24.900: Introduction to Linguistics

Phonology Class 3

April 13, 2005

Phoneme: A contrastive phonological segment whose phonetic realizations are predictable by rule.

a. Review sheet for quiz.
b. No practice quizzes available
c. One more problem set before the end of the semester. This one will be due Wednesday, April 27. Note the date change. It will be available online by Wednesday, April 20.
c. Final projects are due the penultimate week of the semester. See me or your TA if you would like some advice, feedback, etc.
d. Be sure to finish reading Chapter 7 in your textbook. There are many other examples of what we have been discussing for review that we will not necessarily cover in class.
e. Note about loanwords and their phonology.

Focus for today’s class:
1. Review of assumptions concerning derivations; basic assumption about how the human mind and phonological computation.
2. Examples of different kinds of phonological rules and problems
3. Review of how the rules are stated
5. Rule ordering
4. In class practice with derivations

I. Phonological Rules:

An underlying assumption we are making:

- I. Derivations and underlying representations:
a. A systematic modification of stored representations assembled into larger constituents undergoes systematic modification via a class of mental operations.
b. An underlying or phonological representation will contain all and only the unpredictable (distinctive feature) information for each lexical item.
c. Predictable features of pronunciation are added to the underlying phonological representation by grammatical rules and principles.
d. These rules operate on the basis of the information in the lexical item’s phonological representation on an underlying form and the context in which it is located.

- **II. Phonological Rules are of two types:**
  - **Allophonic rules:** fill in qualities of pronunciation that are absent in the lexical forms of morphemes but are required by their circumstances in speech, like the aspiration of word-initial /k/ in *coats* and the rounding of the word-initial /ɾ/ of *rules*.
    - **English stop aspiration:**
      - **Rule 1:** Voiceless stops are aspirated when in initial stressed syllables
      - **Rule 2:** Nouns, main verbs, adjectives and adverbs have at least one stressed vowel.
  - **Morphemic rules:** also known as morphonemic rules and morphophonological rules change or choose between meaningful qualities given as part of the lexical entries of morphemes, as where voicing of the /z/ of the plural suffix is replaced by voicelessness, giving /s/, in words like /kots/ *coats* and /saks/ *socks*.
    - **English plural rule that is described in great detail in your textbook, Chp. 7, pp. 273-279.**
    - **English past tense is another example of this type of rule.**

- **II. More specifics about Phonological Rules:**
  - a. **Assimilation Rule: (Allophonic Rule)**
    - Vowel Nasalization in English: a rule that makes neighboring segments more similar by copying or spreading a phonetic property from one segment to the other.
      - For the most part, assimilation rules stem from articulatory or physiological processes. There is a tendency when we speak to increase the ease of articulation, that is, to articulate efficiently.
        - i. **Nasalization:**
          - Nasalize vowels when they occur before nasal consonants (within the same syllable).
            - *This rule specifies the class of sounds affected by the vowel: Vowels*
              - It states what phonetic change will occur by applying the rule: *Change phonemic oral vowels to phonetic nasal vowels.*
And it specifies the context or phonological environment. 

**Before nasal consonants within the same syllable.**

a. Three kinds of information:
   - Class of phonemes affected
   - Phonetic change
   - Phonological environment

b. Formalization of phonological rule:
   \[ V \rightarrow [ + \text{NASAL}] / ___ [ + \text{NASAL}] (C) # (S) \]

**SUMMARY:**

\( \rightarrow \) means “becomes” or “is changed to”

\( / \) means “in the environment of”

___ is placed before or after segments that condition the change.

( ) enclose optional segments, whose presence or absence are irrelevant to the rule

$ indicates a syllable boundary; you can also just use #

c. 

<table>
<thead>
<tr>
<th>Phonemic representation</th>
<th>BOB</th>
<th>BOMB</th>
</tr>
</thead>
<tbody>
<tr>
<td>/b</td>
<td>a</td>
<td>b/</td>
</tr>
<tr>
<td>Nasality: phonemic feature value</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Apply nasal rule</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

| Nasality: phonetic feature value | b | a | b | b | a | M |
| Phonetic representation | [b a b] | [b a M] |

See example in text for devoicing of Japanese vowels when preceded and followed by voiceless obstruents.

ii. **Feature-Changing rules:** A rule that changes the feature specifications. In English, the [-nasal] value of vowels is changed to [+nasal] phonetically through an assimilation process when the vowels occur before nasals.
Another example: An assimilation rule in Akan (Twi) that nasalizes voiced stops when they follow nasal consonants:

/ bá/ [ bá] “he comes” / m bá/ [ mmá] “he doesn’t come
he come he not come

The /b/ of the verb “come” becomes an [m] when it follows the negative morpheme /m/. (the diacritics are tone marks).

