) a. /h/ → Ø / V_V
b. /h/ → [h] elsewhere (namely, _C & _#)

(18) Javanese *h* deletion (McCarthy & Prince 1995:2)

	Stem	i. _+C	ii. _+V	iii. *"Expected" Red*	Gloss
a.	anɛh	anɛh-ku	anɛ.-e	—	'strange'
b.	bəḍah	bəḍah-bəḍah	bəḍa-bəḍa.-e	*bəḍa[h]-bəḍa.-e	'broken'
c.	ḍajɔh	ḍajɔh-ḍajɔh	ḍajɔ-ḍajɔ.-e	*ḍajɔ[h]-ḍajɔ.-e	'guest'

5.1.2 Javanese *a*∼ɔ alternation

- Dudas (1976) argues that *a* is in complementary distribution with ɔ in Javanese:

(19) a. ɔ / _#
b. ɔ / _Cɔ
c. *a* elsewhere

- There is evidence from alternations under suffixation:

(20) Distribution of *a* vs. *ɔ* in Javanese

STEM	GLOSS	DERIVED
djaksɔ	public prosecutor	*djaksa-ne*
djɔkɔ	young man	*djaka-ne*
djarwɔ	meaning	*djarwa-ne*
djɔrɔ	drill	*djara-ne*
karjɔ	work	*karja-ne*
kɔrɔ	climbing vine	*kara-ne*
warnɔ	sort, variety	*warna-ne*
wɔrɔ	say, speak	*mara-ʔake*

- This doesn't hold in reduplication: whichever quality is proper to the righthand copy is found also in the lefthand copy.

(21) Misapplication in reduplication (Dudas 1976:206)

STEM	GLOSS	DOUBLED	DOUBLED AFFIXED
dongɔ	'prayer'	*dongɔ-dongɔ*	*donga-donga-ne*
dɔwɔ	'long'	*dɔwɔ-dɔwɔ*	*dawa-dawa-ne*
medjɔ	'table'	*medjɔ-medjɔ*	*medja-medja-ne*

5.2 MDT analysis

- These cases and others in Javanese can be analyzed in the following way:

1. The reduplicative construction takes fully affixed stems as its daughters (i.e. $D[aughter]_1$ and $D[aughter]_2$ select S[tem]'s).

2. Phonological processes (e.g. *h*-deletion and *a*∼*ɔ* alternation) apply regularly within the fully affixed stems (in the S node).

3. The lefthand daughter (D_1) has truncation phonology that deletes everything which is not part of the root. (*It's actually a lot more complicated than this, but this is close enough.*)

4. (Some of) the phonological processes which apply in the affixation nodes are *inactive* in the D nodes and the mother node (R[eduplication]), such that some alternations (like *a*∼*ɔ*) do not get fixed even though they exist outside of their normal context.

(22) "Overapplication" in Javanese reduplication in MDT

R

Sem = Y(X)

Phon =
- D_1+D_2
- *VhV ≫ Max[h]-IO
- **Ident[low]-IO ≫ *a#, *ɔ**

- ▶ /bədah, bədah/ → [bədah-bədah]
- ▶ /bəda, bəda-e/ → [bəda-bəda-e]
- ▶ /dongɔ, dongɔ/ → [dongɔ-dongɔ]
- ▶ /donga, donga-ne/ → [donga-donga-ne]
- ▶ /aboh, aboh/ → **[abo-aboh]**

D_1

Sem = X

Phon =
- *truncation*
- *VhV ≫ Max[h]-IO
- **Ident[low]-IO ≫ *a#, *ɔ**

- ▶ /bədah/ → [bədah]
- ▶ /bəda-e/ → **[bəda]**
- ▶ /dongɔ/ → [dongɔ]
- ▶ /donga-ne/ → **[donga]**
- ▶ /aboh/ → [aboh]

D_2

Sem = X

Phon =
- *no truncation*
- *VhV ≫ Max[h]-IO
- **Ident[low]-IO ≫ *a#, *ɔ**

- ▶ /bədah/ → [bədah]
- ▶ /bəda-e/ → [bəda-e]
- ▶ /dongɔ/ → [dongɔ]
- ▶ /donga-ne/ → [donga-ne]
- ▶ /aboh/ → [aboh]

