Classes 12 & 13: Lexical Phonology

To do (besides working on term paper, as always)
- Malayalam assignment due Friday, Nov. 6
- Steriade reading questions due Tuesday, Nov. 10

Overview: Phonological generalizations vary on many dimensions—productivity and automaticity, conscious accessibility, domain of application (e.g., word vs. phrase)—but they seem to cluster in two areas of the space. We'll see a proposal for capturing this by dividing the phonology into two main levels, and then elaborate this structure.

LEXICAL VS. POST-LEXICAL

1. Observation: two kinds of rules

English "trisyllabic shortening"

s[eɪ]ne	s[æ]nity
ser[i]ne	ser[ɛ]nity
prof[aʊ]nd	prof[ʌ]ndity
div[aɪ]ne	div[ɪ]nity
[oʊ]men	[ɑ]minous

English tapping (a.k.a. flapping)

corro[d]e	corro[ɾ]ing
i[d]yllic	i[ɾ]yll
a[tʰ]omic	a[ɾ]om
di[d]	You di[ɾ] it.
wha[t]	Wha[ɾ] a day!

	trisyllabic shortening	*tapping*
exceptions?		
sensitive to morphology?		
applies across word boundaries?		
creates sounds not in phoneme inventory?		
characteristic of English-speakers' L2 accents?		
obvious to untrained native speaker?		

2. Explanation in <u>Lexical Phonology</u>

Really, a theory of morphology and phonology. Founding works: Chomsky 1965; Kean 1974; Allen 1978; Mascaró 1976; Pesetsky 1979; Kiparsky 1982; Kiparsky 1985; Mohanan 1986.

Lexicon

> Starting with root, apply morphology and **lexical** rules.
> Result is, in turn, a lexical entry
> [as we'll see, there's more structure in here]

↓

Syntax

bracket erasure: removes morpheme boundaries, syntactic information, lexical diacritics

↓

Postlexical phonology

> Apply **postlexical** rules
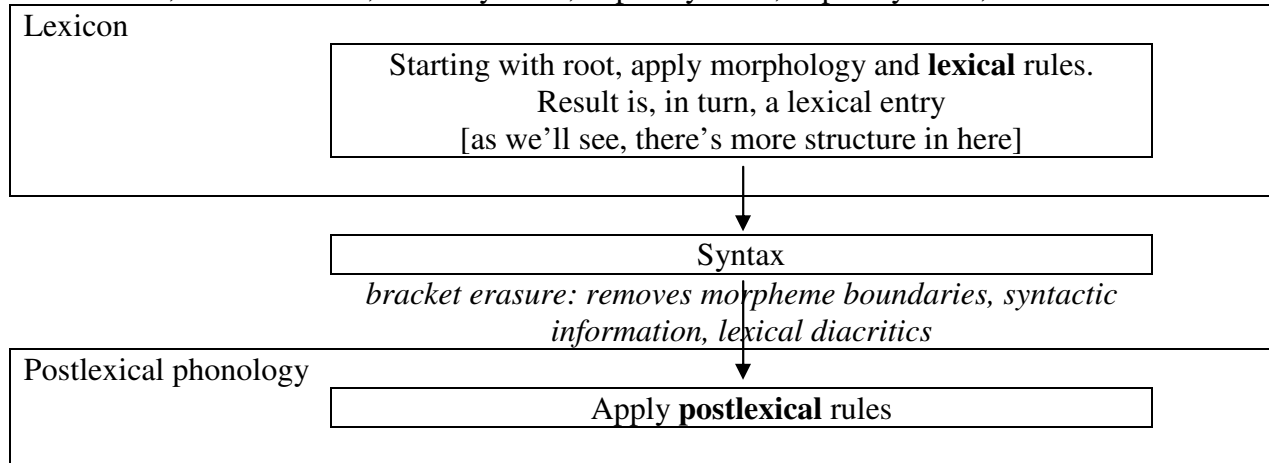
- <u>Exceptions</u>: Lexical rules can see whether the lexical entry has information about being an exception. Postlexical rules can't, because they just get a string of segments.

- <u>Morphological sensitivity</u>: Once a rule goes to the postlexical phonology, all morphological labels are removed ("bracket erasure")—so flapping can't see them.

- <u>Word boundaries</u>: Because lexical rules apply within the lexicon (i.e., they output a new lexical entry, not a modified phrase or sentence), they can't "see" other words in the environment—those other words aren't there yet.

