Variability of Languages in Time and Space

Lecture 2
Phonology

- Phonological Typology
- Phonetics and Phonology
- Consonant and Vowel Inventories
- Segmental Processes
- Linguistic quiz to the end

Anja Nedoluzhko
Phonological Typology - Motivation

• What kinds of phoneme inventories are there?
• Helps to analyze phonological data (*I’ve seen this before... Typically it goes like this...*)
• What is common/uncommon, markedness
  – Odden 2013: „It is very difficult to refuse a claim of the form „X is more common than Y,“ except if a very detailed numerical study is undertaken.“ (p. 207)
  – „X is marked“ (relative to Y): “[ʕ] is more marked than [q]” – “[q] is more marked than [k]”
• Implicational relations
  – e.g. nasal vowels → oral vowels

Most research on spoken languages! Written forms may sometimes help.
X is marked (relative to Y):

- [ʕ] is more marked than [q]
- [q] is more marked than [k]
- pharyngeals are marked sounds (relative to other sounds of the world’s languages)
Phonetics and Phonology

• Phonetics – the manifestation of language sound
  - Acoustic properties of language sounds
Phonetics and Phonology

• **Phonetics** – the manifestation of language sound
  - Acoustic properties of language sounds
  - Articulatory properties of language sounds
Articulatory Phonetics

1. Bilabial
2. Labiodental
3. Dental and interdental
4. Alveolar
5. Postalveolar
   a. Retroflex
   b. Palato-alveolar
6. Palatal
7. Velar
8. Uvular
9. Pharyngeal

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Phonetics and Phonology

• **Phonetics** – the manifestation of language sound
  - Acoustic properties of language sounds
  - Articulatory properties of language sounds
  - Transcription: International Phonetic Alphabet (IPA)
    - There are systematic limits on possible speech sounds in human language
International Phonetic Alphabet (IPA)

CONSONANTS (PULMONIC)

<table>
<thead>
<tr>
<th></th>
<th>Bilabial</th>
<th>Labiodental</th>
<th>Dental</th>
<th>Alveolar</th>
<th>Postalveolar</th>
<th>Retroflex</th>
<th>Palatal</th>
<th>Velar</th>
<th>Uvular</th>
<th>Pharyngeal</th>
<th>Glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plosive</td>
<td>p b</td>
<td></td>
<td>t d</td>
<td>t d</td>
<td>c j</td>
<td>k g</td>
<td>q g</td>
<td></td>
<td></td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>Nasal</td>
<td>m mj</td>
<td></td>
<td>n</td>
<td>η</td>
<td>η</td>
<td>η</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trill</td>
<td>B</td>
<td></td>
<td>r</td>
<td>η j</td>
<td>η</td>
<td>η</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tap or Flap</td>
<td>v</td>
<td></td>
<td>r</td>
<td>η l</td>
<td>η</td>
<td>η</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fricative</td>
<td>φ β f v</td>
<td>θ ð s z</td>
<td>θ s z</td>
<td>θ s j</td>
<td>x y</td>
<td>χ r</td>
<td>h f</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral fricative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approximant</td>
<td>u</td>
<td></td>
<td>ι</td>
<td>j</td>
<td>u</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral approximant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Symbols to the right in a cell are voiced, to the left are voiceless. Shaded areas denote articulations judged impossible.

CONSONANTS (NON-PULMONIC)

<table>
<thead>
<tr>
<th></th>
<th>Voiced implosives</th>
<th>Ejectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilabial</td>
<td>b Bilabial</td>
<td>’ Examples:</td>
</tr>
<tr>
<td>Dental</td>
<td>d’ Dental/alveolar</td>
<td>p’ Bilabial</td>
</tr>
<tr>
<td>(Post)alveolar</td>
<td>f’ Palatal</td>
<td>t’ Dental/alveolar</td>
</tr>
<tr>
<td>Palatoalveolar</td>
<td>g’ Velar</td>
<td>k’ Velar</td>
</tr>
<tr>
<td>Alveolar lateral</td>
<td>G’ Uvular</td>
<td>s’ Alveolar fricative</td>
</tr>
</tbody>
</table>

OTHER SYMBOLS

VOWELS

Front           Central         Back
Close           i • y           u• u
Close-mid       e • ò             ñ
Open-mid        o • ø             e
Open            æ • æ             a • æ

