Ling 403/603
Introduction to Phonology

DAY 12
CESAR KOIRALA
Take home message from last lecture

- There are many interactions between phonological forms and morphological structures and hence it is important to know the basics of morphology in order to understand the Morphophonemic processes.
A morpheme is said to *alternate* when it appears in different forms in different contexts.
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e.g., *Maninka*:

- [bugo] hit
- [dila] repair
- [don] come in
- [dumu] eat
- [gwen] chase

- [bugoli] hitting
- [dilali] repairing
- [donni] coming in
- [dumuni] eating
- [gwenni] chasing
A morpheme is said to *alternate* when it appears in different forms in different contexts.

e.g., *Maninka*:

- [bugo] hit
- [dila] repair
- [don] come in
- [dumu] eat
- [gwen] chase
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- [dumuni] eating
- [gwenni] chasing
Alternation as a consequence of Phonology-Morphology Interaction

- A morpheme is said to *alternate* when it appears in different forms in different contexts.

e.g., *Maninka*:

<table>
<thead>
<tr>
<th>Morpheme</th>
<th>Meaning</th>
<th>Morpheme with Accent</th>
</tr>
</thead>
<tbody>
<tr>
<td>[bugo]</td>
<td>hit</td>
<td>[bugoli] hitting</td>
</tr>
<tr>
<td>[dila]</td>
<td>repair</td>
<td>[dilali] repairing</td>
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<td>eat</td>
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<tr>
<td>[gwen]</td>
<td>chase</td>
<td>[gwenni] chasing</td>
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- Alternation often arises because of the way the phonology interacts with the morphology.
Alternations that involve allophones

- A particular morpheme varies because its phonemes show up with different allophones.
  
  e.g., Alternation in English /t/ - final stems.
Allophones of /t/
Preglottalization

\[ lɛ^2t \ ] \ ‘let’
\[ fæ^2t \ ] \ ‘fat’

Rule: /t/ is preglottalized when it occurs at the end of a word.
Preglottalization

[lɛʔt] ‘let’
[fæʔt] ‘fat’

Rule: /t/ is preglottalized when it occurs at the end of a word.

cap /kæp/ [kæʔp]
hat /hæt/ [hæʔt]
hack /hæk/ [hæʔk]
Preglottalization

\[ lɛ^2t \] ‘let’
\[ fæ^2t \] ‘fat’

**Rule:** /t/ is preglottalized when it occurs at the end of a word.

### Laryngeal features

- **a.** voice (some break this up to [stiff vocal cords] and [slack vocal cords])
- **b.** constricted glottis (glottalized sounds, ejectives)
- **c.** spread glottis (aspirated sounds)

<table>
<thead>
<tr>
<th>aspirated consonants</th>
<th>plain consonants</th>
<th>glottalized consonants</th>
</tr>
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<tbody>
<tr>
<td>( C^h )</td>
<td>( C )</td>
<td>( C^f )</td>
</tr>
<tr>
<td>+spread glottis</td>
<td></td>
<td>-spread glottis</td>
</tr>
<tr>
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<td></td>
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Preglottalization

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Laryngeal features

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<tbody>
<tr>
<td>hat</td>
<td>/hæt/</td>
<td>[hæʔt]</td>
</tr>
<tr>
<td>hack</td>
<td>/hæk/</td>
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- voice (some break this up to [stiff vocal cords] and [slack vocal cords])
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

[-cont -voice] → [ + constricted glottis ] / ___ #
Tapping

[ˈsɪŋ]  ‘sitting’
[ˈæm]  ‘atom’
[ˈhɪŋ]  ‘hitting’
Tapping

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[ˈæm] ‘atom’
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Rule: /t/ is realized as a tap when it occurs between two syllabic sounds of which the second is stressless.
Tapping

[ˈsɪːŋ] ‘sitting’
[æm] ‘atom’
[ˈhɪːŋ] ‘hitting’

Rule: /t/ is realized as a tap when it occurs between two syllabic sounds of which the second is stressless.

\[ /t/ \rightarrow [ɾ] / [+syll]^1 \quad \begin{array}{c} +\text{syll} \\ -\text{stress} \end{array} \]

^1Please refer to page 122 of your text book for the exact rule.
Aspiration

Rule: Voiceless stops are aspirated when they precede a stressed vowel and are not preceded by /s/
Aspiration

