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Discussion Handout 7

2023 Apr 10/11

(1) Today:
   a. Rule Notation
   b. Universal Features in Rule Writing
   c. Rule Ordering
   d. Practice

1 Rule Notation

(2) Target → Structural Change / Context
   a. Target: A natural class which undergoes change
   b. Structural Change: The features which this natural class gains in a certain context
   c. Context: The context in which the Target changes, where "__" represents the target
   d. Read as: [Target] becomes [Structural Change] when [Context].

(3) Special symbols:
   a. # represents a word boundary (either the beginning or ending of a word):
      __# means that the target is word final.
   b. $[_\sigma$ and $]_\sigma$ represents the beginning and ending of a syllable:
      __$]_\sigma$ means that the target is syllable final.
   c. ∅ represents null (nothing):
      (i) X → ∅ represents deletion of X
      (ii) ∅ → X represents epenthesis of X
   d. C represents consonants, V represents vowels
   e. X_n^m means any number of X segments between n and m. If no upper bound is listed, assume infinite.
   f. Greek letters: α, β, γ, etc. represent variable values.
   g. PLACE represents any place features (major or minor).
   h. FEAT represents all features.

Examples:

(4) a. $\left[+ \ \text{CONT}\right] \rightarrow \left[+ \ \text{COR}\right] / \_\_ \left[+ \ \text{COR}\right]_2$
Read as: Continuants become coronal before two or more (consecutive) coronal segments.

b. $\begin{bmatrix} + & \text{VOI} \\ - & \text{SON} \end{bmatrix} \rightarrow \left[\alpha \ \ \text{PLACE}\right] / \_\_ \begin{bmatrix} \alpha & \text{PLACE} \\ + & \text{NAS} \\ - & \text{SYL} \end{bmatrix} \#$
Read as: Voiced obstruents (non-sonorants) assimilate in place with (become the same place as) following nasal consonants word finally

2 Universal Feature Theory in Rule Writing

(5) Some varieties of Spanish:
a. /b/ becomes [β] between vowels (intervocalically)
b. /d/ becomes [ð] between vowels (intervocalically)
c. /g/ becomes [ɣ] between vowels (intervocalically)

Do we want three rules to explain this? Do Spanish speakers process this as three different processes?

(6) Generalization:
Voiced plosives become fricatives intervocalically.

We want a single rule which explains all of these processes.

(7) First try, just names, no features:
Voiced Plosive → Fricative / Vowel __ Vowel

Let's find which (smallest number of) features define each of these groups.

(8) a. Voiced Plosives $= \begin{bmatrix} + & \text{VOI} \\ - & \text{SON} \\ - & \text{DELREL} \end{bmatrix}$

b. Difference between plosives and fricatives $= \begin{bmatrix} + & \text{DELREL} \\ + & \text{CONT} \end{bmatrix}$

c. Vowels $= \begin{bmatrix} + & \text{SYL} \\ - & \text{CONS} \end{bmatrix}$, or just V

Then plug in:

(9) Second try, features:
$\begin{bmatrix} + & \text{VOI} \\ - & \text{SON} \\ - & \text{DELREL} \end{bmatrix} \rightarrow \begin{bmatrix} + & \text{DELREL} \\ + & \text{CONT} \end{bmatrix} /\text{V}\_\_\text{V}$

Do we need to specify $[-\text{SON}]$ in the previous analysis?

(10) Parsimony:
- a. Express classes and rules with the fewest number of symbols
- b. Generalize as much as the data permits
- c. Why? Because that is what people tend to do with phonological data:
  - (i) Learners make the broadest generalizations unless given data which contradicts the generalizations they make.
  - (ii) Acquisition tends to go through stages of overgeneralization, cf. 'goed'

3 Kinds of Sound Change

(11) Assimilation and Dissimilation
- a. Features change to be similar (assimilation) or dissimilar (dissimilation) with surrounding segments.
- b. Progressive: conditioner precedes target (feature spreads rightwards): preserve feature and change late.
- c. Regressive: conditioner follows target (feature spreads leftwards): anticipate feature and change early.
- d. Vowel Harmony: feature change only occurs to vowels, intervening consonants are ignored.
- e. When writing rules: use greek letter variables: e.g. $[\alpha\text{PLACE}]$, in both structural change and condition.