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Phonetics and Phonology

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• **Phonology** – the study of sound systems
  – the symbolic perspective on sound
  – sounds (phonemes) are cognitive abstractions, which represent but are not the same as physical sounds
Phonemes

• The smallest distinct acoustic unit in a language
• A phoneme does not convey meaning but distinguishes meaning of larger units
• At the beginnings and ends of syllables vs. in the middle: consonants and vowels
  – pin, tin, kin, fin, thin, sin, shin
  – dim, din, ding, did, dig, dish
  – pin, pen, pan, pun, pain, pine, pawn
Let’s Try It In Practice

• Are the following statements from phonetics or from phonology?
  – The sounds in the word *frame* change continuously
  – The word *frame* is composed of four segments
  – Towards the end of the word *frame*, the velum is lowered

• Why is it undesirable to use the most precise representation of the physical properties of a spoken word in discussing rules of phonology?

• Give the phonetic symbols for
  – Dental nasal
  – Labio-dental fricative

• How many phonemes are there:
  – *sit, judge, trap, fish, bite, ball, up, ox, through, often*
Phomenic Inventories Databases

- **SPA**, Stanford Phonology Archive (Vihman, 1974)
  - includes descriptions of phonemes, allophones and comments on phonological contexts for 197 languages.
  - phonological descriptions according to the *Handbook of Phonological Data From a Sample of the World's Languages* (Crothers et al. 1979)

- **UPSID**, UCLA Phonological Segment Inventory Database (Maddieson 1984, 1997)
  - statistical survey, phonemic inventories,
  - 451 languages in the last version
  - [http://web.phonetik.uni-frankfurt.de/upsid.html](http://web.phonetik.uni-frankfurt.de/upsid.html)

- Phonemic inventories within **WALS** (Maddieson 2013)
  - 564 languages
  - [http://wals.info/](http://wals.info/)

- **PHOIBLE** database (Moran et al. 2014, updated in 2019)
  - segment inventories of 1,672 languages
  - [https://phoible.org/](https://phoible.org/)
WALS: Consonant Inventories

6 15 19 25 34 122

small  moderately small  average  moderately large  large
Rotokas

only 6 consonants
(/p, t, k, b, d, g/)

Papua New Guinea
WALS: Consonant Inventories

6
small

15
moderately small

19
average

25
moderately large

34
large

122 consonants
(mainly because it has a very large number of different click sounds with which a word may begin)

Click sounds? How to pronounce them?
https://www.youtube.com/watch?v=31zzMb3U0iY

spoken in Botswana
WALS: Consonant Inventories

http://wals.info/feature/1A#2/19.3/152.8
Typology for Consonant Inventories: Correlations

- Hypothesis (Lindblom - Maddieson, 1988): There is an overall relationship between the size of a consonant inventory and the kind of consonants it includes.

<table>
<thead>
<tr>
<th>C’s inventory size</th>
<th>special C’s</th>
<th>glottalized C’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>small</td>
<td>8.7%</td>
<td>8.7%</td>
</tr>
<tr>
<td>moderately small</td>
<td>13.1%</td>
<td>10.7%</td>
</tr>
<tr>
<td>average</td>
<td>22.1%</td>
<td>21.5%</td>
</tr>
<tr>
<td>moderately large</td>
<td>27.4%</td>
<td>39.3%</td>
</tr>
<tr>
<td>large</td>
<td>40.7%</td>
<td>66.7%</td>
</tr>
</tbody>
</table>

Languages with special consonants by consonant inventory size
Typology for Consonant Inventories

- **Place of articulation:** labial, alveolar, velar > alveopalatal (pol. *pioło*) > uvular, dental, retroflex (pol. *żaba*) > pharyngeal
- **Place of articulation:** Most languages have one laryngeal consonant (/h/ > /ʔ/ > /ɦ/)
- **Manner of articulation:** Stops > fricatives, nasals
- **Most languages have at least one fricative** (Klamath only /s/)
- **Most languages have glides** /w j/ – but in some languages, /w j/ do not contrast with high vowels
- **Most languages have at least one nasal** (some n. American languages lack them)
Vowel Quality Inventories

• Three scales
  – Front – Central – Back
  – Close – Mid – Open
  – Rounded - Unrounded

• Typological issues
  – e.g. Front rounded vowels > back unrounded vowels (inventories like English are unusual)

• No correlation between vowel and consonant inventories (Justeson-Stephens, 1984)
Vowel Quality Inventories

Yimas (Papua New Guinea): 2
Vowel Quality Inventories

Yimas (Papua New Guinea): 2

German

French
Why such inventories and not others?

