Phonetics and Phonology: A Broad Overview
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Lecture 04
Language Endangerment and Linguistic Diversity

Welcome to NPTEL MOOC's course on phonetics and phonology broad overview. This is a third unit of this course and in the preceding two units, we have learnt a bit about articulatory phonetics and acoustic phonetics. And now in this unit, we will have a look at the sounds of the world's languages. We have already looked at articulatory phonetics and acoustic phonetics. So, what is new about this section? In the previous two sections we only looked at the most commonly occurring features in articulatory phonetics so in this unit we will look at the broad range of choices available for articulation.

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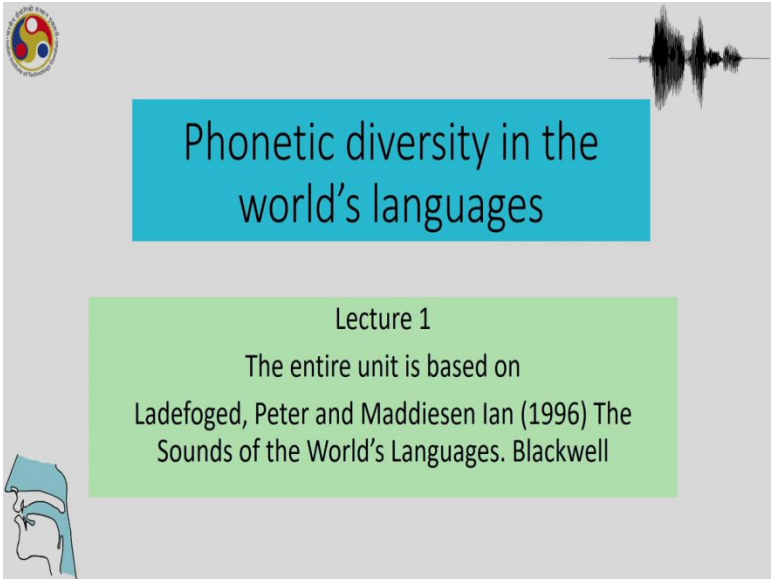

So, in a sense we will have a look at the phonetic diversity in the world's languages and in the previous lecture we concentrated mainly on English and other major languages. In this unit we will look more closely at all the different aspects of articulation that is available for us from different languages of the world. This lecture in the unit is based a lot on the sounds of the world's languages by Ladefoged and Maddieson 1996.

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So, there about 6000 to 7000 languages in the world and most languages are spoken by fewer than 10,000 people, a quarter spoken by under 1000 people. 'Language is a dialect with an army and a navy', this is an off quoted saying in linguistics, which you may or may not agree with but what it says is that the decision to arrive at what is a language vis-a-vis what is a dialect is arrived upon by consideration such as mutual intelligibility and other social and political factors.

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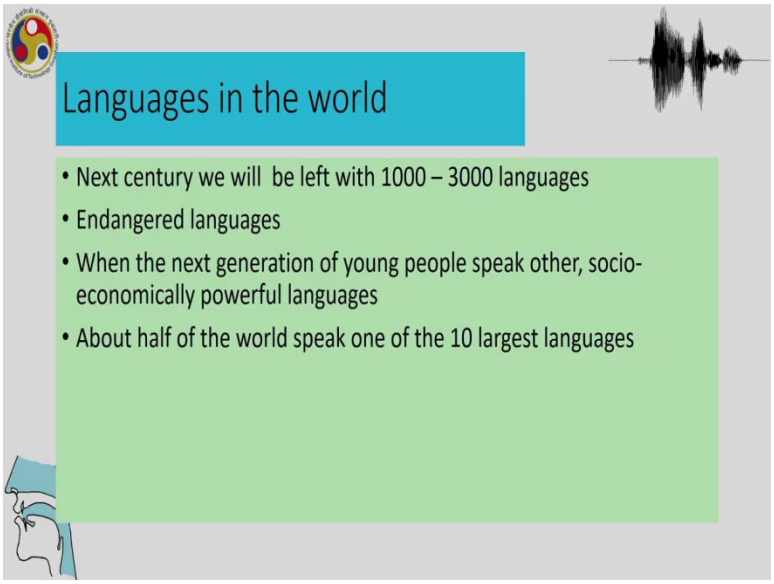

So, it has been predicted, a very ominous prediction, that we will be left with less than half of the languages that we currently have in the world in the next century and we have a whole range of endangered languages in various parts of the world. When the next generation of young people speak other socio-economically powerful languages, about half of the world speaks one of the ten largest languages and among them we have English, Mandarin, Arabic, Hindi, Spanish and a few other languages.

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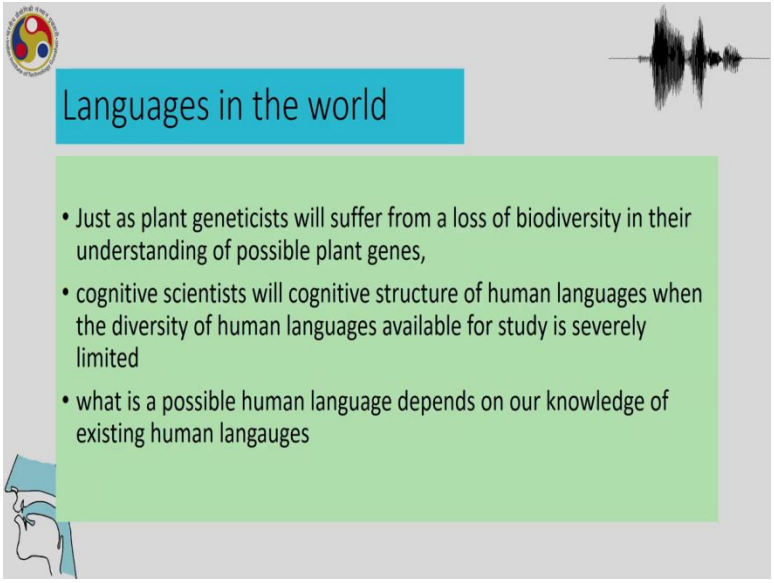

So, there have been many ways of viewing how this language endangerment is going to impact us as human species and it has been said that just as plant geneticists will suffer because of the loss of biodiversity in the understanding of possible plant genes, cognitive scientist of human language will also have to deal with less diversity in languages and the range of available languages to study will be severely limited.

So, this will be a detrimental factor because a human language depends on our knowledge about various things in the world, depends on our knowledge of what is a language, what are the possible languages that human cognitive system is able to come up with. So, those considerations are important to understand with our human cognitive abilities.

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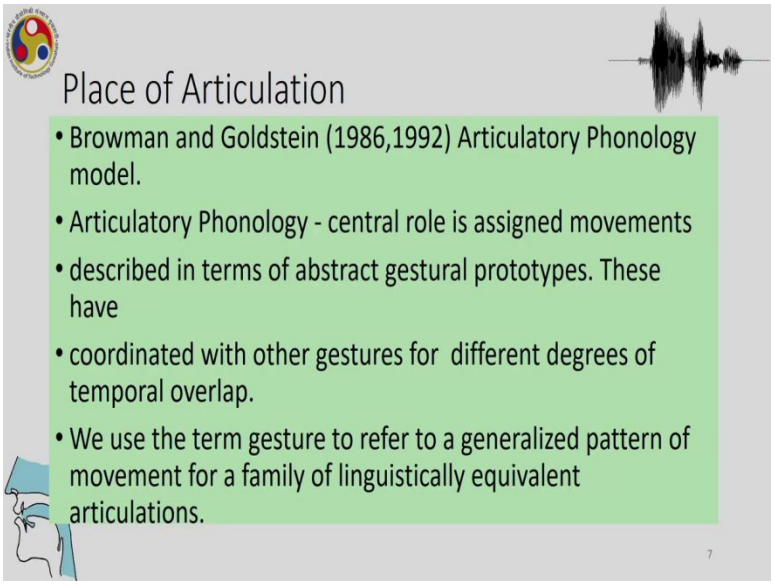

Now, having had this brief overview about the state of languages in the world, we move on to study phonetic diversity.