(12) Deletion and Epenthesis:
- a. Deletion or Creation (Epenthesis) of a segment.
- b. When writing rules: use $\varnothing$, in target for epenthesis, in structural change for deletion.

(13) Metathesis:
- a. Two segments switch ordering.
- b. When writing rules: subscripts to represent different orderings:
- c. $\begin{bmatrix} - & \text{SON} \end{bmatrix}_a \begin{bmatrix} + & \text{SON} \\ - & \text{SYL} \end{bmatrix}_b \rightarrow C_b C_a$

(14) Reasons to have sound change:
- a. Ease of articulation:
  - (i) Changing between segments with different features means moving muscles for each different feature!
  - (ii) Consonant clusters can be hard to pronounce!
  - (iii) Too many syllables means too much time spent talking!
- b. Ease of perception:
  - (i) Too many similar sounds make it difficult to distinguish repetition from unique words (did he say 'go-go' or did he just say 'go' twice by accident?)
  - (ii) Consonant clusters can be hard to hear clearly!

4 Ordering of Multiple Rules

(15) Languages don't just have one sound change rule!

a. Processes may require multiple rules to describe accurately
b. However, the output of one rule might be the context for the input of another rule.
c. How do we determine the ordering of rules? Do rules need orderings?

(16) If two sound changes deal with completely different targets and contexts, then they may not ever influence the other:

a. For all inputs:
input > Rule A > Rule B is the same as
input > Rule B > Rule A
Then there is no strict ordering.
b. This must be the case for all inputs in order to hold true!

(17) There are four kinds of interactions:

a. Feeding
b. Bleeding
c. Counterfeeding
d. Counterbleeding

(18) TL;DR:

	A > B (Reality)	B > A (Could've been)
A Feeds B	B applies	B does not apply
A Bleeds B	B does not apply	B applies
B Counterfeeds A	A does not apply	A applies
B Counterbleeds A	A applies	A does not apply

4.1 Feeding

(19) Feeding is about what was enabled to happen "downstream":
Rule A feeds Rule B if:

a. Rule A applies before Rule B,
b. There is a word to which Rule A and Rule B apply, and
c. For that word, if Rule A did not apply first, the context for Rule B to apply would not exist.

In Tagalog, there is a word /ganap-in/ → [gampin] such that both deletion and assimilation apply, and if deletion did not apply, the context for assimilation would not exist.

(20) Feeding in Tagalog:

a. What it is:

	/kapit-in/	/ganap-in/	/banig-in/
V → ∅ / VC__CV	[kaptin]	[ganpin]	[bangin]
$[+\ \text{COR}] \rightarrow [\alpha\ \text{PLACE}] / \_\_ \begin{bmatrix} \alpha & \text{PLACE} \\ - & \text{SYL} \end{bmatrix}$	—	[gampin]	[baŋgin]

b. What could've been:

	/kapit-in/	/ganap-in/	/banig-in/
$[+\ \text{COR}] \rightarrow [\alpha\ \text{PLACE}] / \_\_ \begin{bmatrix} \alpha\ \text{PLACE} \\ -\ \text{SYL} \end{bmatrix}$	—	—	—
$\text{V} \rightarrow \varnothing\ /\ \text{VC}\_\_\text{CV}$	[kaptin]	[ganpin]	[bangin]

4.2 Bleeding

(21) Bleeding is about what was prevented "downstream":
Rule A bleeds Rule B if:

a. Rule A applies before Rule B,
b. There is a word to which Rule A applies, and
c. For that word, if Rule A did not apply first, the context for Rule B to apply would exist.

