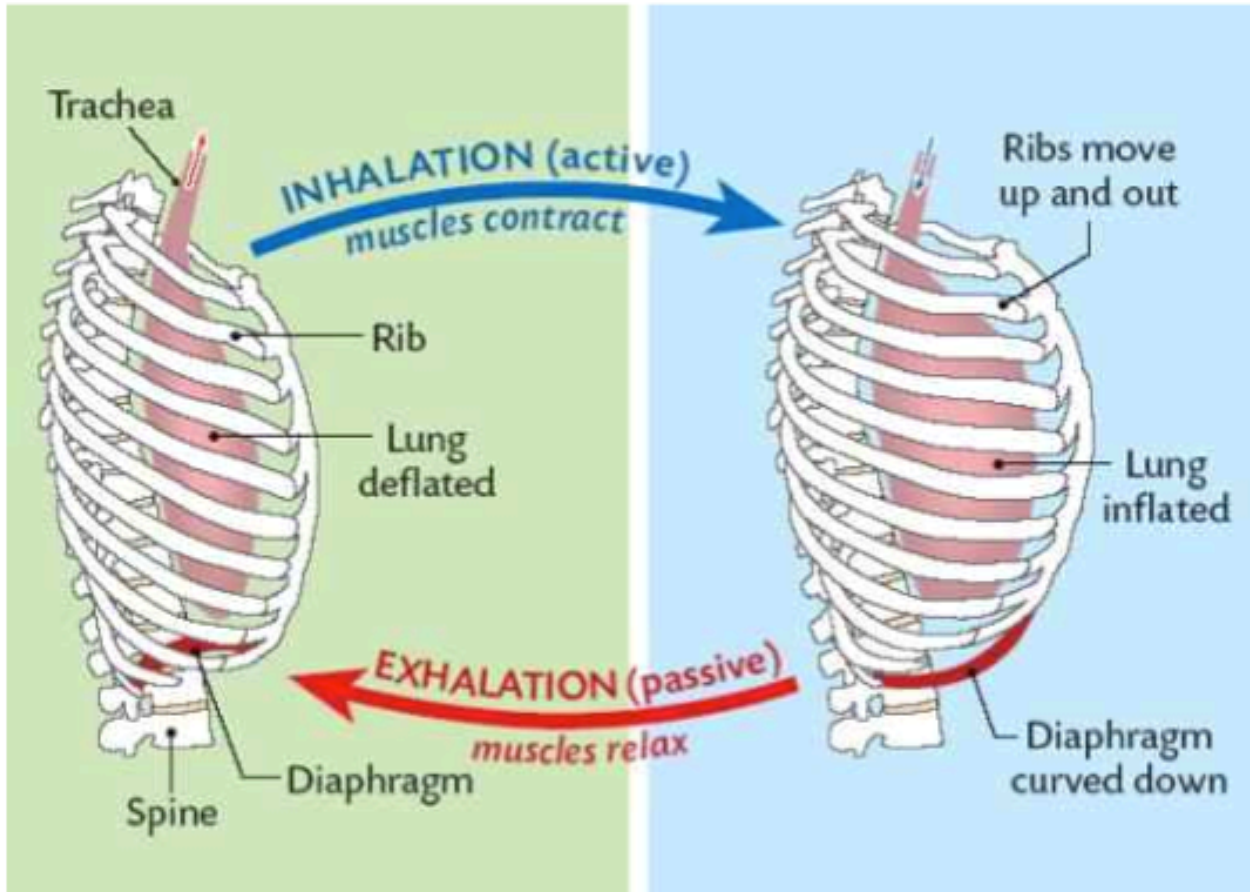


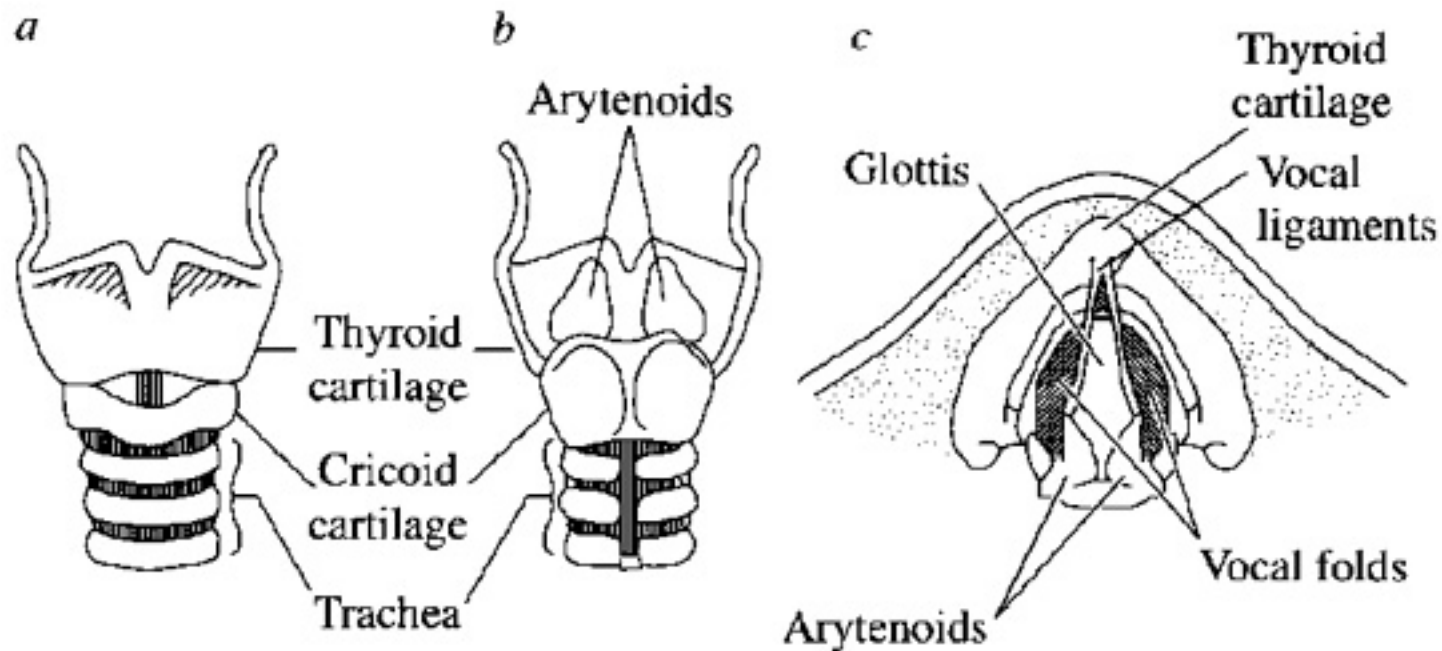
THE PHYSICS BEHIND SPEECH

- **Three primary areas to consider: lungs, vocal cords, mouth**
- **All three areas work in conjunction to create phonemes**
- **Manipulation of the three aforementioned areas will result in different sounds**

