Advanced Phonetics and Phonology

1302741

Lecture (8)

INTERACTION BETWEEN RULES
Rule ordering

- when there are multiple phonological rules in the data, we have to decide if these rules interact with each other and how to order those rules to arrive at the correct outcome (surface forms as presented by the data).
What happens when we have two or more rules?

- rules may not interfere with one another
  e.g. aspiration and nasal assimilation in ‘keen’ [kʰĩn]

- however, rules sometimes do interfere with one another; even when they don’t affect the same segment
What happens when we have two or more rules?

UR /pænda/
Aspiration Rule pʰænda
Nasalization Rule pʰændə
Vowel Reduction Rule pʰændə
SR [pʰændə]

The order of rules may not matter in some cases (see above), but it is important in others.
Rule ordering

Consider the following English data.

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>[pəlɪjs]</td>
<td>‘police’</td>
<td>[plɪjs]</td>
<td>f)</td>
<td>[plɪjz]</td>
<td>‘please’</td>
</tr>
<tr>
<td>b)</td>
<td>[pərɛjd]</td>
<td>‘parade’</td>
<td>[pɾɛjd]</td>
<td>g)</td>
<td>[pɾɛjd]</td>
<td>‘prayed’</td>
</tr>
<tr>
<td>c)</td>
<td>[kəlɛkt]</td>
<td>‘collect’</td>
<td>[klɛkt]</td>
<td>h)</td>
<td>[klɪjn]</td>
<td>‘clean’</td>
</tr>
<tr>
<td>d)</td>
<td>[kərɛkt]</td>
<td>‘correct’</td>
<td>[kɾɛkt]</td>
<td>i)</td>
<td>[kɾɛjt]</td>
<td>‘crate’</td>
</tr>
</tbody>
</table>

What are the two rules observed in these data?

**Liquid devoicing**: Liquids become voiceless after a voiceless stop at the beginning of a syllable.

**Schwa deletion**: Schwa is deleted in an open syllable followed by a stressed syllable.
Rule application and derivation and order

- **Feeding** = Two rules are said to be in a feeding order if the earlier rule creates environments in which the later rule can apply.
Rule application and derivation and order

- Illustration: Stop Insertion and Preglottalization in English syllable finally

  a. /kæts/ [kæʔts] cats
     /hints/ [hɪnʔts] hints
  b. /prins/ [prɪnʔts] prince
     /lɛŋθ/ [lɛŋʔkθ] length

*Stop insertion*: insert a voiceless stop into a syllable-final cluster composed of a nasal followed by a voiceless fricative; the inserted stop is homorganic with the place of the nasal.

*Preglottalization*: voiceless stops are preglottalized syllable-finally.
Rule application and derivation and order

- **Bleeding** = If two rules, A and B, are in a bleeding order, the application of rule A causes a decrease in the number of forms to which rule B can apply.
An example: suppose rule A changes some consonants from voiceless to voiced in some environments and rule B only applies to voiceless consonants. The application of rule A before rule B would mean that fewer forms are available for rule B to apply to.

Illustration: in the derivation of the English plural, *i-insertion* between sibilants (A) prevents devoicing (B) from applying to a form like [bs-z] by separating the final [z] from the stem-final sibilant.
Counter Feeding = The ordering of two phonological rules so that rule A, which could provide contexts for the operation of rule B, is prevented from doing so by being ordered after rule B.
Rule application and derivation and order

Illustration: vowel deletion and final consonant deletion in French

- **UR**: /pətit nəvø/ /pətit-ə njɛs/
- **SR**: [pəti nəvø] ‘little nephew’ [pətit njɛs] ‘little niece’

**Schwa Deletion**: delete a word-final ø. (A)

**Final Consonant Deletion**: delete a word-final consonant when it occurs before another word that is consonant initial. (B)
Rule application and derivation and order