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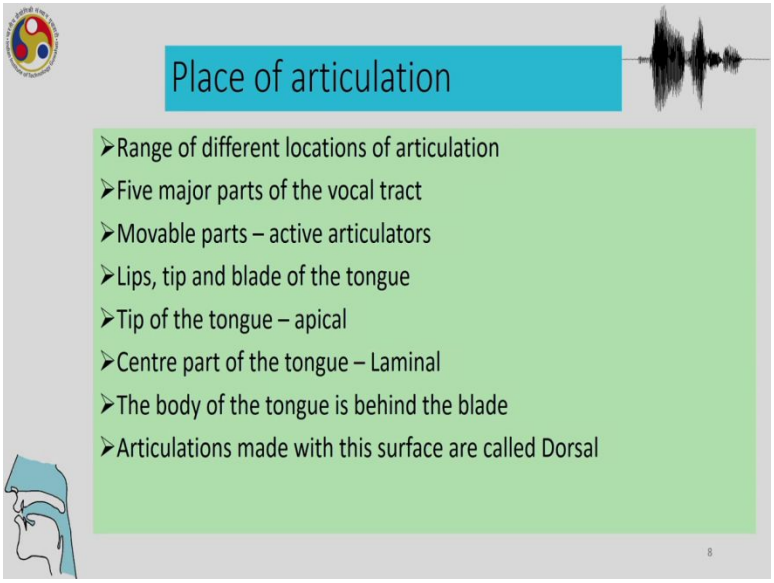

So, in the lectures on place of articulation, we have looked at different locations of articulation. So, the five major parts of the vocal tract and we have seen that they are the movable parts and they are lip, tongue and blade of the tongue and then the tip of the tongue is called apical. The centre part of the tongue is called laminal. In this lecture we will see those distinctions. So, the body of the tongue is behind the blade and articulations made with the surface are called dorsal.

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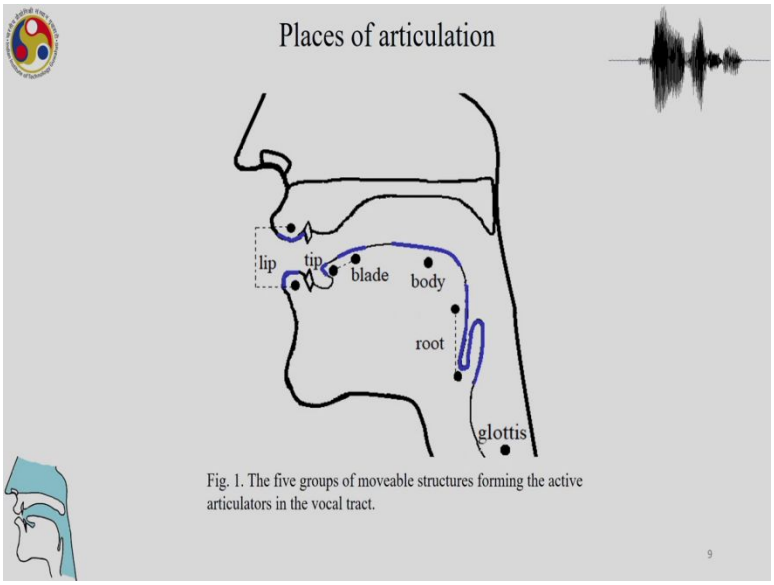

Now, these are the places of articulation that we have been talking about and these are highlighted in blue in the picture in front of you. So, we can see the two lips and we can see the tongue tip. We can see the body of the tongue. The blade of the tongue and root and the glottis these are the movable structures along with the lips.

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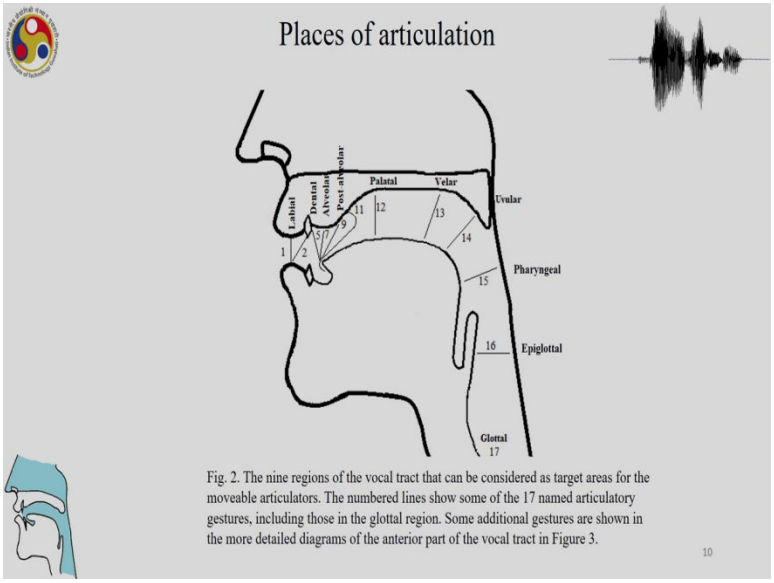

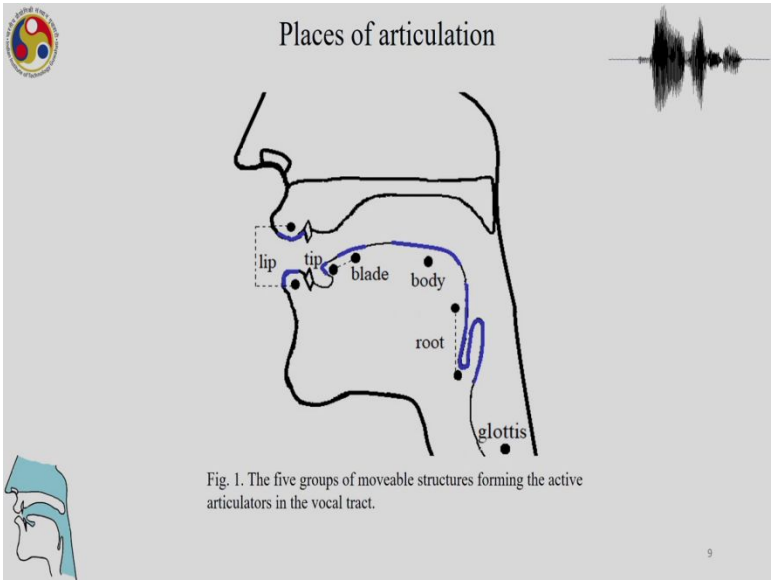

And now in figure 2 what we see is what we can call place of articulation. So, here we saw the movable structures. Here we see what we call the immovable or more precisely in recent studies of in linguistics, we call these the target areas. So, these are the target areas for the movable articulators and the 17 named articulatory gestures. So, the movement towards target is called a gesture. So, the 17 named articulatory gestures are seen in this diagram.

