Week 04 – Phonological Rules and Ordering

September 30, 2008

1 List and Rule

1.1 Basics

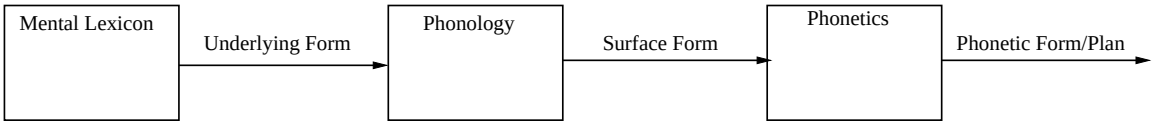

Figure 1: Classic Competence Model

(1) Explanation of terms
   a. The *mental lexicon* is a list of lexical items (where we get our underlying forms (=phonemic forms) from)
   b. *Phonology* here is a mapping from underlying forms to surface forms.
   c. *Phonetics* takes the still-highly idealized surface form and implements a plan of action for the articulators (perhaps taking into account intended perceptual goals) which if executed perfectly in perfect conditions produces the ideal phonetic form.

(2) In the theory we are examining, we are studying how the mapping from underlying forms to surface forms can happen. The main ideas are:
   a. Underlying forms are phonemic forms, and contain only non-redundant information (i.e phonemes are identified by *distinctive features*).
   b. Predictable, redundant information is provided by rules.
   c. The rules apply to the underyling forms, potentially transforming them. The end result is the surface form.

★ This is the theory we are studying. Can you think of alternatives?

★ Can you anticipate some issues of rule application? If there is more than one, do they all apply at once, or in some order? Do rules apply to all potential environments in a word, or just some of them?

1.2 More than one descriptively adequate grammar

(3) Similarly we may find that two sets of (possibly ordered rules) account equally well for the same set of data. How do we decide which one is the right one?

a. Think about what the rules **predict** in forms that are not present in the data. Where the two accounts make different predictions, get data! I.e. solicit from a native speaker, consult dictionaries, do an experiment, etc.

b. Even so, it is possible to have different analyses that make the same predictions everywhere. In this case, we need an **evaluation metric** to decide between competing, equivalent analyses. Generally, go with the *simpler* set of rules.

(4) What does it mean to be simple?

a. The evaluation metric suggested in SPE (Chomsky and Halle 1968) is brevity: the proposed grammar with the fewest number of symbols.

2 Rule Formalizations

2.1 Format

$$\text{A} \longrightarrow \text{B} \;/\; \text{X} \_\_\_\; \text{Y}$$

(5) This means *XAY is rewritten as XBY* or, in other terms, *A is rewritten as B when preceded by X and followed by Y*

(6) Example: $\begin{bmatrix} +syl \\ -low \end{bmatrix} \longrightarrow [\ +high\ ] \;/\; \_\_\_\; \text{CC\#}$

(7) a. A is the affected **segment, focus,** or **target** of the rule.
b. B is the **structural change** that the rule requires.
c. X____ Y is the **context** of the rule.
d. XAY is the **structural description**.

(8) If X and Y are null, then the rule is said to be 'context-free'. Otherwise, it is 'context-sensitive'.

(9) A rule applies to a form if the form contains a string nondistinct from XAY. ('nondistinct' explained precisely below)

2.2 Left side of arrow

(10) A can be a **feature matrix** (sometimes called a **feature bundle**) or $\emptyset$.

a. If A is a feature matrix, like $\begin{bmatrix} +syl \\ -low \end{bmatrix}$, then the rule looks for any segment that is *nondistinct* from that matrix.

b. The segments that a feature matrix 'picks out' are a **natural class**.

(11) Two feature matrices are **distinct** iff there is some feature F whose value is different in the two matrices.

★ Which of the following are distinct from $\begin{bmatrix} +syl \\ -low \end{bmatrix}$?

$$\begin{bmatrix} +syl \\ -low \\ +round \\ +back \end{bmatrix} , \begin{bmatrix} \\ -low \\ -round \end{bmatrix} , \begin{bmatrix} -syl \\ -low \\ +high \end{bmatrix}$$

(12) Note this means that if A doesn't mention some feature F, it "doesn't care" about it—the rule accept segments that are either +F or -F.