S

Sem = X

Phon =
- Root+Suffix
- *VhV ≫ Max[h]-IO
- ***a# ≫ *ɔ ≫ Ident[low]-IO**

- ▶ /bədah/ → [bədah]
- ▶ /bədah, e/ → [bəda-e]
- ▶ /donga/ → [dongɔ]
- ▶ /donga, ne/ → [donga-ne]
- ▶ /aboh/ → [aboh]

6 Epenthesis and reduplication in Fox

- Fox (Dahlstrom 1997) has a disyllabic reduplication pattern, which marks ITERATIVE aspect.
  - Appears to the left of the root.
  - Doesn't allow long vowels or codas in its second syllable (but allows both in the first).
    - Basically the σCV pattern MKM talked about, from Diyari, Balangao, etc.
  - → Same restrictions hold of prosodic words, so reasonable to assume that the reduplicant is parsed into its own prosodic word.

(23) Reduplication in Fox (IZ:166; data, w/ page numbers, from Dahlstrom 1997)

a.	First (C)VC(C)V copied			
	pyeːtaw-eːwa	**pyeːta**-pyeːtaweːwa	'he brings it for him'	217
	k^{w}iːnom-eːwa	**k^{w}iːno**-k^{w}iːnomeːwa	'he longs for him'	217
	niːškesi-wa	**niːške**-niːškesiwa	'he is overburdened'	217
	kiːhpočeː-wa	**kiːhpo**-kiːhpočeːwa	'he eats his fill'	217
b.	Second V always short			
	weːneːhaki	**weːne**-weːneːhaki	'who (pl)?'	218
		*__weːneː__-weːneːhaki		
	mayoː-wa	**mayo**-mayoːwa	'he cries'	218
		*__mayoː__-mayoːwa		
	poːsweːkesi-wa	**poːswe**-poːsweːkesiwa	'he cries louder'	218
		*__poːsweː__-poːsweːkesiwa		
c.	No coda in second syllable			
	nenehkeːnem-eːwa	**nene**-nenehkeːnemeːwa	'he thinks about him'	218
		*__neneh__-nenehkeːnemeːwa		
	nakiškaw-eːwa	**naki**-nakiškaweːwa	'he meets him'	218
		*__nakiš__-nakiškaweːwa		
	kok^{w}aːškeː-wa	**kok^{w}a**-kok^{w}aːškeːwa	'he is jerked'	218
		*__kok^{w}aš__-kok^{w}aːškeːwa		

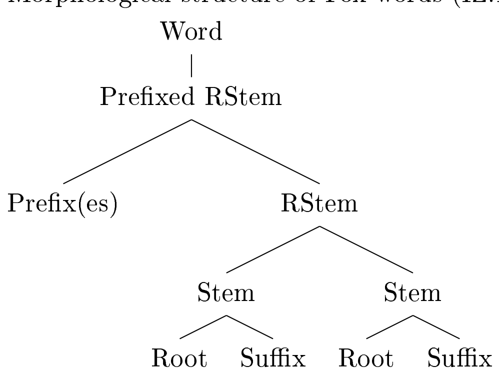
- Suffix material can be copied when the root is subminimal.
  - Prefixes always precede reduplicant, so they can't be copied.

(24) Reduplication of suffix material (IZ:167)

a.	miːn-eːwa	**miːne**-miːneːwa	'he gives it to him'	208
	kot-aki	**kota**-kotaki	'he swallows it; conjunct'	219
b.	ne-miːn-aːwa	ne-**miːna**-miːnaːwa	'I give it to him'	220
	ke-nepa	ke-**nepa**-nepa	'you sleep'	220

- In MDT at least, these facts suggest a morphological structure as follows:

(25) Morphological structure of Fox words (IZ:167)



- In order to posit a structure like this, there should be evidence that the prefixes are exponents of higher terminals than the suffixes.
  - It's not obvious that this is true: there are both prefixal and suffixal subject agreement markers (and maybe some other types of affixes), which often obligatorily co-occur.
  - Though maybe subject agreement happens at two different points along the clausal spine (or whatever the equivalent notion is in this morphosyntactic framework).
- It feels like, for this case at least, they are positing the morphological structure that they need in order to generate the phonological facts, without much external evidence...

