Class 5: Rule+constraint theories; more big-picture stuff

To do
- Study questions for Tuesday: Prince & Smolensky excerpt
- Assignment on this week's material will be posted by tonight—due next Friday

Overview: We'll try to make the framework for rule/constraint interaction more explicit (and find more problems in so doing).

1. Recall blocking and triggering

Here's my attempt lay out the simplest version of what we want constraints to do

In all rule theories, applying Rule i in a derivation begins this way
- Form at current state of derivation, $form_{i-1}$, is saved as CURRENT

In a theory without constraints (SPE-style), it continues this way
- Apply Rule *i* to CURRENT, yielding $form_i$
- Replace CURRENT with $form_i$

Blocking continues this way:
- Apply Rule *i* to CURRENT, yielding $form_i$—save $form_i$ as TENTATIVE
- Does TENTATIVE violate the constraint?
  - If yes, make no change to CURRENT
  - If no, replace CURRENT with TENTATIVE

Triggering continues this way:
- Does CURRENT violate the constraint?
  - If no, make no change to CURRENT
  - If yes, apply Rule *i* to CURRENT, yielding $form_i$—save $form_i$ as TENTATIVE
    - Does TENTATIVE violate the constraint?
      - If no, replace CURRENT with TENTATIVE
      - If yes, make no change to CURRENT and proceed to next rule

2. Implementing triggering: Sommerstein's (1974) proposal (underlining is mine)

- "A P-rule R is <u>positively motivated</u> with respect to a phonotactic constraint C just in case the input to R contains a matrix or matrices violating C AND the set of violations of C found in the output of R is null or is a proper subset of the set of such violations in the input to R." (p. 74)

- "A rule, or subcase of a conspiracy, positively motivated by phonotactic constraint C does not apply unless its application will <u>remove or alleviate a violation</u> or violations of C." (p. 75)
  - Later modified: "a rule applies if its application will remove or alleviate a violation of AT LEAST ONE of its motivating constraints" (p. 87)

3. Latin example (Sommerstein p. 87; slightly re-formatted)

genitive sg.	*nominative sg.*	*UR*	
lakt-is	lak	/lakt/	'milk'
kord-is	kor	/kord/	'heart'

- *deletion* $\begin{bmatrix} \text{–continuant} \\ \text{<–voice>} \end{bmatrix} \rightarrow \emptyset \,/\, \begin{bmatrix} \text{+consonantal} \\ \text{–sonorant} \\ \text{–continuant} \end{bmatrix} \_\_\ \#$[1]
  - positively motivated by constraints that are **surface-true** in the language:[2]
- *no final voiced in cluster* $*\ [\text{+consonantal}] \begin{bmatrix} \text{+consonantal} \\ \text{+voice} \end{bmatrix} \#$ (p. 82)
- *final obst. restrictions* if $\underset{1}{\begin{bmatrix} \text{–sonorant} \\ \text{<–continuant>} \end{bmatrix}} \underset{2}{[\text{–sonorant}]}\ \#$ then 2 is $\begin{bmatrix} \text{+coronal} \\ \text{<+continuant>} \end{bmatrix}$ (p. 82)
  - i.e., [st], [ps], [ks] are OK

○ With those constraints, how can we simplify the deletion rule?

- A derivation might look like this:

	/lakt/	/kord/	/reːks/
violates no final voiced in cluster*?*	no	yes	no
violates final obstruent cluster restrictions*?*	yes	no	no
if so, tentatively apply deletion			NA
is the violation alleviated/eliminated?			NA
if so, accept the change (else don't)			NA

we'll have to fill in the rest according to how we formulate the rule.

4. Multiple available repairs

- Imagine a Roman, Caecilius, who for some reason ends up with this rule too:
  [] → [–voice]

○ How does our derivation change (assuming Caecilius sounds the same as other Romans)? Do we need to add more information to his grammar?

[1] Kaeli Ward pointed out that this rule schema doesn't exactly do what we want: if a voiceless word-final C fails to be preceded by a stop, it can still delete under the shorter version, which deletes any word-final stop that's after another consonant.

[2] Actually, Sommerstein refers to a different constraint (16 on p. 79), but that seems to be the wrong one for /lakt/.

- Imagine Caecilius's neighbor, Metella, who for some reason has this rule (plus the normal Latin rule):
  [] → [+continuant]

  - How does our derivation change (again, assuming Metella sounds like everyone else)? Do we need to add more information to her grammar?

