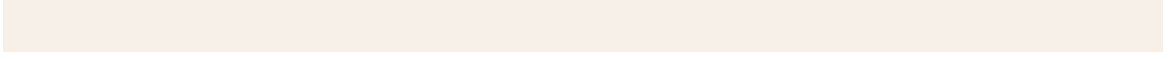


The Sanskrit alphabet and its relation with the Vocal apparatus

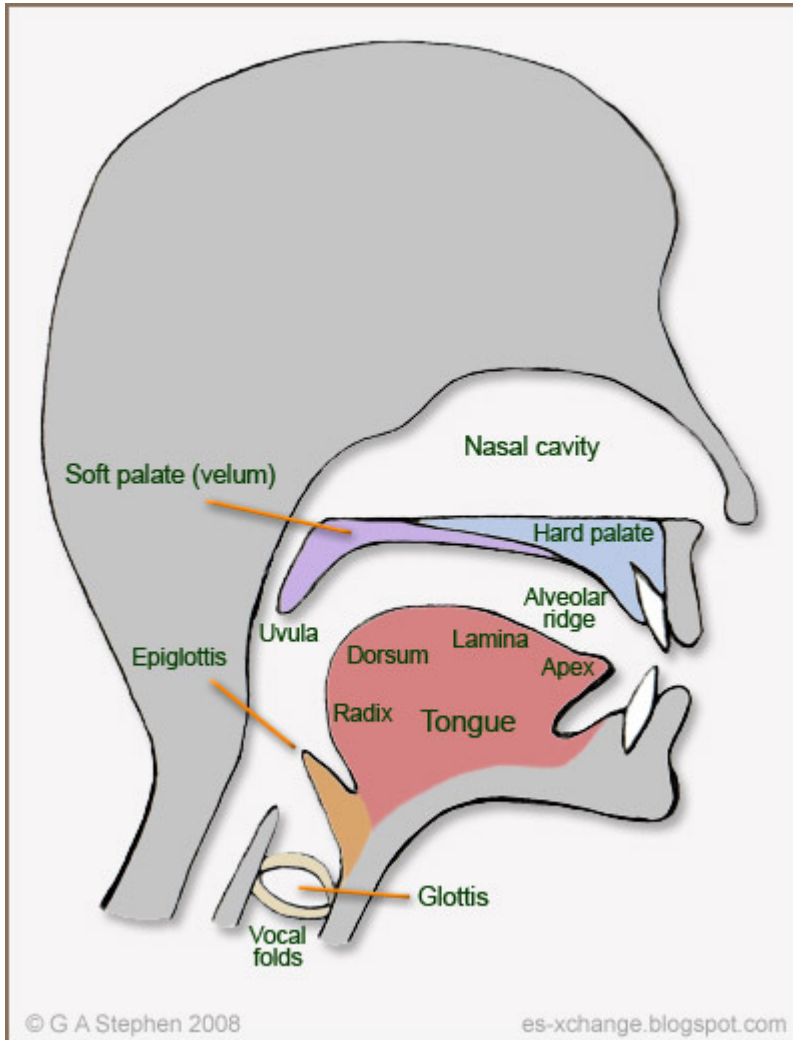
The following pages are extracts from internet sites. They have been included primarily because they have pictorial representations of the human vocal apparatus and how the sounds are produced. These are extracts from different sites and so there is duplication of information but have left them all so it help people.

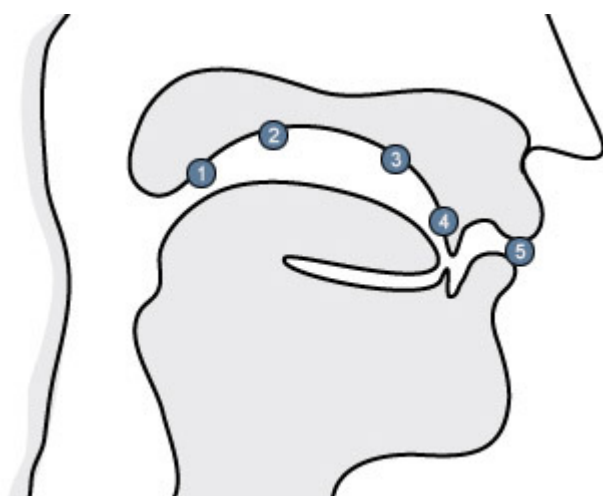
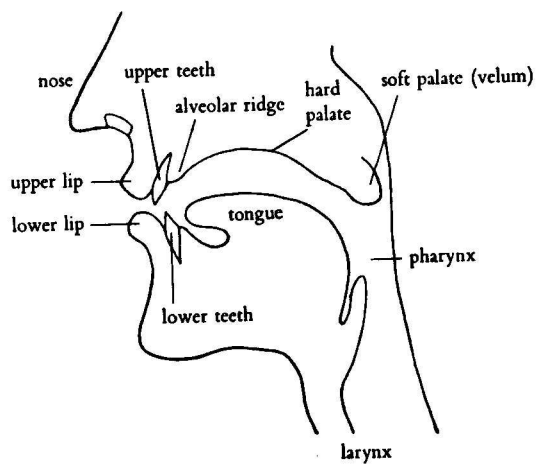
In the Sanskrit language there is a separate specialized area called शिक्षा शास्त्रम् which delves into the details, and further to this each veda has its own set of rules on top of this to specify rules of pronunciation to be followed when studying that वेद शाखा called the वेद प्रातिशाख्यम्. Part of the शिक्षा शास्त्रम् will be covered later in the class.



