

LING5702: Lecture Notes 6

Phonological Competence

The study of **linguistic competence** can be divided into:

- **phonological** competence – knowledge of **distinguishable sounds** in language
- **morphological** competence – knowledge of **meaning-bearing signs** in language
- **syntactic** competence – knowledge of **allowable combinations** of signs
- **semantic** competence – knowledge of **meanings of combinations** of signs
- **pragmatic** competence – knowledge of **inducible meanings** from context

Today we'll introduce terms for talking about **phonological competence**.

(We'll need these terms when we cover speech production / perception.)

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6.1 Phonological competence

A speaker's phonological competence includes:

1. **phonemic inventory** – **set of speech sounds** distinguished in language
2. **phonological rules** – **rules for pronouncing sounds** in different contexts
3. **phonotactic constraints** – **rules for placing speech sounds** in syllables
4. **prosody** – **allowable syllable stress patterns** and metric rhythms

Let's look at each of these areas in more detail. . .

6.2 Phonemic inventory

A **phonemic inventory** is a set of speech sounds distinguished in a language.

These distinguished sounds are called the **phonemes** of that language.

People are efficient, distinguish words by phoneme (*cap/cat*) – this favors a large set.

But people are sloppy, so phonemes can't be too close together – this favors a small set. The balance in English is a phoneme set of about 40 or so (we'll list them below).

We break down phonemes by...

- **prosodic classes:** classed by whether phones can receive stress
 - **vowel** – can receive syllabic stress
 - **consonant** – cannot receive syllabic stress
- **articulatory classes:** classed by how phones are produced
 - **obstruent** – characterized by 'white noise' from obstructed vocal tract
 - **sonorant** – unobstructed, just voicing sound
- **articulatory properties:** details of how phones are produced

6.3 Phonemic inventory: articulatory properties

- **voicing:** laryngeal vocal folds 'raspberry' sound, resonates in throat
- **manner of articulation:** different sequences of actions in vocal tract

for obstruent consonants:

- **oral stop** – complete obstruction (+ optional plosive burst): **p, b, t, d, k, g, ʔ**
- **fricative** – sustained obstruent noise: **f, v, θ(th), ð(dh), s, z, ʃ(sh), ʒ(zh)**
- **affricate** – stop followed by fricative: **tʃ(ch), dʒ(jh)**

for sonorant consonants:

- **nasal stop** – voicing, lips closed, velum open to nasal cavity: **n, m, ŋ(ng)**
- **approximant** – obstruction but no obstruent noise: **w, r, l, j(y sound)**
- **flap** – tap roof of mouth: **ɾ**

for (sonorant) vowels:

- **monophthong** – single static vowel: **i, ɪ, ε, æ, ʌ, ə, ɜ, ø, u, ʊ, ɔ**
i(beat), ɪ(bit), ε(bet), a(bot), æ(bat), ʌ(but), ə(b't), ɜ(bert), ø(-er), u(boot), ʊ(book), ɔ(bought)
- **diphthong** – blend of two vowels from beginning to end: **eɪ, ju, aɪ, aʊ, oʊ, ɔɪ**
eɪ(bait), ju(beat), aɪ(bite), aʊ(bout), oʊ(boat), ɔɪ(boyt)

- **place of articulation:** continuous dimensions of location in vocal tract

for consonants:

- **bilabial** – obstruction between lips: **p, b, m, w**

- **labiodental** – obstruction between lip and teeth: **f, v**
- **dental** – obstruction between tongue and teeth: **θ, ð**
- **alveolar** – obstruction between tongue and alveolar ridge: **t, d, s, z, n, r, l, r**
- **postalveolar** – obstruction between tongue and ant. hard palate: **ʃ, ʒ, tʃ, dʒ**
- **palatal** – obstruction between tongue and hard palate: **j**
- **velar** – obstruction between tongue and velum: **k, g, ŋ**
- **glottal** – obstruction between glottis and top of trachea: **ʔ, h**

