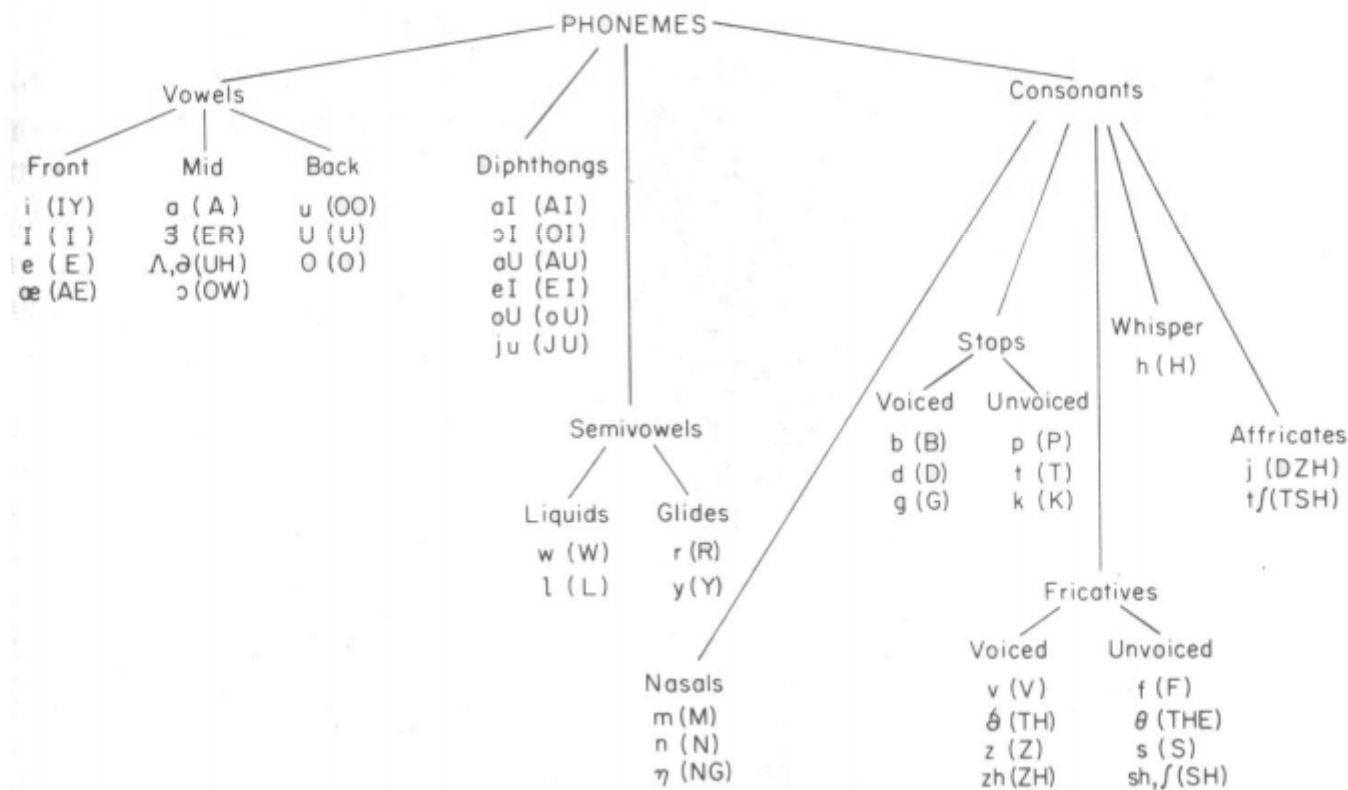


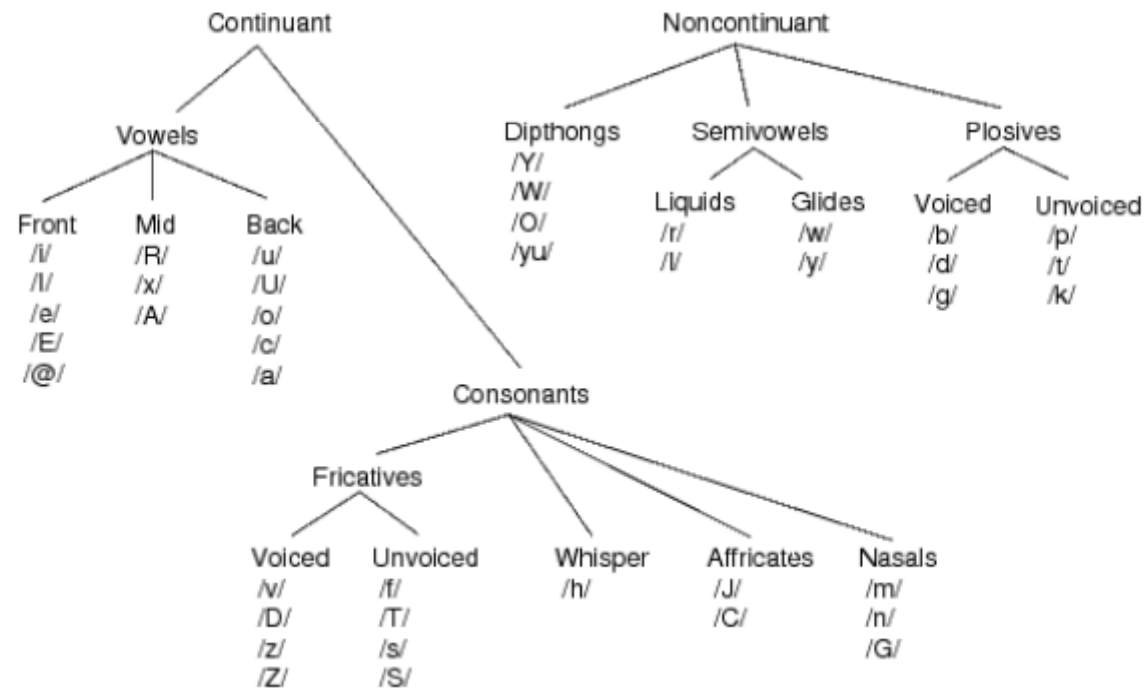
## Four general classes of sounds in American English

- Vowels, diphthongs, semivowels, and consonants
