

3 Daniel Bernoulli or the human voice as a sound producer

- In this lecture the voice apparatus is understood by investigating the immanent biomechanical and acoustic processes.
- During the 19th century the scientists realized that it was not the larynx being responsible for the main site of acoustic articulation but rather the vocal tract, i.e. the cavity between the glottis and the lips.
- According to the speaking machine of the Hungarian Von KEMPELEN, the human speech production is separated into 3 essential parts: 1. The lungs are modeled by a pressure chamber, 2. the vocal cords are assumed to act like a vibrating metal reed and 3. the vocal tract is a pliable leather tube.
- Excited by an air stream, the oscillating vocal cords act as the sound source best explained by the BERNOULLI effect or the aerodynamic paradox.
- Especially through tongue movements, the vocal tract exhibits different shapes and thus the formant building is actually caused by specific geometries.