for vowels: **front – back**

for vowels: **low – high**

manner of articulation (+ vowel height place)	place of articulation (front – back long vocal tract)						
	of lip:		of tongue:			of	
	lip	teeth	teeth	alveolar ridge	palate	velum	glottis
unvoiced (slow) oral stop:	p			t		k	
unvoiced fricative:		f	θ	s	ʃ		
unvoiced affricate:					tʃ		
voiced (fast) oral stop:	b			d		g	ʔ
voiced fricative:		v	ð	z	ʒ		h
voiced affricate:					dʒ		
nasal stop:	m			n		ŋ	
approximant:	w			r,l	j		
flap:				r			
vowel, high:				i		u	
				ɪ	ʌ	ʊ	
vowel, middle:				e	ə	o	
				ɛ		ɔ	
vowel, low:				æ		a	

Languages carve phonological/articulatory space into phonemes.

Different languages divide this space differently:

English: /r/ → [r], /l/ → [l]

Korean: /L/ → [r] or [l]

English: /p/ → [p] or [p^h]

Korean: /p/ → [p], /p^h/ → [p^h]

Questions about phonemes?

6.4 Phonological rules

Continuing with other areas of phonological competence...

Phonological rules are rules for pronouncing phonemes in different contexts.

They exploit redundant information in **allophones**: alternate pronunciations.

When allophones are context-specific, this redundancy can help disambiguate.

Some examples:

- /p/ → [p^h] only in stressed syllable.
- /t/ or /d/ → [ɾ] only between vowels in onset of unstressed syllable.
- lengthen vowels before voiced consonant: /æd/ → [æ:d]
- vowel preceding nasal must be nasalized: /æɳ/ → [æ̃ɳ]
- /l/ → [l̥] ‘light’ at beginning of word (*leap*),
/l/ → [ɫ] ‘dark’ at end (*peal*).

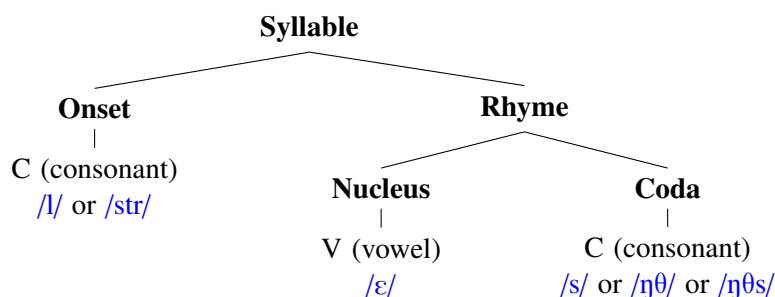
Allophones differ from phonemes because they do not distinguish words.

Violations of these rules just sound wrong (‘ungrammatical’).

6.5 Phonotactic constraints

Phonotactic constraints are rules for placing phonemes in syllables.

Syllables are metric units made of vowels (stressable), consonants (no stress):



Example constraint:

All of /bl/, /pl/, /gl/, and /kl/ can occur in onset: *blaze, place, glass, class*.

But /dl/ and /tl/ can only occur between syllables: *bedlam, butler*.

This may help identify syllables and segment words during comprehension.

6.6 Prosody

Prosody defines allowable pitch patterns and metric rhythms.

Syllabic stress: higher pitch, louder, longer vowel for some syllables.

It helps distinguish words: *PERmit* (document) / *perMIT* (to allow)

Some languages (Chinese) have more than one. These are called **tones**.

Rhythm: patterns of syllabic stress.

In **stress-timed** languages (English), time between stresses is regular.

May help gauge speed, calibrate distinction between voiced/unvoiced stops.

Intonation: pitch pattern (end is low for statement, high for question)

My computer has wireless. / My computer has wireless?

Pitch accent (default end prominence): *Tony disconnected the MODEM.* (vs. *Tony disconnected the modem.*)

Focus accent (give prominence to answer of question):

Who disconnected the modem? TONY disconnected the modem.

What did Tony do to the modem? Tony DISCONNECTED the modem.