(13) Sometimes, if A is meant to pick out a single sound, we use an IPA symbol instead:
u $\longrightarrow$ $\begin{bmatrix} -high \end{bmatrix}$ / ____ (C)#

a. This is a good idea for readability, but keep in mind that, in order to determine how long the rule is (for purposes of applying a length-based evaluation metric), you have to expand the IPA symbol into a feature matrix, namely the smallest feature matrix that picks out just that sound from the language's phonemic inventory.

★ What does the "u" above abbreviate to if the language's vowel inventory is *i, a, u*? If it's *i, a, u, o*? If it's *i, y, a, u, ɯ, o*?

(14) Sometimes we also use C to abbreviate [-syl] or or V to abbreviate [+syl]. Again, this is good for readability. Be careful when reading, though, because some authors, following SPE, use C and V to abbreviate [-voc,+cons] and [+voc,-cons].

(15) If A is $\emptyset$, you've got an insertion rule (the idea is that insertion changes "nothing" into something):
$\emptyset \longrightarrow$ i / C ____ C#

★ Why don't we use the empty matrix [] instead of $\emptyset$?

(16) Note A is at most a single segment. If you need a rule which affects more than one segment at one time, chek out *transformational rules* in §2.7.

2.3 Right side of arrow

(17) B also can be a feature matrix or $\emptyset$.

(18) If B is a feature matrix, then any of the affected segment's features that are mentioned in B are changed to the value given in B. *All other features are left alone.*

★ What does $\longrightarrow$ [+high] do to [o]? to [u]?

(19) If B is $\emptyset$, then the segment that A matches is deleted.

a. C $\longrightarrow \emptyset$ / C $\underline{\quad}$ #

b. (why not []?)

(20) Again, we sometimes use an IPA symbol as an abbreviation for all the feature changes necessary to change anything that could match A into that IPA symbol:
V $\longrightarrow$ i / $\underline{\quad}$ # (silly rule)

(21) If A is $\emptyset$, then the IPA symbol abbreviates the features needed to pick it out of the language's phoneme inventory:
$\emptyset \longrightarrow$ i / C $\underline{\quad}$ C#

★ What does the "i" above abbreviate if the language's vowel inventory is *i, a, u*? If it's *i, e, a, u, o*? If it's *i, y, e, a, u, ɯ, o*?

2.4 Redundancy

(22) The principle that shorter rules are preferred over longer rules means that unnecessary features should be eliminated from A and B.

★ What is wrong with each of the following rules?

1. $\begin{bmatrix} +syl \\ -round \end{bmatrix} \longrightarrow [\ +round\ ]$

2. $\begin{bmatrix} +nas \\ +voice \end{bmatrix} \longrightarrow [\ +anterior\ ]$ (assume the phoneme inventory of English)

2.5 Right side of slash (context)

(23) X and Y are strings made up of

- •feature matrices
- •the boundary types # and + (treated in SPE like segments)
- •at their outside edges, category boundaries

(24) Feature matrices in X and Y match segments in the same way that A does (i.e., they match a segment if not distinct from it).

(25) Boundaries, # (word boundary) and + (morpheme boundary), are treated in SPE as feature matrices, but we won't get into that here.

(26) Category boundaries like $]_{Noun}$ and $_{Verb}[$ can also be used, but only at the edges of X____ Y. (If both edges have brackets, the labels must match).

(27) More recently it has become common to indicate left and right morpheme and word boundaries with category boundary like notation. E.g. $]_{wd}$ indicates a right word edge boundary.

2.6 Expansion Conventions

(28) Devices like parentheses, curly brackets, and angle brackets are used to collapse related rules into a single rule schema (whose length is shorter = cost is lower).