And what we see here is the dental, the alveolar, so what we can see that the tongue moves and it can move to post alveolar or palatal alveolar region, the alveolar region and the dental region. So, either the tongue tip or the tongue blade so depending on either if it is a tongue tip, it will be an apical gesture; if it is a tongue blade, it will be the laminal gesture. So, depending on what sounds you are producing there will be difference in the part of the tongue which is used, it could be either apical or laminal.

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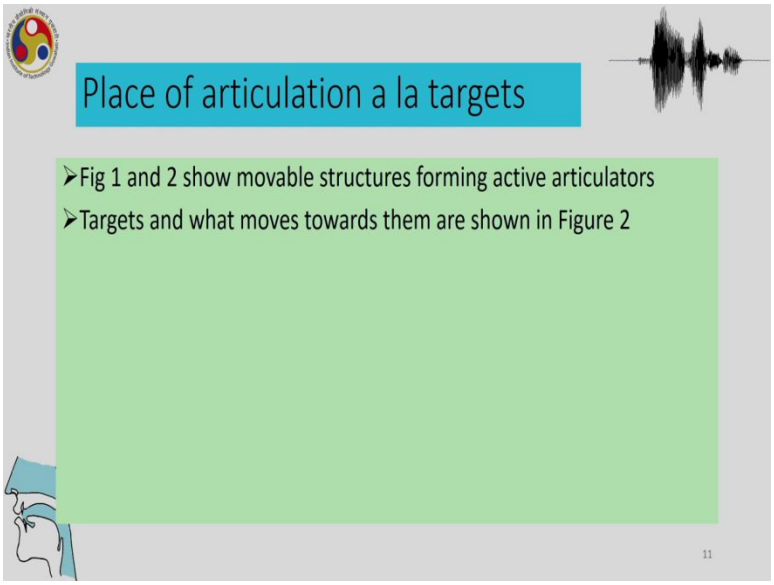
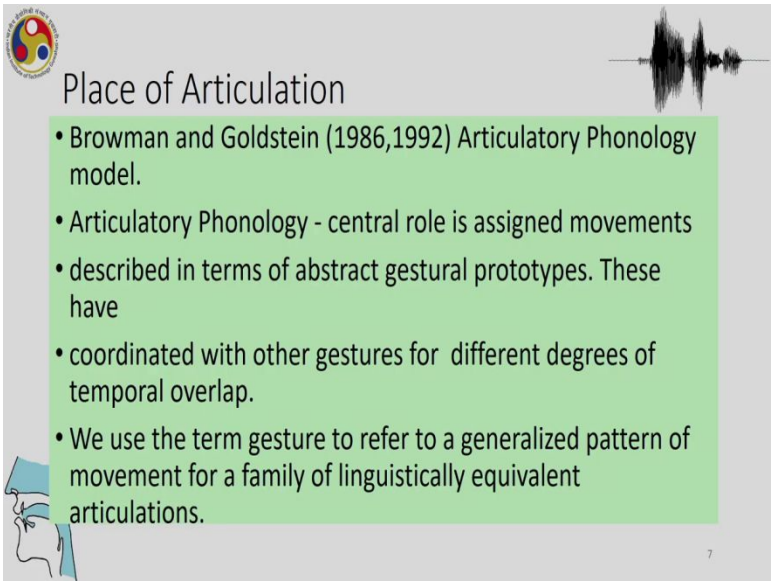




Place of articulation

- Range of different locations of articulation
- Five major parts of the vocal tract
- Movable parts – active articulators
- Lips, tip and blade of the tongue
- Tip of the tongue – apical
- Centre part of the tongue – Laminal
- The body of the tongue is behind the blade
- Articulations made with this surface are called Dorsal

Places of articulation

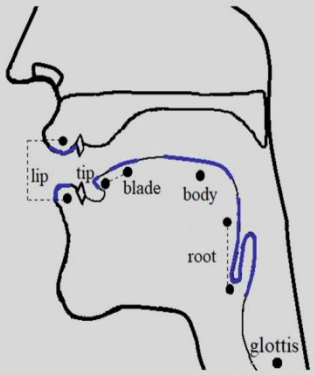
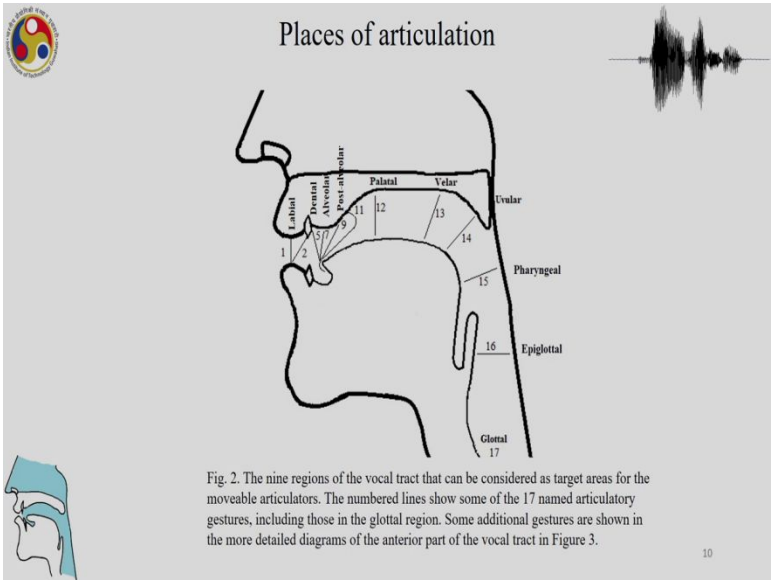


Fig. 1. The five groups of moveable structures forming the active articulators in the vocal tract.



So, if figure 1 and 2 show movable structures forming active articulators, targets and what moves towards them are shown in figure 2 and we saw the target regions and having talked about this now we want to present before you briefly, what is the articulatory phonology model by Browman and Goldstein. Articulatory phonology, the central role assigned is movements and it is described in terms of abstract gestural prototypes and these coordinate with other gestures for different degrees of overlap and we use the term gesture to refer to a generalized pattern of movement in this lecture following much of the literature in articulatory phonology.

So, we have seen the range of different locations of articulation, the movable parts. So, here the movable parts, here are the 17 regions, but the 9 regions here are the target areas, the ones that cannot move. So, we have the target areas here. So, we have dental alveolar, the post alveolar, palatal, velar, all these regions are the target areas.

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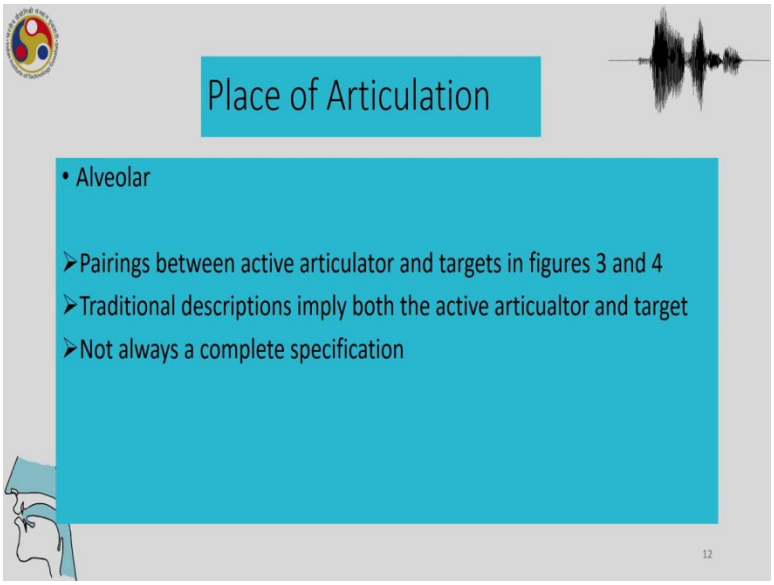

So, now moving on to place of articulation, what is called alveolar. So, we have these pairings between active articulator and targets which we will see in another diagram and the traditional descriptions imply both active articulator and target. So, the traditional descriptions that we saw previously in articulatory phonetics those are sometimes not sufficient and they imply both the articulator and the target.

