Class 9
Output-Output/Base-Derivative Faithfulness

3/8/18

1 Introduction

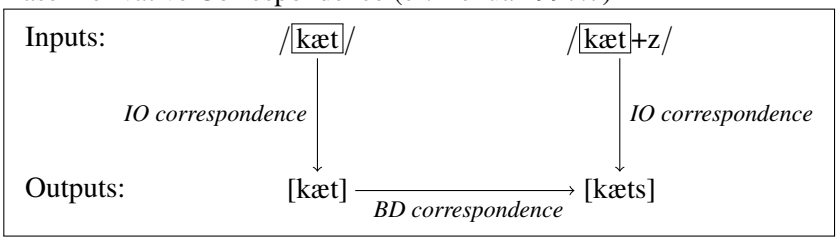
- **Last time:** (Most) cyclic effects can be modeled straightforwardly in Stratal OT (Kiparsky 2000, *et seq.*).
  - Multiple levels/strata (stem, word, postlexical/phrasal), in feed-forward derivation
  - Different affixal morphemes may be added at different levels
  - Each level can have its own constraint ranking; only Input-Output correspondence exists

  → Cyclic effects are the result of a change from $\mathbb{M} \gg \mathbb{F}$ at an earlier level to $\mathbb{F} \gg \mathbb{M}$ at a later level.

- **The main alternative:** Many cyclic effects can be modeled in parallel (i.e. non-serial/stratal) model of phonology by appealing to correspondence/faithfulness between output forms (Benua 1995, 1997, Burzio 1996, Kenstowicz 1996, Kager 1999, *et seq.*).
  - The generalized notion is usually referred to as Output-Output Correspondence or Transderivational Correspondence.

- Most effects can be modeled as (asymmetric/uni-directional) correspondence between a Base (B) and its Derivative (D).
  - Base = [Root(+affix$_{1...n}$)] → Derivative = [[Root(+affix$_{1...n}$)]+affix$_{n+1}$]

(1) Base-Derivative Correspondence (cf. Benua 1997:7)



- Stratal OT splits up rankings, Parallel OT w/ BD correspondence splits up faithfulness constraints:

(2) a. **Stratal OT:**
Level 1: $\mathbb{M} \gg \mathbb{F}_{\text{IO}}$ → Level 2: $\mathbb{F}_{\text{IO}} \gg \mathbb{M}$

b. **Parallel OT w/ BD correspondence:**
$\mathbb{F}_{\text{BD}} \gg \mathbb{M} \gg \mathbb{F}_{\text{IO}}$

→ For the Levantine Arabic case, the two models look very similar w.r.t. how they capture the cyclic effects.
  - Kiparsky argues that Stratal OT better captures certain generalizations than the BD approach. Most significantly, the (conditional) invisibility of epenthesis to word-level processes.

- However, there are other types of cases of (quasi-)cyclic effects (i.e. where morphological relatedness leads to enhanced phonological similarity) that seem less amenable to Stratal OT and more amenable to a (generalized) Output-Output correspondence approach.
  - Paradigm uniformity effects that require *symmetric* correspondence between output forms (McCarthy 2005), or correspondence between two outputs which do not stand in a direct base-derivative relationship (i.e. one does not wholly morphologically contain the other).
  - Affix-by-affix differences that don't neatly divide into stem-level vs. word-level distinctions.

→ These are cases where standard BD faithfulness won't work either.

  - Standard Base-Derivative correspondence then has to be viewed as a sub-type (probably the optimal version) of Output-Output correspondence, which can arise under different kinds of circumstances.

2 Cyclicity and syncope/shortening in Levantine Arabic

- Levantine Arabic has syncope and shortening processes which underapply in particular circumstances in certain morphologically complex words (Brame 1974, Kenstowicz & Abdul-Karim 1980).
  - ⋆ BD analyses based on Kager (1999) and handouts from Donca and Adam (available upon request).
  - I'll be using foot-free stress constraints, but the foot-based constraints Michael used in the Stratal analysis will work in the BD analysis too.

