Cyclicity and its OT translations

Outline:
• Characterize and illustrate the cyclic syndrome.
• Laws predicted by cyclic rule application
• An example of what cyclic application does/does not derive

Properties of cyclic rule application

(1) **The cyclic syndrome:** an unexpected phonological similarity between base and derivative.
> • Two lexically related forms A and B.
> • B = [aff//A] (B is a derivative of A)
> • A derived property P is common to A and B (e.g. stress on same syllable in A and B)
> • Property P is predicted by the phonology in A but not in B.

> Example: stress on 2nd syllable from left in *perípheral, perìpherálity; sublíminal, sublìminálity; solídify, solìdificátion.*

> Stress on 2nd syllable is predictable (conforms to relevant constraint hierarchy on stress distribution) in *perípheral, sublíminal, solídify,* but not in *perìpherálity; sublìminálity, solìdificátion (cf. Tàtamagóuchi, hàmamèlidánthemum).*

> **The anticipated solution**: let O-O Corresp constraints outrank phonotactic constraints.

(2) **The derivational characterization of the cyclic syndrome**:
> • Cyclic domain (1st attempt): any morphosyntactic constituent
> • Addition of any morpheme to a given constituent defines a new cyclic domain.
> • In a morphosynt. constituent [X//[Y//[Z]]], 1st cycle = the innermost constituent, [Z].
> • Cyclic rule application:
> A sequence of ordered rules R_1-R_n applies first on the 1st cycle. The sequence R_1-R_n reapplies on successively larger cycles until the largest constituent has been processed.

> • As always with rules: the input to Rule$_i$ is the output of the previous rule R_{i-1}
> > Therefore the input to Cycle n is the output of Cycle n-1

> > Rules (vastly simplified) : Stress antepenult; Stress 1st, unless clash
> > Stress demotion (1…1 -> 2…1)
> > Cycle 1, input: lexical entry *peripheral*
> > > Stress antepenult: *perípheral*
> > > Stress 1st, unless clash: N/A
> > > Stress demotion: n/a
> > Cycle 2, input   *perípheral-ity*
> > > Stress antepenult *perípherál-ity*
> > > Stress 1st, unless clash: N/A
> > > Stress demotion   *perìpherál-ity*

Compare *Tàtamagóuchi, Mèditerránean*: longer 1st cycle domain allows Stress 1st to apply successfully. A noncyclic application of stress to *peripherality* would yield same stress as in those forms.

(3) **Laws predicted by cyclic rule application**
> (i) **Occasional base-derivative similarity:**
> > Bases and derivatives are predicted to be occasionally more similar to each other than expected from the simple non-cyclic application of phonological processes/constraints.

> > E.g. *perípheral* and *perípheràlity* vs. *Tàtamagóuchi*

(ii) **But No Guarantees:**

The simple fact that rules apply cyclically does not guarantee base-derivative similarity: cyclically applied rules can decrease base-to-derivative similarity.

E.g. *rémedy* and *rémedying* are similar because stress **didn't** reapply.
Had stress re-applied on the *–ing* cycle, we'd get
{*rémedy*, *remédying} like {*órigin*, *oríginal*}

(iii) **Base priority**:

The phonology of bases influences the phonology of derivatives, not vice versa

[How COULD it could be otherwise? Imagine that for every pair of base and derivative, rules apply from outermost cycle inwards, that is on the derivative. On every cycle the outermost affix is stripped; rules reapply on the inner domain, if their SD is met:

Cycle 1: input *peripheral-ity*
Stress antepenult: *peripherálity*
Stress 1st unless clash: *péripherálity*
Stress demotion: *pèripherál-ity*

Cycle 2: input *pèripherál-ity*
Strip affix: *pèripherál*
Stress antepenult: blocked in clash
No further rules apply
Output: *pèripherál (like *Kàlamazóo*)

Resulting paradigm *{ *pèripherálity, pèripherál*} is uniform wrt stress, just like the real paradigm {*peripheral, perípheràlity* }. But it's the wrong paradigm.

General point here: it's possible to imagine what paradigms consisting of similar bases and derivatives would look like if Base priority did not hold. It's an empirical fact that the world wasn't made that way.]

