Language Structure: Sounds

Overview

- How sounds are made
- Abstract descriptors of sound
- Sound sequencing
- Hierarchical organization
- Phonological knowledge

The Vocal Apparatus

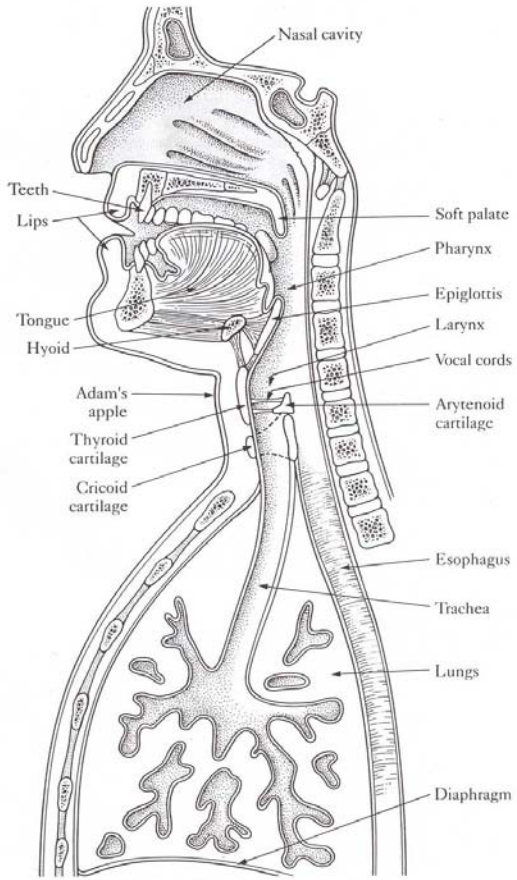
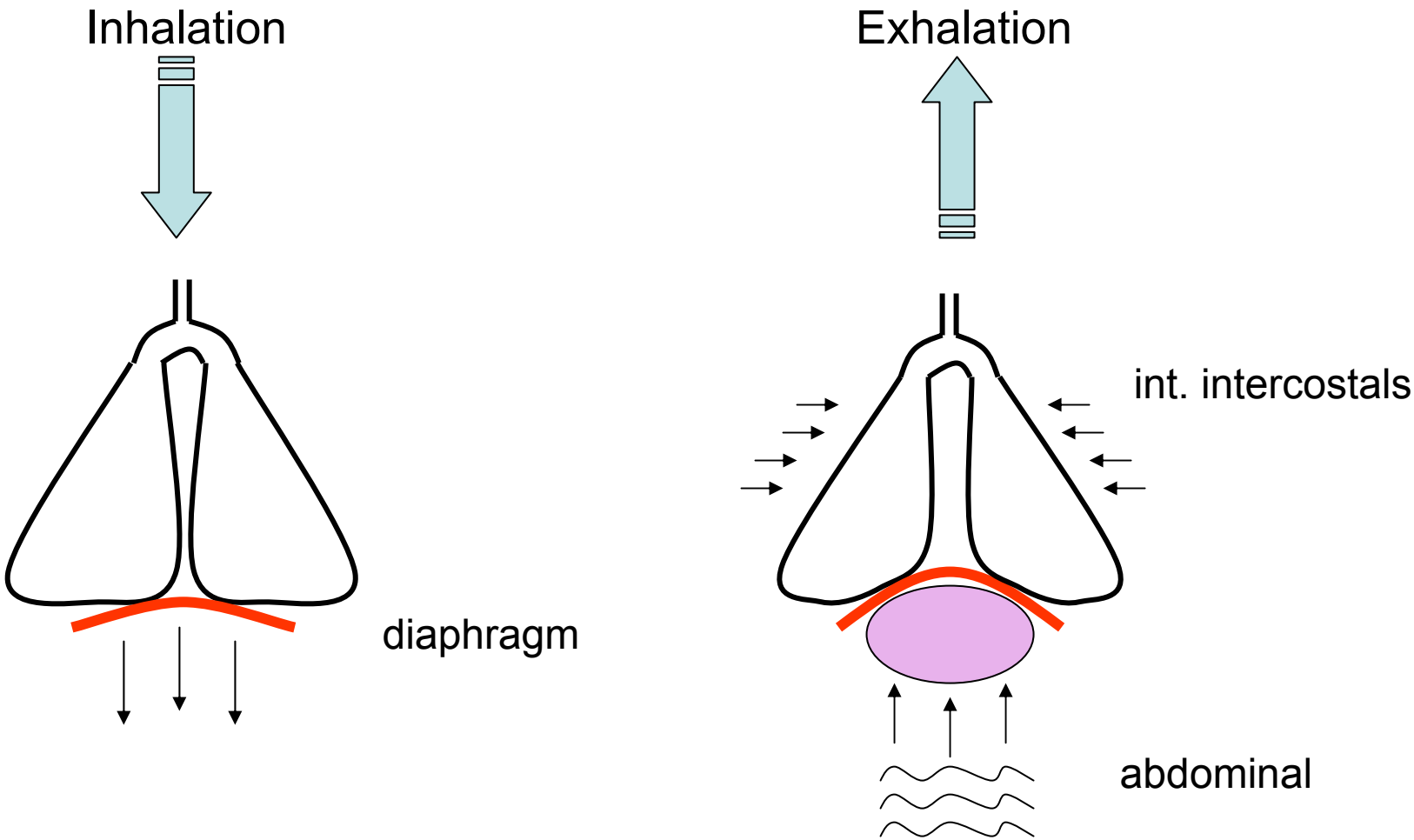


