

LING 520 Introduction to Phonetics I
Fall 2008

Week 2

English consonants and vowels
Articulatory phonology

Sep. 15, 2008

Rules for English consonant allophones

- 1. Consonants are longer when at the end of a phrase (*bib, did, don, nod*).
- 2. Voiceless stops (i.e., /p, t, k/) are aspirated when they are syllable initial, as in words such as *pip, test, kick* [p^hɪp, t^hɛst, k^hɪk]. (Aspiration: A period of voicelessness after the release of an articulation, transcribed as a small raised *h* in IPA).
- 3. Obstruents – stops and fricatives – classified as voiced (that is, /b, d, g, v, ð, z, ʒ /) are voiced through only a small part of the articulation when they occur at the end of an utterance or before a voiceless sound (*try to improve, add two*).
- 4. So-called voiced stops and affricates /b, d, g, dʒ/ are voiceless when syllable initial, except when immediately preceded by a voiced sound (as *in a day* as compared with *this day*).

Rules for English consonant allophones

- 5. Voiceless stops /p, t, k/ are unaspirated after /s/ in words such as *spew*, *stew*, *skew*.
- 6. Voiceless obstruents /p, t, k, tʃ, f, θ, s, ʃ/ are longer than the corresponding voiced obstruents /b, d, g, dʒ, v, ð, z, ʒ/ when at the end of a syllable (*cap*, *cab*; *back*, *bag*).
- 7. The approximants /w, r, j, l/ are at least partially voiceless (transcribed as a small circle (or an underneath) when they occur after initial /p, t, k/, as in *play*, *twin*, *cue*).
- 8. The gestures for consecutive stops overlap, so that stops are unexploded (transcribed as a small raised mark [̚]) when they occur before another stop in words such as *apt* [æp̚t] and *rubbed* [rʌb̚d].

Rules for English consonant allophones

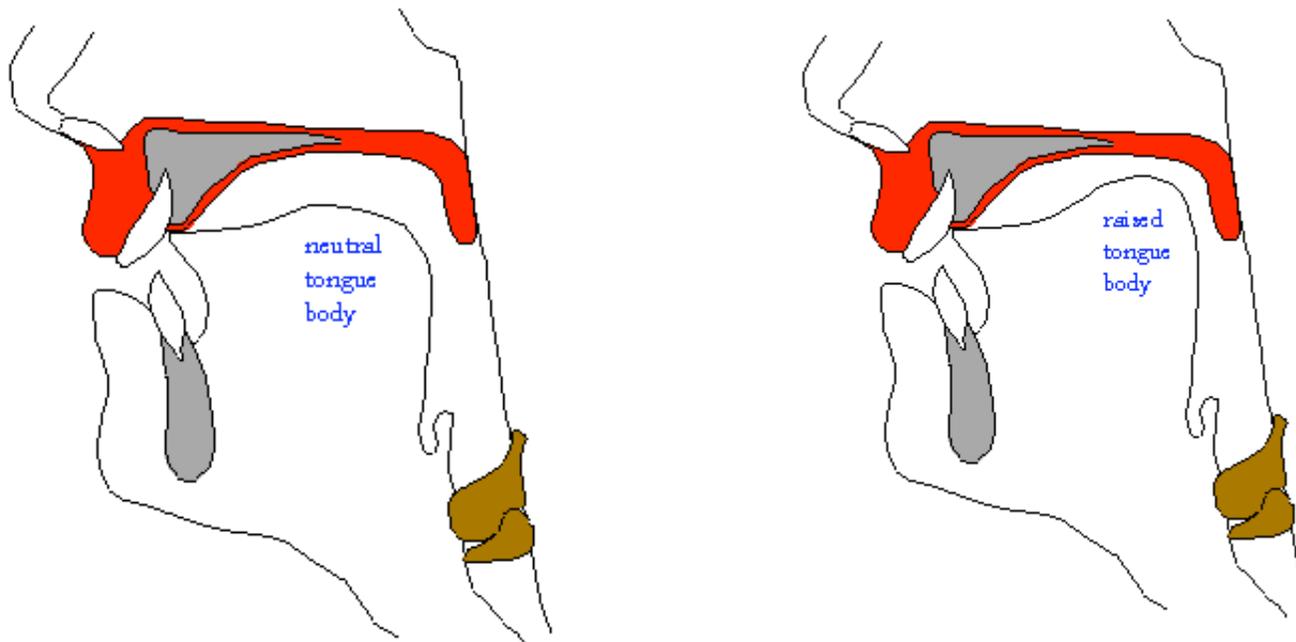
- 9. In many accents of English, syllable final /p, t, k/ are accompanied by an overlapping glottal stop gesture (transcribed as [ʔ], as in pronunciations of tip, pit, kick as [tɪʔp, pɪʔt, kɪʔk].
- 10. In many accents of English, /t/ is replaced by a glottal stop when it occurs before an alveolar nasal in the same word, as in *beaten*.
- 11. Nasals are syllabic (transcribed as [̩]) at the end of a word when immediately after an obstruent, as in *leaden* [lɛd̩], *chasm* [kæz̩].
- 12. The liquids /l, r/ are syllabic at the end of a word when immediately after a consonant (*paddle* [pædl̩], *hammer* [hæmɹ̩].)