- "<u>Structure preservation</u>" (a rule is *structure preserving* if the segments it outputs are in the phoneme inventory): Because the result of applying a lexical rule has to be a legitimate lexical entry, it can't contain anything that doesn't belong to the phoneme inventory.

- <u>L2 accent</u>: Although it doesn't follow directly from the model, the idea is that because postlexical rules are automatic and can't be turned off according to morphological or lexical information, they also don't get turned off when speaking another language.

- <u>Intuitions</u>: When making judgments about whether sounds are the same or different, speakers look at a lexical entry, not a surface form (that's the theory here, anyway).

See Goldrick & Rapp 2007 for neurolinguistics evidence of a lexical-postlexical dissociation, and a literature review of other psycholinguistic investigations of the putative distinction.

3. This can also solve *some* opacity problems, in its OT version

Recall Yokuts counterbleeding. In classic OT, it would be tough to rule out *ʔilil

UR	ʔili:+l		
[+long] → [−high]	ʔile:l	= $\mathbb{P}$	cf. /ʔili:+hin/ → [ʔile:hin] 'fans'
V → [−long] / __ C#	ʔilel	= $\mathbb{Q}$	cf. /pana:+l/ → [panal] 'might
SR	ʔilel	'might fan'	arrive'

(Baković 2007, p. 223; from McCarthy 1999)

.

But, if shortening is a postlexical rule[1] and lowering lexical, it works:

LEXICAL	/ʔili:+l/	*[+long,+hi]	IDENT(long)	IDENT(hi)	*[V,+long]C#
a	ʔili:l	*!			*
☞ b	ʔile:l			*	*
c	ʔilil		*!		
d	ʔilel		*!	*	

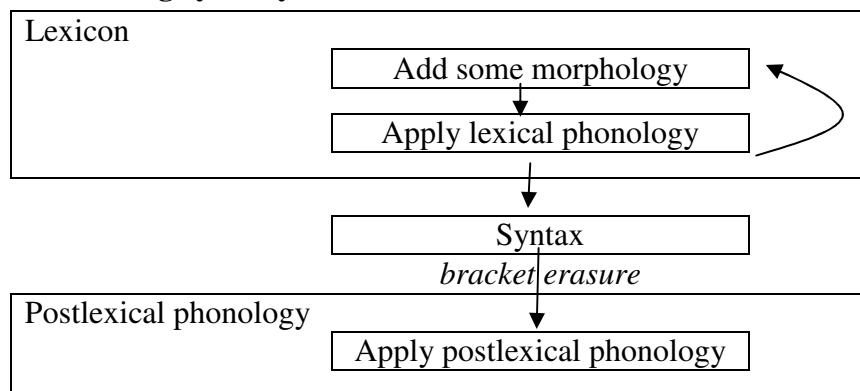| POST-LEXICAL	/ʔile:l/	*[+long,+hi]	*[V,+long]C#	IDENT(long)	IDENT(hi)
e	ʔili:l	*(!)	*(!)		
f	ʔile:l		*!		
g	ʔilil			*	*!
☞ h	ʔilel			*	

Self-counterfeeding and self-counterbleeding are still not predicted

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[1] or at least at a later level than lowering

CYCLICITY

4. The transformational cycle

Some or all of the lexical component is sometimes called the "cyclic" component. This goes back to an idea found in SPE, with syntactic antecedents:

"We assume as a general principle that the phonological rules first apply to the maximal strings that contain no [syntactic] brackets, 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." (SPE, p. 15)

5. Putting cyclicity in the model

```
Lexicon
        ┌─────────────────────────────┐
        │   Add some morphology       │◄──┐
        └─────────────────────────────┘   │
                     │                     │
        ┌─────────────────────────────┐   │
        │  Apply lexical phonology     │───┘
        └─────────────────────────────┘
                     │
        ┌─────────────────────────────┐
        │          Syntax             │
        └─────────────────────────────┘
              bracket erasure
                     │
Postlexical phonology
        ┌─────────────────────────────┐
        │  Apply postlexical phonology │
        └─────────────────────────────┘
```

6. Example: Chamorro (Chung 1983; Crosswhite 1998)

Austronesian language from Guam and Northern Marianas with 62,500 speakers
Complementary distribution: mid Vs in closed, stressed syllables; high Vs elsewhere

lápis	'pencil'	lapés+su	'my pencil'
dǽŋis	'candle'	dæŋés+su	'my candle'
hugándu	'play'	hùgandó+ɲa	'his playing'
malǽguʔ	'wanting'	màlægóʔ+mu	'your wanting'

Secondary-stressed vowels are high in these examples

tintáguʔ	'messenger'	tìntagóʔ+ta	'our (incl.) messenger'
mundóŋgu	'cow stomach'	mùnduŋgó+ɲa	'his cow stomach'

o   But not in these (and cf. the unstressed examples). What do you think?

