

Advanced Phonological Theory B – Lecture 8: Who's afraid of inventories?

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March 9, 2005

Lecture 8: Who's afraid of inventories?

UPSID

- The UCLA Phonetic Segment Inventory Database contains inventory information for a range of languages
 - ◆ UPSID₃₁₇: 317 languages (Maddieson, 1984)
 - ◆ UPSID₄₅₁ (current): 451 languages (Maddieson & Precoda, 1989)
- Based (mostly) on transcription data in the descriptive literature
- Sampled to avoid genetic (but not areal) bias

Lecture 8: Who's afraid of inventories?

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Who needs it

- UPSID allows phonologists to investigate patterns in the phonological organisation and phonetic manifestation of segment inventories
- Key assumption: UPSID provides a sufficiently representative sample of languages to support claims about what is (relatively) common in language
- To some, this is not an area phonology proper is concerned with (Hale & Reiss, 2000)

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UPSID₄₅₁ vowel frequencies

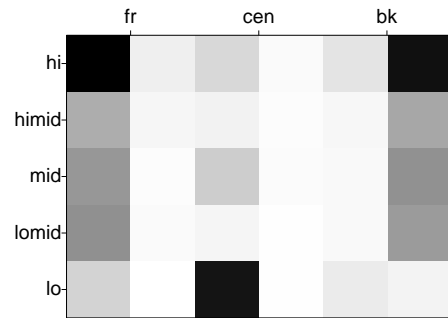
- Raw frequencies of vowels in UPSID₄₅₁ (Maddieson & Precoda, 1989) by height, backness and rounding:

| | fr | | cen | | bk | |
|-------|------|------|------|------|------|------|
| | -rnd | +rnd | -rnd | +rnd | -rnd | +rnd |
| hi | 444 | 28 | 67 | 8 | 46 | 416 |
| himid | 142 | 15 | 22 | 4 | 14 | 153 |
| mid | 181 | 4 | 86 | 6 | 9 | 191 |
| lomid | 192 | 8 | 16 | 1 | 10 | 174 |
| lo | 76 | 0 | 409 | 1 | 34 | 21 |

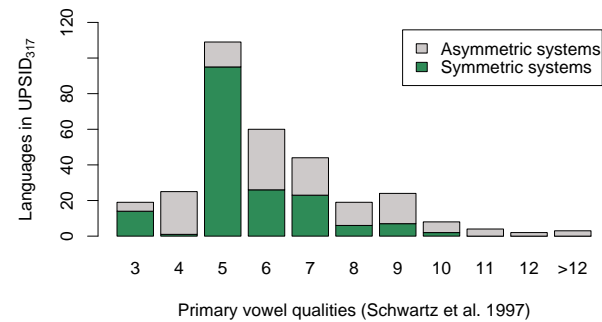
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UPSID₄₅₁ vowel frequencies



UPSID₃₁₇ vowel systems



Vowel inventories: generalisations

- Inventories show a marked preference for **peripheral vowels**:
 - ◆ High front unrounded vowels such as [i]
 - ◆ High back rounded vowels such as [u]
 - ◆ Low central unrounded vowels such as [a]
 - ◆ (Less so) front non-low unrounded vowels such as [e, ε]
 - ◆ (Less so) back non-low rounded vowels such as [o, ɔ]

Vowel inventories: generalisations

- In **non-peripheral** areas there are weak(er) preferences for:
 - ◆ High vowels such as [y, i, u]
 - ◆ Centralised vowels such as [ə]

Vowel inventories: generalisations

- 109 vowel inventories in UPSID₃₁₇ (34%) exhibit 5 primary vowel qualities (Schwartz et al., 1997)
- Of these, 95 inventories are 'symmetric' [i]-[e]-[a]-[o]-[u]-type systems comprising 3 peripheral vowels, a mid front unrounded vowel, and a mid back rounded vowel