FIGURE 4.1 The human vocal organs.

Lungs: Power Source



The Larynx

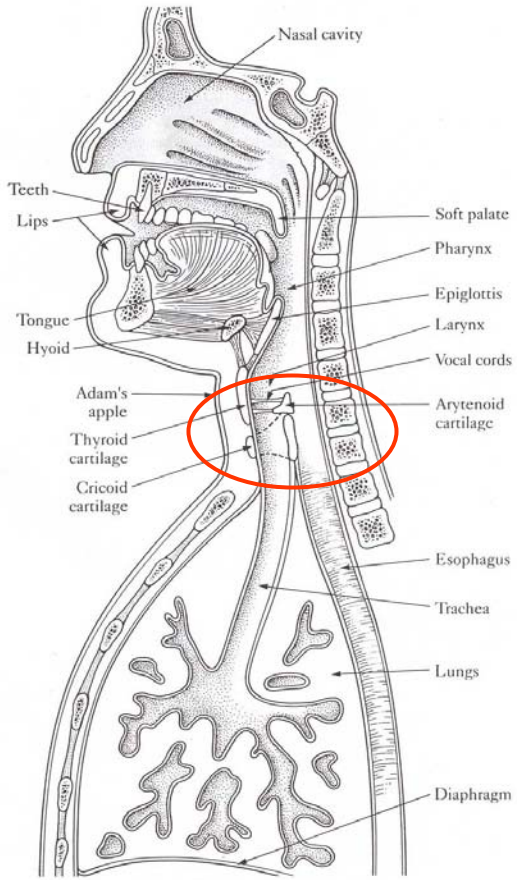
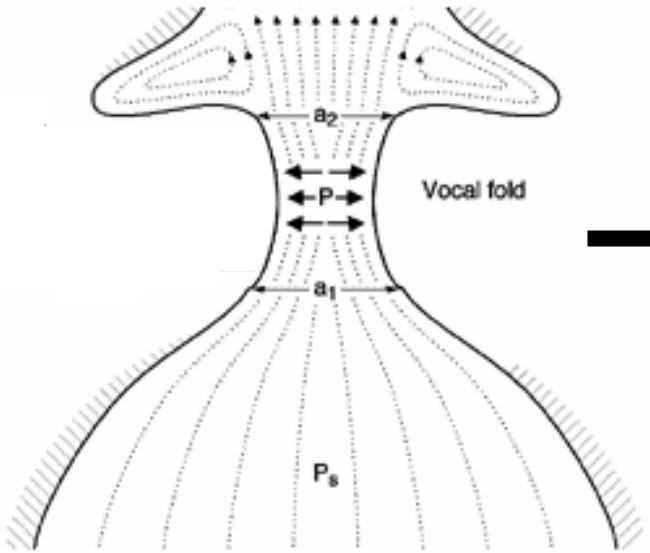
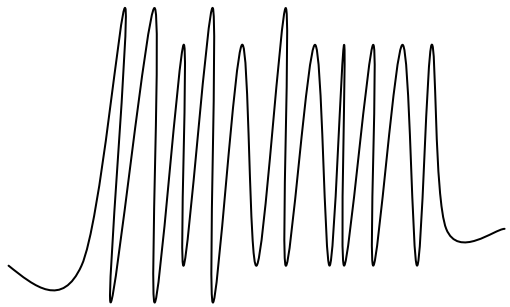


FIGURE 4.1 The human vocal organs.