Rule: Voiceless stops are aspirated when they precede a stressed vowel and are not preceded by /s/
- usable, adjustable, debatable, lockable etc.
- We concluded (in the last lecture) that it can attach to verbs (*its input*) and form adjectives (*its output*). So, the morphological structure for ‘washable’ can be shown as follows.

```
Verb + əbəl → Adjective
Verb + əbəl means “able to be Verbed”
```

*-able affixation

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Verb + əbəl → Adjective
```

**Morphological rule – *able* affixation**
Morphological rule – *ation* affixation

*-ation* Affixation
Verb + *-ise* → Noun
Meaning: “the process or product of Verbing”
Phonology-Morphology Interaction

Phonological form of words accommodate to the new environments that are created as a result of morphology.

When morpheme alternates, its different forms are taken as allomorphs. [ˈnəʊt], [ˈnəʊr], and [nəʊ̯θ] are allomorphs of the morpheme /nəʊt/.
Components and multi-component derivations

- Rules of grammar are arranged into components.
Components and multi-component derivations

- Lexicon (in which the morphemes are stored), Morphological component (morphological processes like derivation and inflection) and Phonological component.

- In a complete derivation:

  Morphological component

  (Output of morphology becomes input for phonology)

  Phonological component
<table>
<thead>
<tr>
<th>quote</th>
<th>quotable</th>
<th>quotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>['kwout]_v</td>
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<td>['kwout]_v</td>
</tr>
<tr>
<td><strong>Lexicon</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Morphological component</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>—</td>
<td>['kwout]_vабель]_A</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>['kwout]'_вейсьан]_N</td>
</tr>
<tr>
<td>['kwout]_v</td>
<td>['kwout]_vабель]_A</td>
<td>['kwout]'_вейсьан]_N</td>
</tr>
<tr>
<td><strong>Phonological component</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/'kwout/</td>
<td>/'kwoutабель/</td>
<td>/'kwout'[е]йсьан/</td>
</tr>
<tr>
<td>^{2}_{t}</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>t</td>
</tr>
<tr>
<td>—</td>
<td>—</td>
<td>—</td>
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Alternation that goes beyond allophonic alternation

- A phoneme turns into a sound that exists independently as a phoneme of the language.
  e.g., voicing agreement in final obstruents.
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- Across languages, word-final obstruent sequences agree in voicing. In English: [dz] (both voiced) and [ts] (both voiceless), are acceptable, while those that disagree are not: *[ds] ([d]: voiced; [s]: voiceless) and *[tz] ([t]: voiceless; [z]: voiced).
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- [mips], [lugz] vs. *[Lekd], *[vigt]
Alternation that goes beyond allophonic alternation

Phonological alternation that occurs due to this restriction:

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<tr>
<th>paid</th>
<th>[peɪ-d]</th>
<th>rubbed</th>
<th>[rʌb-d]</th>
<th>picked</th>
<th>[pɪk-t]</th>
</tr>
</thead>
<tbody>
<tr>
<td>filled</td>
<td>[fɪl-d]</td>
<td>eased</td>
<td>[ɪz-d]</td>
<td>tapped</td>
<td>[tæp-t]</td>
</tr>
<tr>
<td>barred</td>
<td>[bɑːr-d]</td>
<td>dragged</td>
<td>[dɹæɡ-d]</td>
<td>missed</td>
<td>[mɪs-t]</td>
</tr>
<tr>
<td>slammed</td>
<td>[słam-d]</td>
<td>lived</td>
<td>[lɪv-d]</td>
<td>laughed</td>
<td>[lɑːf-t]</td>
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Phonological alternation that occurs due to this restriction:

<table>
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<tr>
<th>past tense</th>
<th>phoneme</th>
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The past tense suffix /-d/ surfaces as [-t] whenever it becomes necessary to avoid a disagreement in voicing.
Alternation that goes beyond allophonic alternation

Phonological alternation that occurs due to this restriction:

\[
\begin{array}{llll}
\text{past tense suffix} & \text{remains voiced} & \text{remains voiced after} & \text{is devoiced to [-t] after} \\
\text{after a sonorant} & \text{a voiced obstruent} & \text{a voiceless obstruent} \\
\text{paid} & [peɪ-d] & \text{rubbed} & [rʌb-d] \\
\text{filled} & [fɪl-d] & \text{eased} & [iz-d] \\
\text{barred} & [bær-d] & \text{dragged} & [dræg-d] \\
\text{slammed} & [slæm-d] & \text{lived} & [liv-d] \\
\end{array}
\]

The past tense suffix /-d/ surfaces as [-t] whenever it becomes necessary to avoid a disagreement in voicing.

Voicing Assimilation

\([-\text{sonorant}] \rightarrow [\text{voice}] / \left[\begin{array}{c}
-\text{sonorant} \\
\text{voice}
\end{array}\right] \] #