- Each can be further divided according to articulators (manner, place)

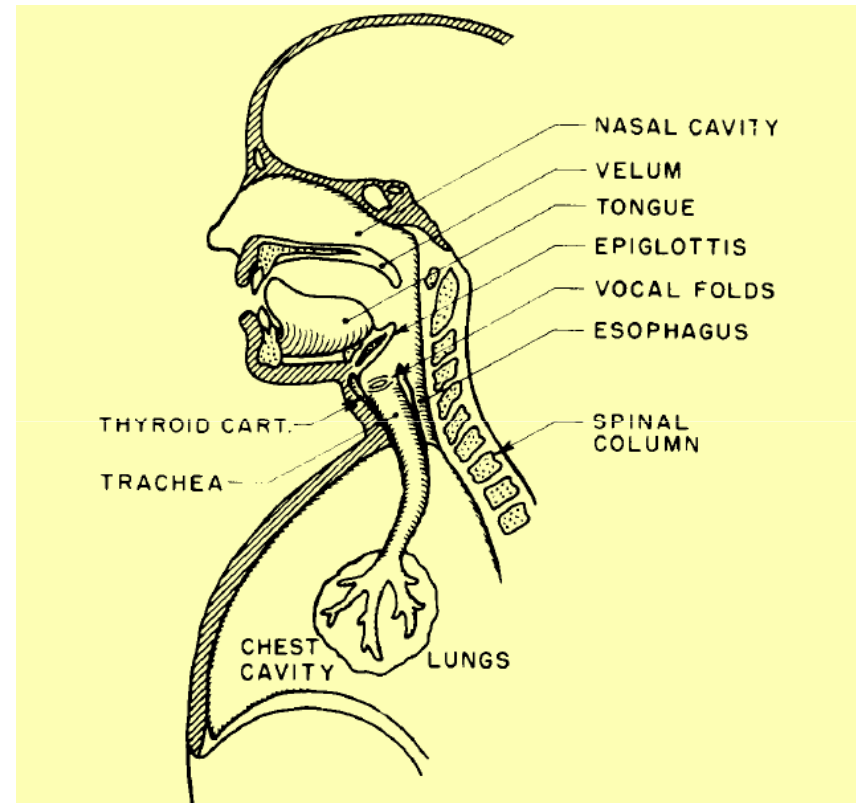
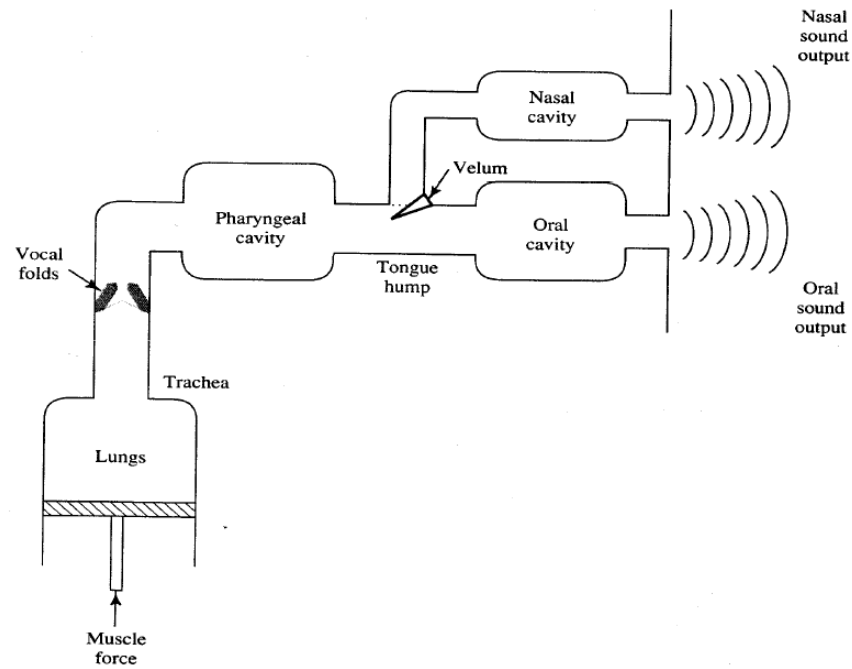