(iv) **Proximate base effect**:

The proximate base of [X//[Y//[Z]]] is [Y//[Z]], not [Z].

The phonological properties of the derivative are determined by the phonological properties of its proximate base. E.g. stress in *orìginálity* is determined by stress in *oríginal* , not in *órigin*.

(v) **No transderivational similarity**:

Suppose you have two co-derivatives of Z: [X//[Y//[Z]]] and [W//[V//[Z]]]: they will share phonological properties only because they share [Z] or, possibly, because X-Y and W-V are accidentally similar.

E.g. stresses of *demónstrative* and *demónstrable***:** based on *démonstràte*
Or *bureáucratism* and *bureáucracy*: based on *búreaucràt*. Accidental identity?

(v) **No foresight**:

Information that is available on Cycle n+1 is not seen on Cycle n.
E.g. English liquids becomes syllabic if not adjacent to a V:
Syllabic is liquid in *cycling, puzzling*: V unseen on cycle 1.

(4) **Not all processes are cyclic: Flapping ('V_V)** á[ɾ]om   a[tʰ]ómic, *a[ɾ]ómic

[in general allophonic differences tend to be less noticeable (most naïve speakers aren't even aware of the flap-stop difference) and it is the more noticeable properties that tend to have reported cyclic effects. But see Steriade 2000 in Labphon 5 for examples of allophonic cyclicity in English and French.]

(5)   Which types of processes are cyclic? Unclear answer in LP
   a. Mascaró 1976: all and only obligatory neutralization rules are cyclic.
         [Russian devoicing is neutralizing and non-cyclic: *goro[t], goro[d]-a*
          Sundanese nasalization is non-neutralizing and cyclic: **mãrios** *vs.* **ɲãrãĩãn**]

   b. Mascaró 1976 and Kiparsky 1982: all and only rules blocked in NDE are cyclic.

[NDE = non-derived environments, i.e. contexts present as such in some morpheme's UR.]
         [Finnish CGradation (Kiparsky 1993) blocked in NDE but not cyclic:
               hattu 'hat'*, hatu-n* 'hat-GEN'; but *appelsiini* 'orange'
               hattu-n-si -> hattusi 'hat-GEN-yours' (**ns -> s**)]

(6)   Are the laws predicted by cyclic application empirically true?
   (i)   **Occasional base-derivative similarity:** yes, but see below.
   (ii)   **No guarantees**: see below.
   (iii)   **Base priority**: yes, this is empirically verified.
   (iv)   **Proximate base effect**: variable, generally holds, but ask about Indonesian stress.
   (v)   **No transderivational similarity**: perhaps not, but debated.
   (vi)   **No foresight**: not investigated

A famous example to illustrate these points

(7)   **Effects of cyclic stress in Levantine (≈ Palestinian) Arabic**
(Brame 1974 LI; esp. Kenstowicz and Abdul-Karim SLS 1980; on stress Hayes 1995; Kager 1999)

   a. stress: stress final if extra-heavy; otherwise heavy penult; otherwise antepenult (penult in 2 syll.)

      katáb-t 'I write', *katáb-na* 'we write', *kátab-u* 'they write', *kátab* 'he writes',

   b. high V syncope: high stressless vowel   -> ø/ _CV

       fíhim 'he understood', *fíhm-u* 'they' , *fíhm-at* 'she' *fhím-na* 'we', *fhím-t* 'I'

   Reference to stress needed to decide which i to drop: *fíhm-at* vs. *fhím-na*

   c. Constituent created by object clitics is subject to syncope too:

       fíhm-u 'we ... him',   *fíhm-ak* 'he ... you masc.', *fíhm-ik* 'he ... you fem. '

   d. Constituent created by object clitics is subject to stress shifts:

       fíhm-at 'she understood'   *fihm-át-na* 'she...us' , *fihm-át-kum* 'she...you.pl.'

(8)   The *fíhmatu* cyclic effect

   • Earlier data requires the order Stress > Syncope and Syncope to apply to stressless V.

   • Non-cyclic analysis of /fihim-at-u/ yields *fihímatu* (stress) then **fhímatu* (via syncope), like *fhímt*.