(29) Rather than adjusting the definition of nondistinctness, SPE gives expansion conventions to turn those schemata into sets of rules that can then be applied using the simple definition of nondistinctness.

2.6.1 Lowercase Greek letters

(30) Variables that stand for +, - , or whatever values the theory says some feature can take (could be 1,2,3 for some features—can you think of any good candidates?).

C $\longrightarrow$ [αvoice] / [αvoice] ____ [αvoice] expands into
C $\longrightarrow$ [+voice] / [+voice] ____ [+voice]
C $\longrightarrow$ [-voice] / [-voice] ____ [-voice]

2.6.2 Parentheses

(31) Parenthesis are used to indicate optionality.

(32) For example, the rule schema V $\longrightarrow$ $\emptyset$ / ____ (V)C# is expanded into these two rules (in that order):
V $\longrightarrow$ $\emptyset$ / ____ VC#
V $\longrightarrow$ $\emptyset$ / ____ C#

(33) The rules that a schema expands into are **disjunctively ordered**. That means, informally, that you try to apply the first one; if its structural description is met, you apply that first rule and don't try any of the other rules from the same schema. If not, move on to the next rule and proceed in the same fashion. In other words, you never apply two rules of the same schema to a single word.

★ How does the rule above apply to /bauk/?

(34) This is a bit too crude, because it doesn't give the right result for cases where different rules of a schema apply to different parts of a word—in those cases, we want multiple rules of the schema to apply to the same word, just in different places.

2.6.3 Braces (curly brackets)

(35) Braces are used to indicate multiple possibilities

(36) For example, the rule schema $\left\{ \begin{array}{c} i \\ o \end{array} \right\} \longrightarrow \emptyset \; / \; \underline{\quad} \; \text{V}$ is expanded into these two rules (in this order):
i $\longrightarrow \emptyset \; / \; \underline{\quad} \; \text{V}$
o $\longrightarrow \emptyset \; / \; \underline{\quad} \; \text{V}$

★ Can you imagine a way to translate parentheses into braces? Try it with
V $\longrightarrow \emptyset \; / \; \underline{\quad} \; \text{V(C)\#}$

2.6.4 Super and subscripts

(37) Used when you want to specify a sequence of common elements.

(38) E.g. C_n means "n or more Cs" (most common is C_0).
$\text{C} \longrightarrow \emptyset \; / \; \underline{\quad} \; \text{C}_0\#$ expands to
...
C $\longrightarrow \emptyset \; / \; \underline{\quad}$ CCCC#
C $\longrightarrow \emptyset \; / \; \underline{\quad}$ CCC#
C $\longrightarrow \emptyset \; / \; \underline{\quad}$ CC#
C $\longrightarrow \emptyset \; / \; \underline{\quad}$ C#
C $\longrightarrow \emptyset \; / \; \underline{\quad}$ #

(39) The tricky thing about this is that we apply the longest rule whose structural description matches.

★ How would the schema above apply to /tabskt/?

2.6.5 Parentheses with star

(40) $(\dots)^*$ means that the material in parentheses can occur zero or more times.

(41) For example, V $\longrightarrow$ [+stress] / #C(VCVC)* ____ expands to
V $\longrightarrow$ [+stress] / #C ____
V $\longrightarrow$ [+stress] / #CVCVC ____
V $\longrightarrow$ [+stress] / #CVCVCVCVC ____
...

(42) With $(\dots)^*$, disjunctive ordering does not apply. Every version of the rule that can apply does apply—they apply simultaneously.

★ How would the stress rule above apply to /badupidome/? How would C $\longrightarrow \emptyset$ / ____ C*# apply to /tabskt/?

2.6.6 Angled brackets

(43) Like parentheses, but when the optional information is in more than one place. A schema with angle brackets expands into two rules: the rule with the information in the angle brackets and the rule without that information.