## Alternatively, phoneme classes can be divided into

- Continuant: produced by a fixed vocal tract configuration
  - Includes vowels, fricatives, and nasals
- Non-continuant: vocal tract configuration changes over time
  - Diphthongs, semivowels, stops and affricatives

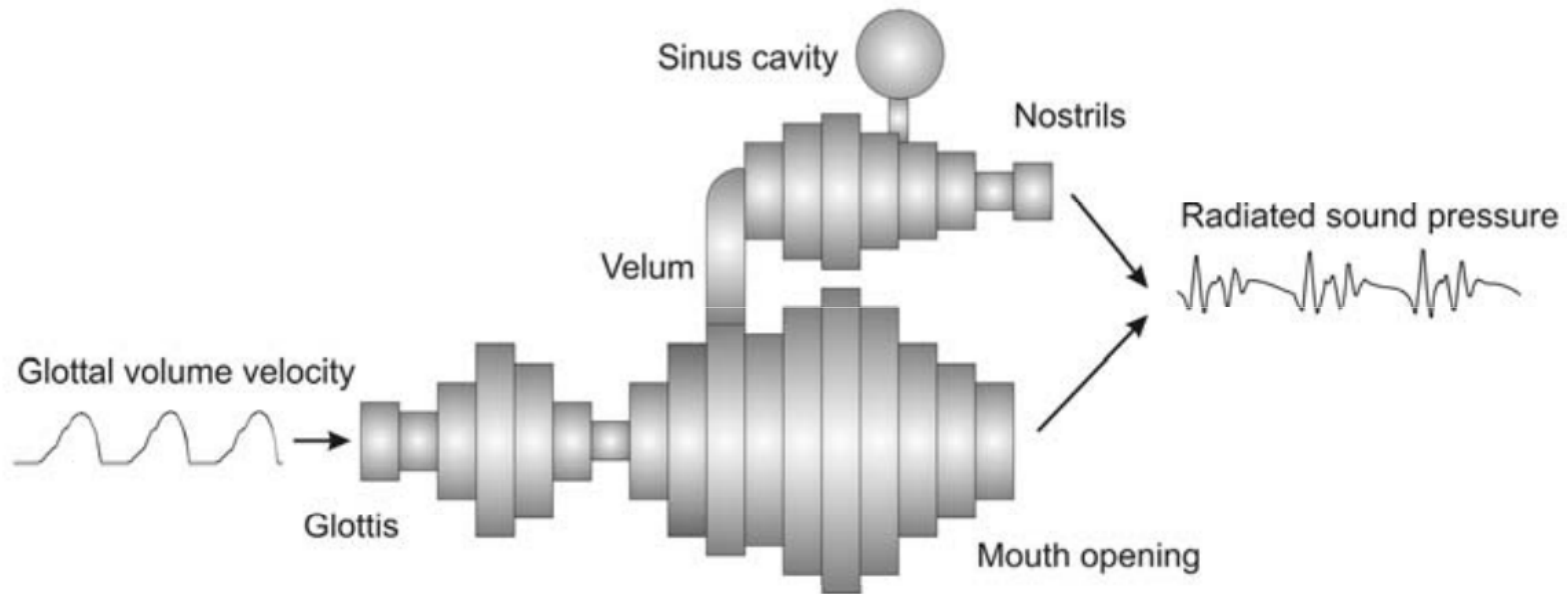


