
Week 06 – The Cycle and Lexical Phonology

October 14, 2008

1 Finishing up from last time

1.1 Natural Orderings

(1) Icelandic (Indo-European language from Iceland with 250,000 speakers)

(2) umlaut and syncope

barn	‘child’	börn+um	‘child-dat.pl.’
svant	‘hungry-neut.nom.sg.’	svöng+u	‘hungry-neut.dat.sg.’
kalla	‘[I] call’	köll+um	‘[we] call’

hamar	‘hammer’	hamr+i	‘hammer-dat.sg.’
fífill	‘dandelion’	fífl+i	‘dandelion-dat.sg.’
morgunn	‘morning’	morgn+i	‘morning-dat.sg.’

(3) Analysis

a. Umlaut : $a \rightarrow \ddot{o} / \text{--- } C_0u$

b. Syncope: $\left[\begin{array}{c} +syll \\ -stress \end{array} \right] \rightarrow \emptyset / C \text{--- } C+V$

	<i>+r/∅</i>		<i>+um</i>	
/katil/	ketill	‘kettle’	kötlum	‘kettle-dat.pl’
/ragin/	regin	‘gods’	rögnum	‘gods-dat.pl’
/alen/	alin	‘ell of cloth’	ölnum	‘ell of cloth-dat.pl’

	<i>+ul+r</i>		<i>+ul+e</i>	
/bagg/	böggull	‘parcel’	böggli	‘parcel-dat.sg.’
/jak/	jökull	‘glacier’	jökli	‘glacier-dat.sg.’
/jat/	jötunn	‘giant’	jötni	‘giant-dat.sg.’

			<i>+ul+an</i>	
/pag/	þögull	‘taciturn’	þöglan	‘taciturn-masc.acc.sg.’

★ If syncope precedes umlaut, what kind of ordering results for the UR /katil+um/ ‘kettle-dat.pl’?

★ For /jak+ul+e/ ‘glacier-dat.sg.’?

★ What about umlaut before syncope for /katil+um/?

★ For /jak+ul+e/?

(4) If the rules are right, we have an ordering paradox! How does Anderson resolve it?

(5) Anderson’s (1974) definition of natural order:

...where only one of the two possible orders for a given pair of rules is feeding, the feeding order is the natural one; and that where only one of the two possible orders is bleeding, the other order [i.e. counterbleeding] is the natural one. In all other cases [...] no natural order is (yet) defined.
(p. 147)

(6) Anderson proposes that at least some pairs of rules are left unordered by a language’s grammar and so apply in their natural order in each case. (See Anderson ch. 12 for some amendments to this proposal.)

★ Again, is this different from the Koutsoudas et. al. proposal?

★ So if a grammar consists of a list of rules and some statements about their orderings, what does a change of the type observed by Kiparsky involve?

★ Can you think of other ways to deal with Icelandic?

1.2 Preview

(7) We have been assuming that all morphology applies before the phonology. But researchers have recognized that a more complex interaction between the two domains appears necessary. You reading this week is about exactly this interaction.

2 The Cycle

(8) Classic example: Palestinian Arabic (data originally from ?)

a. Verbs without objects

subject	‘study’	‘understand’
2sg. masc.	da.rás+t	fhím+t
2sg. fem.	da.rás.+ti	fhím.+ti
3sg. masc.	dá.ras	fí.him
3sg. fem.	dá.ra.s+at	fih.m+at
1pl.	da.rás.+na	fhím.+na
2pl.	da.rás.+tu	fhím.+tu
3pl.	dá.ra.s+u	fih.m+u

★ What’s the stress rule for this language, based on the ‘study’ paradigm?

★ Give a rule for the V/∅ alternations.

★ Determine the ordering of the two rules.

(9) Verbs with objects

object	‘he understood X’	‘she understood X’	‘You (m.) understood X’
1sg.	fi.hím.+ni	fih.m+át.+ni	fhím+t.+ni
2sg. masc.	fih.m+ak	fíh.m+a.t+ak	fhím+.t+ak
2sg. fem.	fih.m+ik	fíh.m+a.t+ik	fhím+.t+ik
3sg. masc.	fih.m+u	fíh.m+a.t+u	fhím+.t+u
3sg. fem.	fi.hím.+ha	fih.m+át.+ha	fhím+t.+ha
1pl.	fi.hím.+na	fih.m+át.+na	fhím+t.+na
2pl.	fi.hím.+kum	fih.m+át.+kum	fhím+t.+kum
3pl.	fi.hím.+hum	fih.m+át.+hum	fhím+t.+hum

★ What’s the problem with our current analysis?