- **Counter Bleeding** = The ordering of two phonological rules so that rule A, which could remove contexts in which rule B operates, is prevented from doing so by being ordered after rule B.
Illustration: ə-epenthesis and /s/-insertion in Kaatsheuvel Dutch diminutives

/ˈsnɔr-ka/ [ˈsnɔrəkə] moustache
/ˈhal-ka/ [ˈhɑləkə] hall
/ˈbɑk-ka/ [ˈbɑksəkə] tray
/ˈslɑŋ-ka/ [ˈslɑŋəskə] snake

ə-epenthesis: insert a schwa before the diminutive suffix (here -kə) when this suffix occurs after a lax vowel + sonorant sequence. (A)

/s/-insertion: insert /s/ between a velar consonant and the diminutive suffix. (B)
Extrinsic and Intrinsic Ordering

Is the order in which rules apply predictable from any properties of the rules concerned?

- If it is, no ordering statement would be necessary: the rule order is said to be **intrinsic**.

- If the order is not given by the theory, and an explicit ordering statement of the type ‘*Rule X applies before Rule Y*’ is necessary, the rule order is **extrinsic**.
Extrinsic and Intrinsic Ordering

- A principle that has stood the test of time is the Elsewhere Condition.
- This is really a principle governing the application of rules in general, and has been invoked in morphology as well as phonology.
- What it says is that when one rule applies to a subset of the forms that another rule applies to, the general rule is blocked from applying to that subset.

- So, it is not just a principle governing order, but also application as such, in the sense that only one of the two rules will be allowed to apply.
Extrinsic and Intrinsic Ordering

- Take the English morphological rules given in (1) and (2). Rule (1) says: ‘Attach the suffix [z] to noun stems ends with voiceless in order to form the plural’, and rule (2) says: ‘Attach the suffix [ən] to the noun stem ox in order to form the plural’.

  (1) [[    ]N z]pl.
  (2) [[ɔks]N ən]pl.

- In order to prevent the formation of *oxes, we must either stipulate that (2) applies before (1), or add to (1) the clause ‘except in the case of [ɔks]’.
Extrinsic and Intrinsic Ordering

- The Elsewhere Condition makes either move unnecessary: because (2) applies to a subset of the contexts specified by (1), it automatically blocks (1). It will be clear that this principle saves us from having to add all sorts of exception clauses to general rules.

(1) \[\text{[ ]N z]\text{pl.}}
(2) \[\text{[oks]N \text{en}\text{pl.}}

Extrinsic and Intrinsic Ordering

- A widely quoted argument for extrinsic ordering is based on a case of dialectal variation in Canadian English (Joos 1942).

- The difference between the two dialects concerned can be described as resulting from different orderings of the same two rules, **flapping** and **pre-fortis clipping**.
Extrinsic and Intrinsic Ordering

- The first rule, given below, causes a [t,d] to be pronounced as an alveolar flap before reduced syllables, as in ['siri] city, ['bɛr̩] better. Note that [r] is voiced.

  \[ \text{Rule 1} \quad \text{FLAPPING} \ [t,d] \rightarrow r/[-\text{cons}] \quad \begin{bmatrix} \text{V} \\ -\text{stress} \end{bmatrix} \]

- The second rule shortens vowels and sonorant consonants preceding voiceless segments. As a result of this rule, the [i:] in [bi:d] bead is longer than that in [bi:t] beat, the [i:] in ['ti:ziŋ] teasing is longer that in ['li:siŋ] leasing, and the [n] in [tɛnz] tens is longer than the [n] in [tɛns] tense.

  \[ \text{Rule 2} \quad \text{PRE-FORTIS CLIPPING} \quad [+\text{voice}] \rightarrow [-\text{long}] / \quad [−\text{voice}] \]
Extrinsic and Intrinsic Ordering

In some dialects, these rules apply in the order **flapping** – **pre-fortis clipping**. That is, the words *rider* (‘someone who rides’) and *writer* (‘someone who writes’) are **homophones**, both being pronounced [raiɾəɾ], while *ride* and *write* are [raid] and [rait] (where [ʌi] represents a shortened [ai].) This is shown blow.

