

Phonological features

LING 451/551

Spring 2011

Prof. Hargus

Feature

- Segments are not indivisible units, but are composed of features. E.g. a feature matrix for /t/:

[-continuant]

[-sonorant]

[+coronal]

[-voiced]

(an unordered list; re possible internal structure for features, see Hayes 4.6.6)

- feature definitions: usually articulatory
- feature values: +, -, 0
 - 0 = n.a. to segment

Functions of features

- A feature system must be able to
 - Describe classes of sounds
 - Distinguish phonemes
 - Specify phonetic detail

Describe classes

- # features inversely proportional to size of class
 - [p t k b d g]: [-continuant, -sonorant]]
 - [p]: [-continuant, -sonorant, -voiced, +labial]
- (check out FeaturePad from Bruce Hayes' web site)
 - <http://www.linguistics.ucla.edu/people/hayes/120a/FeaturePad.htm>

Terminological difs

<i>traditional phonetic term</i>	<i>phonological feature</i>
stop	[-continuant]
nasal	[+nasal]
round	[+round]
labiodental	[+labiodental]

etc.

why difs? Hayes (p. 74): phonol classes are broader than phonetic terms

Operations on features

- Formally, phonological rules are operations on features
 - A phonological rule adds a feature or changes some value of an already specified feature
- In a phonological rule, --> is therefore a metaphor for 'change' or 'add'.

- Phonological rules identify classes of sounds via feature(s)
- Justification: some phonological rules occur relatively frequently across languages while conceivable rules are rare or non-existent
 - E.g. post-nasal voicing of stops is common, typically affecting all stops of some language:

- /p t k/ --> [b d g] / {m n ŋ} ____
- Hypothetical consonant inventory

p	t	k
f	s	x
m	n	ŋ
	l	
w	r	

- But Post-nasal voicing' is not attested
 - *p f x --> [b v γ] / {m n ŋ} ____

- If rules are stated in terms of segments, then the unattested and common rules are equally complex.
- Generative phonology: Phonological formalism should model common phenomena in a simple way. Rare/non-existent/unattested phenomena should be more complicated to describe.
- (An example of “Devise restricted architecture for description”)

- If rules are stated in terms of features:

the common rule:

-continuant --> [+voiced] / [+nasal] _____

-sonorant

(i.e. oral stops are voiced after nasals)

the unattested rule:

-continuant

-sonorant

+labial

--> [+voiced] / [+nasal] _____

or

+continuant

-sonorant

-coronal

(notice difference in “elegance” too)

Features in Hayes 2009

- Typos to correct, p. 96

(apx [k])

		Manner features										Laryngeal features		Place features												
		sonorantal	sonorant	continuant	delayed release	approximant	tap	trill	nasal	voice	spread gl	constr gl	labial	round	labiodental	coronal	anterior	distributed	strident	lateral	dorsal	high	low	front	back	tense
retroflex	r	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0
	ɖ	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0
	ʂ	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	0	0	0	0	0	0
	ʐ	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	0	0	0	0	0
	ɻ	+	+	-	0	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	0	0	0	0	0
	ʄ	+	+	+	0	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0
	ɽ	+	+	+	0	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0
	ɻ̥	+	+	+	0	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0
fronted velar	k̟	+	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	+	-	+	-	0	
	g̟	+	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	+	-	+	-	0	
	x̟	+	-	+	+	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	+	-	+	-	0	
	j̟	-	+	+	0	+	-	-	-	-	-	-	-	-	-	0	0	0	-	+	+	-	+	-	+	
velar	k	+	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	+	-	0	0	0	
	g	+	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	+	-	0	0	0	
	ŋ	+	+	-	0	-	-	-	+	+	-	-	-	-	-	0	0	0	-	+	+	-	0	0	0	
	χ	+	-	+	+	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	+	-	0	0	0	
	x	+	-	+	+	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	+	-	0	0	0	
	ɣ	+	-	+	+	-	-	-	-	-	-	-	-	-	-	0	0	0	+	+	+	-	0	0	0	
	ʀ	+	+	+	0	+	-	-	-	-	-	-	-	-	-	0	0	0	+	+	+	-	0	0	0	
back velar	k̠	+	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	+	+	+	-	-	+	0	
	g̠	+	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	+	-	-	+	0	
	x̠	+	-	+	+	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	+	-	-	+	0	
	ʁ̠	+	+	+	+	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	+	-	-	+	0	
uvular	q̠	+	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	-	-	-	+	0	
	g̠	+	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	-	-	-	+	0	
	χ̠	+	-	+	+	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	-	-	-	+	0	
	ʁ̠	+	-	+	+	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	-	-	-	+	0	
	ʀ̠	+	+	-	0	-	-	-	+	+	-	-	-	-	-	0	0	0	-	+	-	-	-	+	0	
	ʀ̠̥	+	+	+	0	+	-	+	+	-	-	-	-	-	-	0	0	0	-	+	-	-	-	+	0	
pharyn	ħ	+	-	+	+	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	-	+	-	+	0	
	ʕ	+	-	+	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	+	-	+	-	+	0	
glottal	ʔ	+	-	-	-	-	-	-	-	-	+	-	-	-	-	0	0	0	-	-	0	0	0	0	0	
	h	-	-	+	+	-	-	-	-	-	+	-	-	-	-	0	0	0	-	-	0	0	0	0	0	
	ɦ	-	-	+	+	-	-	-	-	-	+	+	-	-	-	0	0	0	-	-	0	0	0	0	0	