THE ORIGINS OF SOUNDS

THE ORIGINS OF SOUND



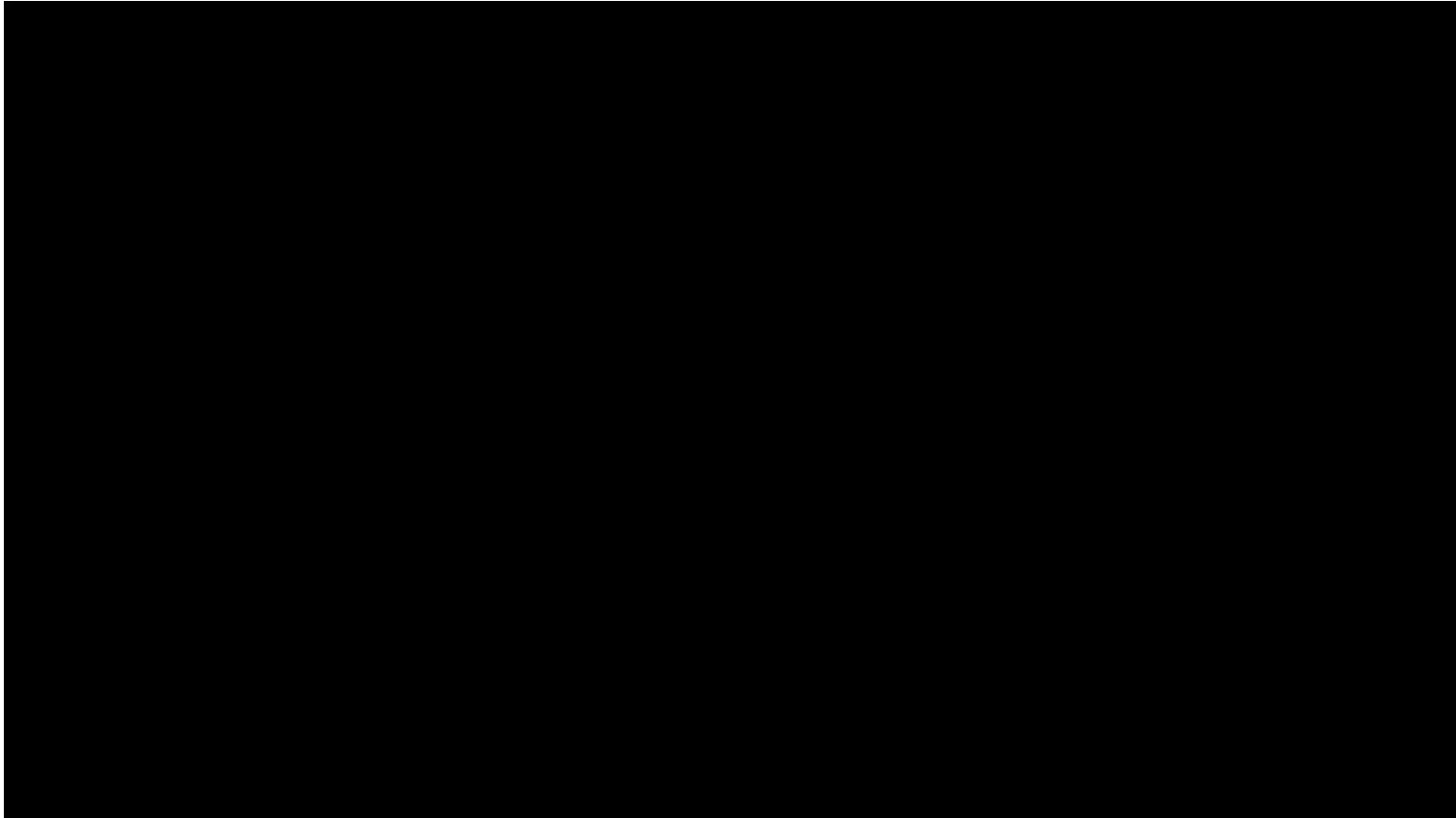


Source: O'Grady, William D., Michael Dobrovolsky & Francis Katamba [eds.] (2001), *Contemporary Linguistics*, Longman. (ISBN 0582246911)

The vocal cords are comprised of two flaps of skin that are attached to muscles on either side. As these muscles relax or contract, the skin is stretched or loosened to produce high and low pitched sounds.

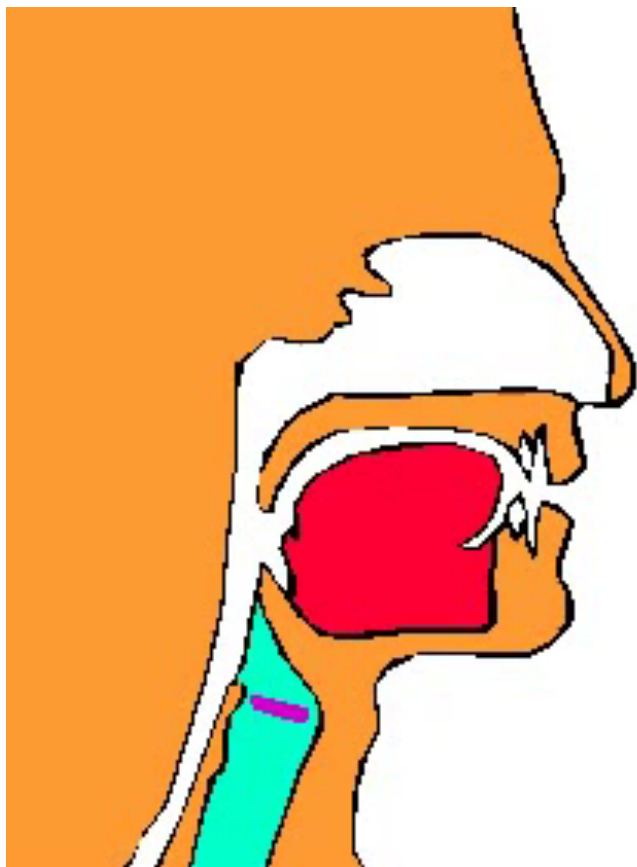
THE ORIGINS OF SOUND (CONT.)