# Pipeline Model



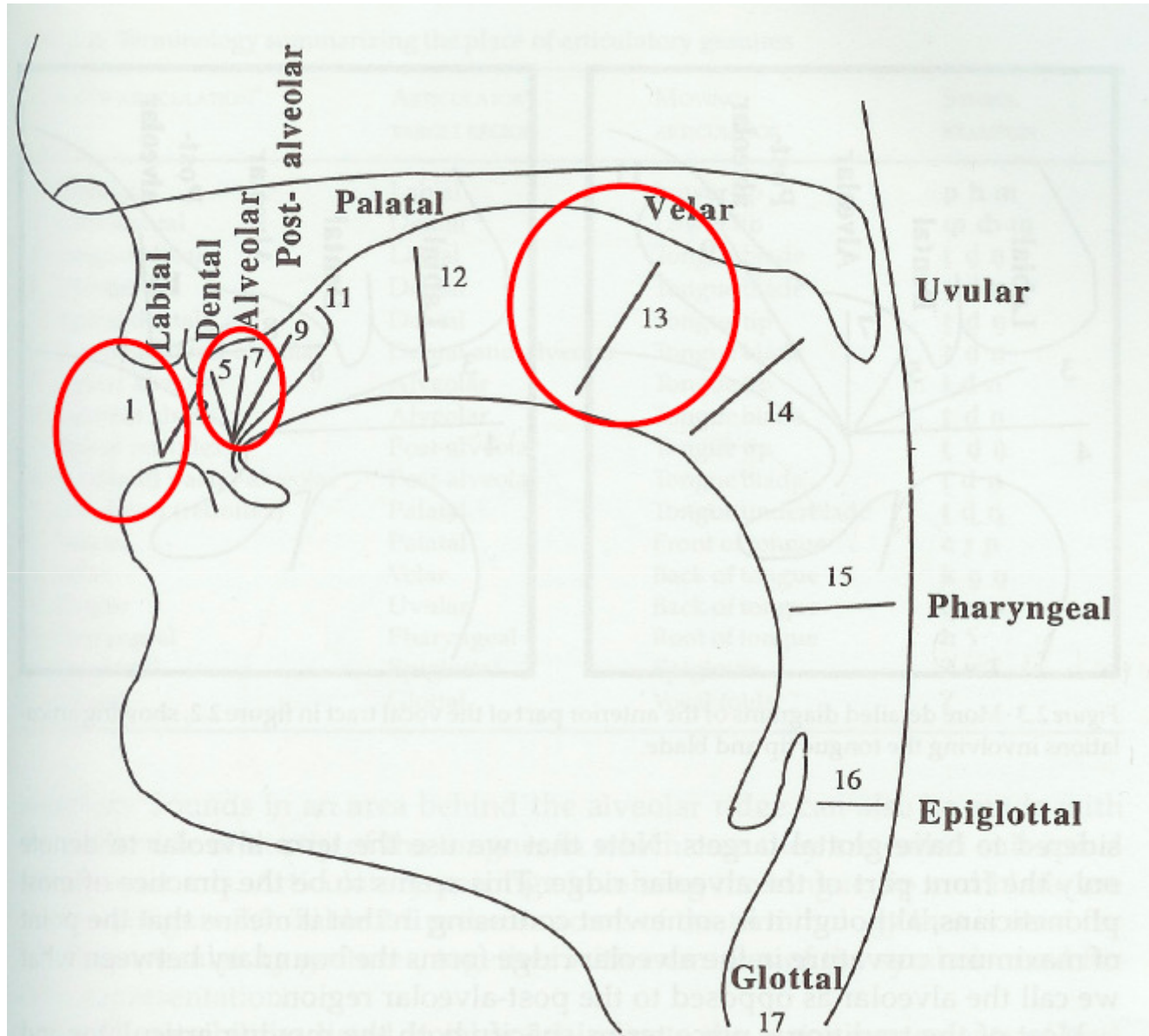
N-tube model

# N-tube model

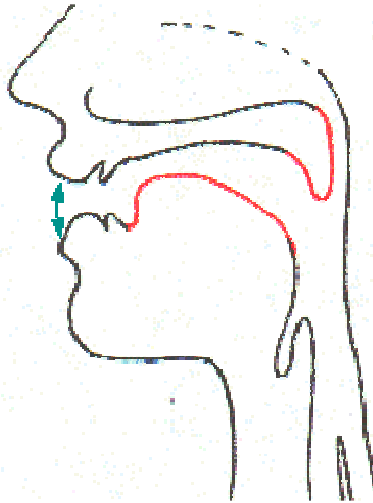


[http://clas.mq.edu.au/speech/acoustics/frequency/vocal\\_tract\\_resonance.html](http://clas.mq.edu.au/speech/acoustics/frequency/vocal_tract_resonance.html)