   • Cyclic application removes the problem:

   1st cycle   *fíhim-at* (stress)
                      fíhm-at (syncope)
   2nd cycle   *fíhmat-u* (stress)
                      (syncope n/a)

(9)   Overall effect:
Cyclic stress insures non-alternation of base-stressed V.

(10) Brame's central datum
Syncope spares base stressed V *even if that V is stressless in derivative*.

fíhim: *fihím-na* 'he ... us',   *fihím-ni* 'he ... me',   *fihím-kum* 'he ... you pl'
                    *fhím-na   **fhím-ni*   **fhím-kum*

(11) The solution in a derivational cyclic system

(a) Stress applies cyclically from word-cycle out, hence *fihím-na* 'he ...us'

Assume stresses assigned on earlier cycles preserved as secondary stresses, as in English *perìpherálity*.

(b) First cyclic domain, word cycle: innermost constituent carrying some inflectional affix incl. Ø (e.g. *fíhim-Ø* 'he understood')

(c) Syncope applies only to stressless vowels: hence *fihím-na* 'we ...' -> *fhímna*, but not   *fihím-na* 'he ...us'

cycle 1		
stress	fíhim-Ø	fihím-na
syncope	n/a	fhím-na
cycle 2		
stress	[fihím-Ø]-na	n/a
syncope	n/a	
Output	fihímna	fhímna

Aside on cyclic domains: not all innermost bracketted domains are counted as 1st cycles, cf. English **còmp[ən]sátion** vs. **cònd[èn]sátion** explained in SPE as a function of cyclic application of stress and V reduction on the constituents [[**cómpensàte]-ion]** and [[**condénse]-ation:** stress blocks V reduction. For this to work, one must assume that the root **compense**- (cf. **recompense**) is not a 1st cycle. This is identical to the assumption made in Arabic. Harris's generalization (1983, *Stress and and Syllable Structure in Spanish*, p. 52), paraphrased:

`   A cyclic domain is a lexical category or a projection thereof: an X, X', X" etc.
        Non-lexcat items (roots) like *fihim- compens-* are non-cycles.

(12) What secondary stress?
" *daráb-na is* ambiguous between 'we hit' and 'he hit us' for all speakers of Palestinian and Levantine Arabic that we have polled." Kenstowicz and Abdul-Karim 1980.

This means that no observable accent difference exists between *[[darab-Ø]-na*] 'he..us' and *[darab-na]* 'we ...', even though a difference is predicted by Brame's analysis.

(13) Revision: ordering secondary stress deletion after syncope

cycle 1			
stress	fíhim-Ø	dárab-Ø	fihím-na
syncope	n/a	n/a	fhím-na
sec. stress deletion	n/a	n/a	n/a
cycle 2			
stress	[fihím-Ø]-na	[dàráb-Ø]-na	n/a
syncope	n/a	n/a	
sec. stress deletion	[fihím-Ø]-na	[daráb-Ø]-na	

Note: the natural *feeding* order betw. sec. stress deletion and syncope will yield *fhímna 'he...us'.

(14) Conclusion: mere cyclicity does not guarantee base invariance
Rather, the base invariance effect (here quality of stressed V) is obtained through
(a) cyclic stress application   *and*
(b) counter-feeding order between syncope and secondary stress deletion.

(15) Base invariance derived by blocking rules
a. CVVC syllables limited to word-final position: *staʃaár* 'he consulted'

b. shortening elsewhere: *staʃár-na* 'we consult'

c. shortening blocked before object clitics: *staʃaár-na* 'he consulted us'

d. Analysis: "The shortening rule must be taken to apply in the domain defined by the inner layer of structure in the cyclic analysis and can thus be taken as indirect support for that analysis." (K&A-K 1980:57) I.e. shortening cannot apply beyond the 1st cycle, the minimal inflected word domain.

(16) Three unrelated mechanisms to get base invariance
• cyclic application for some rules (stress and syncope)
• domain limitations for other rules (shortening)
• counterfeeding relation between certain rules (stress and sec. stress deletion).

Why cyclic rule application is the wrong idea

(17)   Cyclic application fails to predict enough
• Thus productivity of affixation or syntactic concatenation appears to be <u>a guarantee of greater base-derivative similarity</u>. This fact remains a mystery under cyclic rule application, since mere cyclicity of rule application cannot guarantee similarity between bases and derivatives.