- There's lots of phonology going on around reduplication in Fox.
  - All of it can be made consistent with MDT, if you make several (reasonable) provisions about prosodic word boundaries and opacity.
- Given equivalent provisions, BRCT can mostly handle all the same stuff, though it looks weirder.
  - Most notably, for vowel-initial roots, you would expect copying of an epenthetic consonant at a juncture, but you don't get it.

- Fox apparently has three different types of consonant epenthesis which fix hiatus for vowel-initial stems:

(26) a. *h*-epenthesis — between disyllabic reduplicant and its base
b. *y*-epenthesis — between monosyllabic reduplicant and its base (Dahlstrom 1997:213)
c. *t*-epenthesis — between prefixes and (reduplicated) stems

- One might expect that a vowel-initial base for disyllabic reduplication which follows a vowel-final prefix might overapply *h*-epenthesis, or back-copy *t*-epenthesis.
  - This is not the case: it shows normal application — *t*-epenthesis to fill the first hiatus, *h*-epenthesis to fill the second.

(27) Epenthesis with $\sqrt{amw}$ 'eat'
a. *Unprefixed disyllabic reduplication*
e:mwa-**h**-amw-a:čihi 'the ones whom they (repeatedly) eat'
b. *Prefixed unreduplicated stem*
ne-**t**-amw-a:wa 'I eat him'
c. *Prefixed reduplicated stem*
ne-**t**-amwa-**h**-amw-a:wa (*ne-**t**-amwa-**t**-amw-a:wa, *ne-**h**-amwa-**h**-amw-a:wa)

- IZ eventually go in for an analysis where *t*-epenthesis and *h*-epenthesis happen at different nodes.

  - *h*-epenthesis happens in the RStem cophonology:
    - *VV, Dep[t], Max-V ≫ Dep[h]
  - *t*-epenthesis happens in the Prefix or Word cophonology:
    - *VV, Dep[h], Max-V ≫ Dep[t]
  - In the root+suffix constituent, hiatus seems to be resolved through vowel deletion:
    - *VV, Dep[h], Dep[t] ≫ Max-V
  - If *y*-epenthesis is real, then it would be restricted to the construction marked by monosyllabic reduplication.

- But in order to capture certain vowel alternations, IZ have to make a claim about the prosodic structure of complex words:
  - The prefix + first member of the RStem form one prosodic word
  - The second member of the RStem (which contains suffixes) forms a separate prosodic word.

- If we assume this structure, and assert that the type of epenthesis is not conditioned by morphological construction but rather by prosodic environment, then BRCT can analyze the distribution:

(28) a. *VV, DEP[t] / [...PWD} _ {PWD...] ≫ DEP[h] ≫ IDENT[C]-BR, DEP[t] *or*

b. *VV, DEP[h] / [{PWD... _ ...PWD}] ≫ DEP[t] ≫ IDENT[C]-BR, DEP[h]

- It is an accident that we don't get overapplication or back-copying in the BRCT analysis, but it's also an accident that we get different types of epenthesis in the MDT analysis — everything is an accident, because any node can have any phonology.

7 Reduplicant shape alternations in Tawala

- In Zukoff (2022) and a bunch of work before that, I argue that Ponapean and Tawala have reduplicant-shape alternations that pose a problem for MDT:
  → Alternations conditioned by the juncture that are special to reduplication but require the grammar to see the result of concatenating the base and the reduplicant.
    - IZ call this kind of thing "base-dependence", and pointed out that these two languages might be potential counter-examples.

⋆ Turns out MDT can actually generate these patterns, but it makes it clear how unrestrictive the theory actually is.