2.1 Basic phonotactics

2.1.1 Stress

- Stress placement is weight sensitive within a trisyllabic right-edge window:

(3) Stress placement:

1.	Final if super-heavy (CVːC, CVCC)	katáb-t	'I wrote'	staʃáːr 'he consulted'
	CVCC# optionally broken up by (post-lexical) epenthesis; stress does not shift			
2.	Else, penult if heavy (CVː, CVC)	katáb-na	'we wrote'	staʃáːr-u 'they consulted'
3.	Else, antepenult	kátab-u	'they wrote'	
		kátab	'he wrote' (leftmost)	

- Some relevant constraints (each is defined over syllables) and rankings:

(4) Stress constraints

a. WSP($\geq 3\mu$) $\gg$ NONFINALITY (katábt $\succ$ kátabt) [(5)]
b. NONFINALITY $\gg$ WSP($\geq 2\mu$) (kátab $\succ$ katáb) [(6)]
c. WSP($\geq 2\mu$) $\gg$ EXTNONFINALITY (katábna $\succ$ kátabna) [(7)]
d. *EXTLAPSER undominated (stress never further left than the antepenult)

(5) Final stress if final is superheavy

/katab-t/		WSP($\geq 3\mu$)	NONFINALITY
a. ☞	katábt		*
b.	kátabt	*!	

(6) Non-final stress if final is not superheavy

/katab(-Ø)/	NONFINALITY	WSP($\geq 2\mu$)
a. katáb	*!	
b. ☞ kátab		*

(7) Penult stress if penult is heavy

/katab-na/	NONFINALITY	WSP($\geq 2\mu$)	EXTNONFINALITY
a. katabná	*!	*	*
b. ☞ katábna			*
c. kátabna		*!	

- Stress constraints are never violated in service of the other constraints in the analysis, and apply normally regardless of morphological complexity. (Only exception: stress ignores post-lexical epenthetic vowels.)

2.1.2 Syncope (normal application)

- Stressless high vowels delete in open syllables.

(8) Syncope

a.	/fi̲him-t/	fhímt	'I understood'
b.	/fi̲him-na/	fhímna	'we understood'
c.	/fihi̲m-u/	fíhmu	'they understood'
d.	/fihim-Ø/	fíhim	'he understood'

- In a serial model, we can assign stress first and then use that information to help decide what to delete.
- If we are doing stress and syncope in parallel, this is more complicated but still doable.
  - We can determine (normal application) syncope site just with reference to phonotactic constraints, without faithfulness to stress position.

- Deletion motivated by the ranking:

(9) Syncope ranking: *i]$_\sigma$ $\gg$ MAXV-IO

- Deletion normally occurs even if it creates an initial cluster (*i]$_\sigma$ $\gg$ *#CC).

(10) Syncope can create initial cluster

/fihim-t/	*i]$_\sigma$	MAXV-IO	*#CC
a. fihímt	*!		
b. ☞ fhímt		*	*

- In cases like (8b), deleting the second vowel could close the first syllable, and thus satisfy the markedness constraint. This can be excluded by saying that syncope cannot create CCC strings (*CCC $\gg$ *#CC).

(11) Syncope can't create medial CCC cluster

/fihim-na/		*i]$_\sigma$	*CCC	*#CC
a.	fihímna	*!		
b. ☞	fhímna			*
c.	fíhmna		*!	

- When there are multiple possible syncope sites that avoid CCC clusters (8c), syncope targets the second. This is because targeting only the first would still leave an [i] in an open syllable.