(44) For example, C $\longrightarrow \emptyset$ / V$\langle$C$\rangle$ ____ $\langle$C$\rangle$V (silly example, I know) expands to
C $\longrightarrow \emptyset$ / VC ____ CV
C $\longrightarrow \emptyset$ / V ____ V

Expand the following schema and apply it to *putod, luged, and fesil.*

$$\begin{bmatrix} +syl \\ \langle +back \rangle \end{bmatrix} \longrightarrow \text{-high} \;/\; \underline{\quad} \; \text{C}\langle \begin{bmatrix} +syl \\ +back \\ -high \end{bmatrix} \text{C}\rangle\#$$

(45) (SPE proposes a nifty notation to take care of both parentheses and angled brackets and allow more than one pair of angled brackets in a rule, but it doesn't appear used often, so we won't learn it—see pp. 394-395 of SPE.)

2.7 Transformational rules

(46) Transformational rules are used when *more than one segment is affected* at a time. Typical phenomenon which require transformational rules are:

a. Metathesis. Metatheis occurs when segments switch positions (e.g. [ask] → [aks])
b. Coalesence. Coalesence occurs when two segments combine into one, typically preserving some features of each. (e.g. [mai] → [me]).

(47) Typically these rules are of the form A ⟶ B, where A and B are strings of equal length and each feature matrix is indexed.

(48) Example: CV Metathesis

$$\begin{matrix} \text{CV́CV} & & \text{CV́VC} \\ 1\,2\,3\,4 & \longrightarrow & 1\,2\,4\,3 \end{matrix}$$

(49) Coalesence:

$$\begin{matrix} \begin{bmatrix} -high \\ -low \\ +back \end{bmatrix} & \begin{bmatrix} -high \\ -low \\ +back \end{bmatrix} & & \begin{bmatrix} -high \\ -low \\ +back \\ -ATR \\ +long \end{bmatrix} & \emptyset \\ 1 & 2 & \longrightarrow & 1 & 2 \end{matrix}$$

★ Apply these two rules (in the order presented above) to the Citation form [móko] 'smell' in Kwara'ae (Austronesian) to obtain its pronunciation in normal, discourse form.

3 Rule Application

(50) If a language has more than one rule (and they all do), the rules have to find a way to get along. It's usually assumed that they are ordered and apply one by one, but we can imagine other scenarios...

3.1 Simultaneous application

(51) Say we've got two rules:
labialization: [+labial] ⟶ [+round] / u ___ V
harmony: u ⟶ i / iC ___

★ What happens to the underlying forms below if each rule just finds any segments in the underlying form to which it can apply and performs the structural change?

/dalbuge/ /dibumpo/ /griluda/

3.2 Ordered Rules

(52) If rules apply instead one by one (in ordered fashion), so that one rule's output is the next rule's input, there are two possible outcomes with the same two rules.

★ Fill in the derivations:

	/dalbuge/	/dibumpo/	/griluda/
labialization			
harmony			

	/dalbuge/	/dibumpo/	/griluda/
harmony			
labialization			

3.3 Intrinisic vs. Extrinsic rule ordering

(53) Can we tell just from looking at a list of rules what order they should apply in?

a. There have been proposals to do just that—that is, to impose an **intrinsic** rule ordering (an ordering that is determined by properties of the rules themselves, or maybe properties of the rules and the UR).

b. But if each language can order the rules the way it likes, rule ordering is **extrinsic**.

(54) Evidence for extrinsic rule ordering?

a. What we need is languages or dialects that form a (near-)minimal pair for the ordering of some rules. Let's try an example from SPE.

(55) Canadian raising rule of some English dialects: /aɪ/,/æʊ/ become [ʌɪ], [ɛʊ] before voiceless consonants.

a. [ɹaɪd] vs. [ɹʌɪt] [ɡæʊdʒ] vs. [kʰɛʊtʃ]
'ride' 'right' 'gouge' 'couch'

b. Does anyone in the class have this rule in their everyday speech?

(56) Pig Latin rule of children's English language game: Initial consonant(s), if any, are moved to the end of the word, and [eɪ] is added to the end.

a. [pʰɪg læʔn̩] becomes [ɪgpʰei æʔn̩leɪ]

Write the rule informally (we haven't yet reviewed the transformational notation that is needed).