Vocal apparatus

The diagram below illustrates the major components of the human vocal apparatus. This will be useful to refer to when the production of various sounds is described below.





The production of speech sounds

Articulators above the larynx

All the sounds we make when we speak are the result of muscles contracting. The muscles in the chest that we use for breathing produce the flow of air that is needed for almost all speech sounds; muscles in the larynx produce many different modifications in the flow of air from the chest to the mouth. After passing through the larynx, the air goes through what we call the **vocal tract**, which ends at the mouth and nostrils. Here the air from the lungs escapes into the atmosphere. We have a large and complex set of muscles that can produce changes in the shape of the vocal tract, and in order to learn how the sounds of speech are produced it is necessary to become familiar with the different parts of the vocal tract. These different parts are called **articulators**, and the study of them is called **articulatory phonetics**.

Fig. 1 is a diagram that is used frequently in the study of phonetics. It represents the human head, seen from the side, displayed as though it had been cut in half. You will need to look at it carefully as the articulators are described, and you will often find it useful to have a mirror and a good light placed so that you can look at the inside of your mouth.

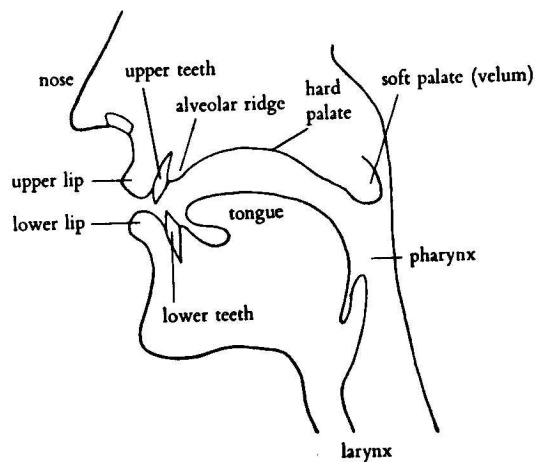


Fig. 1 The articulators

- i) The **pharynx** is a tube which begins just above the larynx. It is about 7 cm long in women and about 8 cm in men, and at its top end it is divided into two, one part being the back of the mouth and the other being the beginning of the way through the nasal cavity. If you look in your mirror with your mouth open, you can see the back of the pharynx.
- ii) The **velum** or **soft palate** is seen in the diagram in a position that allows air to pass through the nose and through the mouth. Yours is probably in that position now, but often in speech it is raised so that air cannot escape through the nose. The other important thing about the velum is that it is one of the articulators that can be touched by the tongue. When we make the sounds g and ŋ the tongue is in contact with the lower side of the velum, and we call these **velar** consonants.
- iii) The **hard palate** is often called the "roof of the mouth". You can feel its smooth curved surface with your tongue.
- iv) The **alveolar ridge** is between the top front teeth and the hard palate. You can feel its shape with your tongue. Its surface is really much rougher than it feels, and is covered with little ridges. You can only see these if you have a mirror small enough to go inside your mouth (such as those used by dentists). Sounds made with the tongue touching here (such as t and d) are called **alveolar**.

v) The **tongue** is, of course, a very important articulator and it can be moved into many different places and different shapes. It is usual to divide the tongue into different parts, though there are no clear dividing lines within the tongue. Fig. 2 shows the tongue on a larger scale with these parts shown: **tip**, **blade**, **front**, **back** and **root**. (This use of the word "front" often seems rather strange at first.)