(12) Syncope prefers medial cluster to initial cluster

/fihim-na/		*i]$_\sigma$	*#CC	*CC
a.	fihímu	*!*		
b.	fhímu	*!	*	*
c. ☞	fíhmu			*

- **Question:** How do we explain the blocking of syncope in [fíhim] (8d)? **Answer:** NONFINALITY $\gg$ *i]$_\sigma$
  - Failing to syncopate (/fihim/ $\rightarrow$ [fíhim]) provides a non-final syllable that can bear stress
  - Whereas syncopating (/fihim/ $\nrightarrow$ *[fhím]) would have forced stress to fall on the final

(13) Syncope blocked by NONFINALITY in C<u>V</u>CVC

/fihim-Ø/		NONFINALITY	*i]$_\sigma$
a. ☞	fíhim		*
b.	fhím	*!	
c.	fíhm	*!	

- By using phonotactics (syllable well-formedness & stress), we can capture the normal distribution of syncope without serialism (i.e. faithfulness to the stress of intermediate forms).

2.1.3 Shortening (normal application)

- Levantine Arabic also has a process that shortens long vowels in non-final closed syllables

(14) Shortening
  a. /staʃaːr-Ø/ $\rightarrow$ staʃaːr 'he consulted'
  b. /staʃaːr-na/ $\rightarrow$ staʃarna 'we consulted'

(15) Shortening ranking: *VːCC $\gg$ IDENT[long]-IO

- We can subsume MAXV-IO and IDENT[long]-IO under a single faithfulness constraint: MAX(μ)-IO

2.2 Object clitics

- The [Verb+Subj] complex can be followed by object clitics: [[Verb+Subj]Obj].
  - When there is an overt object, there is no object clitic.

2.2.1 Data

- Object clitic paradigms for different subjects are given in (16).
  - In (16), a · represents a syncope site.
  - The 1pl subject + overt obj. clitic forms are extrapolated (by Donca). I'm not sure what this dialect does with V-V sequences; stress placement in the -VC suffix forms could be wrong. This shouldn't affect any of the relevant points.

(16) Syncope in object clitic construction

		Subject			
		3sg.m	**3sg.f**	**2sg.m**	**1pl**
		/fihim-Ø-X/	/fihim-at-X/	/fihim-t-X/	/fihim-na-X/
	no obj.	fíhim	fíh·m-at	f·hím-t	f·hím-na
Object	**1sg**	fihím-ni	fih·m-át-ni	f·hím-t-ni	f·hím-na-ni
	2sg.m	fíh·m-ak	fíh·m-at-ak	f·hím-t-ak	f·hím-na-ak
	2sg.f	fíh·m-ik	fíh·m-at-ik	f·hím-t-ik	f·hím-na-ik
	3sg.m	fíh·m-u	fíh·m-at-u	f·hím-t-u	f·hím-na-u
	3sg.f	fihím-ha	fih·m-át-ha	f·hím-t-ha	f·hím-na-ha
	1pl	fihím-na	fih·m-át-na	f·hím-t-na	f·hím-na-na
	2pl	fihím-kum	fih·m-át-kum	f·hím-t-kum	f·hím-na-kum
	3pl	fihím-hum	fih·m-át-hum	f·hím-t-hum	f·hím-na-hum
		'he understood X'	'she understood X'	'you (m.sg.) understood X'	'we understood X'

- In almost all cases, syncope applies as expected, in both the form w/o an object clitic and the forms with object clitics.
  - In the 3sg.f subject forms, the -at subject agreement suffix consistently means that both underlying /i/'s would be in open syllables. Normal application deletes the second one. This applies correctly throughout the paradigm.
  - In the 2sg.m and 1pl subject forms, the C-initial subject agreement suffixes (-t and -na) mean that the second underlying /i/ is consistently in a closed syllable. So normal application deletes the first /i/. This applies correctly throughout the paradigm.
    - ⋆ *I'm not sure how the 2sg.m C-initial obj. forms interact with epenthesis...*

- In the 3sg.m subject forms, the subject agreement suffix is null. This means the syllabic context for the second /i/ will vary depending on the phonological shape of the object clitic.
- We thus expect variation between the two syncope positions comparable to the distinction between the two other paradigm types:
  - Second-syllable syncope with V-initial object clitics (= 3sg.f paradigm) vs.
  - First-syllable syncope with C-initial object clitics (= 2sg.m and 1pl paradigms).