(57) If you have Canadian raising and are reasonably adept in Pig Latin, transform the following words into Pig Latin and have your neighbor carefully transcribe them:

ice

try

might

sigh

(58) Now let's compare notes and see which 'dialects' we've got—do we find both orderings of 'Pig Latin movement' and raising?

4 Rule Orderings

(59) Major research questions

a. What types of phonological patterns can be described with linear rule systems?
b. What types of rule interactions does the linear system predict?

(60) 5 types of rule interaction:

a. Feeding
b. Bleeding
c. Counterfeeding
d. Counterbleeding
e. None

(61) For reasons that will become apparant, patterns describable with feeding and bleeding rule interactions are often called 'transparant', whereas patterns describable with counterfeeding and counterbleeding rule interactions are called 'opaque'.

4.1 Feeding

(62) Rule 1 **feeds** Rule 2 if 2 is applicable to some form that has undergone 1 but wouldn't be applicable to the same form if it had not undergone 1. (Informally, Rule 1 creates a suitable input for Rule 2.)

(63) Example: Guinaang Kalinga (dialect of Lubuagan Kalinga, Austronesian language from the Philippines with 12,000-15,000 speakers)

a. Assume that there are lots of examples like (a), where the first stem vowel is not unstressed [o].

a)	dábo	(hypothetical)	d**in**ábo	(hypothetical)
b)	dopá	'fathom'	d**im**pána	'he measured by fathom'
c)	gobá	'firing (pots)'	g**im**bána	'she fired'
d)	ʔomós	'bath'	ʔ**im**m'osna	'she bathed'
e)	botáʔ	'broken piece'	b**in**táʔna	'she broke'
f)	ʔodáw	'requesting'	ʔ**in**dáwna	'he requested'
g)	bosát	'sudden break'	b**in**sátna	'she snapped'
h)	ponú	'filling'	p**in**núna	'she filled'
i)	toʔóp	'satisfaction'	t**in**ʔópna	'he satisfied'
j)	sogób	'burning'	s**iŋ**góbna	'he burned'
k)	doŋól	'report'	d**iŋ**ŋólna	'he heard'
l)	ʔolót	'tightening'	ʔ**il**lótna	'he made tight'
m)	ʔowá	'doing, making'	ʔ**iŋ**wána	'he made, did'

★ Account for the different allomorphs of the infix /-in-/. Give a derivation for [dimpána]. (Getting the features right in (l) and (m) is hard—don't worry much about it.)

★ Can we get a feeding interaction with simultaneous application? (Let's try it on [dimpána].)

★ A variant on simultaneous application is: all rules that can apply simultaneously to the input, then again, all rule that can apply simultaneously to the resulting form, and so on until no more rules are applicable. How would that work for [dimpána]?

4.2 Bleeding

(64) Rule 1 **bleeds** Rule 2 if 2 is not applicable to some form that has undergone 1, but would have been applicable to the same form if it had not undergone 1. (Informally, Rule 1 destroys a suitable input for Rule 2.)

(65) Example: English plural

pi-z	'peas'
tʰoʊ-z	'toes'
dɑl-z	'dolls'
pʰæn-z	'pans'
dɑg-z	'dogs'
læb-z	'labs'
kʰɪln-z	'kilns'
kʰæsp-s	'clasps'
mɪt-s	'mitts'
bloʊk-s	'blokes'
kʰɑf-s	'coughs'
glas-ɪz	'glasses'
fɪz-ɪz	'fizzes'
bɹænʃ-ɨz	'branches
bædʒ-ɪz	'badges'
wɪʃ-ɪz	'wishes'
gəɹɑʒ-ɪz	'garages'

★ Account for these three allomorphs—that includes choosing an underlying form. Give a derivation for [wɪʃ-ɪz].

★ Can we get a bleeding interaction with simultaneous application? repeated simultaneous application? (Try them for for [wɪʃ-ɪz].)