VOCAL CORDS IN ACTION

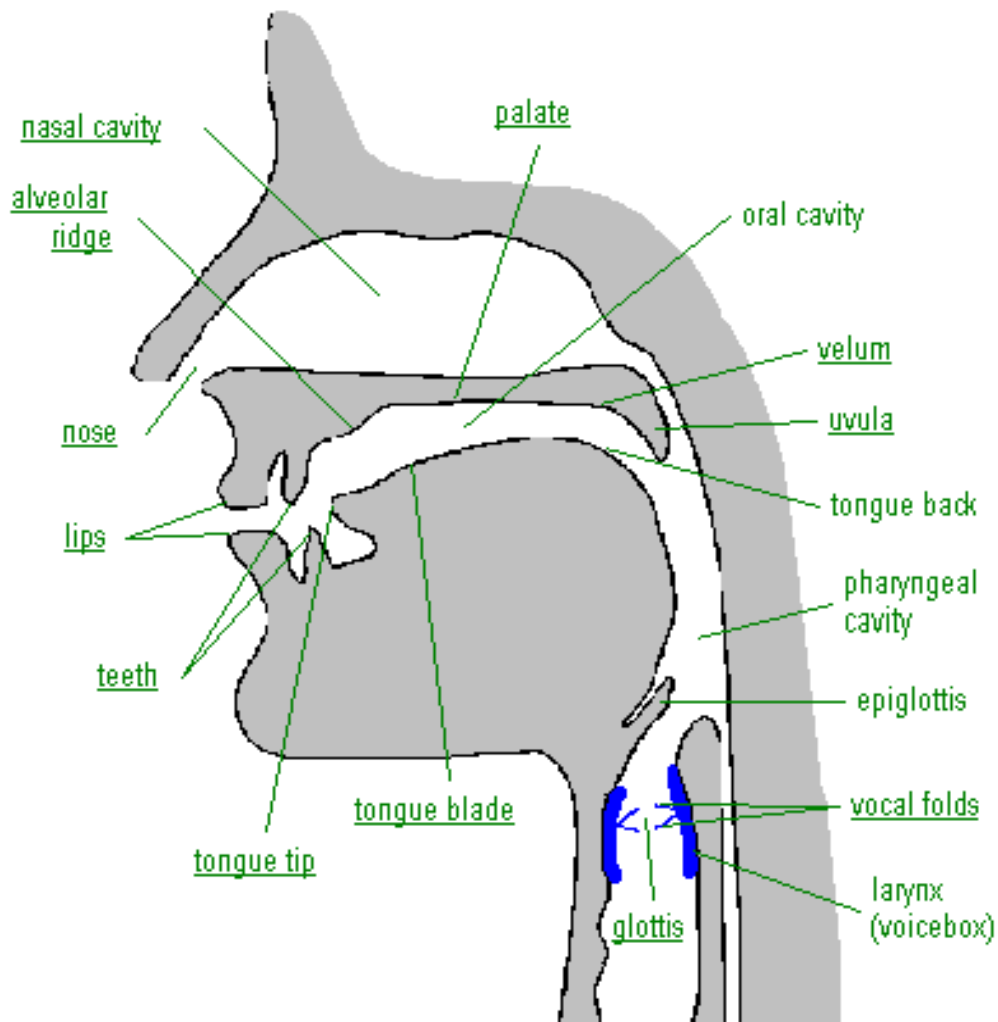


<http://www.youtube.com/watch?v=y2okeYVclQo>

AIRSTREAM IN ACTION



<http://www.youtube.com/watch?v=hKLbJh6C5ns>



The diagram on the left shows a cross section of an adult human vocal tract

THE ORIGINS OF SOUND (CONT.)

