Phonological rules

ANI SETYANINGSIH
anisetyaningsih@uny.ac.id
Phonological Rules

- Two levels of representation:
  1- underlying (phonemic, mental)
  2- surface (phonetic)

- Why do we need rules?
  - link the two levels
  - show when a particular allophone should show up on the surface
Phonological Rules

- Phonemic Form
  - Rules
  - Phonetic Form
Alternations

- The focus of phonology is finding predictable alternations between sounds; e.g. [p] & [pʰ] in English.

- There is one phoneme /p/.

- There is alternation in the representation of this element on the surface (phonetic) level between [p] & [pʰ].

- This alternation is determined by the environment in which the phoneme occurs.
**Processes**

- This alternation occurs due to or because of some phonological processes

- For example,
  - The processes involved in the alternation between \([p]\) & \([p^h]\) is ‘aspiration’

- In English, a voiceless stop is aspirated when it occurs in word-initial position before a stressed vowel (not following \([s]\))
We can represent processes which characterize alternations by means of rules.

**Rules:** rules are formal statements which express the relationship between units on the different levels of the phonological component.

For example, the rule for ‘aspiration’

\[
\begin{align*}
- \text{cont} \\
- \text{voice} \\
- \text{del rel}
\end{align*} \quad \rightarrow \quad [+ \text{spread glottis}] / \# \quad + \text{syll} \\
+ \text{stress}
\]
Generative Phonology

- *Generative Phonology*: identify alternations, phonological processes behind them, & the formalizing of rules.

- Alternations are central part of what native speakers know about their language

- The aim of generative phonology is to give formal representation of such knowledge
Alternation types

- Phonological alternations come in many shapes & sizes

- In (a), there is alternation between oral & nasal vowels

  a- [wɪt] vs. [wɪn]

- In (b), ‘in’ is realized differently because it agrees in place of articulation with the following consonant

  b- ‘i [n]edible, i[n] Edinburah’ vs. ‘i [m]possible, i[m] Preston’ vs. ‘i[ŋ]conceivable, i[ŋ] Cardiff’
Alternation types

- In (c), plural marker is realized as [s] or [z] depending on the nature of the preceding sound
  c - ‘rat[s]’ vs. ‘warthong[z]’ vs ‘hors [ɪz]’

- In (d), alternation in voicing for root final fricative
  d- ‘lea[f]’ vs. ‘lea[v]es’
    ‘hou[s]e’ vs. ‘hou[z]es’

- In (e), alternation between a stop vs. fricative
  e- ‘electri[k]’ vs. ‘electri[s]ity’
    ‘medi[k]al’ vs. ‘medi[s]inal’
Alternation types

- Alternations are different in a number of ways:
  - it occurs whenever the phonetic environment is met
  - may only be found in the presence of a particular suffix
  - or particular lexical items
  - (the phonetic environment by itself is not enough to trigger the alternation)
  - (alternations may be optional)
Phonetically conditioned alternations

- Alternations in (a) & (b) are conditioned purely by the phonetic environment
- In English, these are obligatory (difficult for speakers to avoid)

- also includes:
  - aspirated vs. non-aspirated voiceless stops ([pʰ] in ‘pot’ vs. [p] in ‘spot’)
  - lateral & nasal release (‘beetle’ vs. ‘mutton’)
  - flapping (bɪrər)
  - clear vs. dark /l/ (‘late’ vs. ‘full’)
  - the intrusive ‘r’ in non-rhotic English as in ‘tuna [r] alert’
Phonetically & morphologically conditioned alternations

- The form of the plural depends on the nature of the last sound.

- If the noun ends in sibilant ([s], [z], [ʃ], [ʒ], [tʃ], [dʒ]): it takes [ɪz]

- If the final sound is a voiceless non-sibilant: it takes a voiceless alveolar fricative [s]

- If the final sound is a voiced non-sibilant: it takes a voiced fricative [z]
Phonetically & morphologically conditioned alternations

- Don’t necessarily occur whenever the phonetic environment alone is met; e.g. [fens], [beɪs]

- The final fricative agrees in voice with the preceding sound only if it represents the plural marker (if there is a morpheme boundary between the two segments)

- This alternation is obligatory & automatic

- When the alternation comes in a predictable way it’s called *productive*

- Other examples includes the past tense marker [t/d/ɪd]
Phonetically, morphologically, & lexically conditioned alternations

- examples in (e) & (d) above involves phonetic conditioning:
  - fricatives are voiced between voiced segments
  - velar [k] is fronted & fricativised to [s] (velar softening)