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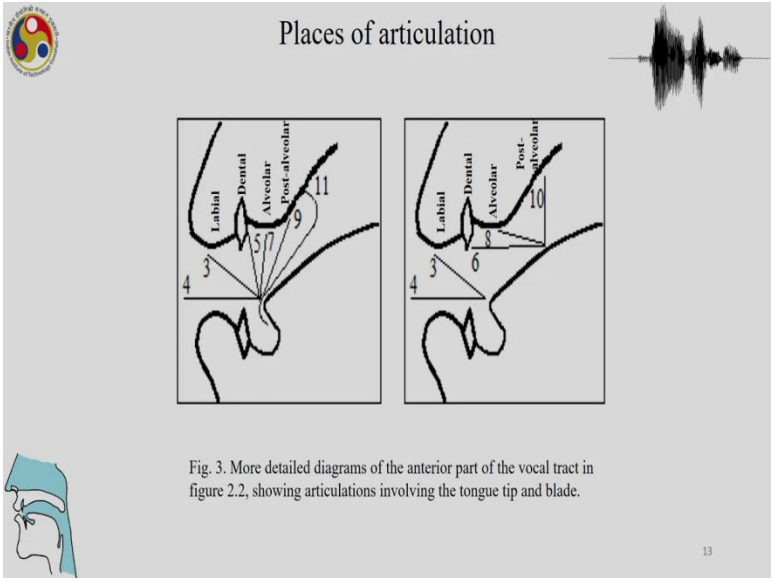

For instance, when we say that the sound is labial dental. We do not know, it is not specified in the traditional description, which part is the movable articulator, which part is not. So, here as

you can see in this diagram you can see that this tongue tip can move to the post alveolar region, the alveolar region, the dental region, the labial region etcetera. And the tongue blade can move to the post alveolar region, the alveolar region, dental region and also the labial regions both the lips, here also both. So, the tongue tip can actually move to all these places, the tongue blade can move to these three places.

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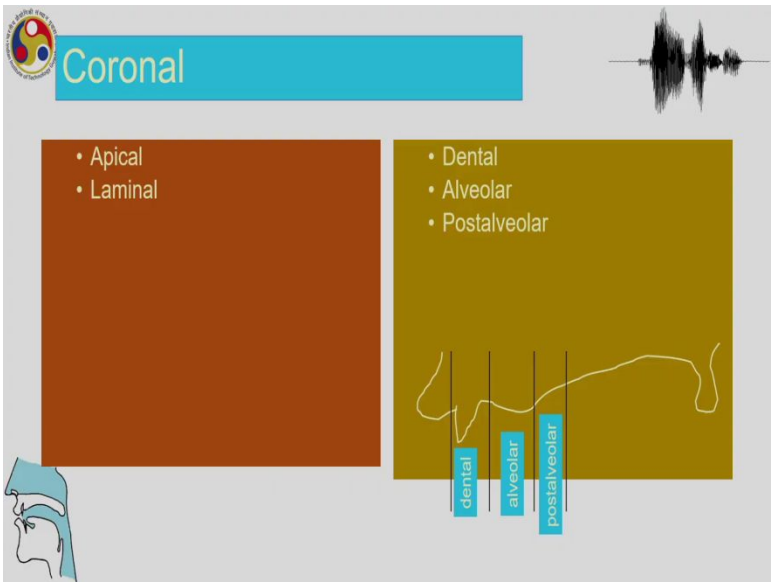

So, basically if we divide the roof of our vocal tract into these dental, alveolar and postalveolar regions, then we can have either apical or laminal or neither actually and we can have either apical or laminal gestures movements. So, in an apical gesture your tongue will move towards the tongue tip, will move towards any of these positions; in a laminal gesture the tongue blade will move towards these positions and when that happens this group of sounds are called coronals.

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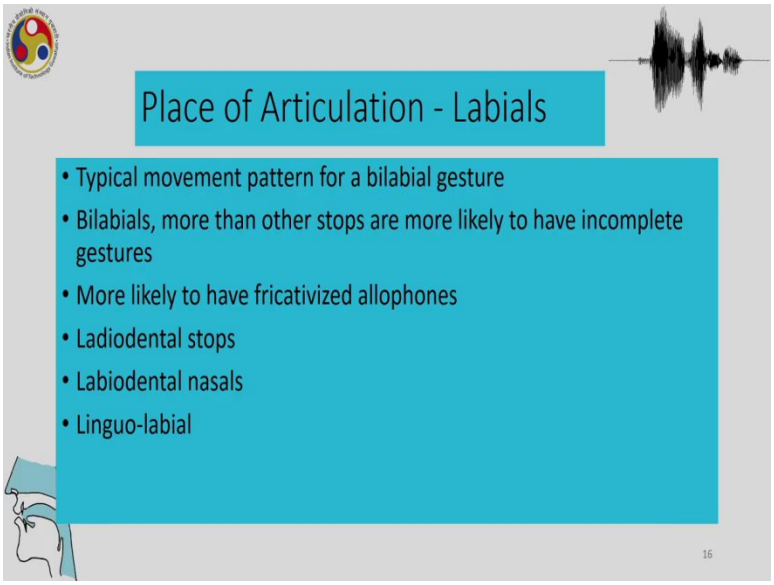

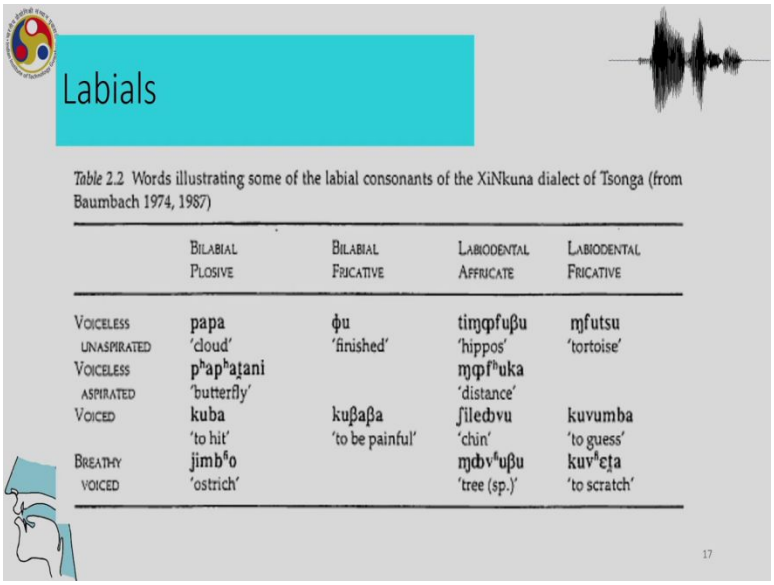

Having looked at coronals where the tongue tip and tongue blade can move towards the various regions that is dental, alveolar, postalveolar and labial regions. We now will have a look at labials. So, the most commonly found sounds for labials are the bilabial sounds or the bilabial gesture. So, bilabials more than other stops are more likely to have incomplete gestures and they are all so that is why likely to have fricativized allophones. There are also labiodental stops, there are labiodental nasals, there are also linguo-labials.