Feature changing rules can also be considered in these cases to be feature spreading.

(Note in the example above that there is no one-to one relationship between phonemes and their allophones: the phone [m] is an allophone of /m/ as well as /b/.

Akan Phonemes /b/ /m/

Akan Phones [b] [m]

Note the differences in brackets in the above. / / are used to enclose phonemes. [ ] are used to enclose phones or allophones.

j. Feature addition rules: aspiration in English

k. Delete segments: Final consonant deletion in French.

[+consonantal] → Ø / _____ # [+consonantal]

A [+consonantal] segment (obstruent, liquid, or nasal) is deleted in the environment at the end of a word which is followed by a word beginning with an obstruent, liquid, or nasal.

Or, Delete a consonant before a word beginning with any consonant that is not a glide.

Example: Before an obstruent
/patit tablo/ [pati tablo] “small picture”
/noz tablo/ [no tablo] “our pictures”
1. **Dissimilation rules:** rules in which a segment becomes less similar to another segment. Such rules have a natural explanation from the hearer’s perspective this time. That is, in listening to speech, if sounds are too similar, we may miss the contrast. Also it may be easier to articulate dissimilar sounds. Tongue twisters are based on the similarity of sounds. “The sixth sheik’s sixth sheep is sick.” Vs. “The fifth sheik’s fourth sheep is sick.” “She sells seashells by the seashore.”

**Latin Example into English:**

<table>
<thead>
<tr>
<th>-al</th>
<th>-ar</th>
</tr>
</thead>
<tbody>
<tr>
<td>anecdot-al</td>
<td>angul-ar</td>
</tr>
<tr>
<td>annu-al</td>
<td>annul-ar</td>
</tr>
<tr>
<td>ment-al</td>
<td>column-ar</td>
</tr>
<tr>
<td>pen-al</td>
<td>perpendicular-ar</td>
</tr>
<tr>
<td>spiritu-al</td>
<td>simil-ar</td>
</tr>
<tr>
<td>ven-al</td>
<td>vel-ar</td>
</tr>
</tbody>
</table>

What is going on here?

In Latin, a derivational suffix –*alis* was added to nouns to form adjectives. When the suffix was added to a noun that contained the liquid /l/, the suffix was changed to –*aris*, that is, the liquid /l/ was changed to the liquid /r/. These words came into English as adjectives ending in –*al* or in the dissimilated form –*ar* as shown in the two columns above.

All the –*ar* adjectives contain an /l/ and as *columnar* illustrates, the /l/ may not be the consonant directly preceding the dissimilated segment.

Dissimilation rules are rare.

II. **Feature addition rules:** neither assimilation nor dissimilation.

The aspiration rule in English:

\[
\begin{align*}
\text{P}^h\text{it} & \quad \text{rep}^h\text{eat} & \quad \text{inspect} & \quad \text{compass} \\
\text{-continuant} & \quad \text{-voiced} & \quad \text{-----} & \quad [+ \text{aspirated}] /S_{\text{c}} & \quad \text{-consonantal} & \quad \text{+ stress}
\end{align*}
\]

**Stated in words:**
Voiceless stops ([-continuant, -voiced]) become aspirated when they occur syllable initially before stressed vowels.

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consonantal</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Continuant</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Labial</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Voiced</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

There are also segment deletion, metathesis (movement) and Insertion rules. p. 307-314. Familiarize yourself with the range of possible phonological rules.

To sum up thus far:
Phonological rules have a number of functions, among them are the following:
1. Change feature values
2. Add new features (distinctive/nondistinctive): aspiration in English
3. Delete segments: contraction rules in English
4. Add segments (schwa insertion in plural and past tense)
5. Reorder segments (metathesis: sk to [ks]
6. See your textbook, chp. 7 for more examples. Pages 327-329 gives a good summary of the different kinds of phonological rules.
7. Phonological rules often refer to entire classes of sounds rather than to individual sounds.

Consult your handout from April 11, 2005 on issues such as predictability and neutralization.

See attached handout on “Rule Ordering” and more details about how to approach and solve a phonological problem in study materials section.

Some in-class practice: