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

To do
- Study questions for Monday: Prince & Smolensky excerpt
- Assignment on last week's material is due tomorrow to my mailbox in Campbell 3125, which closes at 5 PM.
- 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. Implementing triggering: Sommerstein's (1974) proposal (underlining is mine)

Simple example of triggering, as a reminder:

Ø → i (rule) only when required by *CC (constraint)

- "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)
  - Note that this has to be checked on a case-by-case basis (the "input to R" and the "output of R" differ depending on what form we're working on)
- "A rule [...] 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)
- What is "alleviate"?
  - Imagine an underlying form /abstro/
  - Can Ø → i help with *CC?
- Sommerstein's definition (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 $0 < V_{M',C} < V_{M,C}$."

2. 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, try to simplify the deletion rule

- A derivation might look like this:

	/lakt/	/kord/	/re:ks/
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.

[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/.

3. 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?

- Imagine Caecilius's spouse, 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?

4. Partial violation, violation alleviation

- As we saw, for Sommerstein a constraint doesn't have to be surface-true to be part of the grammar
  - You could have a constraint whose violations are only ever alleviated, not eliminated

  - Can we invent another case or two 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.)

5. Implementing blocking: taking inspiration from Sommerstein (he didn't say this)...

Simple example of blocking, as a reminder:

V → Ø (rule) unless prohibited by *CC (constraint)

- A P-rule R is negatively motivated with respect to a phonotactic constraint C just in case the tentative output of 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 create or worsen a violation or violations of C.
- The application to a matrix M of operation A worsens a violation in M of phonotactic constraint C just in case the output M´ of such application is such that $V_{M',C} > V_{M,C}$

6. What a derivation might look like

- syncope rule V → Ø / 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 [abto]	ildoku [ildoku]	NA [uda]	

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

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

[3] Myers actually uses autosegmental representations, which we'll learn about in the final third of the course.

- 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-$^{n}\widehat{\text{tʃ}}$a	'new'
uː-fudu	izi-$^{m}\widehat{\text{pf}}$udu	'tortoise'
uː-sizi	izi-$^{n}\widehat{\text{ts}}$izi	'sorrow'
uː-zwa	izi-$^{n}\widehat{\text{dz}}$wa	'abyss'
uː-zime	izi-$^{n}\widehat{\text{dz}}$ime	'walking staff'
uː-ɮubu	izi-$^{n}\widehat{\text{dɮ}}$ubu	'groundnut'
uː-ʃikisi	izi-$^{n}\widehat{\text{tʃ}}$ikisi	'quarrelsome person'

- 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?

8. Summary

- We've tried to make a rules+constraints theory work, really spelling out the details.
- 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.

The "conceptual crisis" ((Prince & Smolensky 2004), p. 1)

- Since Kisseberth 1970, constraints were taking on a bigger and bigger role. But as we saw there were open questions…

  - Why aren't constraints always obeyed?
    - Korean avoids VV and CC through allomorph selection (narrow-ish transcription):

plain	*nominative*	
ton	ton-i	'money'
saɾam	saɾam-i	'person'
koŋ	koŋ-i	'ball'
namu	namu-ga	'tree'
pʰaɾi	pʰaɾi-ga	'fly'
kʰo	kʰo-ga	'nose'
ɕ*i	ɕ*i-ga	'seed'

    - And yet, CC and VV occur in the language

plain	*locative*
namu	namu-e
kʰo	kʰo-e
	plural
saɾam	saɾam-dɨl
koŋ	koŋ-dɨl

  - What happens if there's more than one way to satisfy a constraint? (discussed last time)

    grammar: *CC, C → Ø, Ø → i
    - What happens to /absko/??

    - Maybe we need to prioritize the rules that could be triggered (e.g., through ordering).
    - Can different constraints prioritize rules differently?
    - If the grammar is actually {*CC, *C#, C → Ø, Ø → i}, what happens to /ubt/??

- Relatedly, what happens when constraints conflict?
  - What if one constraint wants to trigger a rule, but another wants to block it?

  grammar: {*VV, *?$\left[\begin{smallmatrix} \text{V} \\ \text{–stress} \end{smallmatrix}\right]$, Ø →ʔ}

  (based on Dutch; data from Booij 1995 via Smith 2005)

  - What happens to /aórta/?? /xáos/??

  - Must the grammar prioritize constraints?

- Should a rule be allowed to look ahead in the derivation to see if applying alleviates a constraint violation? (how far?)
  grammar: {*C#, C → [–voice], [–voice] → Ø}

  - What happens to /tab/??

  - Or does the alleviation have to be immediate?

- Relatedly, is a rule allowed to make things *worse* if a later rule will make them better?
  grammar: {*CCC, Ø → p / m__s, $\begin{smallmatrix} \text{C} & \text{C} & \text{C} & \text{C} \\ 1 & 2 & 3 & 4 \end{smallmatrix}$ → 3}
  - What happens to /almso/??

- Can a constraint prohibit a certain type of <u>change</u>, rather than a certain structure?

Coming up:
- 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.
- Then the middle third of the course will explore the differing predictions that SPE, OT, and their variants make about phonologies.

References

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Sommerstein, Alan. 1974. On phonotactically motivated rules. *Journal of Linguistics* 10. 71–94.