Atal, Bishnu S., et al. "Inversion of articulatory-to-acoustic transformation in the vocal tract by a computer-sorting technique." *The Journal of the Acoustical Society of America* 63.5 (1978): 1535-1555.

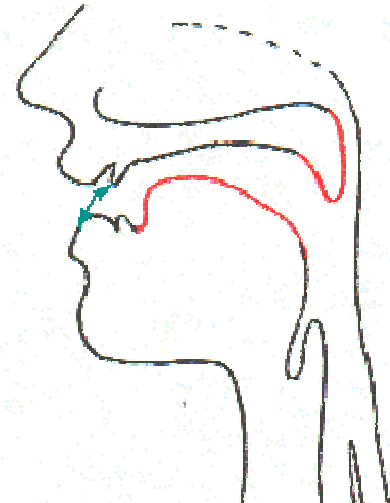


<http://www.phonetics.ucla.edu/index/sounds.html>



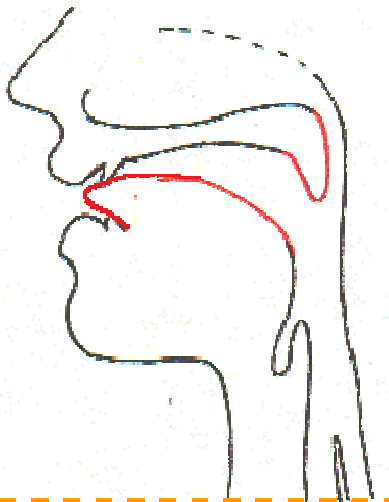
**Labial**

**b, p, m**



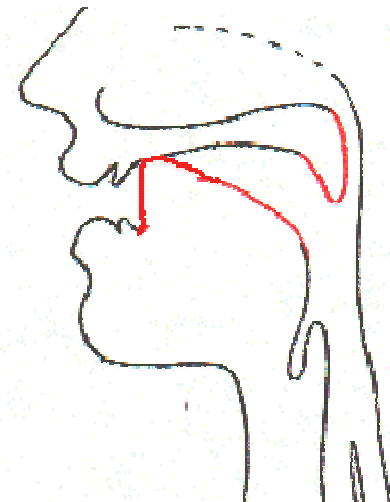
**Labio-dental**

**f, v**



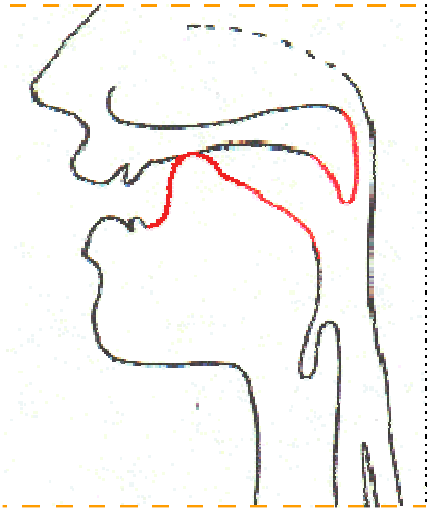
**Interdental**

**θ, ð**



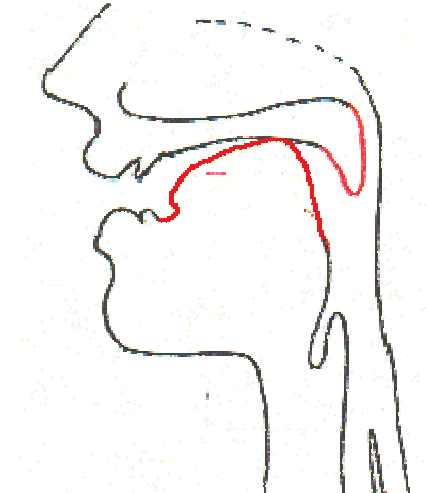
**Alveolar**

**d, t, s, z, n**



Palatal

š, ž



Velar

g, k, ŋ