Larynx: Sound Source





Side-view of larynx

Resulting sound wave

The Vocal Tract

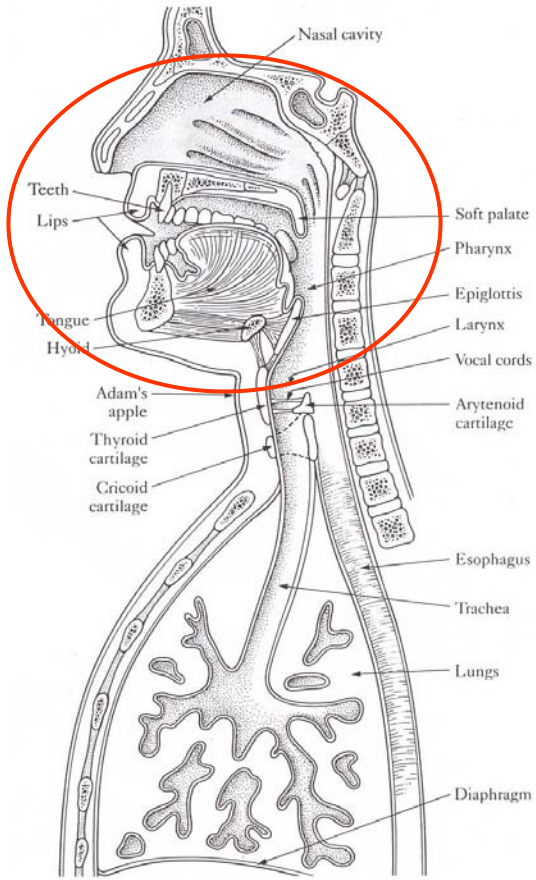


FIGURE 4.1 The human vocal organs.

The Vocal Tract

- Shapes sound source produced by lungs and larynx
- Articulators
  - Velum: up and down → oral & nasal sounds e.g., /b/ "bat" and /m/ "Matt"
  - Tongue: every which way → most sounds
  - Teeth: w/ tongue or lips → /θ/ "thought" /f/ "fought"
  - Lips: spread or rounded → /i/ "eat" or /u/ "boot"

Distinctive Features

- Psuedo-phonetic descriptors
  - Designated as: [+/- feature]
- Elements of contrast
  - English: voicing

    b:p, e.g., *bin* [bɪn] and *pin* [p^hɪn]

    Not p:p^h, e.g., *spit* [spɪt] and *pit* [p^hɪt]
  - Hindi: aspiration

    p:p^h, e.g., [pal] *take care of* and [p^hal] *knife blade*

Phonemes

Smallest (psychologically real) unit of recombination in langauge.

cat	=	/ k æ t /
tack	=	/ t æ k /
pot	=	/ p a t /
top	=	/ t a p /

Orthography ≠ Sound Structure

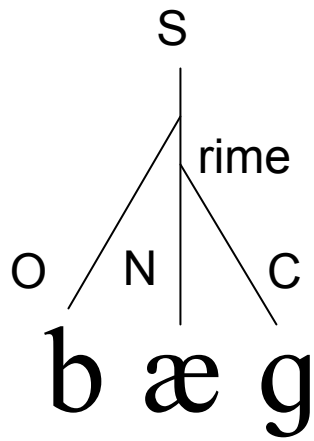
Don’t be fooled by the spelling:

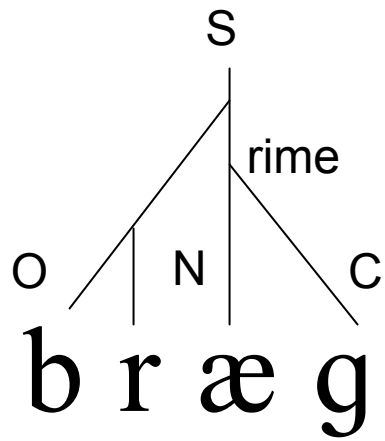
exit	=	/ ɛ g z ɪ t /
Max	=	/ m æ k s /
English	=	/ ɪ ŋ g l ɪ ʃ /
orthography	=	/ ə r θ a g r æ f ɪ /

Sound Sequencing: Syllables

- Consonants + Vowels
  - Mama, Papa
  - Dog, Cat
  - Drat, Flat
  - … Sixths
- Consonants
  - Zmrzlina → zmr.zli.na

Syllable Structure





EVIDENCE: **Spoonerisms**

week long race → leek wong race

fish grotto → grish fotto

soda can → coda san

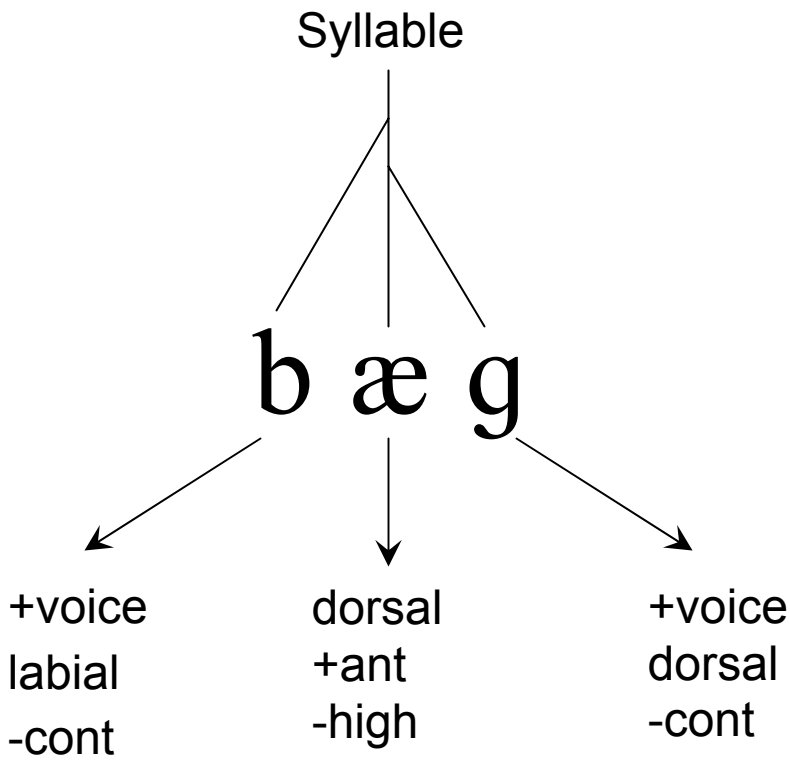
S = syllable

N = nucleus

C = coda

O = onset

Hierarchical Structure of Sound



Sound Structure Regularities

E.g.,

indirect, impossible, ineligible, impregnate

E.g.,

naps, nabs, fights, figs, misplace, misanthrope

E.g.,

Atlantic, a^{h}rocious, spate, p^{h}aste

Phonology

(1) The study of sound structure regularities within and across languages. (2) The set of rules that describes allowable sound structure in one's language.

Phonological Knowledge: Language-specific knowledge

- What are the sound differences between *dogs* and *cats*?
  - How do we know how to pronounce these correctly?
- Which of the following are words in English:
  - brick, blick, bnick
- What is the syllable structure of the word *Atlantic*?
  - How do we know this?

Phonological Knowledge: Evidence from Borrowings

English:

Complex syllable structure, large phoneme inventory

e.g., C h r i s t m a s

Hawiian

CV syllables only, small phoneme inventory

e.g., K a l i k i m a k a

Phonological Transformation

Map English consonants to similar sounding Hawaiian consonants. Insert vowels to preserve CV syllable structure.

Phonological Universals

- Universals
  - Consonants and Vowels
  - The CV syllable
- Near universals
  - Preferred sequencing patterns
  - Preferred syllable structures