• The only mechanism that can guarantee that certain derivatives will be similar to their bases is the class of explicit identity constraints now known as Output-to-Output (Base-Derivative) correspondence conditions.

(18) Some evidence from English
Base-derivative similarity correlated with affixal productivity
(see: Borowsky 1993 in Hargus & Kaisse eds; Steriade 2000 Labphon; Hay 2001 NWU diss.)

	Same stresses?	Same main stress?	Same syllabicity?	Same segment at right edge?
Unproductive: -**ity**	No: **sólid, solídity**	No	No: **capa[bl̩] capa[bɪl]ity**	No: **cycli[k], cyclí[s]ity solemn, sole[mn]ity**
Unproductive: -**al, -ic**	No: **párent, paréntal**	No	No**: cy[kl̩] cy[kl̩ɪk]**	No: **cólumn, colú[mn]al**
Productive: -**able**	Yes: **chállenge, chállengeable**	Variable: **ànalýzable** but ok **prógràmmable**	[dissimilatory effect: *l̩…l]	Yes: **da[m], da[m]able si[ŋ], si[ŋ]able bo[m], bo[m]able**
Productive: -**ing, -er**	Yes: **rémed[iɪŋ], rémed[iɚ]**	Yes: **ánalỳzing prógràmmer**	Yes: **puz[zl̩] pu[zlɪŋ] pu[zlɚ]**	Yes: **lic[k]ing si[ŋ]ing, si[ŋ]er bo[m]ing, bo[m]er**

(19) Comment on (18)
• Bases systematically resemble their productive but not their unproductive derivatives

• This can be explained if we assume that:
   (a) the phonology of productive derivatives is subject – in languages like English – to active
        constraints of Base Derivative identity which invariably outrank IO correspondence and can
        outrank certain phonotactic constraints as well.

   (b) the phonology of unproductive derivatives is frequently listed (e.g. *cycli[s]ity*; *colu[mn]ar*);
        or it displays phonotactic optimization at the expense of base derivative similarity (*oríginal*),
        as if these forms lacked bases.

(20) Why explicit identity conditions (19.a) are needed:
(a) Because not all BD similarity effects can be uniformly modeled via cyclic rule application

   • **Overapplication** (= cycle *prior to* productive affixation undergoes rule):
        E.g. cluster simplification and liquid syllabicity

   • **Underapplication** (= cycle of productive affixation is exempted from rule):
        E.g. stress antepenult blocked in *rémedying*

   • **Misapplication**: rule applies in the wrong way
        E.g. main stress selection misapplies in *prógràmmable*

(b) Cyclic application by itself explains none of these cases:
        It doesn't characterize mis or underapplication.

        It doesn't really explain when rules overapply: in overapplication cases the cyclic explanation is
        provided by the no-foresight effect: a rule applies before the addition of an affix on the next cycle has a
        chance to bleed it. But the 1st cycle of *cycl-ic* is the same constituent (the UR [sɪkl]) as the 1st cycle of *cycḷ-ing*: so why does liquid syllabification apply in one case and not in the other?

        The moral here: overapplication cases must be characterized only as the surface relation between a certain
        kind of derivative and its base, not by the blind application or non-application of a rule on an early cycle.

(c) Cyclic application fails to predict a striking fact:
        Requirements of surface base-derivative identity can predict *which rules will overapply* and *which ones will
        underapply* in the derivation of a productive derivative

        Which rules overapply: those which would be bled by the addition of the next affix
        E.g. liquid syllabicity in *puz[ḷ]ing*

        These rules overapply in order to allow the derivative (form generated on cycle n+1) to acquire a property
        present in the base (cycle n). In that way both the derivative and the base will have the same property.

        Which rules underapply: those whose structural condition is not met on the early cycle in the same way
        as it is met in the base.
        E.g. stress in *rémedying*: the antepenult syllable is different in the base & the derivative.

        These rules underapply in order for the derivative to avoid acquiring information that's different from
        information present in the base. Here too, the goal of underapplication is to keep base and derivative
        identical.