LECTURE: DISTINCTIVE FEATURES
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Goals: this lecture introduces the distinctive feature system used in *The sounds of language*, the phonological structures that capture natural classes.

Keywords: natural classes, feature values and types, major class features, laryngeal features, manner features, coronal features, tongue body features

Reading: SOL 254-272

BACKGROUND

Observation: phonological processes apply to, and are conditioned by, sets of sounds that fall into natural classes.

- English: voiceless stops are aspirated when they are syllable-initial
- Tohono O’odham: dental stops become palato-alveolar stops before high vowels
- Balantak: nasals agree in place of articulation with a following obstruent; nasal codas are deleted before sonorants in onset position
- Russian: voiced obstruents are devoiced word-finally

Assumption: phonological processes do not apply to, and are not conditioned by, random sets of sounds. Rather, processes refer to natural classes of sounds that are predicted by *distinctive features*

Goals of distinctive feature theory:

- Characterize the set of natural classes of sounds, as they are implicated in language particular sound patterns (i.e., phonological processes)
- Describe all the segmental contrasts in the world’s languages
- Relate phonological sound patterns to concrete phonetic events

Question: how does one assess if features are accomplishing these goals?

Two feature types:

- Binary features: features that may refer a ‘+’ or ‘-’ value for some attribute. E.g., manner features.
- Monovalent features: features that may only refer to the existence of some structure, i.e., a positive value for some attribute. E.g., place features. (Other names: privative, unary.)

Task: distinguish two different theories of [labial], binary and monovalent versions.
A SET OF DISTINCTIVE FEATURES

Major class features

[±syllabic]. [+syllabic] sounds occur in the nucleus of a syllable; [-syllabic] sounds occur elsewhere.

[+syllabic]: vowels
[-syllabic]: glides, laterals, approximants, nasals, fricatives, stops

Comment: corresponding vowels and glides alternative in onset/nucleus position, but modern theories of the syllable assume that [±syllabic] is a property of the prosodic tree structure, and not a feature that can assimilate.

[±consonant]. [+cons] segments have a constriction in the vocal tract that is at least as narrow as that required for the turbulent airflow in fricatives; [-cons] segments do not have a constriction.

[+cons]: stops, affricates, fricatives, nasals, laterals, [r]
[-cons]: vowels, glides (also sometimes: laryngeals)

Comment: because laryngeals like /ʔ/ do not have a constriction in the vocal tract, but in the glottis instead, they are sometimes classified as [-consontantal], and indeed there are many language particular systems that require this analysis.

[±sonorant]. [+son] segments are produced with a constriction in the vocal tract that allows the air pressure behind it and in front of it to be relatively equal; this is not the case for [-son] segments.

[+son]: sonorant consonants (nasals, liquids, glides) and vowels
[-son]: obstruents (stops, affricates, fricatives)

Manner features

[±continuant]. [+cont] segments lack a central occlusion in the vocal tract; [-cont] segments have such an occlusion.

[+cont]: fricatives, approximants, and vowels
[-cont]: stops, nasals, affricates

[±nasal]. [+nas] segments are produced with a lowered velum; [-nas] consonants have a raised velum.

[±lateral]. [+lat] segments have a central tongue contact in the oral cavity with one or both sides of the mouth being held away from the roof of the mouth, allowing air to escape laterally.

[±delayed release]. [+delayed release] sounds are affricates, i.e., stops that are released into fricatives, rather than being fully released. Non-affricate sounds are [-delayed release].

Comment: contemporary analysis treats affricates as complex-manner segments that have both a [-continuant] and [+continuant] specification, analogous to complex-place sounds like /kp/. 
Exercise: in a 2D chart, classify the following sound classes in terms of major class and manner features: stops, fricatives, affricates, nasals, approximants, laterals, liquids, glides, vowels.

Problems from *Understanding Phonology* (Gussenhoven & Jacobs 2013): Cordoba Spanish, Dutch gemination, Dutch syllable finals, Scottish English, Turkish syllable-final obstruents

*Laryngeal features*

[±voice]. with [+voice] segments, the vocal cords are close enough together to allow vibration; this is not the case with [-voice] segments

[±spread glottis]. [+spread] segments have a vocal cord configuration that produces audible glottal friction; this constriction is missing in [-spread] segments  
  [+spread]: aspirated segments and glottal fricatives

[±constricted glottis]. In [+constr] segments, the vocal cords are tense and drawn together; this is not the case with [-constr] segments.  
  [+constr]: glottal stop, laryngealized vowels and sonorant consonants, glottalized consonants, ejectives and implosives

Exercise: create a 2D chart that gives the feature descriptions of voiceless, voiced, voiceless aspirated, voiced aspirated, ejective/?/, and creaky voice segments using these features.
Place features

[labial]. [lab] segments have a constriction made with the lips. Segments that are [lab] may also be specified for [±round] (see below).

[lab]: bilabials and labial-dentals

[coronal]. [cor] segments are articulated with a raised crown of the tongue, i.e., a raised tip and/or blade. [cor] segments may also be specified [±anterior] and [±distributed]; [cor] fricatives and affricates may also be specified [±strident].

[dorsal]. [dor] segments are articulated with a bunched dorsum. [dor] segments may also be specified for tongue body features which specify where the mass of the tongue body is located.

[dor]: velars, fronted velars, uvulars

[pharyngeal]. [phar] have a constriction made with the tongue root

[phar]: pharyngeal stops and fricatives

[laryngeal]. [lar] sounds have a constraint in the glottis. [lar] sounds are /ʔ/ and h/.

Comment: [phar] and [lar] are often not necessary, and some distinctive feature systems do not employ them. [phar] is actually indispensible for languages like Arabic, but larygneals are often encoded with other tools, like [-cons].

Subsidiary place distinctions

[±anterior]. [+ant] segments involve an articulation with the tongue crown and the alveolar ridge, or some point further forward; [-ant] segments involve the crown and a point further back in the mouth than the alveolar ridge. (Only used for coronals.)

[±anterior]: dental, alveolar

[±distributed]. [+distr] segments are produced with a constriction that extends for a relatively long distance along the vocal tract, while [-distr] segments lack such a constriction. (Only used for coronals.)

[±distributed]: apical consonants, [s z], retroflex

[±strident]. This feature is reserved for fricatives and affricates. [+strid] segments are produced with a grooved crown that causes noisy friction; it captures the natural class of sibilants.

[±strident]: sibilants, labiodental and uvular fricatives, affricates.

[-strid]: all other fricatives/affricates not listed above.
Exercise: in a 2D chart, give the feature description of the following place classes in fricatives, bilabial, labio-dental, (inter)dental, alveolar, post-alveolar, retroflex, velar, uvular, pharyngeal, glottal.

Features for vowels (tongue body and lip rounding)

[±high]. [+high] segments raise the dorsum to a position close to the roof of the mouth; [-high] segments do not.

[±low]. [+low] segments have a bunched dorsum low in the mouth; [-low] segments do not.

[±back]. [+back] segments involve a bunched portion of the tongue positioned in the center of the mouth, or further back; [-back] segments have a bunched dorsum in the front of the mouth.

[±advanced tongue root]. [+ATR] vowels have the tongue root pulled forward. It overlaps with the tense/lax distinction in many languages.

[±round]. [+rd] segments have lip rounding.

[+rd]: segments with secondary labialization, e.g., [pʷ], rounded vowels, e.g., [u y]

Problems from *Understanding Phonology*: Corsican, Bengali, Wehl Dutch, Luganda, Telugu

Exercise: in a 2D chart give the feature specifications for the following vowels: i e æ u o o a y æ æ i