- I'll show you Tawala, which is the clearer case. (This is cribbed from the companion handout to my 2021 AMP poster; Zukoff 2021.)
  - Original Tawala analysis based on Hicks Kennard (2004) [HK].
  - MDT analysis inspired by Haugen & Hicks Kennard (2011) [HHK].

7.1 Data Overview

- Tawala has four distinct, predictable reduplicant shapes:
  - $C_1V_1.V_2$-initial bases copy <u>C_1V_2</u>- (**Type A**)
  - CVCV-initial bases copy <u>CVCV-</u> (**Type B**)
  - VC-initial bases copy <u>VC</u>- (**Type C**)
  - Bases that begin in a repeated CV sequence locally double the first root vowel (**Type D**)

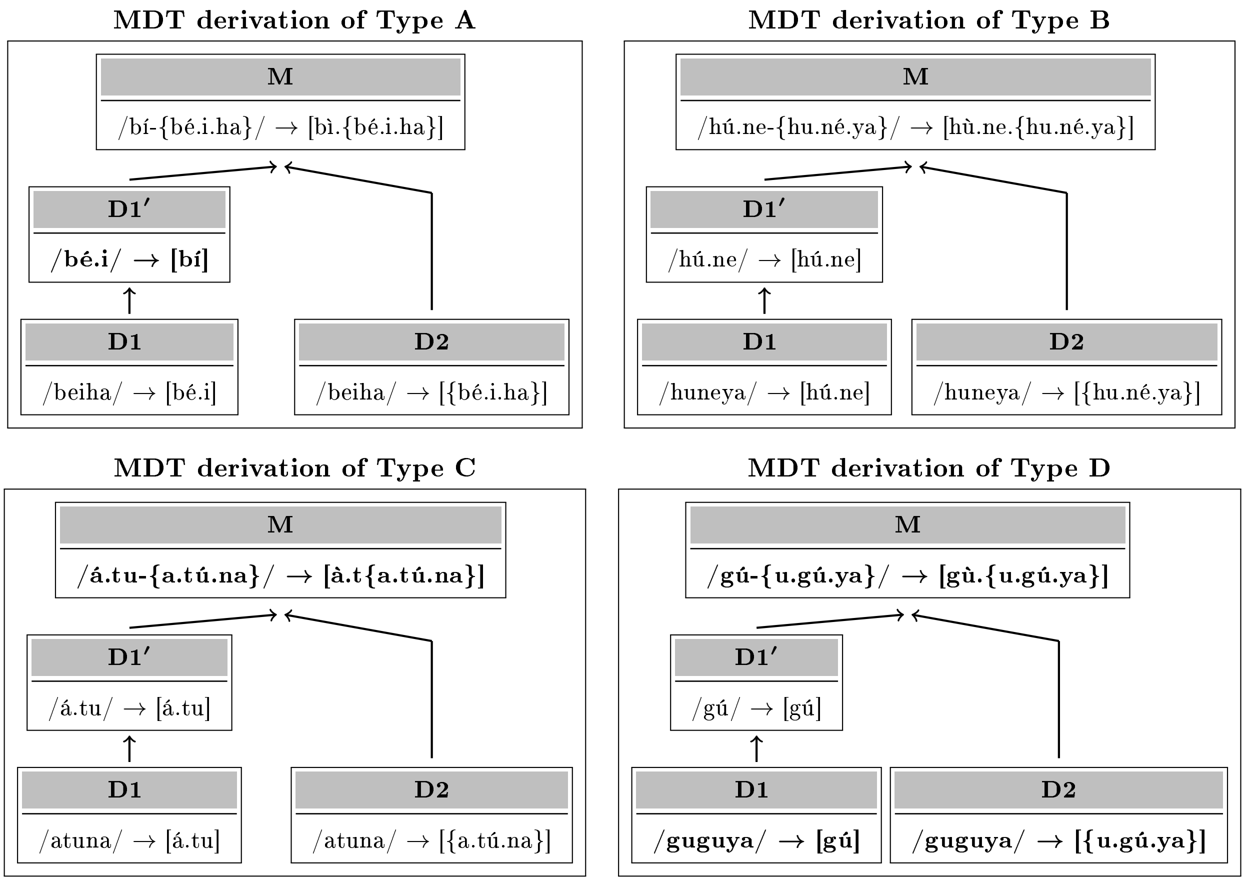
(29) Reduplicant shape types in Tawala

	Base	Reduplicated
Type A:	*bé.i.ha*	→ *bì.bé.i.ha*
Type B:	*hu.né.ya*	→ *hù.ne.hu.né.ya*
Type C:	*a.tú.na*	→ *à.ta.tú.na*
Type D:	*gu.gú.ya*	→ *gù.u.gú.ya*

7.2 Analysis Overview

- **Main components of analysis:**
  1. Truncation in D1
  2. Prosodic Root ({...}) parsing in D2
  3. Hiatus resolution in M, sometimes blocked by FAITH
  4. A semantically vacuous node D1′ between D1 and M
  5. V_1-deletion under hiatus in D1′

(30)



7.3 Analysis

7.3.1 Truncation in D1

- First step in MDT analysis (IZ:95, HHK): D1 preferentially truncates input down to two syllables (41A,B,C).
  - This is effectuated by the ranking in (52) (constraints defined in (33)), and demonstrated for Type B in (34).

  → It is the combined effect of STRESSL and NONFINALITY that requires at least two syllables in the truncatum. (This also correctly places stress on the first syllable.)

(31) **Output of D1**

	INPUT		[D1]
A	*beiha*	→	*bé.i*
B	*huneya*	→	*hú.ne*
C	*atuna*	→	*á.tu*
D	*guguya*	→	*gú*

(32) **Ranking for 2σ truncation**
STRESSL, NONFIN ≫ *STRUC) ≫ MAX