So, this is a data set from a language called Tsonga. It is a dialect of Tsonga and the labial consonants here show that they have labiodental fricative, labiodental affricate, bilabial fricative

and bilabial plosive and which may be either voiceless unaspirated, voiceless aspirated, voiced or breathy voiced.

So, while we have seen earlier that bilabials are not difficult to understand, we will play those videos again to show the bilabial gesture when the two lips come together and the labiodental gesture where the lip move towards the upper teeth and these two are commonly found sounds, the target as well as the origin of the sound, so we have bilabial plosives, bilabial fricatives, labiodental affricates and labiodental fricatives in this data here.

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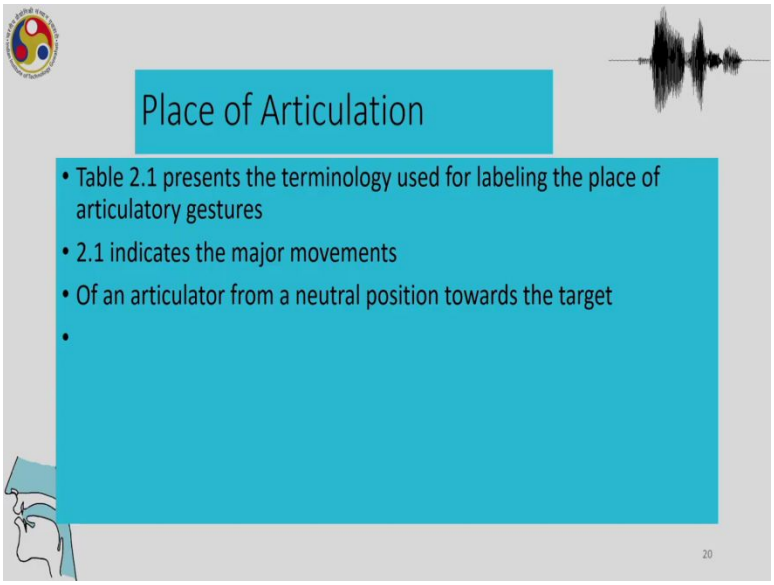

So, we already saw the major movements from one articulatory region to another showing the targets, showing the gestures and showing the movement from a neutral position towards a target.

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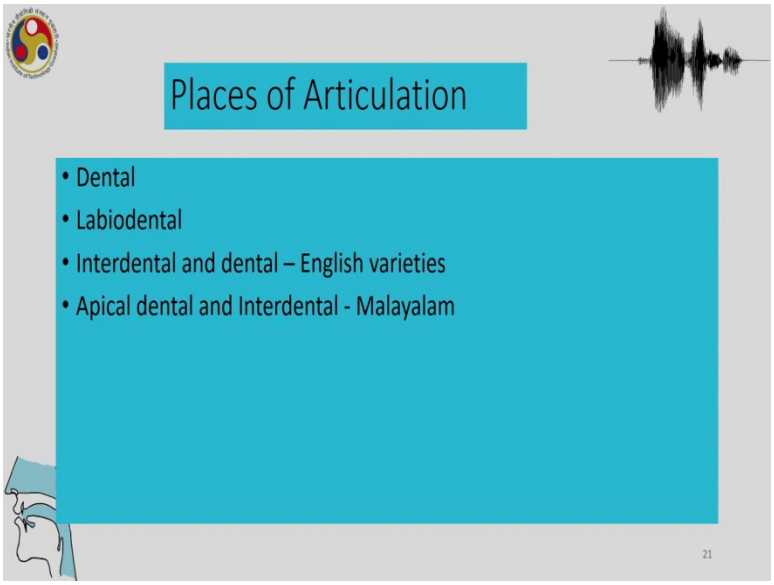

So, now let us again begin from the dental region. So, we have looked at coronal how we can have the laminal and the apical gestures where the tongue tip and tongue blade can move either towards a dental region or towards the alveolar region or postalveolar region where labiodental sounds are concerned or and dental sounds are concerned if the dental sounds are very commonly found in languages of the world, there is a difference there between interdental sounds and dental sounds.

So, the difference between interdental and dental is that in the production of interdental the tip of the tongue moves between the teeth whereas in production of the canonical dental sounds the tip of the tongue makes an obstruction around the back of the upper teeth. So, there can be differences in the dental sound. So they could be apical dental and interdental, so Malayalam sounds have a difference sometimes and these are not contrastive sounds and there are variations.

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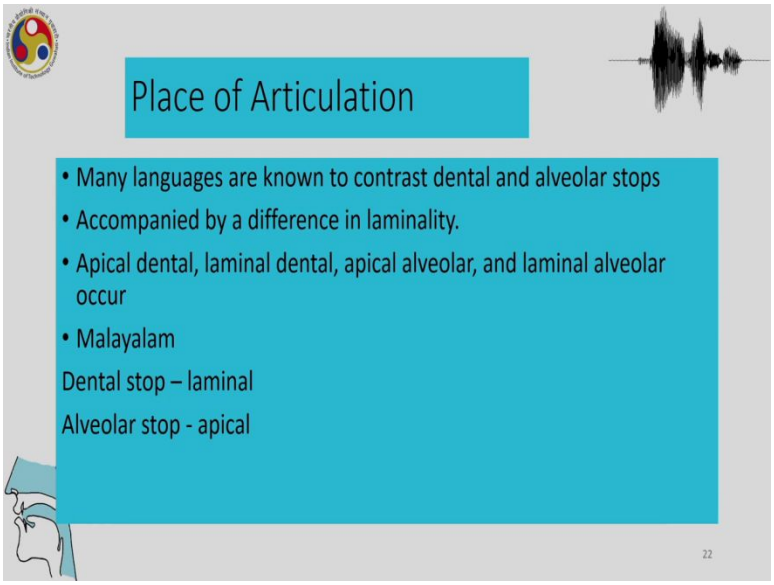

So, languages are known to contrast dental and alveolar stops this is very common contrast in the languages of the world. However, it may be accompanied by a difference in laminality. So, what does this mean apart from the distinction that the contrast is being made is the tongue makes an obstruction either the dental region or alveolar region there is a difference in laminality which means the gesture is not the same. So, even though it is a contrast based on dental and alveolar, there are further differences based on the way the tongue moves.

So, if it is the tip of the tongue then it is an apical gesture. If it is a tongue blade then it is a laminar gesture and apart from the dental and alveolar contrast there can be difference in laminality, so there could be apical dental, laminal dental, apical alveolar and laminal alveolar. So, in Malayalam as we just talked about, dental stops are laminal and alveolar stop are apical. So, apart from the distinction of place of articulation of dental and alveolar, the gestures could also be different as in they could be either laminal or apical.