4.3 Transparent vs. opaque interactions

(66) Feeding and bleeding interactions are called transparent, because, if we think of the two rules in declarative rather than procedural terms, (i) they are both satisfied in the resulting form, and (ii) this is achieved without superfluous changes:

a. Example: It is evident from the string [dimpána] that it satisfies both rules
   (i) "don't have unstressed [o] in the environment VC____ CV"
   (ii) "nasal must match following consonant in certain features"
b. Likewise, both rules below are obeyed by [wiʃɪz]
   (i) "adjacent obstruents must agree in voice"
   (ii) "don't have adjacent sibilants"

(67) In opaque interactions, this is not so.

4.4 Counterfeeding opacity

(68) Rule 2 counterfeeds Rule 1 if Rule 1 is ordered before Rule 2, and Rule 1 doesn't apply, but would have applied if Rule 2 had been ordered first (Rule 2 would have fed Rule 1 if the order had been reversed).

(69) In the simplest cases, a rule $A \longrightarrow B \ / \ X \_\_ Y$ has been counterfed if there exist surface representations containing XAY.

(70) Example: Palauan (Austronesian language from the Republic of Palau with about 15,000 speakers)

	X	*his/her/its X*	
a)	ɾákt^{h}	ɾəkt-ɛ́l	'sickness'
b)	sɛ́səb	səsəb-ɛ́l	'fire'
c)	bótk^{h}	bətk-ɛ́l	'operation'
d)	ɾíŋəl	ɾəŋəl-ɛ́l	'pain'
e)	kúk-	kəkú-l	'nail'
f)	ɾɛ́ːk^{h}	ɾɛk-ɛ́l	'rustling sound'
g)	ðəkóːl	ðəkol-ɛ́l	'cigarette'
h)	ʔíːs	ʔis-ɛ́l	'escape'
i)	búːʔə	buʔ-ɛ́l	'betel nut'

★ Account for length and quality alternations (you'll need 2 rules). Why does this interaction not qualify as transparent? How is it different from bleeding?

★ Can we capture this case with simultaneous rule application? Repeated simultaneous application? Try it for [ʔis-ɛ́l].

(71) Patterns which can be described with a counterfeeding rule order are also said to exhibit 'underapplication'.

4.5 Counterbleeding opacity

(72) Rule 2 counterbleeds Rule 1 if Rule 1 is ordered before Rule 2, and Rule 1 applies, but wouldn't have if Rule 2 had been ordered first (Rule 2 would have bled Rule 1 if the order had been reversed).

(73) In the simplest cases, a rule $A \longrightarrow B \ / \ X \_\_ Y$ has been counterbled if there exist surface representations containing B that was derived by the rule in environments other than $X\_\_ Y$.

(74) Example: Polish (Indo-European language from Poland with about 43 million speakers).

	sg.	*pl.*	
a)	trup	trupi	'horse'
b)	wuk	wuki	'bow'
c)	snop	snopi	'sheaf'
d)	kot	koti	'cat'
e)	nos	nosi	'nose'
f)	sok	soki	'juice'
g)	klup	klubi	'club'
h)	trut	trudi	'labor'
i)	grus	gruzi	'rubble'
j)	wuk	wugi	'lye'
k)	dvur	dvori	'mansion'
l)	bul	bole	'ache'
m)	pokuj	pokoji	'room'
n)	stuw	stowi	'table'
o)	z̨ur	z̨uri	'a kind of sour soup'
p)	ul	ule	'beehive'
q)	vuj	vuje	'uncle'
r)	muw	muwi	'mule'
s)	z̨wup	z̨wobi	'crib'
t)	lut	lodi	'ice'
u)	vus	vozi	'cart'
v)	ruk	rogi	'horn'

★ Account for the voicing and vowel-height alternations (you'll need 2 rules).

★ Why does this interaction not qualify as transparent? How is it different from feeding?

★ Can we capture this case with simultaneous rule application? Repeated simultaneous application? Try it for [ruk].

