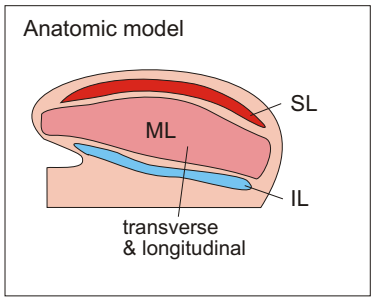
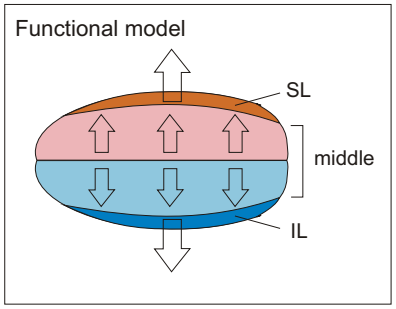
PART A - ARTICULATION

fig. 1



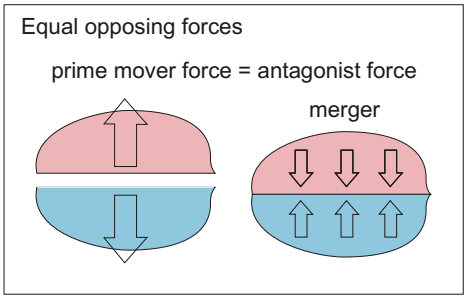
The tongue consists of a muscle mass, comprised of (a) the superior longitudinal (SL), (b) the inferior longitudinal (IL), and (c) the composite transverse plus vertical muscles. The last group can be designated as the combined longitudinal (CL), cf. the "The Human Tongue Atlas" of the Visible Human Project, but here it is simplest to call it the middle layer, (ML).

fig. 2



The tongue is can be sensed as being divisible into two horizontal halves. In the upper half the SL is the prime mover in upward tongue curvature and the vertical muscles of the ML elevate in joint synergy with the SL. In the lower half the prime mover in downward curvature is the IL and the verticals depress in joint synergy with the IL.

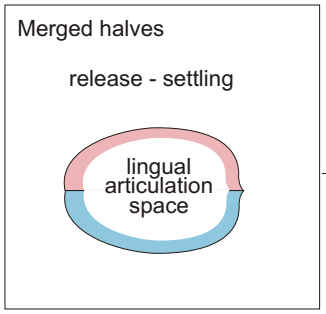
fig. 3



First, the two opposing halves can be made to exert equal forces, bringing about an balanced equilibrium.

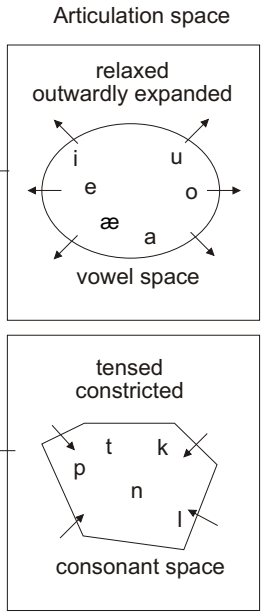
Second, relaxing the balanced unit to reach a sufficiently low energy level causes the two parts to merger into a single combined element. Applying an all around outward pull creates a chamber, while inward pull compresses the tongue.

fig. 4



If the two equal halves are merged and outward moving tension is applied, a space appears. A central point anchor for this space can also be found.

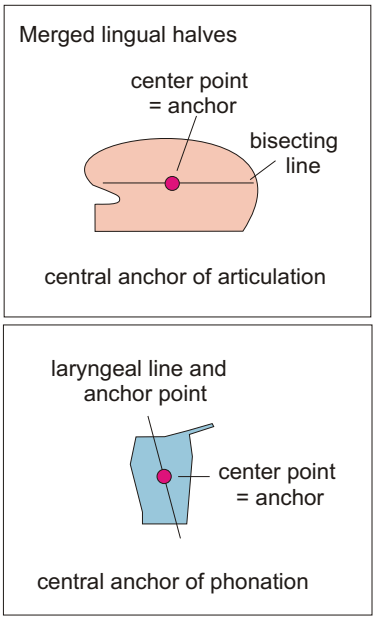
fig. 5



When the relaxed space is kept expanded, it becomes the region in which vowels can be articulated (with of without phonation).

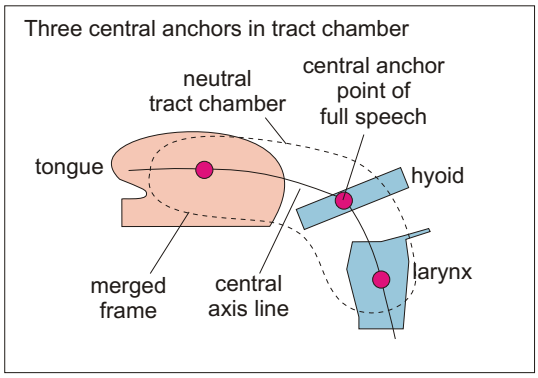
When the borders of the tensed space are constricted, it becomes the region in which consonants can be articulated (with of without phonation).

PART B - PHONATION



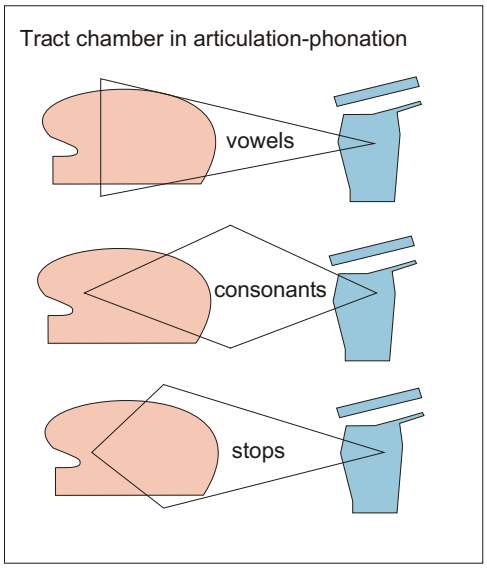
When the horizontal halves are merged a line bisecting them can be found. This line also has a mid point, which is the anchor of articulation. An anchor is the node where various forces meet and balance against one another, as they do in producing a phoneme.

Similarly, a point and a line exists in the larynx, but here the line runs at a vertical slant. The point in the larynx is the anchor of phonation.



A single continuous line runs through these points and passes through the hyoid. The merged frame comprised by the tongue and laryngeal frames has a central point in the hyoid. This point is the central anchor of the full speech frame, which combines both articulation and phonation. During speech lingual articulation and laryngeal phonation are antagonists, that balance each other, exchanging roles as prime movers in producing, respectively, vowels or consonants.

fig. 6



In full speech (= articulation plus phonation) the tract chamber takes on characteristic shapes, appearing as a cone for vowels and as a “spindle” with a hwide middle “belly”, for consonants. To make the diagram simpler the curved tract is represented by a straight one.

The widest section of the tract varies according to phoneme being produced. This is more easily observed for vowels, less so for consonants. For example, for stops the belly is at the front, for liquids it is at the back, and it is at the middle for /n/.

Similar active tract shaping goes on during respiration and feeding. In feeding food is held in an open segment, while constriction of a segment forces food along the tract.