(33) a. **StressL**: Assign one violation if the leftmost syllable is unstressed. (*[#σ̆])
b. **NonFinality**: Assign one violation if the rightmost syllable is stressed. (*[σ́#])
c. ***Struc**: Assign one violation for each segment in the output.
d. **Max-IO**: Assign one violation for each input segment without an output correspondent

(34) **D1 derivation of Type B (same for Types A & C)**

/huneya/			StressL	NonFin	*Struc	Max-IO
a.	hú.ne.ya	[100]			6!	
b. ☞	hú.ne	[10]			4	2
c.	hú	[1]		*!	2	4
d.	hu	[0]	*!		2	4

- However, Type D, the crucial case in HHK's argument, is truncated to a single syllable.
  - This is effectuated by ranking *Repeat(initial) (cf. HK) (35) and StressL above NonFin.
  - This ranking is shown in (36) and demonstrated for Type D in (37).

(35) ***Repeat(initial)**: Assign one violation if the first two syllables are identical. (*[#$\sigma_\alpha\sigma_\alpha$])

(36) **Ranking for 1σ truncation in Type D**: StressL, *Repeat(init) ≫ NonFin

(37) **D1 derivation of Type D**

/gu_1gu_2ya/			StressL	*Repeat(init)	NonFin
a.	$gú_1.gu_2.ya$	[100]		*!	
b.	$gú_1.gu_2$	[10]		*!	
c. ☞	$gú_1$	[1]			*
d.	gu_1	[0]	*!		

- High-ranked Anchor-L (38a) and Contiguity (38b) ensure that other 2σ alternatives are not viable (39).

(38) a. **Anchor-L-IO**: Assign one violation if the leftmost segment in the input does not correspond to the leftmost segment in the output.
b. **Contiguity-IO**: Assign one violation for each pair of adjacent segments in the output which were not adjacent in the input.

(39) **D1 derivation of Type D**

/gu_1gu_2ya/			Anchor-L	Contiguity	NonFin
a. ☞	$gú_1$	[1]			*
b.	$ú_1.gu_2$	[10]	*!		
c.	$gú_1.ga$	[10]		*!	
d.	$gú_1.ya$	[10]		*!	
e.	$gú_2.ya$	[10]	*!		