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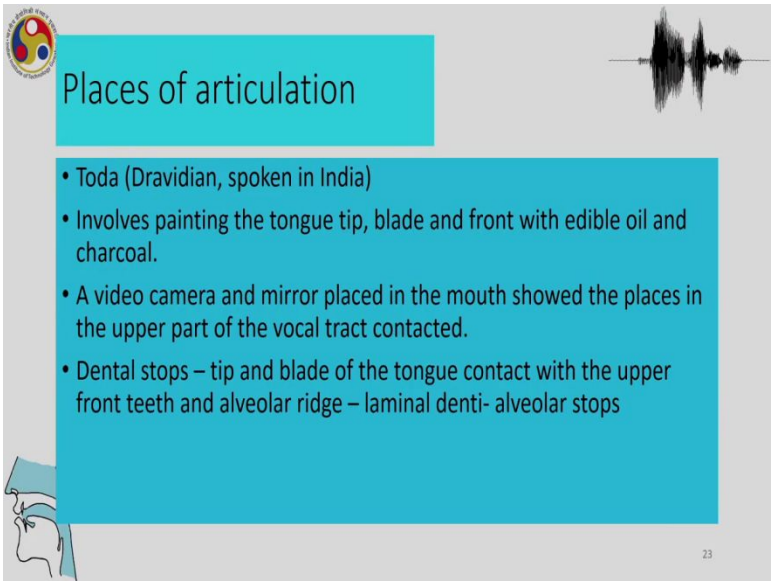

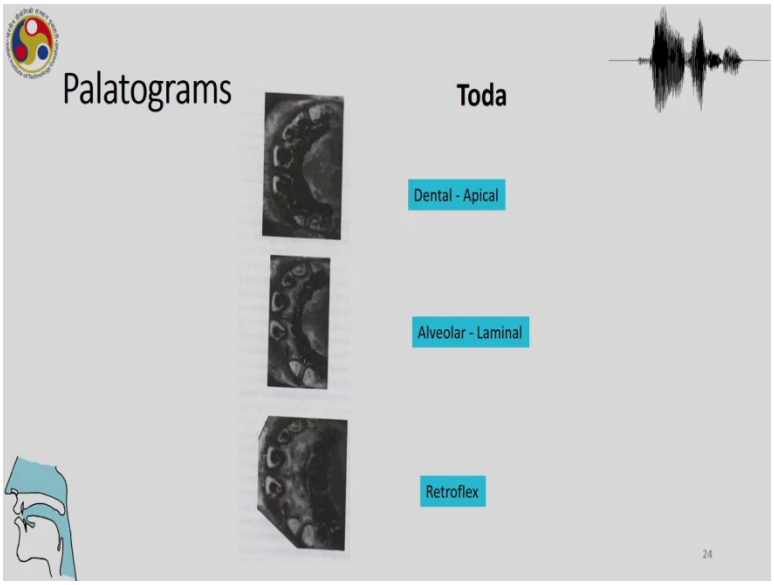

Apart from the laminal and apical gestures which are involved in making the contrast between alveolar and dental. There are other aspects in the way the gestures that the tongue can make. So we showed Toda, palatograms and linguograms, which show how these apical, dental, laminal alveolar and retroflex sounds are the gestures where they make an impact in that region of dental, alveolar or retroflex.

As you can see, what is visible for the dental, it is apical. So, if palatograms and linguograms are it involves a process which involves painting the tongue tip blade in front with edible oil and charcoal and a video camera and mirrors are placed in the mouth showing the places where the

contact has been made and in the Toda case we see that the tip and blade of a tongue contact with the upper teeth and alveolar ridge showing that these are laminal denti-alveolar stops.

So, as you can see the contact made are different for all these three places. So, if there is one is denti-alveolar, denti-apical; the other is alveolar laminal involving the blade of the tongue, it was a tip of the tongue and retroflex as we will see as we move along they are sub apical and they are neither apical nor laminal.

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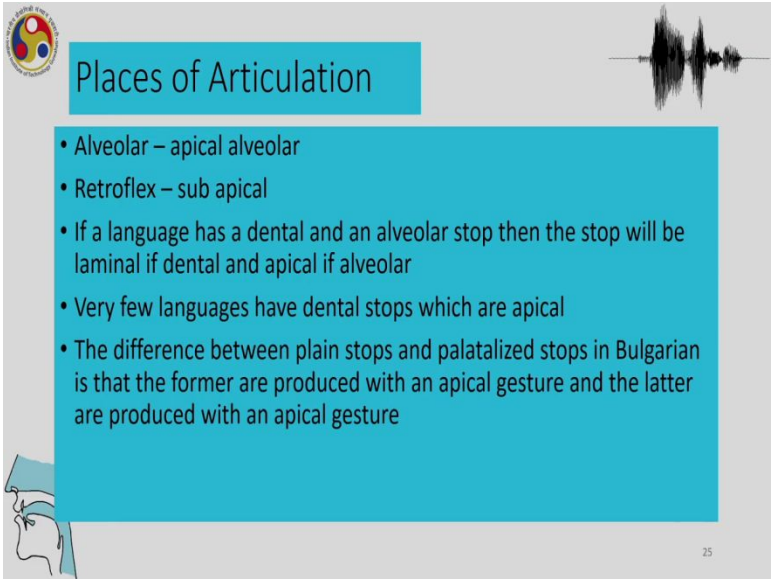

So, the alveolar can be apical alveolar. The retroflex can be sub apical, one important distinction that is to be understood is that, if a language has a dental and alveolar contrast and then very often the dental sound will be laminal and the alveolar will be apical. And very few languages have dental stops which are apical. So, most of the time the gesture for dental sounds is always apical, the gesture for alveolar sounds would always be laminal.

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So, we will see a bit more with regard to retroflexes here and Ladefoged and Bhaskararao have shown that languages can differ in the kind of retroflexion they employ. So, we will see the typical tongue positions for the retroflex consonants in Tamil and Telugu, two Dravidian languages and Hindi, an Indo-Aryan language.

So, the Dravidian languages typically have subapical consonants. In which the underside of the tongue contacts the interior of the hard palate. So, the gesture in the case of Dravidian languages is a subapical concentrates with regard to Hindi, we do not usually have the tongue tip curl so far back and therefore the contact is only is apical. Whereas, in Dravidian languages it can be called subapical.

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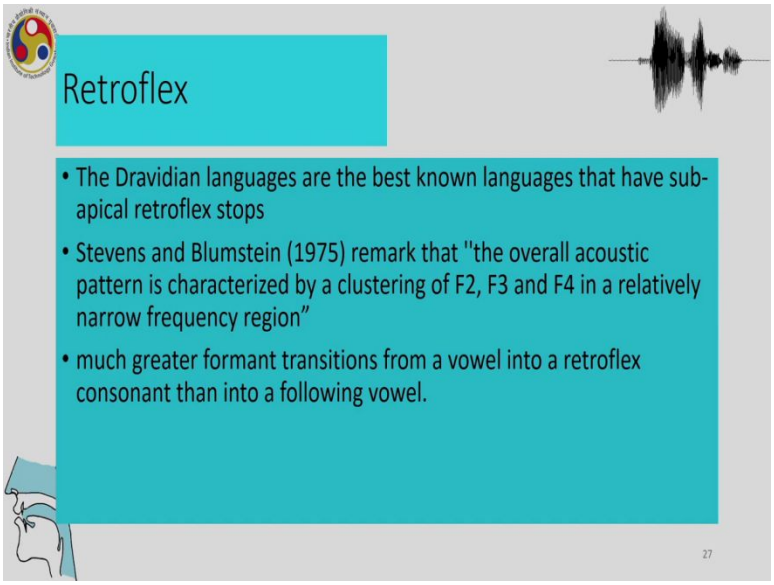

So the Dravidian languages are therefore best known to have subapical retroflex stops and importantly the acoustics of retroflexes also show that the overall acoustic pattern, we find F2, F3, F4 in a relatively narrow frequency region. Much greater formant transition from a vowel into a retroflex consonant than into a following vowel.