Modelling inventories

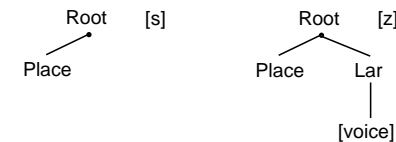
- So how can generative phonological theory capture generalisations about (vowel) inventories?
- Note first that it is unlikely that lexical inventories are represented *as such*
- Consequently, constraints/rules will have to be stated over the phonological forms of morphemes/words
- **Declarative** formalisms such as OT offer devices that allow this

Modelling inventories

- OT provides a formalism for modelling inventories but (of itself) not a theory of preferred sounds
 - ♦ Constraints such as *[a] are as easy to state as *[æ]
- As a form of 'markedness' it would seem attractive to treat inventory asymmetries in terms of underspecification / complexity
 - ♦ Example: plain voiceless sounds are (deemed to be) frequent crosslinguistically, and have been treated as laryngeally unmarked (Kaye et al., 1990; Harris, 1994; Iverson & Salmons, 1995)

Modelling inventories

- Assuming that [-voice] obstruents are laryngeally unmarked *LAR \gg MAX_{Lar} (cf. Lombardi 1999) allows [p, t, k, f, s, x] etc.
- MAX_{Lar} \gg *LAR allows [p^h, t^h, k^h, b, d, g, v, z, ʒ] etc. as well as [p, t, k, f, s, x] etc.



Modelling inventories

- Problem: favoured feature values can be phonologically active
 - ◆ Voiceless obstruents are often deemed to be favoured over obstruent belonging to different laryngeal categories (voiced, aspirated, ejective)
 - ◆ There's a good case to be made at least for **sibilant fricatives**: 397 languages with voiceless sibilants vs. 147 with voiced sibilants in UPSID₄₅₁
 - ◆ [-voice]/[spread glottis] active in plosives and (especially?) fricatives (Vaux, 1998; Mascaró & Wetzels, 2001)

Modelling inventories

- N.B.: UPSID does not code the distinction between prevoiced and short lag /b, d, d̥, g/ etc. and is unreliable wrt plain voiceless vs. voiceless plosives, which makes impossible to verify any claims about the unmarkedness of plain voiceless stops

Modelling inventories

- Voiceless fricatives pattern with aspirated rather than plain plosives in New Julfa Armenian (Vaux, 1998):

| | | |
|-----------------|----------------|-----------------------------|
| /k-t-a-m/ | [kətam] | 'I will give' |
| /k-kien-a-m/ | [kəkienam] | 'I will exist' |
| /k-tʰoɸ-n-ie-m/ | [kʰətʰoɸniem] | 'I will allow' |
| /k-tʰʃapʰ-ie-m/ | [kʰətʰʃapʰiem] | 'I will measure' |
| /k-χnd-a-m/ | [kʰəχəndam] | 'I will laugh' |
| /k-savor-ie-m/ | [kʰəsavoriem] | 'I will grow accustomed to' |

Modelling inventories

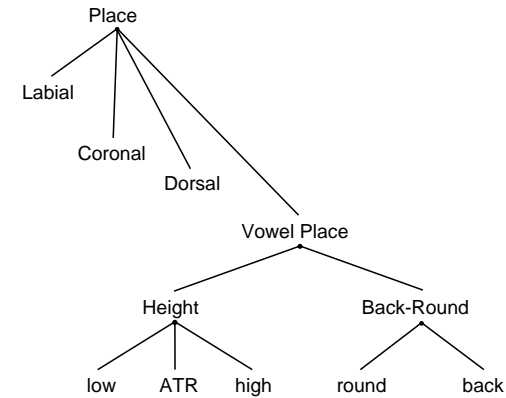
- Plain voiceless obstruents trigger VA in Hungarian (Siptár & Törkenczy, 2000):

| | | |
|--------------------|-----------------|-------------------|
| /rɔb/+ /to:l/ | [rɔpto:l] | from (a) prisoner |
| /ka:d/+ /to:l/ | [ka:to:l] | from (a) bathtub |
| /a:ʃ/+ /to:l/ | [a:cto:l] | from (a) bed |
| /mɛlɛg/+ /to:l/ | [mɛlɛktø:l] | from (the) heat |
| /monta:ʒ/+ /sɛry:/ | [monta:s:ɛry:] | montage-like |
| /igɔz/+ /ʃa:g/ | [igɔʃ:a:g] | truth |
| /bridʒ/+ /sobɔ/ | [britʃsɔbɔ] | bridge room |
| /vɔra:ʒ/+ /ʃɛruzɔ/ | [vɔra:ʃtʃɛruzɔ] | magic pencil |