- Looking for cross-linguistic biases in the distribution of phonemes
- Most of research proposes explanations based on speech production and/or perception
  - *Perceptual factors* often compete with *Articulatory factors* (maximization of perceptual distinctness and minimization of articulatory effort)
- Liljencrants and Lindblom (1972): Adaptive Dispersion Theory
  - Phoneme inventories are preferable to the extent they possess contrasts that are maximally distinct in the perceptual domain.
- A number of other theories
  - Dispersion Focalization Theory (Schwartz et al. 1997)
  - Lindblom and Maddieson model (1988)
  - Stevens’s Quantal Theory (1972, 1989)
Frequency Distributions Within Languages: Consonants

There is a strong correlation between the typologically most common consonants and their frequency within languages.
Schwa \([\emptyset]\) occurs with greater frequency within languages than three of the cardinal vowels /e, o, u/, even though schwa is considerably less common across languages.
Phoneme Inventories: Summary

- Although there are a large number of sounds attested in languages of the world, most languages only employ a relatively small subset of them to make contrasts.
- There are certain consonants and vowels that are much more common than others both cross-linguistically and within languages
  - There is an extensive literature about the phonetic and phonological motivations for phoneme inventories
- Constantly evolving nature of the lexicon leads to changes in intra-language frequency distribution of phonemes.
Phonological Rule Typology: Segmental Processes

• A more complex problem than segment inventory typology, requires more language-particular commentary and analysis.

• All spoken languages have phonological rules, but not all rules are found in every language.
  – may be in certain language families but not in the others, e.g. rounding harmony common in Turkic languages

• Most phenomena affecting segments may be explained by minimizing articulating effort and enhancing perceptual salience.
Segmental Processes

- **Assimilation** (*bags* [bægz]*)
  - Nom. sg. stol
  - Dim. (nom.sg.) stoljk
  - Loc.sg. stôle ‘table’
- **Long-distance assimilation** (e.g. harmony)
- **Dissimilation** (*pilgrim* ← lat. *peregrinus*)
- **Fortition, Lenition, Deletion and compensatory lengthening** (*p[ə]ˈtato, p[Ø]ˈtato*)
- **Epenthesis** (e.g. *oputimisuto* in Japanese as syllable repair, etc.)
- **Metathesis** (more sporadic, more diachronic)

---

VC metathesis in Late Common Slavic (Townsend and Janda 1996: 60–1)

<table>
<thead>
<tr>
<th>Late Common Slavic</th>
<th>Gloss</th>
<th>Polish</th>
<th>Bulgarian</th>
</tr>
</thead>
<tbody>
<tr>
<td>gördů</td>
<td>‘enclosure’</td>
<td>grod</td>
<td>grad</td>
</tr>
<tr>
<td>golvá</td>
<td>‘head’</td>
<td>gwowá</td>
<td>glavá</td>
</tr>
<tr>
<td>sólma</td>
<td>‘straw’</td>
<td>wWoma</td>
<td>sláma</td>
</tr>
<tr>
<td>melkó</td>
<td>‘milk’</td>
<td>mlekó</td>
<td>mljakó</td>
</tr>
</tbody>
</table>
Let’s Try It In Practice

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>klup</td>
<td>klubi</td>
<td>‘club’</td>
<td>trup</td>
</tr>
<tr>
<td>dom</td>
<td>domi</td>
<td>‘house’</td>
<td>snop</td>
</tr>
<tr>
<td>3wup</td>
<td>3wobi</td>
<td>‘crib’</td>
<td>trut</td>
</tr>
<tr>
<td>dzvon</td>
<td>dzvoni</td>
<td>‘bell’</td>
<td>kot</td>
</tr>
<tr>
<td>lut</td>
<td>lodi</td>
<td>‘ice’</td>
<td>grus</td>
</tr>
<tr>
<td>nos</td>
<td>nosi</td>
<td>‘nose’</td>
<td>vus</td>
</tr>
<tr>
<td>wuk</td>
<td>wugi</td>
<td>‘lye’</td>
<td>wuk</td>
</tr>
<tr>
<td>sok</td>
<td>soki</td>
<td>‘juice’</td>
<td>ruk</td>
</tr>
<tr>
<td>bur</td>
<td>bori</td>
<td>‘forest’</td>
<td>vuw</td>
</tr>
<tr>
<td>sul</td>
<td>soli</td>
<td>‘salt’</td>
<td>buj</td>
</tr>
<tr>
<td>ʃum</td>
<td>ʃumi</td>
<td>‘noise’</td>
<td>ʒur</td>
</tr>
</tbody>
</table>