éttigu	'short'	èttigó+ɲa	'shorter'
inéŋŋuluʔ	'peeping'	inèŋŋulóʔ+hu	'my peeping'
óttimu	'end'	òttimó+ɲa	'his end'

o   We also need to take care of these:

kwéntus	'to speak'	kwintús+i	'to speak to'
lókluk	'to boil'	luklók+ɲa	'its boiling'
sénsin	'flesh'	sinsén+ɲa	'his flesh'

7. Further evidence for interleaving phonology and morphology

Raffelsiefen 1996, 1999: many English affixes are selective about what they'll attach to

rándom	rándomìze	sálmon	sálmonìze
fóreign	fóreignìze	síster	sísterìze
shépherd	shépherdìze	rhýthm	rhýthmìze
corrúpt	*corruptize	ápt	*aptize
obscéne	*obscénize	fírm	*firmize
políte	*polítize	ténse	*tensize	(1996, p. 194)

Kiparsky's interpretation: stress rules have already applied by the time the grammar tries to attach –*ize*.

DIFFERENT LEXICAL LEVELS

8. Observation: two classes of affix in English (and many other languages)

suffix examples	-al, -ous, -th, -ate, -ity, -ic, -ify, -ion, -ive	-ship, -less, -ness, -er, -ly, -ful, -some, -y
stress shift?	párent vs. paréntal	párent vs. párentless
trisyllabic shortening?	op[eɪ]que vs. op[æ]city	op[eɪ]que vs. op[eɪ]quenessless
velar softening?	opa[k]e vs. opa[s]ity	opa[k]e vs. opa[k]e-y
prefix examples	*in-, con-, en-*	*un-, non-*
can bear main stress?	cóntemplate	-- (rarely)
obligatory assim. of nasal?	iɬegal	unlawful
both		
attach to bound morph.?	caust-ic	-- (rarely)
ordering	act-<u>iv</u>-<u>at</u>-<u>ion</u>-<u>less</u>-<u>ness</u>[2],	<u>non</u>-<u>in</u>-<u>com</u>-prehens-ible[3]
semantics	riot vs. riotous	riot vs. rioter

(prefixes that come in two flavors: *re-*, *de-*, *sub-*, *pre-*; and of course there are exceptions…)

9. Solution: lexical component is broken into *levels*

...each with their own WFRs and phonological rules

WFR = word formation rule (i.e., a morphological operation). Could be adding an affix, could be something else (e.g., *sing → sang*).

English (Kiparsky 1982 with material from Mohanan 1986, who proposes 4 levels for English):

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[2] "may allow verification of the correspondingly predicted near-**activationlessness** of the reaction" (www.pnas.org/cgi/content/full/101/46/16198)
[3]"good production values, great cast, snappy dialogue, non-boring **non-incomprehensible** non-insane plotting" (www.thepoorman.net/archives/002732.html)

Level 1	WFRs	"primary" (i.e., irregular) inflection (tooth/teeth)
		primary derivational affixes (*-al*, *-ous*, *-ant*, *in-* etc.), including some Ø affixes
	Phon. rules (selected)	stress
		trisyllabic shortening (*opacity*)
		obligatory nasal assimilation (*illegal*)
		velar softening (*electricity*)
Level 2	WFRs	secondary derivational affixes (*-ness*, *-er*, *un-*, etc.)
		compounding (*blackbird*)
	Phon. rules	compound stress
		$n \rightarrow$ Ø / C__]# (*damning* vs. *damnation*)
		$g \rightarrow$ Ø / __ [+nas]# (*assigning* vs. *assignation*[4])
Level 3	WFRs	"secondary" (regular) inflectional affixes (*-s*, *-ed*, *-ing*)
	Phon. rules	optional sonorant resyllabification __]V (*cycling*)
Postlexical	Phon. rules	aspiration, tapping
		(no morphology occurs after the lexical component, so no WFRs)

If a word bears *n* affixes from the same level, it goes through that level's phonology *n* times.