In English, there is a word /glæs-z/ → [glæsɪz] such that epenthesis applies to it, and if epenthesis did not apply, the context for voice assimilation would exist, but because epenthesis did apply, the context for voice assimilation no longer exists.

(22) Bleeding in English:

a. What it is:

	/kæt-z/	/glæs-z/	/dɔg-z/
$\varnothing \rightarrow \text{ɪ} / [+\ \text{STRID}] \_\_ [+\ \text{STRID}]$	—	[glæsɪz]	—
$[+\ \text{STRID}] \rightarrow [-\ \text{VOI}] / [-\ \text{VOI}] \_\_$	[kæts]	—	—

b. What could've been:

	/kæt-z/	/glæs-z/	/dɔg-z/
$[+\ \text{STRID}] \rightarrow [-\ \text{VOI}] / [-\ \text{VOI}] \_\_$	[kæts]	[glæss]	—
$\varnothing \rightarrow \text{ɪ} / [+\ \text{STRID}] \_\_ [+\ \text{STRID}]$	—	[glæsɪs]	—

4.3 Counterfeeding

(23) Counterfeeding is about what could've been enabled "downstream":
Rule B counterfeeds Rule A (Rule A is counterfed by Rule B) if:

a. Rule A applies before Rule B,
b. If Rule B applied before Rule A, then Rule B would feed Rule A.

In Catalan, there is a word /sant/ → [san] such that nasal deletion does not apply to it, but if cluster reduction occurred before nasal deletion, then nasal deletion would apply to it.

(24) Counterfeeding in Catalan:

a. What it is:

	/san/	/sant/	/əskerp/
$\text{n} \rightarrow \varnothing\ /\ \_\_\#$	[sa]	—	—
$\begin{bmatrix} -\ \text{SYL} \\ -\ \text{LAB} \end{bmatrix} \rightarrow \varnothing / \text{C}\_\_\#$	—	[san]	—

b. What could've been:

	/san/	/sant/	/əskerp/
$\begin{bmatrix} - & \text{SYL} \\ - & \text{LAB} \end{bmatrix} \rightarrow \varnothing / \text{C}__\# $	—	[san]	—
$\text{n} \rightarrow \varnothing \ / \ \_\_\#$	[sa]	[sa]	—

4.4 Counterbleeding

(25) Counterbleeding is about what could've been prevented "downstream":
Rule B counterbleeds Rule A (Rule A is counterbled by Rule B) if:
a. Rule A applies before Rule B,
b. If Rule B applied before Rule A, then Rule B would bleed Rule A

In Polish, there is a word /ʒwob/ → [ʒwup] such that raising applies to it, but if devoicing applied before raising, then raising would not have applied to it.

(26) Counterbleeding in Polish:
a. What it is:

	/ʒwob/	/ʒwobi/	/trud/
$\begin{bmatrix} + & \text{BACK} \\ - & \text{LOW} \end{bmatrix} \rightarrow \begin{bmatrix} + & \text{HI} \end{bmatrix} .\_\_ \begin{bmatrix} - & \text{SYL} \\ + & \text{VOI} \end{bmatrix} \#$	[ʒwub]	—	—
$\begin{bmatrix} - & \text{SON} \end{bmatrix} \rightarrow \begin{bmatrix} - & \text{VOI} \end{bmatrix} / \_\_\#$	[ʒwup]	—	[trut]

b. What could've been:

	/ʒwob/	/ʒwobi/	/trud/
$\begin{bmatrix} - & \text{SON} \end{bmatrix} \rightarrow \begin{bmatrix} - & \text{VOI} \end{bmatrix} / \_\_\#$	[ʒwop]	—	[trut]
$\begin{bmatrix} + & \text{BACK} \\ - & \text{LOW} \end{bmatrix} \rightarrow \begin{bmatrix} + & \text{HI} \end{bmatrix} .\_\_ \begin{bmatrix} - & \text{SYL} \\ + & \text{VOI} \end{bmatrix} \#$	—	—	—

Note!! For /ʒwob/, both Rule A and Rule B apply, doesn't that mean that Rule A feeds Rule B? No: Rule B would apply without Rule A, so it is not considered a feeding configuration.