(75) Patterns which can be described with a counterbleeding rule interaction are also said to exhibit 'overapplication'.

4.6 Noninteraction

(76) Alternations in Zoque (first person prefix /N-/)

	N	my N	gloss		N	my N	gloss
a.	pama	mbama	'clothing'	e.	tatah	ndatah	'father'
b.	burro	mburru	'burro'	f.	disko	ndisko	'record'
c.	tsima	ndzima	'calabash'	g.	kaju	ŋgaju	'horse'
d.	ʧoʔngoja	ɲʤoʔngoja	'rabbit'	h.	gaju	ŋgaju	'rooster'

i.	faha	'belt' / 'my belt'	k.	sʌk	'beans' / 'my beans'	m.	ʃɑpun	'soap' / 'my soap'
j.	lawus	'nail' / 'my nail'	l.	ranʧo	'ranch' / 'my ranch'			

Sources: Wonderly (1951), International Journal of American Linguistics 17.2:105-123. Padgett (1995) Stricture in Feature Geometry, Stanford: CSLI Publications.

(77) Rules for Zoque

a. Nasal Place Assimilation

$$\begin{bmatrix} +cons \\ +nasal \end{bmatrix} \longrightarrow [\ \alpha place\ ] \ / \ \underline{\quad} + \begin{bmatrix} +cons \\ -cont \\ \alpha place \end{bmatrix}$$

Condition: First-person prefix. (In fact other prefixes undergo the alternation too.)

b. Voicing Assimilation

$$[\ +cons\ ] \longrightarrow [\ +voice\ ] \ / \ \begin{bmatrix} +cons \\ +nasal \end{bmatrix} \ \underline{\quad}$$

c. Nasal deletion

$$\begin{bmatrix} +cons \\ +nasal \end{bmatrix} \longrightarrow \emptyset \ / \ \underline{\quad} + \begin{bmatrix} +cons \\ +cont \end{bmatrix}$$

★ What is unsatisfactory about the Voicing Assimilation rule? Can you suggest a way to write the rule which addresses this problem?

★ No ordering relation can be established between Zoque nasal place assimilation and voicing rules. Why?

(78) Questions left unanswered:

a. Why is a (stop) consonant voiced after a nasal?

b. Why is the nasal deleted before a fricative?

(79) Zoque II: monomorphemic words

camdʌhkaʔopya	'he meditates'	kendʸoʔpya	'he wants to look'
minba	'he comes'	maŋba	'he goes'

★ Why doesn't the Nasal Assimilation rule apply above?

(80) Sources: Wonderly (1951), International Journal of American Linguistics 17.2:105-123. Padgett (1995) Stricture in Feature Geometry, Stanford: CSLI Publications. See also Kenstowicz & Kisseberth 1979:35.

4.7 Other issues with rules and orderings

(81) In SPE, all these types of rule interaction (represented as different orderings) have equal status—no ordering is more or less favored than any other.

a. Consequenlty, rule ordering of this type predicts that all types of interaction should exist, perhaps with equal commonality.

b. This might also be taken to mean that learners should be able to learn transparant and opaque patterns equally well.

(82) There have also been proposals to...

a. rule out certain types of interaction entirely (requires reanalysis of purported cases)

b. make certain types of interaction the default, with others needing to be stipulated by the grammar.

(83) What is the functional purpose of the rule?

a. E.g. in Zoque above, the rule eliminate [+nasal][-voice] sequences.

(84) If rules 'repair' bad structure, are there other ways to repair them?

a. Could there be another language that eliminates [+nasal][-voice] sequences by deletion? metathesis? denasalization?

4.8 Review

(85) 5 types of rule interaction:

a. Feeding
b. Bleeding
c. Counterfeeding
d. Counterbleeding
e. None

(86) Phonological processes which are 'transparant' are ones in which the declarative statement or 'goal' of the rules are satisfied in the surface form.

a. E.g. processes describable with feeding and bleeding rule interactions as in Guinaang Kalinga *-in-* infixation and in English plurals, respectively.