An obstruent in word-final position takes on the same voicing as a preceding obstruent.
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Morphology:
- Past Tense Formation

Phonology:
- underlying forms
- Voicing Assimilation
- surface forms
Alternation that goes beyond allophonic alternation

- A phoneme turns into a sound that exists independently as a phoneme of the language.
Alternation that goes beyond allophonic alternation

- A phoneme turns into a sound that exists independently as a phoneme of the language.

- This phenomenon is called neutralization.

Neutralization is *identical phonetic realization of distinct phonetic forms*.

(In simple words, Phonemes that are contrastive in certain environments may not be contrastive in all environments. In the environments where they don't contrast, the contrast is said to be *neutralized*. )
Illustration of Neutralization

In English there are three nasal phonemes, /m, n, ŋ/, as shown by the minimal triplet,

/sʌm/  sum
/sʌn/  sun
/sʌŋ/  sung
Illustration of Neutralization

In English there are three nasal phonemes, /m, n, ŋ/, as shown by the minimal triplet,

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However, in words like limp, lint, link, only one of these may appear before each of the plosives. That is, the /m, n, ŋ/ distinction is neutralized before each of the plosives /p, t, k/:

only /m/ before /p/
only /n/ before /t/
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only /ŋ/ before /k/.

Hence, these phonemes are not contrastive in these environments. The contrast is neutralized.
Static and Dynamic Neutralization

- In dynamic neutralization, morphemes alternate to respect the pattern of contextually limited contrast.
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  Does Voicing Assimilation result in dynamic neutralization?
Static and Dynamic Neutralization

- In dynamic neutralization, morphemes alternate to respect the pattern of contextually limited contrast.

Does Voicing Assimilation result in dynamic neutralization?

- In context of the rule, the contrast of voicing is neutralized and voicing disagreement is ‘repaired’ by changing the voicing of the rightmost obstruent.
Static and Dynamic Neutralization

Alveolar Place Enforcement

\[
\begin{align*}
[-\text{sonorant}] & \rightarrow [+\text{coronal}] / [-\text{sonorant}] \\
[-\text{continuant}] & \rightarrow [+\text{anterior}] / [-\text{continuant}]
\end{align*}
\]

Word-final stops following a stop must be alveolar.
Static and Dynamic Neutralization

Alveolar Place Enforcement

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\begin{align*}
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\end{align*}
\]

Word-final stops following a stop must be alveolar.

- Simply, no final clusters may end in anything other than [t] or [d].
- So, words like concept \( ['kænsɛpt] \) or bagged \( [bægd] \) are possible.
- While \* [mɪlkp], \* [bædg], or \* [dædb] are phonologically impossible.
Static and Dynamic Neutralization

Alveolar Place Enforcement
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Word-final stops following a stop must be alveolar.

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- However, there are no cases of “repair”.
Static and Dynamic Neutralization

- Simply, no final clusters may end in anything other than [t] or [d].
- So, words like *concept ['konsept] or bagged [bægd] are possible
- While *[mɪlkp], *[bædg], or *[jʌdb] are phonologically impossible.

- However, there are no cases of “repair”.
- **Voicing Assimilation** imposes its neutralization dynamically (altering the form of morphemes), **Alveolar Place Enforcement** is entirely static, imposing no actual changes.
Two cases of alternations...

- Alternations that involve allophones
- Alternation that goes beyond allophonic alternation (Neutralization)
Neural Correlates of Voicing Mismatch using MEG

Stimuli

Attested in Languages

A. [udz]

Unattested in Languages

C. [uds]

B. [ute]

D. [utz]
Neural Correlates of Voicing Mismatch using MEG

Shaded area on the waveform plot designates region of significant difference between the two conditions.

Overlay of the grand average MEG RMS temporal waveforms.
Finding

The listeners make use of their knowledge of phonological constraints regarding sound sequences to predict the phonetic quality of the upcoming sound.
Conclusions

- Alternation results because the phonological rules enforce their demands on the output of morphology.
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- Alternation results because the phonological rules enforce their demands on the output of morphology.

Morphemes (constant pronunciation) → Morphology (Rearranges the phonological environments of the phonemes) → Phonology