(10) SPE: the transformational cycle

We assume as a general principle that the phonological rules first apply to the maximal strings that contain no brackets [i.e., morpheme or word boundaries], and that after all relevant rules have applied, the innermost brackets are erased; the rules then reapply to maximal strings containing no brackets, and again innermost brackets are erased after this application; and so on, until the maximal domain of phonological processes is reached. (p. 15)

★ Let's do some derivations:

'he u.'	[fihim+∅]	
'we u.'	[fihim+na]	
'he u. us'	[[fihim+∅]+na]	
'he u. you(m.)'	[[fihim+∅]+ak]	
'she u. me'	[[fihim+at]+ni]	
'she u. you(m.)'	[[fihim+at]+ak]	
'You(m.) u. me'	[[fihim+t]+ni]	

★ Which forms would be different if we did all the morphology first and then applied the phonological rules?

3 Lexical phonology

3.1 Overview

- (11) As you read, Kiparsky argues that this is not enough (see Pesetsky 1979 for an earlier proposal along the same lines). Different sub-grammars apply at different levels of morphology (in the lexical component), and an additional sub-grammar (postlexical) applying after the syntax.

Lexicon		
	Root	English example
LEVEL 1	P-rules ↓ ↑ WFR, if any	stress, trisyllabic shortening primary inflection (umlaut, ablaut, irregular past-tense) and derivation (-al, -ous, -th, im-)
LEVEL 2	P-rules ↓ ↑ WFR, if any	compound stress secondary derivation (un-, -ness, -er) and compounding
LEVEL 3	P-rules ↓ ↑ WFR, if any	laxing secondary inflection (regular plural and past-tense)
SYNTAX		
Postlexical phonology		
	postlexical rules	flapping, aspiration, ...

- (12) Should the root pass through the Level 1 rules first or go straight to WFR? Not clear.

3.2 Cyclicity in the lexical component

- (13) Within each level, the phonological rules apply after each morphological operation (thus the bidirectional arrows above).
- (14) Evidence/examples
- a. WFRs can be sensitive to derived phonological properties: e.g. -ize, which don't apply to stems with final stress (e.g. *públic* vs. *públicize*). Kiparsky's interpretation is that stress rules apply to the stem on the previous cycle.
- (15) Internal brackets are erased after each level, so WFRs and phonological rules don't have access to morphological information from the previous level. Postlexical rules don't have access to any bracketing.
- (16) Evidence/examples
- a. Postlexical rules are automatic in the sense that they don't admit of lexical exceptions, and don't care about morphological information.

3.3 Strict Cycle Condition

- (17) The idea is to allow lexical rules (at least those that change feature values, rather than filling in underspecified ones) to apply only to environments newly made, by either a morphological operation or a phonological rule in the same cycle. This phenomenon is known as *non-derived environment blocking* (NDEB).
- (18) Lexical phonology's attempts to deal with NDEB were always kind of a mess, and it's not clear we've done better since then, so rather than review the details of the proposals, here are two classic examples, Finnish and Sanskrit, from Kiparsky.

3.3.1 Finnish

- (19) Ignore various other rules: vowel harmony, degemination, a/o ...

<i>to X</i>	<i>Let him/her X!</i>	<i>'active instructive infinitive II'</i>	<i>she/he was Xing</i>	
halut+a	halut+koon	halut+en	halus+i	'want'
net+a	noet+koon	noet+en	nokes+i	'smudge(?)'
piet+æ	piet+køøn	piet+en	pikes+i	'pitch'
filmat+a	filmat+koon	filmat+en	filmas+i	'film'
ll+a	l+kn	ll+en	l+i	'be'
aja+a	aja+kn	aja+en	aj+i	'go'
puhu+a	puhu+kn	puhu+en	puhu+i	'speak'

- (20) So $t \rightarrow s / \text{ ____ } i$. Can we modify the rule to deal with these cases?