**Rule 1**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>'raid-əɾ</td>
<td>'rait-əɾ</td>
<td>raid</td>
<td>rait</td>
</tr>
<tr>
<td>(n.a.)</td>
<td>(n.a.)</td>
<td>(n.a.)</td>
<td>(n.a.)</td>
</tr>
<tr>
<td>'raiɾəɾ</td>
<td>'raiɾəɾ</td>
<td>raid</td>
<td>rait</td>
</tr>
</tbody>
</table>

**Rule 2**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>f</td>
</tr>
<tr>
<td>(n.a.)</td>
<td>(n.a.)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>-stress</td>
</tr>
<tr>
<td></td>
<td>[−long] / __ [−voice]</td>
</tr>
</tbody>
</table>
Extrinsic and Intrinsic Ordering

- In some dialects, these rules apply in the order **flapping – pre-fortis clipping**. That is, the words *rider* (‘someone who rides’) and *writer* (‘someone who writes’) are **homophones**, both being pronounced [raiɾəɾ], while *ride* and *write* are [raid] and [rait] (where [ʌi] represents a shortened [ai].) This is shown below.
Extrinsic and Intrinsic Ordering

- In most Canadian speech, however, the pronunciations of these same words are [raiɾəɾ], [rʌiɾəɾ], [raid] and [rʌit]. This situation is obtained if we reverse the order of the rules, as shown below.

<table>
<thead>
<tr>
<th>Rule 2/clipping</th>
<th>Rule 1/flapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>'raid-ər</td>
<td>'raiɾəɾ</td>
</tr>
<tr>
<td>(n.a.)</td>
<td>(n.a.)</td>
</tr>
<tr>
<td>ɾ</td>
<td>ɾ</td>
</tr>
<tr>
<td>'raiɾəɾ</td>
<td>'raiɾəɾ</td>
</tr>
<tr>
<td>raid</td>
<td>raid</td>
</tr>
<tr>
<td>rait</td>
<td>ɾait</td>
</tr>
</tbody>
</table>

- Clearly, if dialects can differ depending on the order in which two rules apply, it cannot be the case that rule ordering is predictable.
Extrinsic and Intrinsic Ordering

<table>
<thead>
<tr>
<th>Rule 1/flapping</th>
<th>ʼraĭd-ər</th>
<th>ʼraĭt-ər</th>
<th>raid</th>
<th>rait</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n.a.)</td>
<td>(n.a.)</td>
<td>(n.a.)</td>
<td>(n.a.)</td>
</tr>
<tr>
<td>Rule 2/clipping</td>
<td>ʼraĭrər</td>
<td>ʼraĭrər</td>
<td>raid</td>
<td>rait</td>
</tr>
<tr>
<td></td>
<td>(n.a.)</td>
<td>(n.a.)</td>
<td>(n.a.)</td>
<td>(n.a.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rule 2/clipping</th>
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<th>ʼraĭt-ər</th>
<th>raid</th>
<th>rait</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n.a.)</td>
<td>(n.a.)</td>
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<tr>
<td>Rule 1/flapping</td>
<td>ʼraĭrər</td>
<td>ʼraĭrər</td>
<td>raid</td>
<td>rait</td>
</tr>
<tr>
<td></td>
<td>(n.a.)</td>
<td>(n.a.)</td>
<td>(n.a.)</td>
<td>(n.a.)</td>
</tr>
</tbody>
</table>
Exercise
Mwera has three rules, given as (1), (2) and (3) below. Two noun stems in Mwera are [gomo] ‘lip’ and [kuja] ‘cape bean’. The plural is formed by prefixing a nasal consonant, whose underlying form is [n]. The plural surface forms are [ŋomo] and [ŋguja]. The following three rules derive the surface forms (Kenstowicz and Kisseberth 1977: 157).