(40) **Ranking summary for D1**

ANCHOR-L-IO CONTIGUITY-IO STRESSL *REPEAT(init)

NONFIN

*STRUC

MAX-IO

7.3.2 Type D C_1-deletion in D2

- D2 parses all its segment into an output Prosodic Root (cf. IZ:140; Downing 1998a,b).
  - This is effectuated with the constraint MAX–INPUT-PROOT (41), as shown in (42).

(41) **MAX-IP**: Assign one violation for each input segment which does not have an output correspondent contained within a Prosodic Root.

(42) **MAX-IP induces PRoot parsing, e.g. for Type A**

/beiha/	MAX-IP
a. bé.i.ha	5!
b. {bé.i}.ha	2!
c. ☞ {bé.i.ha}	

> ⋆ **Note:** it is crucial that D1 not output a PRoot.
> - Therefore, D1 needs to have a constraint against PRoot's in the output (e.g. *PROOT) or against parsing segments into a PRoot (unclear how this would work), which outranks MAX-IP.
> - D2 needs to have the reverse ranking: MAX-IP ≫ *PROOT

- The only constraint which forces violation of MAX-IP in D2 is *REPEAT(init).
  - If *REPEAT(init) outranks MAX-IP *and* MAX-IO (43), we generate initial-C deletion for Type D only (44).
  - Since there is not general truncation in D2, we know that *STRUC ranks below at least one of the MAX constraints.

(43) **Ranking for initial-C deletion in Type D**: *REPEAT(init) ≫ MAX-IP, MAX-IO

(44) ***REPEAT(init)-driven deletion in D2 for Type D**

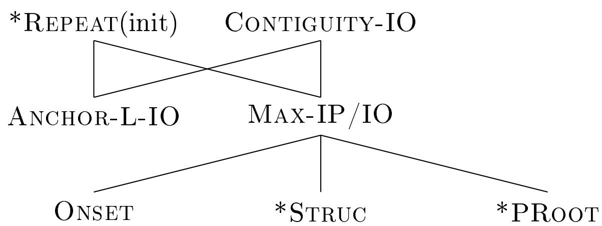
/gu_1gu_2ya/	*REPEAT(init)	MAX-IP	MAX-IO	*STRUC
a. {gu_1.$gú_2$.ya}	*!			6
b. g{u_1.$gú_2$.ya}	*!	*		6
c. ☞ {u_1.$gú_2$.ya}		*	*	5

- The fact that the *REPEAT(init) violation is repaired by *initial* deletion and not medial deletion shows that CONTIGUITY-IO ≫ ANCHOR-L-IO (45).
  - At least the higher-ranked MAX constraint must also outrank ONSET, because initial-C deletion (45b) is preferred to initial-CV deletion (45c).
  - The low ranking of ONSET in D2 also explains why hiatus is tolerated stem-internally in D2 (e.g. {bé.i.ha}).

(45) ***Repeat(init)-driven deletion in D2 for Type D**

/gu$_1$gu$_2$ya/	*Repeat(init)	Contig-IO	Anch-L	Max-IP/IO	Onset
a. {gu$_1$.gú$_2$.ya}	*!				
b. ☞ {u$_1$.gú$_2$.ya}			*	*	*
c. {gú$_2$.ya}			*	**!	
d. {gú$_1$.ya}		*!		**	

(46) **Ranking summary for D2**



- D2 also enforces the language's normal stress pattern (see Ezard 1997):
  - Right-to-left trochees (i.e., penult primary stress + alternating stress leftward from the penult).
  - Unless the penult lacks an onset and the antepenult has a higher vowel, in which case stress retracts to the antepenult, as in *bé.i.ha*.

⋆ I will not spell out the stress constraints here (see Zukoff 2022), except to note that StressL must be low-ranked, unlike in D1.

7.3.3 Restricted hiatus resolution in M

- The only process in M is deletion to repair hiatus, which occurs at the reduplicant-base juncture for Type C (49).
  - This can be modeled using the ranking Onset ≫ Max-IO (48).
  - To prevent deletion of reduplicant-initial vowels in Type C, we could include Anchor-L-IO ≫ Onset in the rankings, or we could use a constraint protecting stressed vowels (47), which will be needed independently below.