Rules for English consonant allophones

- 13. Alveolar stops become voiced taps when they occur between two vowels the second of which is unstressed (*fatty*, [færi], *data* [dæɾə]).
- 14. Alveolar consonants become dentals before dental consonants, as in *eighth* [eɪ̯t̪θ], *tenth* [tɛ̯n̪θ].
- 15. Alveolar stops are reduced or omitted when between two consonants (*most people*).
- 16. A Homorganic voiceless stop may occur after a nasal before a voiceless fricative followed by an unstressed vowel in the same word (*something* [sʌmpθɪŋ]).
- 17. A consonant is shortened (or dropped) when it is before an identical consonant (*straight tissue*).

Rules for English consonant allophones

- 18. Velar stops become more front before front vowels (*cap, kept, kit, key, gap, get, give, geese*).
- 19. The lateral /l/ is velarized (transcribed as [ɫ]) when after a vowel or before a consonant at the end of a word (*fill* [fiɫ])



From: <http://www.umanitoba.ca/linguistics/russell/phonetics/narrower/dark-l.html>

Rules for English consonant allophones

- Nasal plosion: The release of a plosive by lowering the soft palate so that air escapes through the nose, as at the end of the word *hidden*.

Hidden, sadden, sudden, leaden pronounced with nasal plosion 

Hidden, sadden, sudden, leaden pronounced without nasal plosion 

- Lateral plosion: The release of a plosive by lowering the sides of the tongue, as at the end of the word *saddle*.

Rules for English consonant allophones

- A real example: 

“Wanted: Chief Justice of the Massachusetts Supreme Court. In April, the S.J.C.'s current leader Edward Hennessy reaches the mandatory retirement age of seventy, and a successor is expected to be named in March. It may be the most important appointment Governor Michael Dukakis makes during the remainder of his administration and one of the toughest. As WBUR's Margo Melnicove reports, Hennessy will be a hard act to follow.” [from: Boston University Radio News]

- Which rules are applied to this paragraph?

Vowels in English

- Tense and lax vowels:
 - lax vowels are lower, shorter and more centralized.
 - lax vowels do not occur in stressed open syllables.

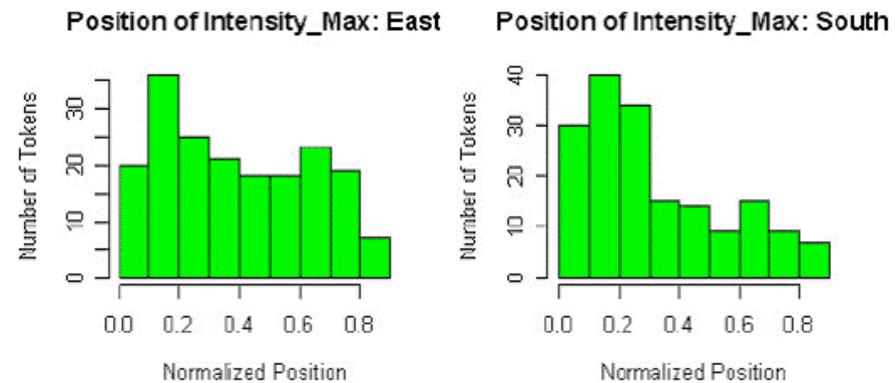
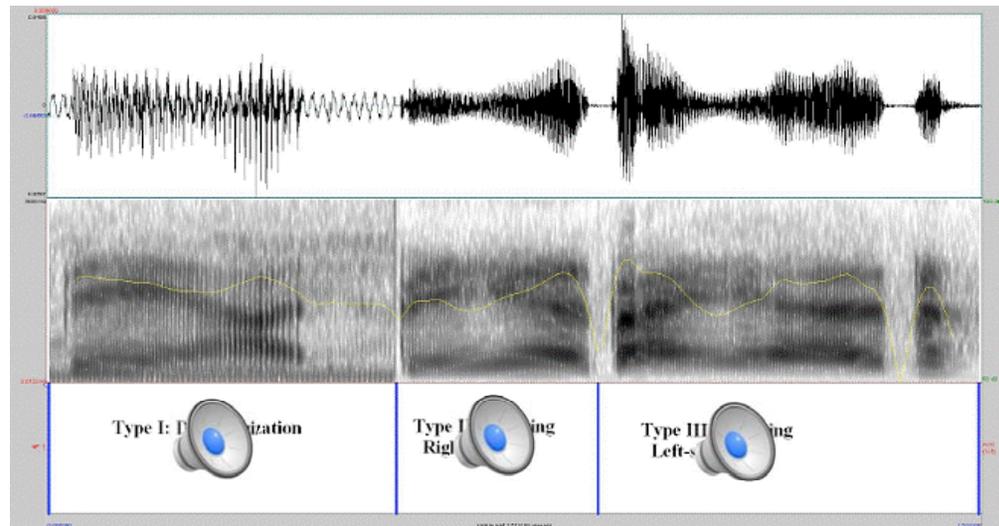
Tense Vowels	Lax Vowels	Most closed syllables	Open syllables	Syllables closed by		
				[r]	[ŋ]	[ʃ]
i	ɪ	beat	bee	beer		(leash)
		bit			sing	wish
eɪ		bait	bay			
	ɛ	bet		bare	length	fresh
		bat			hang	crash
ɑ	æ	hot	pa	bar		slosh
ɔ		bought	saw	bore	long	(wash)
oo		boat	low	(boar)		
	ʊ	good				push
u		boot	boo	poor		
	ə/ʌ	but		purr	hung	crush
aɪ		bite	buy	fire		
aʊ		bout	bough	hour		
ɔɪ		void	boy	(coir)		
ju		cute	cue	pure		