The output of each level (or, depending on the author, the output of each cycle) is a lexical item. (Everyone clear on the difference between cycle and level?)
o   How does this explain why Level 2 affixes can't attach to bound roots?

o   Compare the derivations for *damnation* [dæmn-eɪʃən] and *damning* [dæm-ɪŋ].

o   How is this (disputed!) asymmetry in compounds explained in the model?

| tooth marks | teeth marks | | claw marks | *claws marks |
| louse-infested | lice-infested | | rat-infested | *rats-infested |

10. Exercise: Conservative European Spanish example (based on Harris)

Palatal and alveolar nasals and laterals contrast:

| ka.na | 'grey hair' | po.lo | 'pole' |
| ka.ɲa | 'cane' | po.ʎo | 'chicken' |

But the contrast is neutralized in some environments

dezðeɲ+ar	'to disdain'	donθeʎ+a	'maiden'
dezðeɲ+oso	'disdainful'	donθeʎ+a+s	'maidens'
dezðen	'disdain (N)'	donθel	'swain'

o   What about these forms—what can we conclude about levels in Spanish?

| dezðen+es | 'disdain (N, plural)' | donθel+es | 'swains' |

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[4] though also some problematic cases like ?*assigner*. For a completely different view of all this, see Jennifer Hay (2003) *Causes and Consequences of Word Structure.* New York: Routledge.