(47) **MaxV́-IO**: Assign one violation for each stressed vowel in the input that lacks a correspondent in the output.

(48) **Ranking for hiatus resolution in M**: MaxV́-IO ≫ Onset ≫ Max-IO[1]

(49) **Onset-driven reduplicant-V$_2$ deletion in M for Type C**

/á.tu-{a.tú.na}/	MaxV́-IO	Max-PO	Onset	Max-IO
a. à.tu.{a.tú.na}			**!	
b. à.tu.{tú.na}		*!	*	*
c. ☞ à.t{a.tú.na}			*	*
d. t{a.tú.na}	*!			*

[1] If we assume that adjacency relations are established in the input across morpheme boundaries, then Contiguity-IO would have to rank below Onset as well to allow deletion in Type C.

- Crucially, hiatus is left unresolved in Type D. This can be derived from the combined effect of two special Max constraints, both of which are sensitive to input properties of segments:
  - A constraint protecting underlyingly stressed vowel: MaxV́-IO (47).
  - A constraint protecting underlying PRoot segments: Max-PO (50).

(50) **Max–PRoot-Output [Max-PO]**: Assign one violation for each vowel segment which was part of a PRoot in the input that does not have an output correspondent.

- These constraints, unlike general Max-IO, rank *above* Onset (51), and thus can block hiatus resolution.
  - They succeed in doing so across the juncture for Type D (52), because the lefthand vowel is stressed and the righthand vowel belongs to a PRoot.

(51) **Full ranking for hiatus (non-)resolution in M**: MaxV́-IO, Max-PO ≫ Onset ≫ Max-IO

(52) **Hiatus tolerance across the juncture for Type D in M**

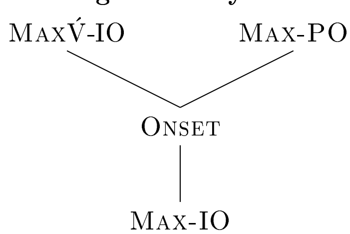
/gú-{u.gú.ya}/	MaxV́-IO	Max-PO	Onset	Max-IO
a. ☞ gù.{u.gú.ya}			*	
b. gù.{gú.ya}		*!		*
c. g{u.gú.ya}	*!			*

- Max-PO also explains why there is no hiatus-driven deletion base-internally in, e.g., Type A:

(53) **Hiatus tolerance base-internally for Type A in M**

/bí-{bé.i.ha}/	MaxV́-IO	Max-PO	Onset	Max-IO
a. ☞ bì.{bé.i.ha}			*	
b. bì.{bé.ha}		*!		*

(54) **Ranking summary for M**



- The only other piece of phonology in M is demotion of the reduplicant's underlying primary stress to secondary stress.

7.3.4 An extra node for Type A: Hiatus-resolution in D1′

∗ There is one problem remaining with this analysis with respect to Type A (which was suppressed in (23)):

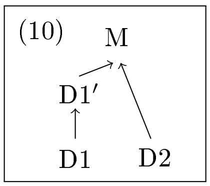
- Given that the output of D1 for Type A is [bé.i], we predict that the unstressed /i/ should delete under hiatus in M, yielding *[bè.{bé.i.ha}] (55b).
- If deletion of the /i/ were blocked by the fact that this would introduce an initial repetition (a *Repeat(init) violation), the alternative would be *no deletion* [bè.i.{bé.i.ha}] (55a), not deletion of stressed /é/ (55c,d).
- And even if something could prefer /é/ deletion, we would still need something else to force the addition of stress to the /i/ in order to overcome (55c).

