Class 12 (Mar. 20, 2002): Features and Feature Geometry

Overview

• natural classes
• feature bundles
• hierarchical grouping of features
• vowels vs. consonants

Natural class
= a set of sounds that is defined by shared feature values, where a feature is an acoustic or articulatory property.

e.g. all and only the sounds that are [+F]
  all and only the sounds that are both [+F] and [-G]

Examples we’ve seen so far?

There’s no universally agreed-on set of features (it’s a matter of ongoing research), but the criterion for evaluating a proposed feature system is, Does it capture all and only the natural classes we actually see rules referring to?

Tamil
Dravidian language with 62,000,000 speakers, mainly in India, Sri Lanka, and Malaysia. Written with Tamil script. Data originally from Christdas (1988)

Not all glide-vowel sequences are permitted:

*ji *je ja jo ju
wi we wa *wo *wu

How can we use features to characterize what’s forbidden?

Features behaving as groups

Toba Batak
Austronesian language with 2 million speakers in Indonesia (Sumatra). Traditional Batak script exists, but Roman script is used today. (data from Nababan 1981, Hayes 1986)

n → p / __ p /bulan purnama/ → [bulap purnama] ‘full moon’
n → t / __ t /sian toru/ → [siat toru] ‘from below’
n → k / __ k /sɔŋɔŋ kuli/ → [sɔŋɔk kuli] ‘like a cooly’
n → b / __ b /sɔŋɔŋ batu/ → [sɔŋɔb batu] ‘like a stone’
In autosegmental terms, this could be represented as

```
C   C   C
|   |   n
n   [ ]
```

where the Cs are placeholders for the fact that there's a segment there, and the features all spread as a group (we'll see more about this idea of a "C-V" tier after spring break)

or just

```
C   C
|   |
+---
n   [ ]
```

Putting the features on a different tier from the placeholders allows the features to spread as a group.

Malayalam
Dravidian language with 34 million speakers, mostly in India.

The place features are spreading as a group. How about a place tier?
Ancient Greek

**UR of stem** 
+ /-o/  
+ /-tai/  
+ /tʰem/  
+ /dθm/  

<table>
<thead>
<tr>
<th>Word</th>
<th>Stem</th>
<th>Sound</th>
</tr>
</thead>
<tbody>
<tr>
<td>/trib/</td>
<td>trib-o</td>
<td>te-trib tai</td>
</tr>
<tr>
<td>/gripʰ/</td>
<td>gripʰ-o</td>
<td>ge-grip tai</td>
</tr>
<tr>
<td>/pemp/</td>
<td>pemp-o</td>
<td>e-pempʰem</td>
</tr>
<tr>
<td>/klept/</td>
<td>klept-o</td>
<td>kleb-dem</td>
</tr>
</tbody>
</table>

'rub'

'write'

'send'

'steal'

Evidence for further hierarchical groupings

**[anterior] can spread on its own**

Navajo sibilant harmony

\[ s \rightarrow \{\text{i, }\} X_{0} \{\text{s, }\} \]

\[ \text{ʃ} \rightarrow \{\text{s, }\} X_{0} \{\text{s, }\} \]

**[anterior] can spread with the other tongue-blade features**

English t,d,n ([+anterior, -distributed])

\[ \rightarrow \text{dental } \{\text{θ, }\} \delta \]  
([+anterior, +distributed])

\[ \rightarrow \text{palatoalveolar } \{\text{ʃ, }\} \text{dʒ, }\text{ʃ, }\text{ʒ} \]  
([-anterior, +distributed])

\[ \rightarrow \text{retroflex } \{\text{ɬ, }\} \]  
([-anterior, -distributed])

---

1 for speakers who have a retroflex r
[anterior] can spread with all the place features
as in Malayalam
This suggests a hierarchical organization of features:

\[
X \\
| place \\
| coronal (= tongue blade/tip) \\
| anterior
\]

**Feature trees**
McCarthy’s tree (more or less)

Evidence for hierarchical grouping
- Assimilation as a group (spreading)

- Deletion as a group (delinking)
  debuccalization:    Spanish dialects s \( \rightarrow \) h / ___ \_syll
  English, some Ethiopian languages glottalized C \( \rightarrow \) ?
  laryngeal neutralization:    Korean codas

- OCP interaction

**Obligatory Contour Principle**: adjacent identical elements are prohibited.
Can show up as…
- inalterability effects (evidence that the structure is linked, as in tone examples from before, and Chickasaw case below)
- restrictions on allowable sequences (e.g., Arabic: two adjacent consonants with same place class not allowed in a root)
Chickasaw
Muskogean language with under 1,000 speakers in Oklahoma and Los Angeles

\[
\begin{align*}
V & \rightarrow [+\text{long}] / \_ \_ \text{syl} \\
[+\text{nasal}] & \quad [+\text{nasal}] \\
1 & \quad 2 & \quad 1
\end{align*}
\]

But, rule doesn’t apply when the nasal shares place of articulation with a following C (e.g. ampa).

(OCP is a troubled concept in rule-based phonology: what is the prescribed repair for an OCP violation? Can the OCP ever be violated, and if it can, then what good is it? OT has some answers that rescue the concept: the interaction with other constraints determines what the repair is, and under what circumstances the OCP can be violated.)

Vowels vs. consonants
Do Vs and Cs share features?

Sometimes Vs and Cs interact, sometimes they don’t.

Turkish has [round] harmony

\[
\begin{align*}
V & \rightarrow [+\text{round}] / V \quad C_0 \_ \_ \\
[+\text{hi}] & \quad [+\text{round}]
\end{align*}
\]

But labial consonants don’t act as triggers.

Turkish also has [front] harmony

\[
\begin{align*}
V & \rightarrow [+\text{front}] / V \quad C_0 \_ \_ \\
[+\text{front}]
\end{align*}
\]

And palatalized Cs do act as triggers.

Examples of V-C interaction

- **Spreading**: in many languages, velar and labial consonants can become coronal before front vowels (so are front vowels coronal?)
  
  *Maltese*: certain vowels become [i] before coronal consonants

- **OCP**: in many languages, sequences of featurally-similar Vs and Cs are prohibited

  *Korean*: coronal obstruents are not followed by high front vowels underlyingly, labial consonants are not followed by round vowels underlyingly.

Archangeli & Pulleyblank propose a *vocalic* node, from which depend place and height features.
Clements & Hume’s Place node:

```
place
[LABIAL], etc. ➔ vocalic

V-place ➔ aperture

[LAB] [COR] [DOR] [open]
```

Explains why single consonantal features can skip vowels (as [anterior] in Navajo), but
the whole Place node never skips vowels.

**Preview of next time (Mon., April 1)**
- underspecification: must all segments be [+F] or [-F]?
- markedness: are some values of a feature better?

**To do for next time (Wed., March 20)**
- Read and answer study questions about McCarthy article.