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:

\[ \emptyset \rightarrow i \] (rule) only when required by *CC (constraint)

• “A P-rule R is positively motivated 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 remove or alleviate a violation 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/
    o Can \[ \emptyset \rightarrow i \] 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)

<table>
<thead>
<tr>
<th>genitive sg.</th>
<th>nominative sg.</th>
<th>UR</th>
</tr>
</thead>
<tbody>
<tr>
<td>lakte</td>
<td>lak</td>
<td>/lakt/</td>
</tr>
<tr>
<td>kord</td>
<td>kor</td>
<td>/kord/</td>
</tr>
</tbody>
</table>

- deletion \[ \text{[\text{-continuant}]} \rightarrow \emptyset / \text{[\text{+consonantal} \text{\text{-sonorant} \text{-continuant}}]} \] \#^1

  • positively motivated by constraints that are **surface-true** in the language:\(^2\)

- no final voiced in cluster \* \[ \text{[+consonantal]} ] \# (p. 82)

- final obst. restrictions if \[ \text{[\text{-sonorant} \text{\text{-continuant}}]} \text{[\text{-sonorant}} \] \# then 2 is \[ \text{[+coronal} \text{\text{<+continuant>}}] \] (p. 82)

  • i.e., [st], [ps], [ks] are OK

  o With those constraints, try to simplify the deletion rule

- A derivation might look like this:

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

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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:
  \[ \[] \rightarrow [-\text{voice}] \]

  o 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):
  \[ \[] \rightarrow [+\text{continuant}] \]

  o 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

  o 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:

\[ V \rightarrow \emptyset \text{ (rule) unless prohibited by } *CC \text{ (constraint)} \]

- 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** \[ V \rightarrow \emptyset / C \_C \]

- **cluster constraint** 

  \[ * \{ \begin{array}{c} \# \\# \\ C \\# \end{array} \} \]

  

<table>
<thead>
<tr>
<th>abito/</th>
<th>ildoku/</th>
<th>uda/</th>
<th>brodu/</th>
</tr>
</thead>
<tbody>
<tr>
<td>(abto)</td>
<td>(ildku)</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

*tentatively apply syncope*

*does this create/worsen violation of cluster constr.?* no yes NA

*if not, accept the change (otherwise reject)*

<table>
<thead>
<tr>
<th>abto</th>
<th>ildoku</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>[abto]</td>
<td>[ildoku]</td>
<td>[uda]</td>
</tr>
</tbody>
</table>

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

- **Zulu:** prenasalized affricates, but no prenasalized fricatives. We might propose a constraint: \(^3\)

  \[ * \begin{array}{c} +\text{continuant} \\ +\text{nasal} \end{array} \]

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

<table>
<thead>
<tr>
<th>singular</th>
<th>plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>u:-ba\text{\textsuperscript{m}}bo</td>
<td>izi-\text{\textsuperscript{m}}ba\text{\textsuperscript{m}}bo</td>
</tr>
<tr>
<td>u:-p\text{\textsuperscript{h}}ap\text{\textsuperscript{h}}e</td>
<td>izi-\text{\textsuperscript{m}}pap\text{\textsuperscript{h}}e</td>
</tr>
<tr>
<td>ama-t\text{\textsuperscript{h}}at\text{\textsuperscript{h}}u</td>
<td>ezi-\text{\textsuperscript{h}}tat\text{\textsuperscript{h}}u</td>
</tr>
<tr>
<td>u:-k\text{\textsuperscript{h}}uni</td>
<td>izi-\text{\textsuperscript{h}}kuni</td>
</tr>
</tbody>
</table>

---

\(^3\) 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:

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>eli-ʃa</td>
<td>eⁿtfₐʃa</td>
</tr>
<tr>
<td>u:-fudu</td>
<td>iziⁿm프₃fudu</td>
</tr>
<tr>
<td>u:-sizi</td>
<td>iziⁿtsizi</td>
</tr>
<tr>
<td>u:-zwa</td>
<td>iziⁿdžwa</td>
</tr>
<tr>
<td>u:-zime</td>
<td>iziⁿdzime</td>
</tr>
<tr>
<td>u:-ɬubu</td>
<td>iziⁿdʒubu</td>
</tr>
<tr>
<td>u:-ʃikisi</td>
<td>iziⁿʃiʃisı</td>
</tr>
</tbody>
</table>

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{array}{c}
\text{[+nasal \[+continuant]\rightarrow [+delayed release \[\negcontinuant]\]}
\end{array}
\]

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):
    
    \[
    \begin{array}{ll}
    \text{plain} & \text{nominative} \\
    \text{ton} & \text{ton-i} & \text{‘money’} \\
    \text{saram} & \text{saram-i} & \text{‘person’} \\
    \text{koŋ} & \text{koŋ-i} & \text{‘ball’} \\
    \text{namu} & \text{namu-ga} & \text{‘tree’} \\
    \text{pʰari} & \text{pʰari-ga} & \text{‘fly’} \\
    \text{kʰo} & \text{kʰo-ga} & \text{‘nose’} \\
    \text{ɕ*i} & \text{ɕ*i-ga} & \text{‘seed’}
    \end{array}
    \]

  - And yet, CC and VV occur in the language
    
    \[
    \begin{array}{ll}
    \text{plain} & \text{locative} \\
    \text{namu} & \text{namu-e} \\
    \text{kʰo} & \text{kʰo-e} & \text{plural} \\
    \text{saram} & \text{saram-dil} \\
    \text{koŋ} & \text{koŋ-dil}
    \end{array}
    \]

- 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, \[^\text{stress}\]^V\}, \emptyset \rightarrow ?\}
    (based on Dutch; data from Booij 1995 via Smith 2005)
    o 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 \rightarrow [–voice], [–voice] \rightarrow \emptyset\}
  o 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, \emptyset \rightarrow p / m\_s, \quad C \quad C \quad C \quad C \quad \rightarrow 3\}
  o What happens to /almso/??

• Can a constraint prohibit a certain type of change, 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