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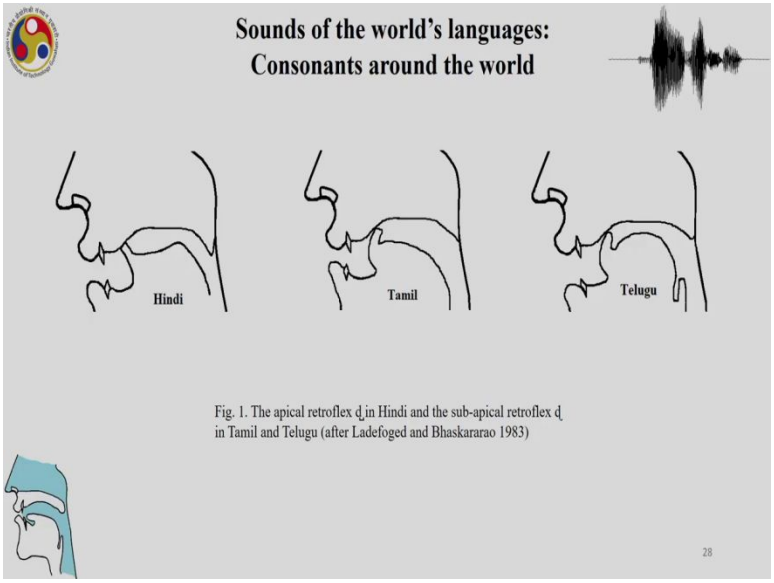

So, this is what we have talked about just now. So, in Hindi the retroflexion is apical, in both Tamil and Telugu, we find subapical, that is the surface behind the tongue tip making a gesture to form the retroflexion.

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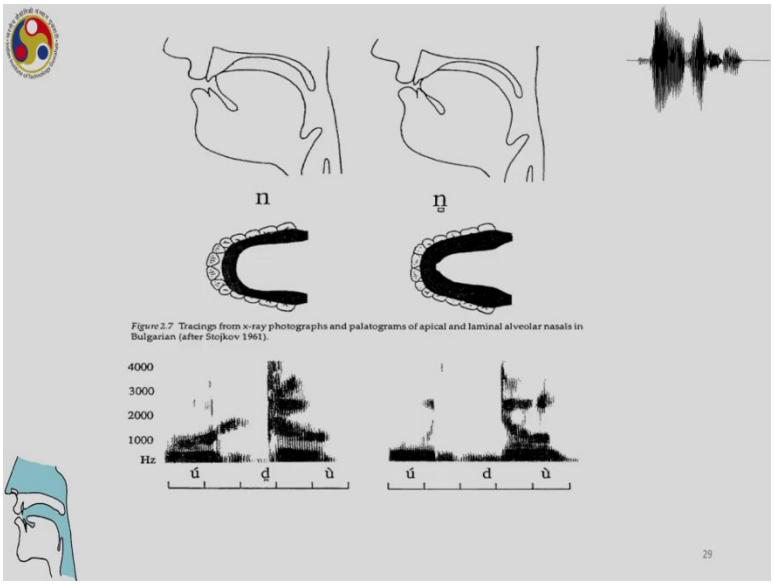

So, Bulgarian has apical and alveolar nasals and you can see the slight difference here in the gestures between the apical and laminal alveolar nasals. So, very few languages have these distinctions and Bulgarian is known to have this.

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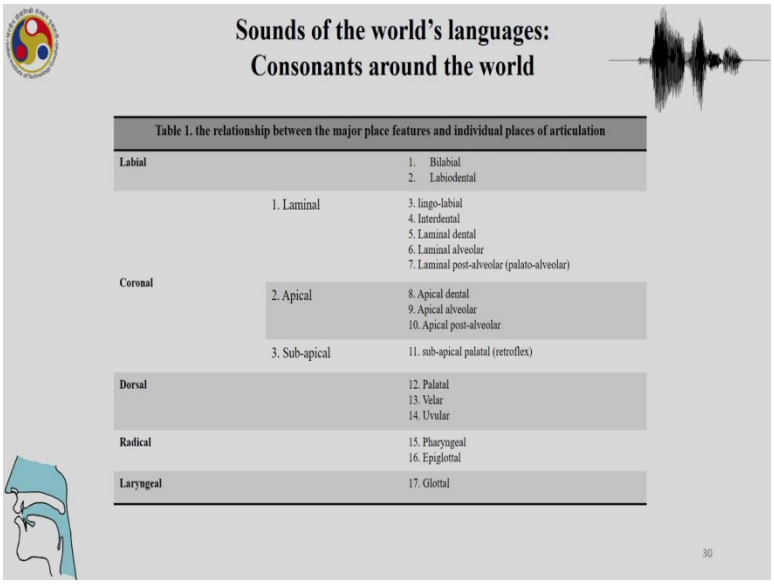

So, now let us again have a look at the distinctions that we just talked about in the labial place of articulation. We can have bilabial and labiodentals, these are the major place features. Where laminal is concerned, we can have linguo-labial. So, where the tongue can make contact with the

lips and we can have linguo-labial, we can have interdental, we can have laminal dental, we can have laminal alveolar and we can have laminal postalveolar or palato-alveolar.

Where the apical gesture is concerned we can have apical dental, apical alveolar, apical postalveolar and in subapical gesture we can have the palatal retroflex. Apart from that we also have palatal sounds velar, uvular, pharyngeal and epiglottal which are the radical sounds and finally we have the laryngeal place of articulation where the glottal sounds are produced.

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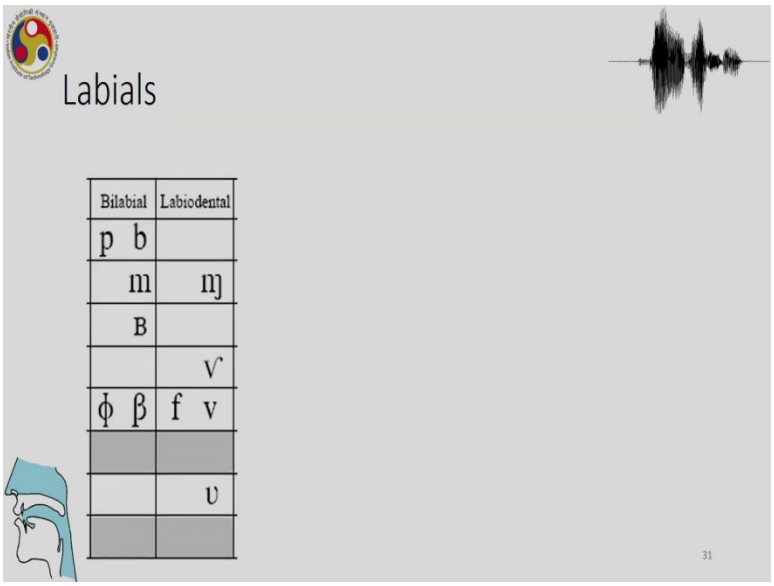

So, let us have a look at some of these sounds again and we can see that we can have labial stops, we can have labial nasals, we can have labial fricatives, we do not have labiodental stops, we can have labiodental nasals, we can have labiodental approximants and we can have labiodental fricative but some of these stops etcetera are not possible.