1. Suggest suitable names for these rules.
2. Show that of the six possible orders that these rules could have, only one is correct.
In-Class Exercise ___ Mwera

(1) \[\begin{array}{c}
\text{son} \\
\text{cont} \\
\text{voice}
\end{array}\] \rightarrow \emptyset / [+nas] __

(2) \[\begin{array}{c}
\text{son} \\
\text{cont}
\end{array}\] \rightarrow [+voice] / \[\begin{array}{c}
\text{syl} \\
\text{nas}
\end{array}\] __

(3) \[\begin{array}{c}
\text{syl} \\
\text{nas}
\end{array}\] \rightarrow [\alpha_{\text{PLACE features}}] / __ \[\begin{array}{c}
\text{cont}
\alpha_{\text{PLACE features}}
\end{array}\]
In-Class Exercise ___ Mwera

(1) $\begin{bmatrix} -\text{son} \\ -\text{cont} \\ +\text{voice} \end{bmatrix} \rightarrow \emptyset / [+\text{nas}]$

(2) $\begin{bmatrix} -\text{son} \\ -\text{cont} \end{bmatrix} \rightarrow [+\text{voice}] / \begin{bmatrix} -\text{syl} \\ +\text{nas} \end{bmatrix}$

(3) $\begin{bmatrix} -\text{syl} \\ +\text{nas} \end{bmatrix} \rightarrow [\alpha\text{PLACE features}] / \begin{bmatrix} -\text{cont} \\ \alpha\text{PLACE features} \end{bmatrix}$

voiced plosive deletion
In-Class Exercise ___ Mwera

(1) \[
\begin{array}{c}
\begin{bmatrix}
-\text{son} \\
-\text{cont} \\
+\text{voice}
\end{bmatrix} \\
\rightarrow \emptyset / [+\text{nas}] \\
\end{array}
\]
voiced plosive deletion

(2) \[
\begin{array}{c}
\begin{bmatrix}
-\text{son} \\
-\text{cont}
\end{bmatrix} \\
\rightarrow [+\text{voice}] / \begin{bmatrix}
-\text{syl} \\
+\text{nas}
\end{bmatrix}
\end{array}
\]
post-nasal voicing

(3) \[
\begin{array}{c}
\begin{bmatrix}
-\text{syl} \\
+\text{nas}
\end{bmatrix} \\
\rightarrow [\alpha\text{PLACE features}] / \begin{bmatrix}
\end{array}
\]

In-Class Exercise ___ Mwera

(1) \[
\begin{bmatrix}
-\text{son} \\
-\text{cont} \\
+\text{voice}
\end{bmatrix}
\rightarrow \emptyset / [+\text{nas}] ___
\]

(2) \[
\begin{bmatrix}
-\text{son} \\
-\text{cont}
\end{bmatrix}
\rightarrow [+\text{voice}] / \begin{bmatrix}
-\text{syl} \\
+\text{nas}
\end{bmatrix} ___
\]

(3) \[
\begin{bmatrix}
-\text{syl} \\
+\text{nas}
\end{bmatrix}
\rightarrow [\alpha\text{PLACE features}] / ___ \begin{bmatrix}
-\text{cont} \\
\alpha\text{PLACE features}
\end{bmatrix}
\]

- voiced plosive deletion
- post-nasal voicing
- place assimilation

but more or less explicit names would also be correct.
### In-Class Exercise ___ Mwera

**Order 1)**

<table>
<thead>
<tr>
<th>UR</th>
<th>/n + gomo/</th>
<th>/n + kuja/</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) voiced plosive deletion</td>
<td>nomo</td>
<td>n.a.</td>
</tr>
<tr>
<td>(2) post-nasal voicing</td>
<td>n.a.</td>
<td>nguja</td>
</tr>
<tr>
<td>(3) place assimilation</td>
<td>n.a.</td>
<td>nguja</td>
</tr>
</tbody>
</table>

| PR                                    | *[nomo]*   | [ŋuŋuja]   |
In-Class Exercise __ Mwera