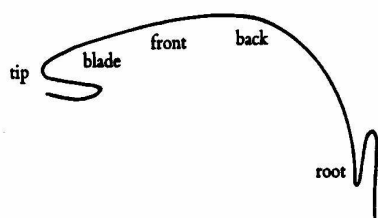


Fig. 2 Sub-divisions of the tongue

vi) The **teeth** (upper and lower) are usually shown in diagrams like Fig. 1 only at the front of the mouth, immediately behind the lips. This is for the sake of a simple diagram, and you should remember that most speakers have teeth to the sides of their mouths, back almost to the soft palate. The tongue is in contact with the upper side teeth for many speech sounds. Sounds made with the tongue touching the front teeth are called **dental**.

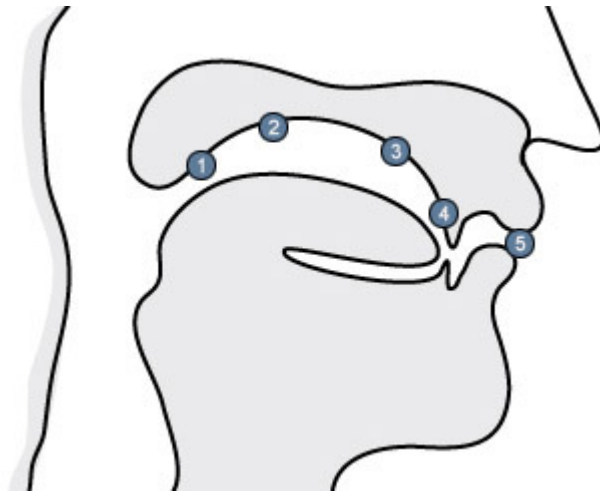
vii) The **lips** are important in speech. They can be pressed together (when we produce the sounds p , b), brought into contact with the teeth (as in f , v), or rounded to produce the lip-shape for vowels like u . Sounds in which the lips are in contact with each other are called **bilabial**, while those with lip-to-teeth contact are called **labiodental**.

The seven articulators described above are the main ones used in speech, but there are three other things to remember. Firstly, the larynx could also be described as an articulator - a very complex and independent one. Secondly, the **jaws** are sometimes called articulators; certainly we move the

lower jaw a lot in speaking. But the jaws are not articulators in the same way as the others, because they cannot themselves make contact with other articulators. Finally, although there is practically nothing that we can do with the **nose** and the **nasal cavity**, they are a very important part of our equipment for making sounds (what is sometimes called our **vocal apparatus**), particularly nasal consonants such as **ŋ**, **ɱ**. Again, we cannot really describe the nose and the nasal cavity as articulators in the same sense as (i) to (vii) above.

The five important articular parts of the mouth to pronounce the sounds are:

1. Velar or Guttural - Using the back of the tongue against the soft palate.
2. Palatal - Using the flat of the middle of the tongue against the back of the hard palate.
3. Cerebral (or Retroflex) - Using the tip of the tongue (or the part slightly below the tip) against the top of the hard palate.
4. Dental - Using the tip or blade of the tongue against the top front teeth.
5. Labial - Using the lips.



CONSONANTS

Unlike in English where consonants each have an individual sound (b=bee, f=ef, k=kay, z=zed), the Sanskrit letters representing consonants incorporate an 'a' sound (pronounced 'ah' - ka, ta, pa) making each symbol a single syllable. This vowel 'a' can be replaced by any other vowel by the addition of extra symbols.

Guttural:	क ख ग घ ङ
	ka kha ga gha ña
Palatal:	च छ ज झ ञ
	ca cha ja jha ña
Cerebral:	ट ठ ड ढ ण
	ṭa ṭha ḍa ḍha ṇa
Dental:	त थ द ध न
	ta tha da dha na
Labial:	प फ ब भ म
	pa pha ba bha ma

Semi-Vowel:	य र ल व
	ya ra la va
Silibant:	श ष स
	śa ṣa sa
Aspirate:	ह
	ha

VOWELS

There are two ways of writing vowels; using the full form, or the abbreviated form. The full form vowels are used at the beginning of a word or when following another vowel.

The abbreviated vowels are used within a word in place of the unwritten inherent vowel, 'a'.

VOWELS - FULL FORM

अ	आ	इ	ई	उ	ऊ
a	ā	i	ī	u	ū
ऋ	ॠ	ऌ			
ṛ	ṝ	ḷ			
ए	ओ	ऐ	औ		
e	o	ai	au		

VOWELS - ABBREVIATED FORM

का	कि	की	कु	कू	
ā	i	ī	u	ū	
कृ	कृ	के	कै	को	कौ
ṛ	ṝ	e	ai	o	au