

---

# 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] & [p<sup>h</sup>] in English
  - There is one phoneme /p/
  - There is alternation in the representation of this element on the surface (phonetic) level between [p] & [p<sup>h</sup>]
  - 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<sup>h</sup>] is ‘aspiration’
  - In English, a voiceless stop is aspirated when it occurs in word-initial position before a stressed vowel (not following [s])
-

# Rules

- 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’



---

# 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- [wit] vs. [wĩn]

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

b- 'i [ŋ]edible, i[ŋ] 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 ([p<sup>h</sup>] in 'pot' vs. [p] in 'spot')
    - **lateral & nasal release** ( 'beetle' vs. 'mutton' )
    - **flapping** (bɪrə)
    - **clear vs. dark //** ('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

- $A \rightarrow B / X \_\_\_\_\_\_ Y$

For example, the flapping rule of American English: e.g. [bɪrər]

$/t/ \rightarrow [ɾ] / v \_\_\_\_\_\_ \left( \begin{array}{l} + \text{syll} \\ \_ \text{stress} \end{array} \right)$

$/t/ \rightarrow [ʔ] / v \_\_\_\_\_\_ \# ; \text{ e.g. 'cat' \& 'hit'}$

- Glottalisation: as in [mɪnt], [mæp]

$\left( \begin{array}{l} - \text{continuant} \\ - \text{voice} \end{array} \right) \rightarrow [+ \text{const glottis}] / \_\_\_\_\_\_ \#$

---



---

# Rules writing (parentheses notation)

- ( ) is used to include optional elements in rules
  - $A \rightarrow B / X (Y) \_\_\_ Z$
  - The rule for 'l-velarisation'; e.g. 'fell', 'bulk'
  - $// \longrightarrow [ɫ] / \_\_\_ (C) \#$
-

---

# Rules writing (Braces)

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

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

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

- $/t/ \rightarrow [ʔ] / \text{---} \left\{ \begin{array}{l} C \\ \# \end{array} \right\}$

---

---

# Rules writing (Braces)

■  $A \rightarrow B / X (Z) \underline{\hspace{2cm}} \left\{ \begin{array}{l} Y \\ \# \end{array} \right\}$

■  $A \rightarrow B / X \underline{\hspace{2cm}} Y$

■  $A \rightarrow B / XZ \underline{\hspace{2cm}} Y$

■  $A \rightarrow B / X \underline{\hspace{2cm}} \#$

■  $A \rightarrow B / XZ \underline{\hspace{2cm}} \#$

---

---

## Rules writing (superscripts & subscripts)

- superscripts & subscripts express the minimum & maximum numbers of segments
  - For example, [nist]
  - /i/ → [ɪ]/ C<sub>\_\_\_\_\_</sub> C<sup>2</sup> (subscript indicates the minimum number)
  - /i/ → [ɪ]/ C<sup>\_\_\_\_\_</sup> C<sup>1</sup> (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

- $/n/ \longrightarrow \begin{pmatrix} \alpha & \text{ant} \\ \beta & \text{cor} \end{pmatrix} / \text{---} \begin{pmatrix} + & \text{cons} \\ \alpha & \text{ant} \\ \beta & \text{cor} \end{pmatrix}$
- 

---

---

# 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 [tʃɪml:] (nasal dissimilation)
  - [+nasal] → [- nasal] / [+ nasal]\_\_\_\_\_
-

# Deletion

- **Deletion** is expressed in terms of a segment becoming  $\emptyset$  (zero)
- $A \rightarrow \emptyset / B \text{ \_\_\_\_\_\_ } \#$
- In some varieties of English, word-final coronal stop is deleted in a cluster; e.g. 'hand' [hæ̃n], 'list' [lɪs]

- $\left( \begin{array}{l} - \text{ syll} \\ + \text{ cons} \end{array} \right) \longrightarrow \emptyset / \left( \begin{array}{l} - \text{ syll} \\ + \text{ cons} \end{array} \right) \text{ \_\_\_\_\_\_ } \#$

# 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. /fɪlm/ becomes [fɪləm]

$$\emptyset \rightarrow \text{ə} / \left( \begin{array}{l} + \text{ cons} \\ + \text{ son} \\ - \text{ nas} \end{array} \right) \text{ \_\_\_\_\_\_ } \left( \begin{array}{l} + \text{ cons} \\ + \text{ nas} \end{array} \right)$$



---

# Metathesis

- ***Metathesis*** refers to the reversal of a sequence of segments in a word
  - Modern English 'bird', 'first' have earlier forms 'brid' & 'frist'.
  - b1r2i3d → 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
-