tila	'room'	lahti	'Lahti'	valtin	'public'
æiti	'mother'	mæti	'roe'		
silti	'however'	limnaati	'lemonade'		
paasi	'boulder'				
sinæ	'you (sg.)'				
kuusi	'six'				

- (21) Another rule is needed to account for this vowel alternation:

joke+na	'river' essive sg.	joki	'river' nom.sg.
mæke+næ	'river' essive sg.	mæki	'hill' nom. sg.
æiti+næ	'mother' essive sg.	æiti	'mother' nom.sg.
kahvi+na	'coffee' essive sg.	kahvi	'coffee' nom.sg.

- (22) How should the two rules be ordered, given these data? (ignore h/k alternation)

vete+næ	'water' essive sg.	vesi	'water' nom.sg.
kæte+næ	'hand' essive sg.	kæsi	'hand' nom. sg.
yhte+næ	'one' essive sg.	yksi	'one' nom. sg.

★ What's the problem in [vesi]?

3.3.2 Sanskrit

(23) ‘ruki’ rule of Sanskrit: $s \rightarrow \text{ṣ} / \{r, u, k, i\}$ _____

da+da:+si ‘you give’ bi+bhar+ṣi ‘you carry’
 kram+sja+ti ‘he will go’ vak+ṣja+ti ‘he will say’

(24) Now consider:

	bisa	‘lotus’
	busa	‘mist’
	barsa	‘tip’
	sas	‘instruct’
<i>ablaut</i>	/sas+ta/ → sista → [siṣ+ṭa]	participle
	ghas	‘eat’
<i>V-deletion</i>	/ga+ghas+anti/ → dʒa+ks+anti → [dʒa+kṣ+anti]	3 pl.

★ How is this like Finnish?

3.4 Bare-bones lexical phonology bibliography

- Mascaró, Joan (1976). Catalan phonology and the phonological cycle. Indiana University dissertation. Follows [Kean, Mary-Louise (1974). The strict cycle in phonology. *Linguistic Inquiry* 5: 179-203] in extending [Chomsky, Noam (1965). *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press]’s syntactic Strict Cycle Condition to phonology to produce NDEB (a phenomenon pointed out by Kiparsky 1973a) in cyclic rules and only in cyclic rules. Includes now-classic Catalan examples.
- Pesetsky, David (1979). Russian morphology and lexical theory. MIT ms. Addresses the problem that morphology seems to demand bracket erasure after each WFR (later WFRs are blind to information from earlier stages), but phonological rules need those brackets. His solution was to interleave WFRs with the cyclic phonological rules, instead of starting with the full morphological output and then erasing brackets. All this happens “in the lexicon”. Postcyclic rules come later, after the syntax.
- Kiparsky, Paul (1982). Lexical phonology and morphology. In I. S. Yang (ed.), *Linguistics in the Morning Calm*. Seoul: Hanshin. Pp. 3-91. Shows how Pesetsky’s proposal explains various differences between lexical and postlexical rules. Proposes levels, and uses identity rules to capture NDEB.
- Mohanan, K.P. (1982). Lexical phonology. MIT dissertation. Revised as Mohanan, K.P. (1986). *The Theory of Lexical Phonology*. Dordrecht: Kluwer. Like Kiparsky, proposes levels, but argues that some rules have to apply in more than one level (as long as those levels are adjacent).

- Kiparsky, Paul (1985). Some consequences of lexical phonology. *Phonology Yearbook* 2: 83-138. And Booij, Geert and Jerzy Rubach (1987). Postcyclic versus postlexical rules in lexical phonology. *Linguistic Inquiry* 18: 1- 44. Propose that an additional level of postcyclic lexical rules (word level) applies before syntax.