Modelling inventories

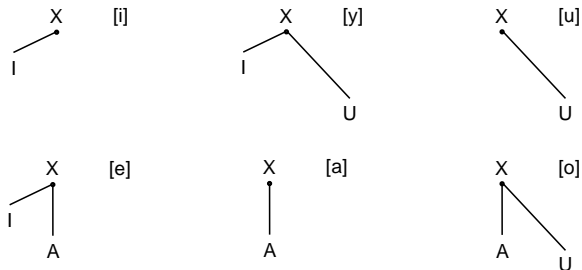
- Problem: sometimes preferred and dispreferred sounds are assigned equally simple/complex representations
 - ◆ Labiodental and dental/alveolar fricatives vs. velars
 - ◆ Mid front unrounded and mid back rounded vs. high frint (or central) rounded vowels (some theories)
- Problem: sounds favoured by inventories can not always be characterised as structurally simpler than dispreferred sounds
 - ◆ Preferred vowels (several versions of Feature Geometry)
 - ◆ 4-way oral stop systems

Vowels: Odden(1991)

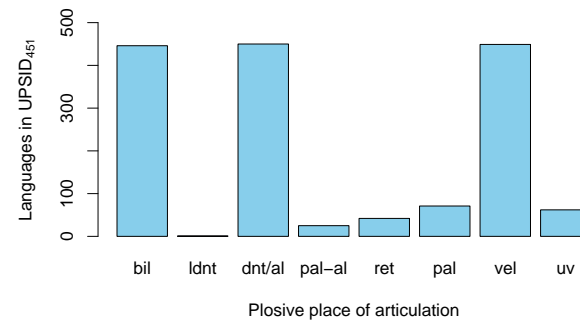


Quasi-acoustic representations

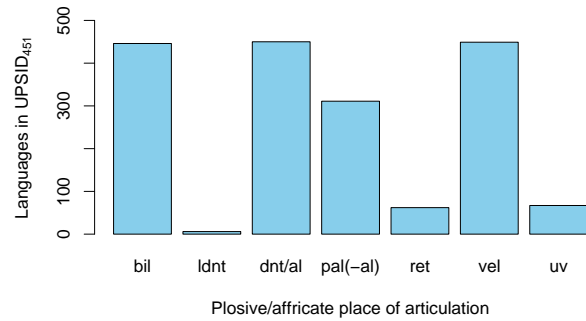
- primes/elements/articles (e.g., Schane 1984; Anderson & Ewen 1987; Kaye et al. 1985; Harris 1994) provide a better handle on preferred vowel systems:



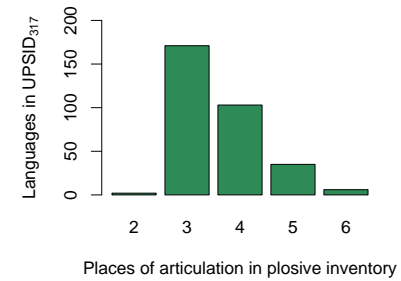
UPSID₄₅₁ plosive frequencies



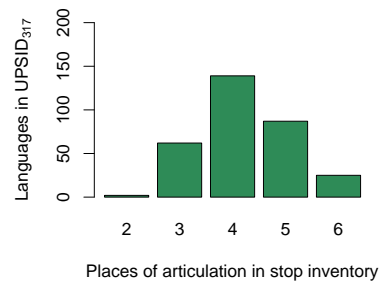
UPSID₄₅₁ plosives/affricates



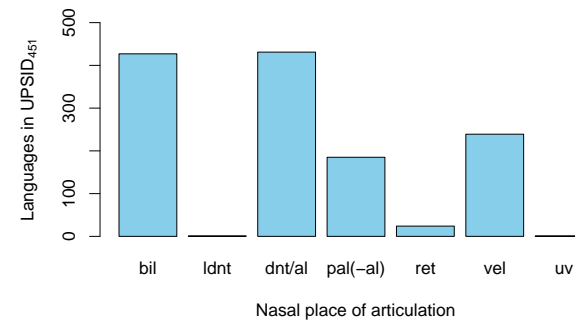
UPSID₃₁₇ plosive inventories



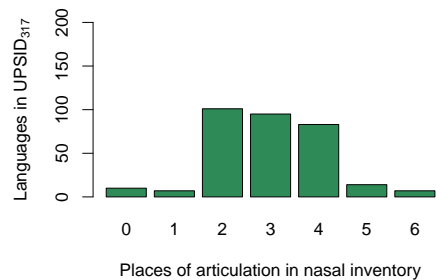
UPSID₃₁₇ plosive/affricate inventories



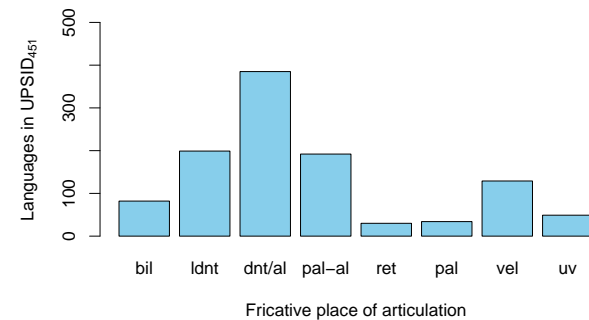
UPSID₄₅₁ nasal frequencies



UPSID₃₁₇ nasal inventories



UPSID₄₅₁ fricative frequencies



Place of articulation: generalisations

- The majority of oral stop inventories contrast:
 - ◆ Plain bilabial plosives (such as [p, p^h, b])
 - ◆ Plain alveolar/dental plosives (such as [t, t^h, d, t̪, t̪^h, d̪])
 - ◆ Plain **palatal** plosives (such as [c, c^h, ɟ]) or alveo-palatal/palatal affricates (such as [tʃ, tʃ^h, dʒ, ʧ, ʧ^h, ʝ])
 - ◆ Plain velar plosives (such as [k, k^h, g])

Place of articulation: generalisations

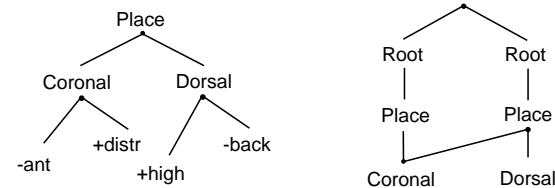
- Nasal inventories do not display the same preference for 4-way place systems
- ... in part as a result of the more restricted distribution of (alveo-)palatals and velars
- Fricative inventories exhibit a strong preference for a single dental or alveolar (sibilant), and weaker preferences for additional labiodentals, (sibilant) palato-alveolars, and velars

Place of articulation: implications

- Most feature geometrical models treat (alveo-)palatals as considerably more complex than bilabials, front coronals, and velars (cf. [Lahiri & Evers 1991](#))
- This is especially true of alveo-palatal affricates (cf. [Clements & Hume 1995](#))
- Most (all?) feature geometrical models lack devices to capture manner-based place asymmetries in inventories

Place of articulation: implications

- Partial representations of plain palatals and alveo-palatal affricates:



Conclusions

- Generative feature theories are generally constructed on the basis of (synchronic) phonological processes
- It seems that these theories are less well-suited to capturing (some) generalisations about inventories
- Deeper and further-reaching problem (perhaps): speech is inherently **multimodal** (articulation, audition, visual perception) and therefore not amenable to the monomodal explanations offered by most phonological theories
- Need to look elsewhere for accounts of inventories

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