→ We do get a distinction, but not exactly what we expected.
- V-initial object clitics induce second-syllable syncope as expected (17a).
- But C-initial object clitics show no syncope at all (17b).

(17) Syncope in object forms of /fihim-Ø/ → [fíhim] 'he understood'

a. V-initial object clitics (= stem final syllable is open)

/fihim-Ø-ak/	fíh·m-ak	'he understood you (masc. sg.)'
/fihim-Ø-ik/	fíh·m-ik	'he understood you (fem. sg.)'
/fihim-Ø-u/	fíh·m-u	'he understood him'

b. C-initial object clitics (= stem final syllable is closed)

/fihim-Ø-ni/	fihím-ni	(not *f·hím-ni)	'he understood me'
/fihim-Ø-ha/	fihím-ha	(not *f·hím-ha)	'he understood her'
/fihim-Ø-na/	fihím-na	(not *f·hím-na)	'he understood us'

- A particularly striking difference between 1pl subjects and 1pl objects:

(18) 1pl subject vs. object

Syncope applies as expected: 1pl subject (/-na/) + no object → f·hím-na

Syncope does not apply: 3sg.m subject (/-Ø/) + 1pl object (/-na/) → fihím-na, *f·hím-na

- Similar facts hold for shortening. Compare different objects with /staʃaːr-Ø/ → [staʃáːr] 'he consulted'.
  - Caution: some data extrapolated (by Adam).

(19) Shortening in object forms of /staʃaːr-Ø/ → [staʃáːr] 'he consulted'

a. V-initial object clitics (= stem final syllable is open)

/staʃaːr-Ø-ak/	staʃáːr-ak	'he consulted you (masc. sg.)'
/staʃaːr-Ø-ik/	staʃáːr-ik	'he consulted you (fem. sg.)'
/staʃaːr-Ø-u/	staʃáːr-u	'he consulted him'

b. C-initial object clitics (= stem final syllable is closed)

/staʃaːr-Ø-ni/	staʃáːr-ni	(not *staʃár-ni)	'he consulted me'
/staʃaːr-Ø-ha/	staʃáːr-ha	(not *staʃár-ha)	'he consulted her'
/staʃaːr-Ø-na/	staʃáːr-na	(not *staʃár-na)	'he consulted us'

- Again, there's a difference between 1pl subjects and 1pl objects:

(20) 1pl subject vs. object

Shortening applies as expected: 1pl subject (/-na/) + no object → staʃ**a**r-na

Shortening does not apply: 3sg.m subject (/-Ø/) + 1pl object (/-na/) → staʃ**aː**r-na, *staʃ**a**r-na

- These distinctions make it clear that the phonological differences can not be derived solely through reference to the phonological material which is present in the output string, because the phonological material contributed by suffixes/clitics is identical:
  - 1pl subject /-na/ + no object = [-na]
  - 3sg.m subject (/-Ø/) + 1pl object /-na/ = [-na]
- The difference can, though, be attributed to differences in the morphological structure of the two forms.

2.2.2 What's going on? Difference in bases.

- All finite verb forms in Arabic have a subject marker (fíhim-**Ø**, fíhm-**u**, fíhm-**at**, etc.).
  - /fihim/ is the stem, but subject marking is needed to make it a word.
  - The presence of an output [fíhim] identical to the underlying stem is accidental, due to the arbitrary existence of a phonologically null subject agreement marker.
  - As far as the morphology is concerned, there is a subject marker there.
- On the other hand, object marking does not occur if there is a full DP object.
  - i.e., it's possible to have verb forms with no object marking, depending on the syntax/morphology.
  - In other words, for every object clitic form, there is a well-formed output word with a proper subset of morphosyntactic features that lacks the object clitic.