(55) **Incorrect prediction for Type A in M**

/bé.i-{bé.i.ha}/	(*RPT(init))	MAXV́-IO	MAX-PO	ONSET	MAX-IO	DEP[stress]-IO
a. (💣) bè.i.{bé.i.ha}				*(!)		
b. 💣 bè.{bé.i.ha}	(*!)				*	
c. bi-{bé.i.ha}		*!			*	
d. ☹ bì-{bé.i.ha}		*!			*	*

- The simplest solution (following HHK:15–16) is to introduce an additional, semantically vacuous node [D1′] (56) between D1 and M that maps /bé.i/ → [bí] (58).

(56) **MDT derivational structure with D1′**



- The way to do this is as follows:
  - Have ONSET outrank MAXV́-IO and MAX-IO (57a) to make sure stressed vowel deletion will be tolerated as a means of avoiding hiatus.
  - Also have ONSET outrank CONTIGUITY-IO to allow for the discontiguous mapping resulting from V_1-deletion, and outrank DEP[stress]-IO to allow for restressing the /i/ (57a).
  - Have ANCHOR-R-IO outrank MAXV́-IO and CONTIGUITY-IO (57b) to prefer keeping the rightmost vowel instead of the stressed one, which is also the one that's adjacent to the stem-initial consonant.
  - STRESSL must outrank DEP[stress]-IO (27c) to favor inserting stress onto the newly leftmost /i/, and also outrank NONFIN (57c) (just as in D1) because this means that the final vowel will now be stressed.

(57) **Rankings in D1′ to fix Type A**

a. ONSET ≫ MAXV́-IO, MAX-IO, CONTIGUITY-IO, DEP[stress]-IO [(58d) ≻ (58a)]
b. ANCHOR-R-IO ≫ MAXV́-IO, CONTIGUITY-IO [(58d) ≻ (58b)]
c. STRESSL ≫ DEP[stress]-IO, NONFIN [(58d) ≻ (58c)]

(58) **Fixing Type A in D1′**

/bé.i/	ONSET	ANCHOR-R	STRESSL	MAXV́	CONTIGUITY	DEP[stress]-IO	NONFIN
a. bé.i	*!						
b. bé		*!					*
c. bi			*!	*	*		
d. ☞ bí				*	*	*	*

- We'll also need ANCHOR-L-IO to outrank ONSET (59) in order to avoid deleting the stem-initial vowel in Type C (60).

(59) **Ranking for Type C in D1′**: ANCHOR-L-IO ≫ ONSET

(60) **Not messing up Type C in D1′**

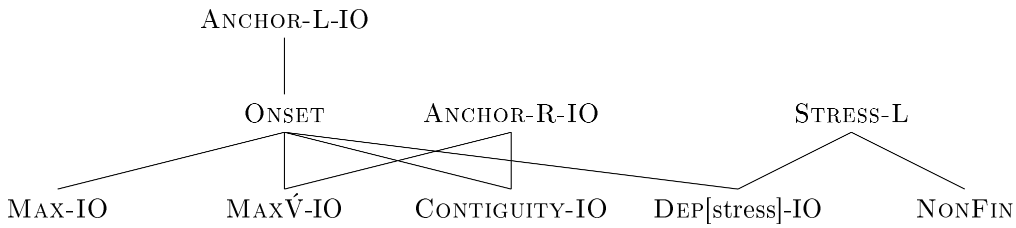
/á.tu/	ANCHOR-L	ONSET	ANCHOR-R	MAXV́-IO	CONTIGUITY
a. ☞ á.tu		*			
b. tú	*!			*	

- Once we implement these rankings in D1′, we achieve the desired result for Type A in M (61); in fact, there are no obvious competitor candidates.

(61) **Correct result for Type A in M**

/**bí**-{bé.i.ha}/	MaxV́-IO	Max-PO	Onset	Max-IO
a. ☞ bì-{bé.i.ha}				

(62) **Ranking summary for D1′**



7.4 Conclusion

- This analysis, while consistent, requires four substantially different cophonologies.
  - The processes that we need to posit in the different nodes bear little resemblance to one another, and sometimes even make contradictory demands.
- MDT provides us with the tools we need to fix all the problems.
  - But the facility with which we can use disparate tools in an ad hoc fashion should give us pause about the restrictiveness of the theory.

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