KNOWING THE BASICS

- **Air is drawn from the lungs (pulmonic) and pushed out through the vocal tract (egressive)**
- **English only has pulmonic egressive airstream mechanisms**
- **Two directions for airflow: in (ingressive) or out (egressive)**
- **Three sources of air: pulmonic, velaric, glottalic**

SOURCES OF AIR

Pulmonic-generated by the lungs. If the lungs are fairly full, elastic recoil compresses them and generates air pressure.

Velaric-generated by closing the oral tract at the back by raising the back of the tongue against the velum, closing it at the front with the tongue tip or blade or the lips, pulling down the centre of the tongue, thereby expanding the volume of the enclosed region and generating a vacuum. The closure at the front is then released.

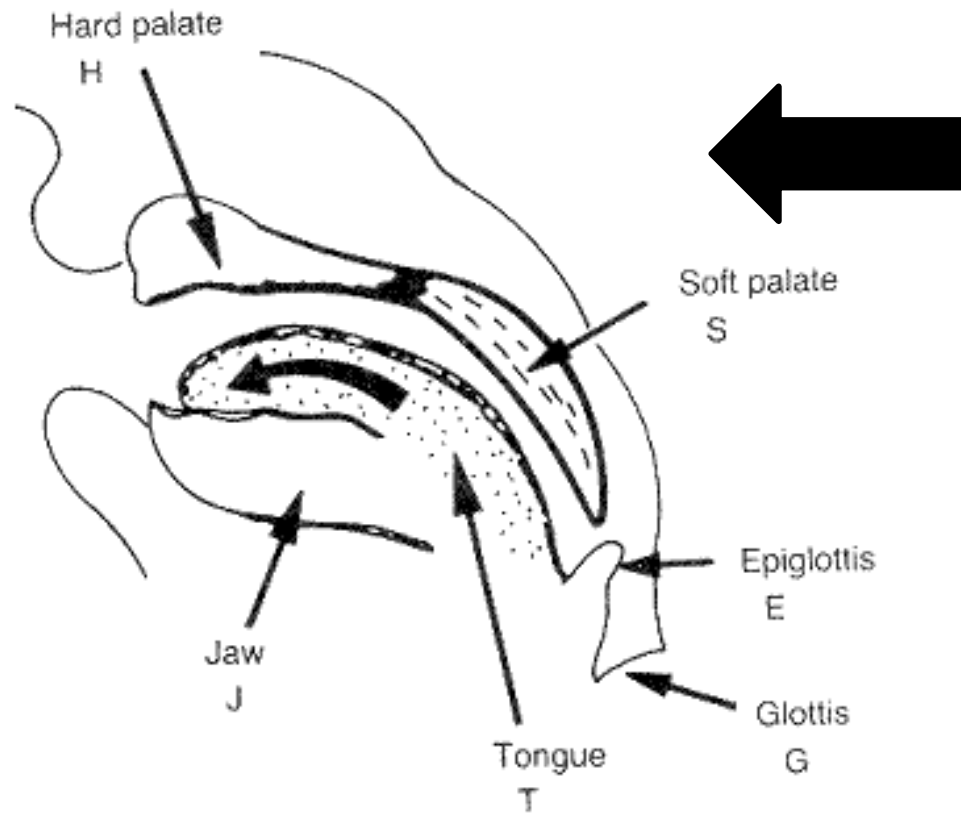
Glottalic-generated by closing the oral tract at the glottis by jamming the vocal folds together. When a closure is made somewhere farther forward, the result is a sealed tube. If the larynx is then raised, the air is compressed. If the larynx is lowered, the air is rarefied (a vacuum is produced).