Vowels in English

- Rhotacization: Rhotacized vowels are produced with an r-coloring quality as in 'fur', 'hurt', 'bird' (transcribed as [ʁ], for example, [ɝ,ɚ]), Rhotacization can be achieved in 2 ways:
 1. With tongue tip raised (and curl) as in a retroflex consonant.
 2. with tongue tip down but tongue body bunched up.[In either case, pharynx is also typically narrowed & lips at least partly rounded]
- Nasalization: Nasalized vowels are produced with the soft palate lowered to allow part of the airstream to go through the nasal cavity, transcribed as [̃], for example [ẽ].

Vowels in English

- Vowel breaking:



Vowels in English

- The Atlas of North American English

Phonetic transcription: theoretical issues

- IPA (ARPAbet) transcription assumes that:
 - Sounds are static units;
 - The basic units are segments (consonants, vowels) or features (labial, nasal, etc.).
- The variations of the basic units in different contexts are explained by rules. For example, [l] becomes voiceless after a voiceless consonant, *play*.
- But how many rules? How did a child learn these rules? For example, the [d] in [ada] and [idi] are quite different, should we have a rule for this?
- Articulatory phonology takes a more elegant solution: nasalization, π -gesture, etc.

Articulatory phonology

- Articulatory phonology claims that ‘gestures’ are phonological primitives. Much of the variation in acoustics can be captured by a direct ‘output’ consequence of overlap of invariant gestural units. The general principles of gestural overlap are, however, blind to their acoustic consequences.
- Gestures are events that have a time span;
- Gestures are on different tiers; so they can overlap;
- There are general principles that define how gestures are organized/phased;
- Gestures are mathematically defined and implemented.

Articulatory phonology

	tract variable	articulators involved
LP	lip protrusion	upper & lower lips, jaw
LA	lip aperture	upper & lower lips, jaw
TTCL	tongue tip constrict location	tongue tip, tongue body, jaw
TTCD	tongue tip constrict degree	tongue tip, tongue body, jaw
TBCL	tongue body constrict location	tongue body, jaw
TBCD	tongue body constrict degree	tongue body, jaw
VEL	velic aperture	velum
GLO	glottal aperture	glottis

A sagittal cross-section of the human vocal tract. Labels with arrows indicate the location and degree of various constrictions: VEL (velic aperture) at the soft palate, TBCL (tongue body constrict location) and TBCD (tongue body constrict degree) in the oral cavity, TTCL (tongue tip constrict location) and TTCD (tongue tip constrict degree) at the alveolar ridge, LA (lip aperture) and LP (lip protrusion) at the lips, and GLO (glottal aperture) at the larynx.

A sagittal cross-section of the human vocal tract showing the articulators involved in speech production. Labels with '+' signs indicate the positions of the velum, tongue tip, upper lip, lower lip, jaw, tongue body center, and glottis.

Articulatory phonology