5. Partial violation, violation alleviation

- Under Sommerstein's conception, a constraint doesn't have to be surface-true to be part of the grammar [bold mine] (p. 76):

  "The DEGREE OF VIOLATION $V_{M,C}$ to which a matrix M violates a phonotactic constraint C is equal to the **cost** of the minimal structural change necessary to turn M into a matrix satisfying C.
  "The application to a matrix M of operation A ALLEVIATES a violation in M of phonotactic constraint C just in case the output M´ of such application is such that $0 < V_{M',C} < V_{M,C}$."

  - Can you invent a case where a violation could be alleviated without being eliminated? (it's hard to think of non-silly cases; Sommerstein himself introduces this idea just to keep the possibility open, not because he has any data that require it.)

6. Implementing blocking: taking inspiration from Sommerstein...

- A P-rule R is <u>negatively motivated</u> with respect to a phonotactic constraint C just in case the <u>tentative output of</u> R contains a matrix or matrices violating C AND the set of violations of C found in the input to R is null or is a proper subset of the set of such violations in the tentative output of R.

- A rule that is negatively motivated by phonotactic constraint C does not apply if its application will <u>create or worsen a violation</u> or violations of C.

- The application to a matrix M of operation A <u>worsens</u> a violation in M of phonotactic constraint C just in case the output M´ of such application is such that $V_{M',C} > V_{M,C}$

7. What a derivation might look like

- syncope rule $V \rightarrow \emptyset \,/\, C\_\_C$
- cluster constraint $* \begin{Bmatrix} \# \\ C \end{Bmatrix} C \begin{Bmatrix} \# \\ C \end{Bmatrix}$

	/abito/	/ildoku/	/uda/	/brodu/
tentatively apply syncope	(abto)	(ildku)	NA	
does this create/worsen violation of cluster constr.?	no	yes	NA	
if not, accept the change (otherwise reject)	abto	ildoku	NA	
	[abto]	[ildoku]	[uda]	

8. Blocking vs. triggering: Myers's (1991) persistent rules

- <u>Zulu</u>: prenasalized affricates, but no prenasalized fricatives. We might propose a constraint:[3]

$$* \begin{bmatrix} \text{+continuant} \\ \text{+nasal} \end{bmatrix}$$

- Here is a prefix that creates prenasalized consonants (p. 329):

singular	*plural*	
uː-bambo	izi-^{m}ba^{m}bo	'rib'
uː-p^{h}ap^{h}e	izi-^{m}pap^{h}e	'feather'
ama-t^{h}at^{h}u	ezi-^{n}tat^{h}u	'three'
uː-k^{h}uni	izi-^{ŋ}kuni	'firewood'

- ○ Assume the underlying form of the prefix is /izin/. Formulate a prenasalization rule.

- Here's what happens when the prefix attaches to a fricative-initial stem:

singular	*plural*	
eli-ʃa	e-^{n}t͡ʃa	'new'
uː-fudu	izi-^{m}p͡fudu	'tortoise'
uː-sizi	izi-^{n}t͡sizi	'sorrow'
uː-zwa	izi-^{n}d͡zwa	'abyss'
uː-zime	izi-^{n}d͡zime	'walking staff'
uː-ɮubu	izi-^{n}d͡ɮubu	'groundnut'
uː-ʃikisi	izi-^{n}t͡ʃikisi	'quarrelsome person'

[3] Myers actually uses autosegmental representations.

- What would happen if prenasalization were subject to blocking by the constraint above?

  - Myers proposes instead a "**persistent rule**"—it tries to apply at every point in the derivation, so that any time its structural description is created, it immediately gets changed.

$$\begin{bmatrix} \text{+nasal} \\ \text{+continuant} \end{bmatrix} \rightarrow \begin{bmatrix} \text{+delayed release} \\ \text{–continuant} \end{bmatrix}$$ i.e., nasal fricative → affricate

- Let's spell out what the derivation would look like.

- Can we recast this as a simpler rule that is triggered by the constraint?

Summary of today:
- We've tried to make a rules+constraints theory really work.
- You should now feel uncomfortable about ignoring conspiracies, yet also uncomfortable about exactly how constraints are supposed to work.
  - Now you know how many phonologists felt through the 1970s and 1980s.

Next:
- Your next reading is excerpts from Prince & Smolensky's 1993 manuscript introducing Optimality Theory (OT), an all-constraint theory.
- Next week we'll cover the basics of OT.
- The rest of the course will explore the differing predictions that SPE, OT, and their variants make about phonologies.

References

Myers, Scott. 1991. Persistent rules. *Linguistic Inquiry* 22. 315–344.
Sommerstein, Alan. 1974. On phonotactically motivated rules. *Journal of Linguistics* 10. 71–94.