Day 18

Cesar Koirala

Introduction to Phonology
Native speakers can usually count the syllables in a word without any difficulty.

How many syllables does the word *phonology* have? *pho.no.lo.gy*

Furthermore, we have clear intuitions about where to put the syllable boundary.

Identify the syllable boundaries in *incidental*. *in.ci.den.tal*

(we have an implicit knowledge that the segments ‘nt’ cannot occur together at the left edge of the 3rd syllable and so we break them up such that each segment attaches to a different syllable.)
What constitutes this implicit knowledge?

- Internal structure of the syllable.
- Phonotactic rules or constraints.
Most syllables start with a consonant or a consonant sequence known as **onset**. For e.g., *kæt*

The rest of the syllable is called as syllable **rhyme** (*kæt*). Rhyme contains obligatory **nucleus** (usually a vowel) and an optional coda.

The internal structure of word ‘sprint’ is shown below.

```plaintext
\[ \sigma \]
```

- **Onset Rhyme**
  - **Nucleus Coda**
    - *s p r i n t*
Sprint is a monosyllabic (consisting of a single syllable) word with a complex onset and a complex coda. \( \rightarrow \) CCCVCC
The internal structure of word ‘rabbit’ is shown below.

Rabbit is a **bisyllabic** (consisting of a 2e syllable) word that has an **open** and a **closed** syllable $\rightarrow$ CV.CVC
Internal structure of a syllable

Syllabification Algorithm (first approximation)

a. Scanning from left to right identify the vowels in the word, and project a syllable node from them.

b. For each syllable node, link to a consonant to the left of the vowel (if there is one).

c. Then, for each syllable node, link to a consonant to the right of the vowel (if there is one).

d. Unlinked segments are then either linked to existing syllable nodes, respecting the Sonority Sequencing Principle wherever possible, and the process is repeated with other sonorous sounds like glides and liquids now serving to project syllable nuclei.
Exercise: Draw the internal structure of words ‘happy’ and ‘rhythm’.

- Draw the internal structure of ‘rhythm’ such that [m] is syllabic.
These basic principles of syllable structure are universal among all languages, but they are language specific in terms of particular settings they allow.

Many languages allow only CV and CVC syllables. However, English has very complex syllable structure. For e.g., **sprints**.
## Typological facts (Belvins (1996))

<table>
<thead>
<tr>
<th>Language</th>
<th>Onsets</th>
<th>Codas</th>
<th>Possible Syllables (excluding complex onsets and codas)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabela, Siona, Piro, Hua</td>
<td>required</td>
<td>forbidden</td>
<td>CV</td>
</tr>
<tr>
<td>Totonac, Klamath, Nisqually, Tunica, Sedang, Dakota, Thargari</td>
<td>required</td>
<td>allowed, but not required</td>
<td>CV, CVC</td>
</tr>
<tr>
<td>Pirahã, Mazateco, Fijian, Cayuvara</td>
<td>allowed, but not required</td>
<td>forbidden</td>
<td>V, CV</td>
</tr>
<tr>
<td>English, Gilyak, Finnish, Tamazight Berber, Cairene Arabic, Spanish, Italian, Mokilese, Cuna</td>
<td>allowed, but not required</td>
<td>allowed, but not required</td>
<td>V, CV, VC, CVC</td>
</tr>
</tbody>
</table>
Phonotactics and syllabification

- Languages have significant rules on what kinds of sounds may or may not combine. We see this shaped strongly by the syllable, with different restrictions holding for the beginning of syllables, the end of syllables, and combinations across syllable boundaries.
  
et. English allows “tr” at the beginning of words, but never “rt”.

Q. Why is “tr” okay at the beginning of a syllable but not “rt”? Is this a random rule in English?

- In a syllable, the sonority increases from the margins to the nucleus. (sonority sequencing principle)
The sonority hierarchy

- The phonetic idea of sonority: the more open the air passages, the more sonorous.

**The sonority hierarchy**

<table>
<thead>
<tr>
<th>high sonority</th>
<th>low sonority</th>
</tr>
</thead>
<tbody>
<tr>
<td>vowels</td>
<td>obstruents</td>
</tr>
<tr>
<td>glides</td>
<td></td>
</tr>
<tr>
<td>liquids</td>
<td></td>
</tr>
<tr>
<td>nasals</td>
<td></td>
</tr>
</tbody>
</table>

Example sounds:

- [a, i]
- [j, w]
- [l, r]
- [m, n]
- [s, b]
Sonority Sequencing Principle

- In a syllable, sonority increases from the margin to the nucleus.
Sonority Sequencing Principle

- Sonority Sequencing is a universal principle of language but its application is language specific.

  e.g1., Initial clusters like $\alpha pt-$, $\alpha ps-$, $\alpha fl-$ occur in Russian though they are impossible sequences in English.

  $[\text{psa}]$ ‘dog’s’  $[\text{fslux}]$ ‘aloud’  $[\text{ptjitsø}]$ ‘bird’

  e.g2. Restriction against similar sounds in English Onsets.

  * $t/d/θ$ - 1  
  * $p/b/f$ - w

  i.e. *[ [coronal][coronal,+lat] ]_{ONSET}  
  i.e. *[ [labial][labial] ]_{ONSET}
Despite cross linguistic differences, we see some effect of sonority sequencing principle in every language. Some languages agree to SSP 100%. English is an exception – [s] in complex onsets and codas DOES NOT obey SSP.
Random Exercise

Write a phonological rule that describes the following process.

/kapt+kαn/ → [kapkan].
/kapt/ → [kap].
/kapt+i/ → [kapti].
Write a phonological rule that describes the following process.

\[ /k\text{apt}+\text{kan}/ \rightarrow [\text{kapkan}] .\]
\[ /k\text{apt}/ \rightarrow [\text{kap}] .\]
\[ /k\text{apt}+i/ \rightarrow [\text{kapti}] .\]

\[ C \rightarrow \emptyset / C \quad \# \{C, \#\} \]
Importance of *syllable* in Phonology

- Syllable is relevant to the description of some phonological rules.
- Syllable forms basis for describing stress patterns in languages.
Allowing rules to refer to *syllable*

- Try writing the rule referring to syllable now.

\[
\begin{align*}
/k\text{apt}+k\text{an}/ & \rightarrow [k\text{apkan}]. \\
/k\text{apt}/ & \rightarrow [k\text{ap}]. \\
/k\text{apt}+i/ & \rightarrow [k\text{apti}].
\end{align*}
\]
Allowing rules to refer to syllable

- Try writing the rule referring to syllable now.

/kapt+kan/ → [kapkan].
/kapt/ → [kap].
/kapt+i/ → [kapti].

C → ∅ / ____ ]σ
Importance of *syllable* in Phonology

- Syllable is relevant to the description of some phonological rules.
- Syllable forms basis for describing stress patterns in languages.