11. Putting it all together

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Lexicon
                    ┌──────────────────────────┐
                    │ Root                     │
                    └──────────────────────────┘
                                 │
                    ┌──────────────────────────┐
                    │ Level 1 WFR, if any      │  ◄─┐
                    └──────────────────────────┘    │
                                 │                   │
                    ┌──────────────────────────┐    │
                    │ Apply Level 1 rules      │ ───┘
                    └──────────────────────────┘
                                 │
                    ┌──────────────────────────┐
                    │ Level 2 WFR, if any      │  ◄─┐
                    └──────────────────────────┘    │
                                 │                   │
                    ┌──────────────────────────┐    │
                    │ Apply Level 2 rules      │ ───┘
                    └──────────────────────────┘
                    ┌──────────────────────────┐
                    │ Level 3 WFR, if any      │  ◄─┐
                    └──────────────────────────┘    │
                                 │                   │
                    ┌──────────────────────────┐    │
                    │ Apply Level 3 rules      │ ───┘
                    └──────────────────────────┘
                                 │
                    ┌──────────────────────────┐
                    │ Syntax                   │
                    └──────────────────────────┘
                          bracket erasure
Postlexical phonology
                    ┌──────────────────────────┐
                    │ Apply postlexical rules  │
                    └──────────────────────────┘
```

> Should the root pass through the Level 1 rules first thing? Or should it go straight to a WFR? Not clear (empirical question).
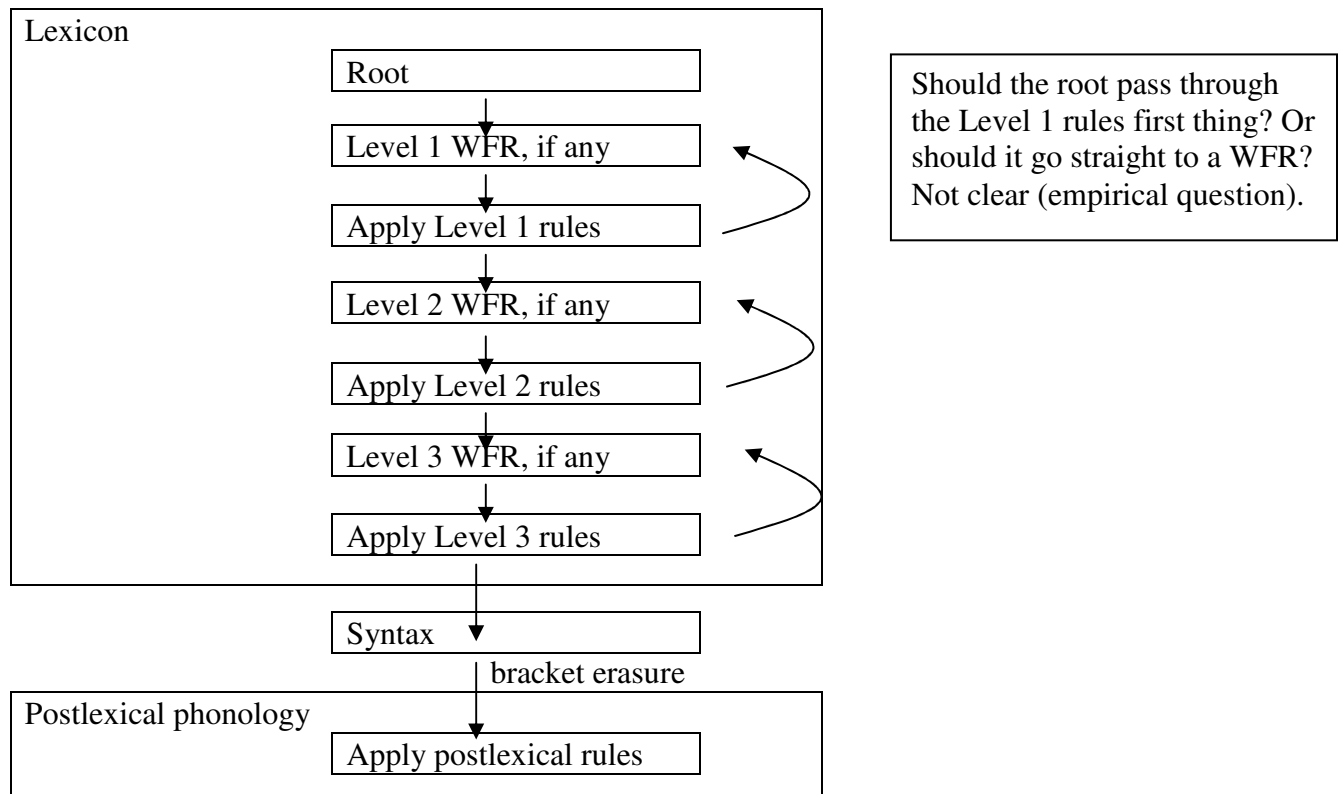
In recent Stratal OT work, Kiparsky tends to employ just two lexical levels: **Stem Level** and **Word Level**, plus a Postlexical Level (Kiparsky 2000).

12. Dissent

- Some have argued that affixed don't fall neatly into 2-3 discrete categories; and/or that an affix's behavior can be predicted from its phonological makeup and its distribution (Plag 1999; Hay & Plag 2004; Raffelsiefen 1999; Hay 2003).
- One postlexical phonology probably isn't enough.
    - Some have argued that postlexical rules can be assigned to well-defined phonological domains such as phonological phrase, intonational phrase, utterance (Selkirk 1978; Selkirk 1980; Nespor & Vogel 1986)
    - Others argue that phonological domains influence phonological rules quantitatively, not categorically (Féry 2004)

13. Exercise, if time: German dorsal fricatives (based loosely on **Merchant 1996**[5])

o   Formulate the basic rule governing distribution of x/ç. Assume that it is fed by a syllabification rule.

maːzo**x**	'Masoch'	ʔi**ç**	'I'
oynuː**x**	'eunuch'	ʃprɛ**ç**+t	'speak!'
ʔa**x**	'oh!'	kø**ç**+ə	'cooks'
ʃpraː**x**+ə	'language'	byː**ç**+ʌ	'books'
kɔ**x**	'cook'	riː**ç**+ən	'to smell'
bu**x**+əs	'book-GEN'	**ç**emiː	'chemistry'
kuː**x**+ən	'cake-EN'	ʃtraɪ**ç**+t	'he/she paints'
buː**x**+ʊŋ	'booking'	riː**ç**+ən	'to smell'
raʊ**x**+ən	'to smoke'	mɪl**ç**	'milk'
taʊ**x**+ən	'to dive'	kɔl**ç**oːzə	'collective farm'
ʔa**x**t+ən	'to observe'	duːr**ç**	'through'
zuː**x**t+ə	's/he searched'	man**ç**	'some'
		mʏn**ç**ən	'Munich'
maːzo**x**+ɪʃ	'Masoch-ish'	**ç**iːna	'China'
kno**x**+ɪç	'boney'	**ç**aos	'chaos'