3.5 Strict Cycle Condition revisited

- (25) Strict Cycle Condition (SCC):
- Cyclic rules apply only to derived representations.
 - A representation ϕ is *derived* w.r.t. rule R in cycle j iff ϕ meets the structural analysis of R by virtue of a combination of morphemes introduced in cycle j or the application of a phonological rule in cycle j .
- (26) The SCC accounts for Non-Derived Environment Blocking.
- As we saw in Finnish, the rule $t \rightarrow s / ___ i$ applies in cases like /halut+i/ \rightarrow [halusi] ‘she/he was wanting’ and in cases where there is word final front vowel raising as in /vete/ \rightarrow veti \rightarrow [vesi] ‘water nom.sg.’, but not in underived environments such as /tila/ \rightarrow [tila] ‘room’.
- (27) Kiparsky argues the SCC can be derived from the Elsewhere Condition, which states that if two rules A and B are adjacently ordered, and rule A defines a subset of the contexts of rule B, then rule A applies and not rule B.
- Intuitively: only apply the more specific rule.
 - This requires an ‘identity’ rule for lexical entries.

- ★ What does the Elsewhere Condition say should happen to the following adjacently ordered rules?

tila \rightarrow tila

$t \rightarrow s / ___ i$

3.6 Icelandic

- (28) Application of Lexical Phonology to Icelandic (from Kiparsky 1984)
- (29) u-epenthesis
- | | | | |
|--------|------------------------|---------|-------------------------|
| dag+ur | ‘day m.nom.sg.’ | bæ+r | ‘farm m.nom.sg.’ |
| tek+ur | ‘take 2/3sg.pres.ind.’ | næ+r(ð) | ‘reach 2/3sg.pres.ind.’ |
- (30) j-deletion

bylj+ar	‘snowstorm gen.sg.’	krefj+i	‘request 2pl.’
bylj+ir	‘snowstorm nom.pl.’	krefj+a	‘request 3pl.’
bylj+i	‘snowstorm acc.pl.’	krefj+um	‘request 1pl.’
bylj+a	‘snowstorm dat.pl.’	kref	‘request 1sg.’
bylj+um	‘snowstorm dat.pl.’	kref+ur	‘request 2/3sg.’
byl	‘snowstorm acc.sg.’		
byl+s	‘snowstorm gen.sg.’		
byl+ur	‘snowstrom nom.sg.’		

★ How should we order these two rules?

(31) u-umlaut

/harð+um/	hörðum	‘hard dat.pl.’
/kalla+um	köllum	‘call 1sg.’
/saga+ur/	sögur	‘sagas nom.pl.’
/dag+r/	dagur	‘day nom.sg.’

★ Ordering?

(32) Syncope, roughly: certain unstressed Vs $\rightarrow \emptyset$ / $\text{---} \{l,r,n,\delta,s\}V$. Additional facts:

- syncope applies before case and derivational endings, but not before the enclitic articles -inn and -ið.
- Stress in Icelandic is almost always on the initial syllable.

hamar	‘hammer nom.sg.’	akur	‘acne nom.sg.’	höfuð	‘head nom.sg.’
hamr+i	‘hammer dat.sg.’	akr+i	‘acne dat.sg.’	höfði+i	‘head dat.sg.’
hamr+a	‘to hammer’				
hamar#inn	‘the hammer nom.sg.’	akur#inn	‘the acne nom.sg.’	höfuð#ið	‘the head nom.sg.’
		ökr+um	‘acne dat.pl.’		
fóður	‘lining nom.sg.’	dag+ur	‘day nom.sg.’		
fóðr+i	‘lining dat.sg.’	dag+r+i	‘day dat.sg.’		
fóðr+a	‘to line’				
fóður#ið	‘the lining nom.sg.’	dag+ur#inn	‘the day nom.sg.’	stað#num	‘the place dat.sg.’

(33) Recall the problem from Anderson: we have to order u-umlaut before syncope (/bagg+ul+i/ → [bögg+l+i]—counterbleeding) but we also have to order syncope before u-umlaut (/alin+um/ → [öln+um]—feeding)

★ Shifting to Lexical Phonology, is syncope lexical or postlexical? u-umlaut? u-epenthesis?

★ Let's try to resolve the ordering paradox using Lexical Phonology. We should do derivations for: *dag+ur*, *dag+ur#inn*, *byl+ur*, *hamar#inn*, *akur*, *ökr+um*, *bögg+l+i*, *stað#num*.

★ Some more data—are they consistent with our analysis?

	Nikulás	'Nicholas'
/dag+r#inn/	dagurinn	'the day nom.sg.'
/lifr#inn/	lifrin	'the ? nom.sg.'