PLACES OF ARTICULATION

- This term refers to the area of the vocal tract that the sound occurs
- 10 places of articulation starting from the lips and extending to the glottis
- Only concerned with where sound happens

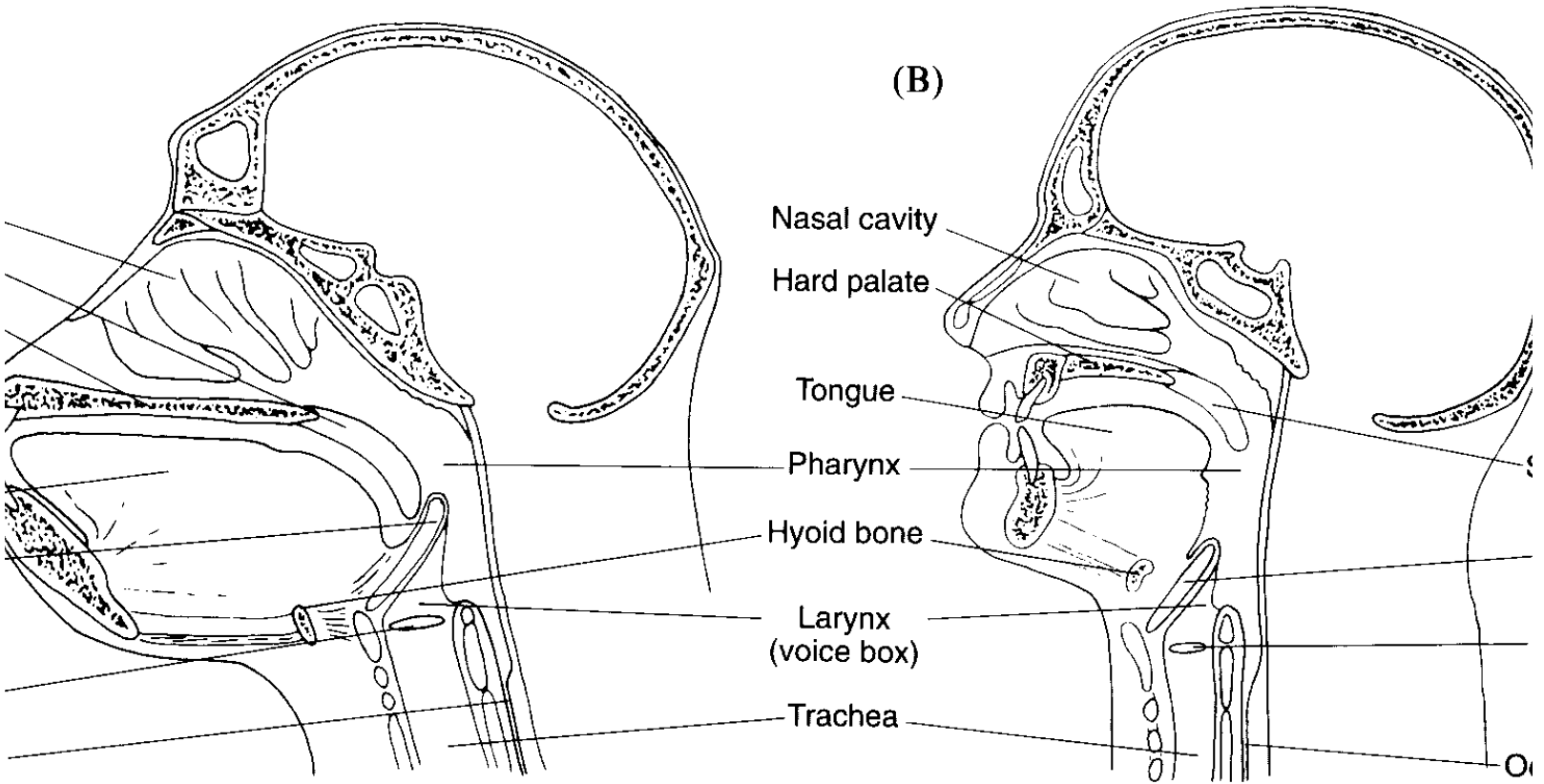
MANNER OF ARTICULATION

- **This term refers to the way that sound occurs**
- **It describes the manner in which airflow escapes the tract e.g. little friction, to the side of the tongue etc**
- **Only concerned with airflow, not where this originates**



Infant vocal tract

- How does this compare to the two images in the preceding slide?
- How might this affect the way that sound is produced?



Top left; Ape vocal tract, Top right; adult human vocal tract