5 Practice

5.1

This data set contains words in both singular and plural form. What word endings are added to make the singular and plural? What are the roots of each word? Find the rules that determine the sound changes in this dataset; are the rules crucially ordered? If so, what relationship do the rules have?

(27)

Meaning	singular	plural
wildflower	pɛ	pɛt
cotton	lœb	lœβət
mouse	fyəs	fyəsət
dewdrop	sik	sikət
sunlight	falaɢ	falaʁət
sedge	ɔpaəd	ɔpaəðət
dandelion	aβɔt	aβɔtət
rivulet	tisa	tisat

5.2

Suppose a language has the following two rules, ordered as follows:

(28) a. $[+\ \text{SYL}] \rightarrow \begin{bmatrix} + & \text{ROUND} \\ - & \text{FRONT} \\ + & \text{BACK} \end{bmatrix} / \_\_ \, [+\ \text{ROUND}]$

b. $[+\ \text{COR}] \rightarrow \begin{bmatrix} - & \text{ANT} \\ + & \text{DIST} \end{bmatrix} / \_\_ \begin{bmatrix} + & \text{HI} \\ + & \text{FRONT} \end{bmatrix}$

The language in question has the following phonemic inventory:

(29) a.

	Bilabial	Alveolar	Unrounded Velar	Rounded Velar	Pharyngeal
Nasal	m	n	ŋ	$ŋ^w$	
Oral Stop	p b	t d	k g	k^w g^w	ʔ
Fricative	ɸ β	s z	x ɣ	x^w $ɣ^w$	ʜ
Approximant		l	ɯ̞	w	

b.

	Front	Central	Back
Close	i y		u
Mid	e ø		o
Open		a	

If this language only has CV syllables; come up with a possible word in this language for which the first rule applies; one where the second rule applies.

What kind of relationship do the two rules, crucially ordered, have? Can you think of a possible word which would demonstrate this?

5.3

This data set contains words in multiple case endings. What are the forms of each case? What are the roots of each word? Find the rules that determine the sound changes in this dataset; are the rules crucially ordered? If so, what relationship do the rules have?

(30)

Meaning	absolutive	ergative	dative	ablative	locative
woman	guhate	guhatene	guhatefu	guhatego	guhateŋa
man	hapi	hapne	hapfu	hapgo	hapŋa
kinfolk	d͡zapa	d͡zapane	d͡zapafu	d͡zapago	d͡zapaŋa
ginger	t͡sot	t͡sodne	t͡sotfu	t͡sodgo	t͡sodŋa
grass	fed	fedne	fetfu	fedgo	fedŋa
bowl	kas	kasne	kasfu	kasgo	kasŋa
flour	t͡sit͡si	t͡sit͡sne	t͡sit͡sfu	t͡sit͡sgo	t͡sit͡sŋa
water	nomu	nomne	nomfu	nomgo	nomŋa
mountain	pelad͡z	pelad͡zne	pelat͡sfu	pelad͡zgo	pelad͡zŋa
horse	pego	pegone	pegofu	pegogo	pegoŋa
arrow	sipik	sipigne	sipikfu	sipiggo	sipigŋa
lottery	gesu	gesne	gesfu	gesgo	gesŋa
rain	kot͡s	kod͡zne	kot͡sfu	kod͡zgo	kod͡zŋa
peppercorn	sefum	kesumne	kesumfu	kesumgo	kesumŋa
wheel	lep	lebne	lepfu	lebgo	lebŋa
hole	badu	badne	badfe	badgo	badŋa