Polish

- What phonological rules are observed here?
- What order do they apply in?
Example of Assimilation: Vowel Harmony

- A type of long-distance assimilatory phonological process involving vowels
- A vowel or vowels in a word are changed to sound the same (thus "in harmony")
- In languages with vowel harmony, there are constraints on which vowels may be found near each other
- Many agglutinative languages have vowel harmony

\[
\begin{array}{c}
gün\quad \text{‘day’} \\
ay\quad \text{‘month’} \\
günler\quad \text{‘days’} \\
aylar\quad \text{‘months’} \\
\end{array}
\]
Vowel Harmony

- **Vowel harmony**
  - Front-back (Turkish, Hungarian)
  - Height (N. Salentino)
  - Rounding (Turkish)

- **Variations in Rounding Harmony**
  - Kirghiz – all vowels assimilate in rounding to preceding vowels except that [a] does not assimilate to [u]
  - Turkish – only high vowels undergo, all round vowels trigger
  - Sakha (Yakut) – high vowels undergo, round vowels trigger; nonhigh vowels undergo if same height as trigger
  - Mongolian – only nonhigh vowels undergo, only nonhigh vowels trigger
  - Yawelmani – vowels undergo if same height as trigger
Vowel Harmony in Hungarian

<table>
<thead>
<tr>
<th>háború</th>
<th>‘war’</th>
</tr>
</thead>
<tbody>
<tr>
<td>háborúról</td>
<td>‘about war’</td>
</tr>
<tr>
<td>bűn</td>
<td>‘guilt’</td>
</tr>
<tr>
<td>bűntelen</td>
<td>‘guiltless’</td>
</tr>
<tr>
<td>bűnről</td>
<td>‘about guilt’</td>
</tr>
<tr>
<td>út</td>
<td>‘way’</td>
</tr>
<tr>
<td>útról</td>
<td>‘about way’</td>
</tr>
<tr>
<td>keserű</td>
<td>‘bitter’</td>
</tr>
<tr>
<td>keserűség</td>
<td>‘bitterness’</td>
</tr>
<tr>
<td>keserűső</td>
<td>‘bitter salt’</td>
</tr>
<tr>
<td>kör</td>
<td>‘ring’</td>
</tr>
<tr>
<td>körút</td>
<td>‘ring way’</td>
</tr>
<tr>
<td>körről</td>
<td>‘about ring’</td>
</tr>
<tr>
<td>bátor</td>
<td>‘brave’</td>
</tr>
<tr>
<td>bátorságról</td>
<td>‘about braveness’</td>
</tr>
<tr>
<td>bátortalan</td>
<td>‘not brave’</td>
</tr>
<tr>
<td>föld</td>
<td>‘field’</td>
</tr>
<tr>
<td>földtelen</td>
<td>‘fieldless’</td>
</tr>
<tr>
<td>burgonya</td>
<td>‘potato’</td>
</tr>
<tr>
<td>burgonyaföld</td>
<td>‘potato field’</td>
</tr>
<tr>
<td>sötét</td>
<td>‘dark’</td>
</tr>
<tr>
<td>sötétség</td>
<td>‘darkness’</td>
</tr>
</tbody>
</table>

1. Which words are compounds and why?
2. Which of the following words can be divided into parts?

földtan, földnek, háborúellenes, Budapest, burgonyalevés, óraütés, hőálló, bűnöző.

3. Translate into Hungarian:
guiltlessness, about field, about potato, wayless
References -1

References - 2

- Handbook of phonological data from a sample of the world's languages : a report of the Stanford Phonology Archive / compiled and edited by John H. Crothers ... [et al.]