Practice with features

1 *Natural classes*

Assume the vowel inventory shown in table 4.11 and the features [high], [low], [back], and [round] as defined in §4.10.3. For the sake of simplicity, ignore [front]

Table 4.11 Vowel chart for exercise 1

Vowels:	Front		Back	
	Unrounded	Rounded	Unrounded	Rounded
high	i	y	ɯ	u
mid	e	ø	ɤ	o
low	æ	œ	ɑ	ɒ

- Find as many natural classes as you can that have four members. List them, and define the natural class using features.
- Find as many natural classes as you can that have six members. List them, and define the natural class using features.
- Find as many natural classes as you can that have eight members. List them, and define the natural class using features.
- Find as many natural classes as you can that have five members.
- Explain why [y, e] is not a natural class.

“natural class”
defined on p.
43

2 Hypothetical language

A hypothetical language has the phonemes shown in table 4.12.

Table 4.12 Consonant chart for exercise 2

Consonants	Labial	Alveolar	Palatoalveolar	Fronted Velar	Velar	Uvular	Pharyngeal	Glottal
Stops	p	t		k̟	k	q		ʔ
Affricates		t͡s						
Fricatives	f	s	ʃ	x̟	x	χ	ħ	h
Nasals	m	n	ɲ	ŋ̟	ŋ	ɴ		
Liquids: Tap Lateral		r l						
Glides	w			j				

Vowels: as in previous problem.

Write the following phonological rules of this language using the features presented in this chapter. In each case I have indicated the real-life rule on which I have modeled the imaginary rule. Some problems will arise in notation; read the footnotes for help with these.

- 1 [i, y, ʊ, u] become [e, ø, ʏ, o] before [q, N].
(modeled on Eskimo languages)
- 2 [t] becomes [t̪] before [i, y, ʊ, u].
(modeled on Japanese)
- 3 [i, e, æ] become [j] before a vowel.
(modeled on Ilokano)
- 4 When a member of the group [s, t̪, ʃ] is followed by a member of the group [s, ʃ], the resulting cluster is broken up by the insertion of [i]. Use features, not a phonetic symbol, for [i].
(modeled on English)
- 5 [n] assimilates in place to a following stop or affricate.
(modeled on Ilokano)
- 6 All consonants except /t, t̪, s, n, r, l, ʃ, ŋ/ delete word-finally.
(modeled on Lardil (Australia))
- 7 [l] becomes [r] if another [l] precedes it anywhere in the word.⁸
(modeled on Latin)
- 8 [ʀ] changes places with an immediately following glide.⁹
(modeled on Ilokano)
- 9 All unrounded vowels become [a], and all rounded vowels become [ɔ], before [h̪].
(modeled on Maltese Arabic)
- 10 [e] and [ʏ] become [ø] and [o] if a [ø] or [o] occurs in the preceding syllable.¹⁰
(modeled on Khalkha Mongolian)
- 11 [k, x, ŋ] become [k̟, x̟, ŋ̟] after [i, j].
(modeled on German)