→ Under the right phonological circumstances, object clitic forms preserve phonological properties (outside of their expected context) of their object-less counterpart.
  - There are no circumstances in which a form with an overt subject marker preserves phonological properties of a subject form with a phonologically null subject marker.

- In this case at least, we can distinguish between what can count as a base and what can't according to:

(21) **The "Free Base Generalization"**
Only well-formed (i.e. actual or possible) output words may serve as bases for the purpose of Base-Derivative correspondence. (Name due to Donca (Steriade 2013:12), building on Brame (1974), Kenstowicz (1995, 1996, 1998), Benua (1997), Borowsky & Harvey (1997), Kager (1999), *a.o.*)

  - "Cyclic misapplication" usually only occurs in categories that are derived from free standing words.
  - In most cases (and the ideal case), the free standing word (base) comprises a morphological sub-constituent of the complex word (derivative).

→ These conditions recapitulate (or, if you're feeling un-charitable, stipulate) properties that largely follow from the architecture of Stratal OT.
  - Though Stratal OT still has the problem that bare stems normally don't function as cyclic domains.

- In our case, the Free Base Generalization properly describes the contexts in which we get cyclic effects.
  - Cyclic effects in object paradigms:
    - VERB-SUBJ$_i$ is a freestanding word.
    - VERB-SUBJ$_i$ is a sub-constituent of VERB-SUBJ$_i$-OBJ$_j$, so VERB-SUBJ$_i$ can function as a base for VERB-SUBJ$_i$-OBJ$_j$.
    - VERB-SUBJ$_i$-OBJ$_j$ is faithful to VERB-SUBJ$_i$.

- No cyclic effects in subject paradigms:
  - All verb stems must have a morphologically-specified subject agreement marker (which may have a phonologically null exponent).
  - Therefore, VERB is not a well-formed output word and cannot serve as a base for VERB-SUBJ$_i$, even though it is a morphological sub-constituent.
  - We do not observe VERB-SUBJ$_i$ being faithful to a hypothetical output of VERB, i.e. no paradigm uniformity among different subject inflected forms (fíhim- $\sim$ fhím- $\sim$ fíhm-).

2.3 A Base-Derivative Faithfulness account

- The cases where syncope and shortening underapply are the cases where the normal target for syncope/shortening bears stress in its base.

(22) MAX($\acute{\mu}$)-BD: For each mora attached to a stressed vowel in the base, assign a violation * if that mora does not have a correspondent in the derivative.
- Must be restricted such that the mora has be attached to the same vowel in the derivative as the base. This can be done with LINEARITY(μ)-BD.
- Does not require the mora to still be stressed in the derivative, only to be present.

- If we use the Free Base Generalization to determine what may function as a possible base, we can use the Base-Derivative faithfulness constraint to account for the underapplication of syncope and shortening.

  - The object forms have a free base, so they are subject to the BD faithfulness constraint. This blocks syncope when it would target the vowel that corresponds to the base's stressed vowel:

(23) Cyclic underapplication in 3sg.m subject + 1pl object

INPUT: /fihim-Ø$_{3sg.m.subj}$-na$_{1pl.obj}$/ BASE: [fíhim] (← /fihim-Ø$_{3sg.m.subj}$/)	MAX($\acute{\mu}$)-BD	*i]$_\sigma$	MAX(μ)-IO
a. ☞ fihímna		*	
b. fhímna	*!		*

  - The subject forms don't have a free base (even though there's a null subject form that looks it could be), so the BD faithfulness constraint is irrelevant in the derivation. Syncope thus has to apply normally.