Order 2)

<table>
<thead>
<tr>
<th>UR</th>
<th>/n + gomo/</th>
<th>/n + kuja/</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) voiced plosive deletion</td>
<td>nomo.</td>
<td>n.a</td>
</tr>
<tr>
<td>(3) place assimilation</td>
<td>n.a.</td>
<td>ηguja</td>
</tr>
<tr>
<td>(2) post-nasal voicing</td>
<td>n.a.</td>
<td>ηguja</td>
</tr>
</tbody>
</table>

| PR                                      | *[nomo]    | [ηguja]    |


In-Class Exercise ___ Mwera

Order 3)

<table>
<thead>
<tr>
<th>UR</th>
<th>/n + gomo/</th>
<th>/n + kuja/</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) post-nasal voicing</td>
<td>n.a.</td>
<td>nguja</td>
</tr>
<tr>
<td>(1) voiced plosive deletion</td>
<td>nomo</td>
<td>nuja</td>
</tr>
<tr>
<td>(3) place-assimilation</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

| PR                                      | *[nomo]    | *[nuja]    |
In-Class Exercise ___ Mwera

### Order 4)

<table>
<thead>
<tr>
<th>UR</th>
<th>/n + gomo/</th>
<th>/n + kuja/</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) post-nasal voicing</td>
<td>n.a.</td>
<td>nguja</td>
</tr>
<tr>
<td>(3) place assimilation</td>
<td>ηgomo</td>
<td>ηguja</td>
</tr>
<tr>
<td>(1) voiced plosive deletion</td>
<td>ηomo</td>
<td>ηuja</td>
</tr>
<tr>
<td>PR</td>
<td>[ŋomo]</td>
<td><em>[ŋuja]</em></td>
</tr>
</tbody>
</table>
## In-Class Exercise ___ Mwera

### Order 5)

<table>
<thead>
<tr>
<th>Category</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR: (3) place assimilation</td>
<td>/ŋgomo/</td>
<td>/ŋkuja/</td>
</tr>
<tr>
<td>UR: (2) post-nasal voicing</td>
<td>n.a.</td>
<td>/ŋguja/</td>
</tr>
<tr>
<td>UR: (1) voiced plosive deletion</td>
<td>/ŋomo/</td>
<td>/ŋuja/</td>
</tr>
<tr>
<td>PR:</td>
<td>[ŋomo]</td>
<td><em>[ŋuja]</em></td>
</tr>
</tbody>
</table>
In-Class Exercise ___ Mwera

Order 6)

<table>
<thead>
<tr>
<th>UR</th>
<th>/n + gomo/</th>
<th>/n + kuja/</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3) place assimilation</td>
<td>ṅgowo</td>
<td>ṅkuja</td>
</tr>
<tr>
<td>(1) voiced plosive deletion</td>
<td>ṅomo</td>
<td>ṅkuja</td>
</tr>
<tr>
<td>(2) post-nasal voicing</td>
<td>n.a.</td>
<td>ṅguja</td>
</tr>
</tbody>
</table>

| PR                                      | [ŋomo]     | [ŋguja]    |
In-Class Exercise ___ Mwera

Order 6)

<table>
<thead>
<tr>
<th>UR</th>
<th>/n + gomo/</th>
<th>/n + kuja/</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3) place assimilation</td>
<td>ṅgowo</td>
<td>ṅkuja</td>
</tr>
<tr>
<td>(1) voiced plosive deletion</td>
<td>ṅomo</td>
<td>ṅkuja</td>
</tr>
<tr>
<td>(2) post-nasal voicing</td>
<td>n.a.</td>
<td>ṅuża</td>
</tr>
</tbody>
</table>

| PR                                      | [ŋomo]     | [ŋuja]     |

Only this last order derives the correct surface forms [ŋomo] and [ŋuja].
That’s all Folks!

/ ði end əv lektʃə eɪt /

kalilik