(87) Phonological process which are 'opaque' are ones in which the declarative statement or 'goal' of the rules are not satisfied in the surface form.

a. Phonological processes which are said to 'underapply' are often associated with patterns that are describable with a counterfeeding rule interaction (as in Paluan).
b. Phonological processes which are said to 'overapply' are ofen associated with patterns describable with a counterbleeding rule interaction (as in Polish).

(88) Sometimes there is no interaction between two rules and it does not matter in which order they apply (as in Zoque)

(89) Recall the two kinds of hypothesis K&K discussed in the beginning of their book.

a. The null hypothesis says "Everything is memorized". E.g. there is no grammar.
b. A rule-based account separates the idiosyncratic from the predictable. There is a grammar which is productive and allows us to apply the grammar in new ways.

4.9 Polish Revisited: Opacity and Productivity

(90) Rules

a. ɔ-Raising: ɔ $\longrightarrow$ u / C $\underline{\quad}$ [-nasal,+voice]#
b. Final C-Devoicing: [-sonorant] $\longrightarrow$ [-voice] / $\underline{\quad}$ #
c. Final C-Devoicing counterbleeds ɔ-raising

(91) (Sanders 2003) Final devoicing counterbleeds Vowel Raising.

a. Final Devoicing: "This generalization holds true of all Polish words, regardless of language of origin, morphological features, or grammatical category. . . "

(92) ɔ-Raising is not as productive! Exceptions, loans:

stem UR	*Nom sg*	**Nom sg*	*Nom pl*	*gloss*
/kɔlɔr/	kɔlɔr	*kɔlur	kɔlɔrɪ	'card suit'
/xɔl/	xɔl	*xul	xɔlɛ	'lobby'
/parasɔl/	parasɔl	*parasul	parasɔlɛ	'umbrella'
/kɔvbɔj/	kɔvbɔj	*kɔvbuj	kɔvbɔjɛ	'cowboy'
/grutʃɔw/	grutʃɔw	*grutʃuw	grutʃɔwɪ	'gland'
/glɔb/	glɔp	*glup	glɔbɪ	'globe'
/snɔb/	snɔp	*snup	snɔbɪ	'snob'
/ɛpjizɔd/	ɛpjizɔt	*ɛpjizut	ɛpjizɔdɪ	'episode'
/kɔd/	kɔt	*kut	kɔdɪ	'code'
/nɛkrɔlɔg/	nɛkrɔlɔk	*nɛkrɔluk	nɛkrɔlɔgi	'obituary'
/prɔlɔg/	prɔlɔk	*prɔluk	prɔlɔgi	'prologue'
/rɛkɔrd/	rɛkɔrt	*rɛkurt	rɛkɔrdɪ	'record'
/fjɔrd/	fjɔrt	*fjurt	fjɔrdɪ	'fjord'

(93) "The number of lexical exceptions, especially in recent loanwords, strongly suggests that the back vowel alternation is not synchronically productive..." (p. 53).

(94) A wug test

a. 2 subjects.

b. Stimuli: plurals of Polish sounding non-words like *szlapogy* ('szlapogs') embedded in sentences

c. Task:form the singular, where the voiced C is in final position.

d. Example stimuli:

> Bardzo ładne źnabody dały Jankowi kawę, nie herbatę.
> Bardzo ładne szlapogy dały Jankowi kawę, nie herbatę.
> (etc.)
> 'The very pretty źnabods (szlapogs, ...) gave John coffee, not tea.'

e. Example target (production) sentences:

> Jeden bardzo ładny _____ pożyczył Jankowi i pieniądze, i koszulę.
> 'One very pretty _____ lent John both money and a shirt.'

f. Results: Inspection of the vowel height in the nonce forms is in the same category as the vowel height of the plurals. It appears raising does not apply to nonce forms.

(95) Sanders concludes Polish ɔ-raising is not productive and not a part of the synchronic grammar.

References

Chomsky, Noam and Morris Halle. 1968. *The Sound Pattern of English*. Harper & Row.

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