(24) No cyclic effect in 1pl subject + no object

INPUT: /fihim-na$_{1pl.subj}$/ ~~BASE: [fíhim]~~ (← /fihim-Ø$_{3sg.m.subj}$/)	MAX($\acute{\mu}$)-BD	*i]$_\sigma$	MAX(μ)-IO
a. fihímna	not applicable	*!	
b. ☞ fhímna			*

  - Same goes for shortening:

(25) Cyclic underapplication in 3sg.m subject + 1pl object

INPUT: /staʃaːr-Ø$_{\text{3sg.m.subj}}$-na$_{\text{1pl.obj}}$/ BASE: [staʃáːr] (← /staʃaːr-Ø$_{\text{3sg.m.subj}}$/)	MAX($\acute{\mu}$)-BD	*VːCC	MAX(μ)-IO
a. ☞ staʃáːrna		*	
b. staʃárna	*!		*

(26) No cyclic effect in 1pl subject + no object

INPUT: /staʃaːr-na$_{\text{1pl.subj}}$/ ~~BASE: [staʃáːr]~~ (← /staʃaːr-Ø$_{\text{3sg.m.subj}}$/)	MAX($\acute{\mu}$)-BD	*VːCC	MAX(μ)-IO
a. staʃáːrna	not applicable	*!	
b. ☞ staʃárna			*

- MAX($\acute{\mu}$)-BD will only have noticeable effects in the highlighted cells from (16), because in all other cases, it advocates for the candidate which would be selected via normal application anyway.
  - i.e., the target of syncope/shortening in the other object clitic forms is *not* the stressed vowel in the respective base.

2.4 A Stratal OT account

- Subject agreement affixes are attached on the Stem Level, object clitics are attached on the Word Level.
  - Everything which is a "free base" will be properly contained within its derivative, so we can use MAX($\acute{\mu}$)-**IO** rather than MAX($\acute{\mu}$)-**BD**.
- Cyclic effects only occur in Word Level affixation, so we need a ranking reversal between levels:
  - At the Stem Level: *i]$_\sigma$, *VːCC ≫ MAX($\acute{\mu}$)-IO
    - (Even if there is no initial root evaluation, given Richness of the Base, we need this ranking to ensure that potential underlying stresses don't disrupt syncope/shortening.)
  - At the Word Level: MAX($\acute{\mu}$)-IO ≫ *i]$_\sigma$, *VːCC

(27) Cyclic underapplication in 3sg.m subject + 1pl object

Stem Level — root evaluation

/fihim$_{\text{Root}}$/	NONFIN	*i]$_\sigma$	MAX($\acute{\mu}$)-IO	MAX(μ)-IO
a. ☞ fíhim		*		
b. fhím	*!			*

↪ Stem Level — subject affix evaluation

/fíhim$_{\text{Root}}$-Ø$_{\text{3sg.m.subj}}$/	NONFIN	*i]$_\sigma$	MAX($\acute{\mu}$)-IO	MAX(μ)-IO
a. ☞ fíhim		*		
b. fhím	*!		*	*

↪ Word Level — object clitic evaluation

/fíhim$_{\text{Root+3sg.m.subj}}$-na$_{\text{1pl.obj}}$/	WSP($\geq 2\mu$)	MAX($\acute{\mu}$)-IO	*i]$_\sigma$	MAX(μ)-IO
a. ☞ fihímna			*	
b. fhímna		*!		*
c. fíhimna	*!		*	

(28) No cyclic effect in 1pl subject + no object
Stem Level — root evaluation

/fihim$_{\text{Root}}$/	NONFIN	*i]$_\sigma$	MAX($\acute{\mu}$)-IO	MAX(μ)-IO
a. ☞ fíhim		*		
b. fhím	*!			*

↪ Stem Level — subject affix evaluation

/fíhim$_{\text{Root}}$-na$_{\text{1pl.subj}}$/	WSP($\geq 2\mu$)	*i]$_\sigma$	MAX($\acute{\mu}$)-IO	MAX(μ)-IO
a. fihímna		*!		
b. ☞ fhímna			*	*
c. fíhimna	*!	*!		

↪ Word Level — object clitic evaluation ...

- One downside of this analysis: it would seem to miss the Free Base Generalization. But we'll see next time that this isn't an absolute anyway.

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