- also, some morphological conditioning

- only for a particular set of lexical items

- others include ‘vowel shift’ or ‘trisyllabic shortening’; e.g. ‘ins[eɪ]ne’ vs. ‘ins[æ]nity’ & ‘rept[aɪ]le’ vs. ‘rept[ɪ]lian’
Non-phonological alternations: suppletion

- **Suppletion**: an alternation in which there is no certain phonetic conditioning (no phonological processes) & is not part of our phonological knowledge

- For example,
  - ‘mouse’ vs. ‘mice’
  - ‘go’ vs. ‘went’
Formal rules

- A → B/ X____ Y
  For example, the flapping rule of American English: e.g. [bɪrər]

  /t/ → [ɾ]/ v____ \[+ syll\]
  \[+ stress\]

  /t/ → [ʔ]/ v___ #; e.g. ‘cat’ & ‘hit’

- Glottalisation: as in [mɪnt], [mæp]

  \(- continuant\)
  \(- voice\)

  \[+ const glottis\]/ _____ #
Rules writing (parentheses notation)

- ( ) is used to include optional elements in rules

- A → B/ X (Y) ___ Z

- The rule for ‘l- velarisation’; e.g. ‘fell’, ‘bulk’

- /l/ → [ɾ]/ ___ (C) #
Rules writing (Braces)

- {  } represents an either/or relationship between two environments

- $A \rightarrow B/ \left\{ \begin{array}{c} X \\ Z \end{array} \right\} \rightarrow Y$

- The rule for glottalising /t/ as in ‘cat’ or ‘petrol’

- $/t/ \rightarrow [?]/ \rightarrow C \left\{ \begin{array}{c} \# \end{array} \right\}$
Rules writing (Braces)

- \( A \rightarrow B/X (Z) \{ Y \} \)
- \( A \rightarrow B/X \{ Y \} \)
- \( A \rightarrow B/XZ \{ Y \} \)
- \( A \rightarrow B/X \{ # \} \)
- \( A \rightarrow B/XZ \{ # \} \)
Rules writing (superscripts & subscripts)

- **superscripts & subscripts** express the minimum & maximum numbers of segments

- For example, [nist]
  
  - /i/ → /ɪ/ C___ C² (subscript indicates the minimum number)
  
  - /i/ → /ɪ/ C___ C¹ (superscript indicates the maximum number)
Rules writing (alpha notation)

- Alpha notation is used for feature matching generalization.
- The $\alpha$ represents either ‘+’ or ‘-’ value of features

\[
\begin{align*}
/n/ & \quad \rightarrow \quad \begin{pmatrix}
\alpha & \text{ant} \\
\beta & \text{cor}
\end{pmatrix}
/ \_ \_ \\
\end{align*}
\]

\[
\begin{pmatrix}
+ & \text{cons} \\
\alpha & \text{ant} \\
\beta & \text{cor}
\end{pmatrix}
\]
Feature-changing rules

- Feature-changing rules: rules which affect individual features or small groups of features; e.g. nasal assimilation, flapping, glottalisation

- another kind is *dissimilation* in which two adjacent segments which share some features change to become less like each other

- Example,
  - ‘chimney’ pronounced as [tʃɪmlː] (nasal dissimilation)
  - [+nasal] → [- nasal] / [+ nasal]
Deletion

- **Deletion** is expressed in terms of a segment becoming $\emptyset$ (zero)
- $A \rightarrow \emptyset/ B ___ #$

- In some varieties of English, word-final coronal stop is deleted in a cluster; e.g. ‘hand’ [hæn], ‘list’ [lɪs]
  
  - syll
  - cons
  $\rightarrow \emptyset/$

  - syll
  + cons
  $\rightarrow + cons$ ___ #
Insertion

- *Insertion* involves inserting a segment that wasn't originally there.

- In some varieties of English, a schwa is inserted into a final liquid+ nasal cluster; e.g. /film/ becomes [ﬁləm]

\[
\emptyset \rightarrow \epsilon/ \begin{cases} +\text{cons} \\ +\text{son} \\ -\text{nas} \end{cases} \quad \underline{\text{---}} \quad \begin{cases} +\text{cons} \\ +\text{nas} \end{cases}
\]
**Metathesis**

- *Metathesis* refers to the reversal of a sequence of segments in a word.

- Modern English ‘bird’, ‘first’ have earlier forms ‘brid’ & ‘frist’.

- \texttt{b1r2i3d} \rightarrow \texttt{b1i3r2d} ‘bird’
**Reduplication**

- **Reduplication**: is the copying of a part of the word then attaching the copy to the original word (involves phonology & word-formation)

- In French, bonbon ‘sweet’; pepere ‘grandpa’

- Usually the initial consonant is copied along with the vowel & the copy is added to the original structure

- Some languages like Tagalog, Dakota use it extensively to indicate tense & number