ʃpraː**x**+ɪç	'(mono-)lingual'	**ç**oːlɛsteriːn	'cholesterol'
da**x**+artɪç	'roof-like'	**ç**emiː	'chemistry'
raʊ**x**+ɪç	'smoky'	**ç**arɪsma	'charisma'

speakers vary

We now encounter some problem data:

kuː+**ç**ən (some report kyː+**ç**ən)	'little cow'	*speakers vary:*	
fraʊ+**ç**ən	'little woman'	maːzoː**ç**+ɪst	'masochist'
mama+**ç**ən	'mommy'	oynuː**ç**+ɪsmus	'eunuchism'
bioː+**ç**eːmikʌ	'bio-chemist'	oynuː**ç**+iziːrən	'to make into a eunuch'
noyro+**ç**irurk	'neuro-surgeon'	paroː**ç**+iː	'parish'
indo+**ç**ina	'Indo-China'	paroː**ç**+ial	'parochial'

o   Let's see if we can create a lexical-phonology analysis (not the only option). I think we will need two levels, so we'll have to decide which affixes belong to which level.

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[5] There are also some [x] inside monomorphemic words. Merchant suggests that all follow short vowels, and therefore are syllabified as syllable-final. Some apparently monomorphemic words need to be treated as *bound root+suffix*. Umlaut must apply before fricative assimilation, to bleed it; this suggests umlaut applies at Level I, which may lead to problems for the strict cycle condition. Also, there are some lexical exceptions to the basic generalization, such as *[x]utzpa* 'chutzpa' and *[x]atschaturjan* 'Khachaturian'. My use of "r" is laziness: I don't want to worry about allophones of German /ʁ/.

14. Properties of the lexical component: strict cycle condition

The idea was to allow lexical rules (at least those that <u>change feature values</u>, rather than filling in underspecified feature values or adding syllable structure) 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)**.

Lexical phonology's attempts to deal with NDEB were always kind of a mess, so rather than go through the details of the proposals, I'll just give two classic examples, from Kiparsky, and review his 1982 proposal, so that you have an idea of what the problem is.

Finnish (Kiparsky 1973)
Ignore various other rules: vowel harmony, degemination, a~o…

to X	*Let him/her X!*	*'active instructive infinitive II'*	*she/he was Xing*	
halu**t**+a	halu**t**+koon	halu**t**+en	halu**s**+i	'want'
noe**t**+a	noe**t**+koon	noe**t**+en	noke**s**+i	'smudge (?)'
pie**t**+æ	pie**t**+køøn	pie**t**+en	pike**s**+i	'pitch'
filma**t**+a	filma**t**+koon	filma**t**+en	filma**s**+i	'film'
cf.				
oll+a	ol+koon	oll+en	ol+i	'be'
aja+a	aja+koon	aja+en	ajo+i	'go'
puhu+a	puhu+koon	puhu+en	puhu+i	'speak'

o   The data above suggest t → s / __ i. Can we modify the rule to deal with these monomorphemic cases?

tila	'room'	lah**ti**	'Lahti'	cf.	
æi**ti**	'mother'	mæ**ti**	'roe'	paa**si**	'boulder'
sil**ti**	'however'	limonaa**ti**	'lemonade'	**si**næ	'you (sg.)'
val**ti**on	'public'			kuu**si**	'six'

o   Another rule is needed to account for this vowel alternation:

jok**e**+na	'river' essive sg.	jok**i**	'river' nom. sg.
mæk**e**+næ	'hill[j] essive sg.	mæk**i**	'hill' nom. sg.
æit**i**+næ	'mother' essive sg.	æit**i**	'mother' nom. sg.
kahv**i**+na	'coffee' essive sg.	kahv**i**	'coffee' nom. sg.

o   How should the two rules be ordered, given these data? (ignore h~k alternation)

ve**te**+næ	'water' essive sg.	ve**si**	'water' nom. sg.
kæ**te**+næ	'hand' essive sg.	kæ**si**	'hand' nom. sg.
yh**te**+næ	'one' essive sg.	yk**si**	'one' nom. sg.

o   What's the problem in *vesi*?

Sanskrit "ruki" [6]

      s → ş / {r, u, k, i} __

    da+da:+**si**   'you give'   bi+bhar+**ş**i 'you carry'
    kram+**s**ja+ti 'he will go'   vak+**ş**ja+ti 'he will say'

o   How is this like Finnish:
    b**is**a   'lotus'
    b**us**a   'mist'
    ba**rs**a   'tip'

ablaut	sa:**s**	'instruct'	/s**as**+ta/ → si**s**ta→ [si**ş**+ʈa]		participle
V-deletion	gha**s**	'eat'	/ga+**ghas**+anti/ → dʒa+**ks**+anti→ [dʒa+**kş**+anti]		3 pl.

As Wolf 2008 discusses, there are only about 3 cases in which some derived-environment-only rule can be fed by either a morphological or a phonological operation, and they can be re-analyzed (e.g., Hammond 1991 for Finnish). For alternative theories, see Wolf; McCarthy 2003.

15. Aside on strict cyclicity: how to get counterfeeding in Lexical Phonology

Polish (orig. from Rubach; I failed to note via where):

$$\begin{bmatrix} +cor \\ +strid \end{bmatrix} \rightarrow \text{ç} / \underline{\quad} \begin{bmatrix} +syll \\ -back \\ +high \end{bmatrix} \text{ (in nouns) "nominal strident palatalization"}$$

kapelu[s]   'hat'   kapelu[ç]+ik   'little hat'   kapelu[ç]+ik+o   'big hat'

gro[s]   (monetary unit)   gro[ç]+ik   'little grosz'   gro[ç]+iw+o   'big grosz'

$$\{k,g,x\} \rightarrow \begin{bmatrix} -high \\ +cor \\ +strid \end{bmatrix} / \underline{\quad} \begin{bmatrix} -cons \\ -back \end{bmatrix} \text{ "first velar palatalization"}$$

krzy[k]   'a shout'   krzy[t͡ʃ]+e+ć   'to shout'
stra[x]   'fear'   stra[ʃ]+y+ć   'to frighten'
miaz[g]+a 'squash'   miaż[d͡ʒ]+y+c 'to squash'   miaż[d͡ʒ]+ę   'I squash'

o   What's the order of the rules (assuming the rules are correct)?
gma[x]   'building'   gma[ʃ]+ysk+o   'big building'
                           * gma[ç]+ysk+o

o   If both rules are cyclic (Rubach argues that they are), what prevents *gma[ç]+ysk+o?

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[6] Vennemann 1974 proposes that this is because the coarticulations that *r,u,k,i* impose on a following [s] are acoustically similar (though articulatorily diverse). [r] is apparently retroflex, so it would induce retroflexion; [u] would induce rounding; [k] would induce palatalization (because of back tongue position), and so would [i], as it does in many languages. All of these changes (to, roughly, [ş], [sʷ], and [ʃ]) would cause the fricative noise of [s] to lower in frequency, because the resonant cavity in front of the constriction becomes bigger. It would therefore be difficult to maintain a contrast between [s] and [ş] in the post-*ruki* environment.

16. Can this theory help us with some of the Icelandic puzzles from last time?

Recall: ordering paradox between these two rules:

> *syncope, roughly*:   certain unstressed Vs → Ø / C __ {l,r,n,ð,s}+V
> u-*umlaut*:   a → ö / __ C_0 u   (where "u" usu. = [ʏ], "ö" = [œ])

	+r/Ø		*+um*	
/katil/	ketil+l	'kettle'	k**ö**tl+um	'kettle-dat.pl'
/ragin/	regin	'gods'	r**ö**gn+um	'gods-dat.pl'
/alen/	alin	'ell of cloth'	**ö**ln+um	'ell of cloth-dat.pl'

	+ul+r		*+ul+e*, *+ul+an*	
/bagg/	bögg+ul+l	'parcel'	b**ö**gg+l+i	'parcel-dat.sg.'
/jak/	jök+ul+l	'glacier'	j**ö**k+l+i	'glacier-dat.sg.'
/þag/	þög+ul+l	'taciturn'	þ**ö**g+l+an	'taciturn-masc.acc.sg.'

o   Proposed analyses of the above?

o   And what about these cases where umlaut *doesn't* apply:
  /da**g**+r/   d**a**g+**u**r   'day *nom.sg.*'
  /hatt+r/   h**a**tt+**u**r   'hat *nom.sg.*'
  /stað+r /   st**a**ð + **u**r   'place *nom.sg.*'

o   Do these data fit with what we've said so far?
  fóð**u**r   'lining *nom.sg.*'   dag+**u**r (/dag+r/)   'day *nom.sg.*'
  fóðr+i   'lining *dat.sg.*'   dag+r+i   'day *dat.sg.*'
  fóð**u**r#ið   'the lining *nom.sg.*'   dag+**u**r#inn   'the day *nom.sg.*'

[To save a couple of twigs, I'm not printing out the last page, which is just references; see online version]

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