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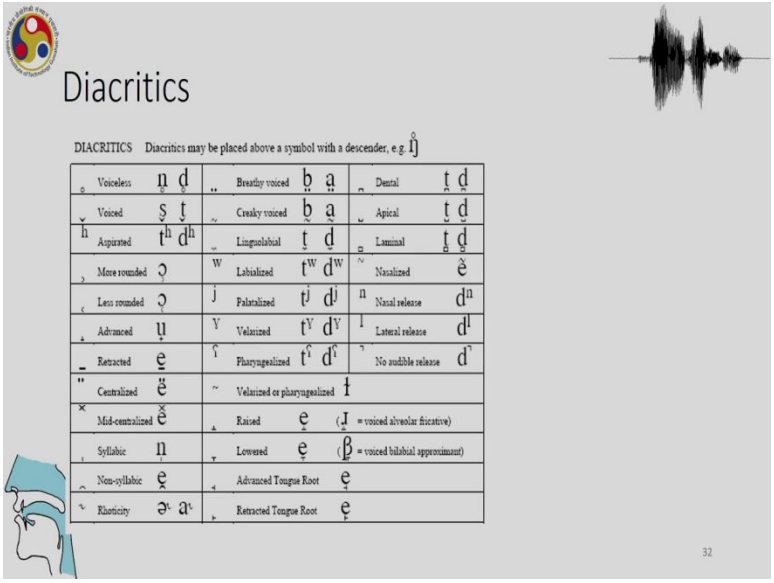

So, all the gaps are not filled and these are the diacritics the various diacritics that can be used for sounds and whenever there is a circle underneath the sound it means a voiceless, the voiced, voiceless sound and sometimes voicing is added to voiceless sounds and then we have this diacritic and then we have aspiration, roundedness, advanced, retracted, centralized, mid centralized, syllabic again and when continental sound is syllabic, we have a diacritic for that non-syllabic, rhotic is shown with that curl there and then breathy voiced with two dots creaky voiced, linguolabial and labialized these are secondary articulations.

Palatalized, velarized, pharyngealized and dental, apical and laminal, nasalized, nasal released, lateral release and no audible release and some more for velarized, pharyngealized, raised, lowered, advanced tongue root and retracted tongue root. So, this is the full list of diacritics which are available and some of these distinction we have just considered extensively now apical laminal for instance linguolabial etcetera.

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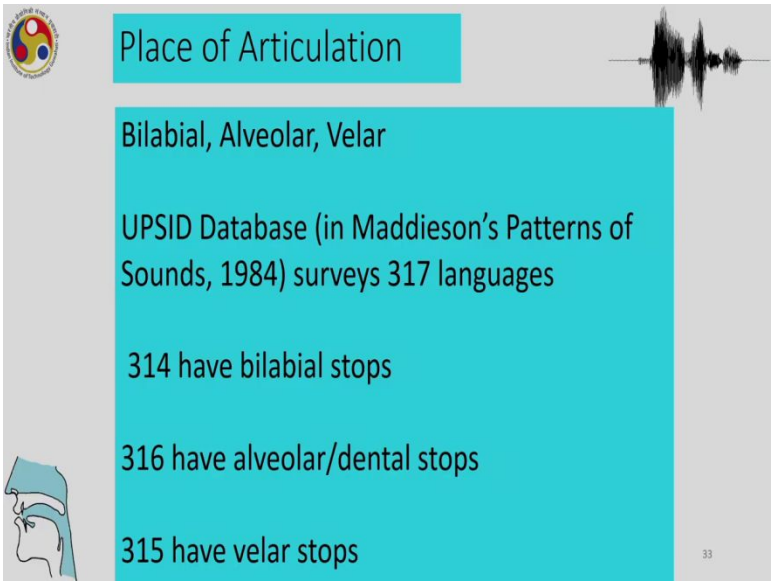

So, place of articulation again, the UPSID database, which is patterns of sounds surveys 317 languages of which 314 have bilabials stops, 316 have alveolar dental stops and 315 have velar stops. So we can see that these are the most commonly found case of articulations.

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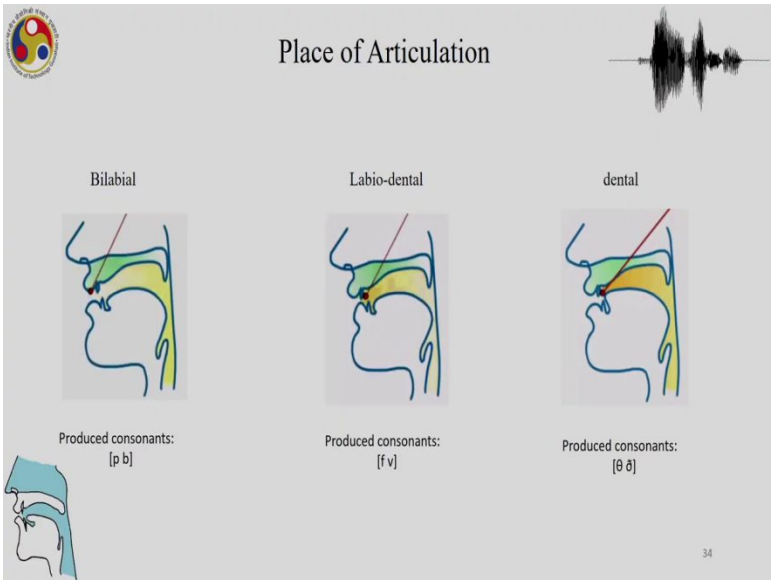

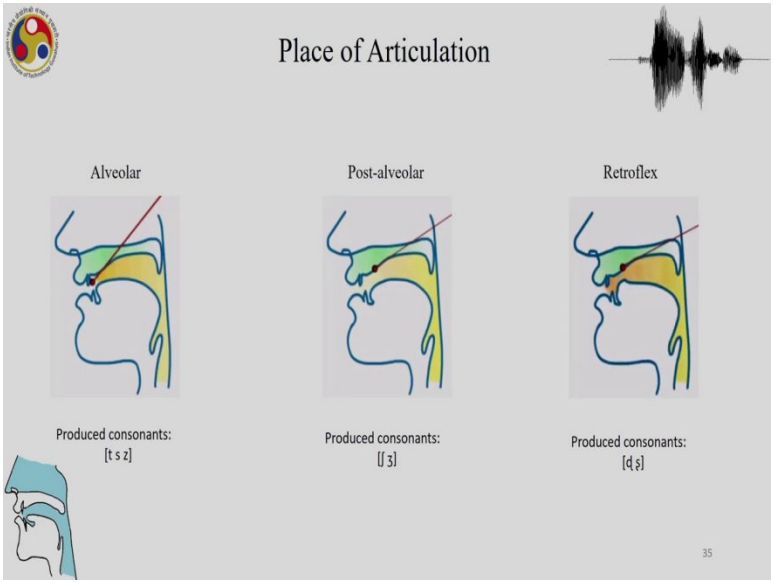

And we have seen earlier. So, what those places of articulations are, we have for bilabial the lips, for labio-dental it is the lower lip making a contact with the upper teeth and for dental sound it is the tip of the tongue here making a contact with the upper teeth.

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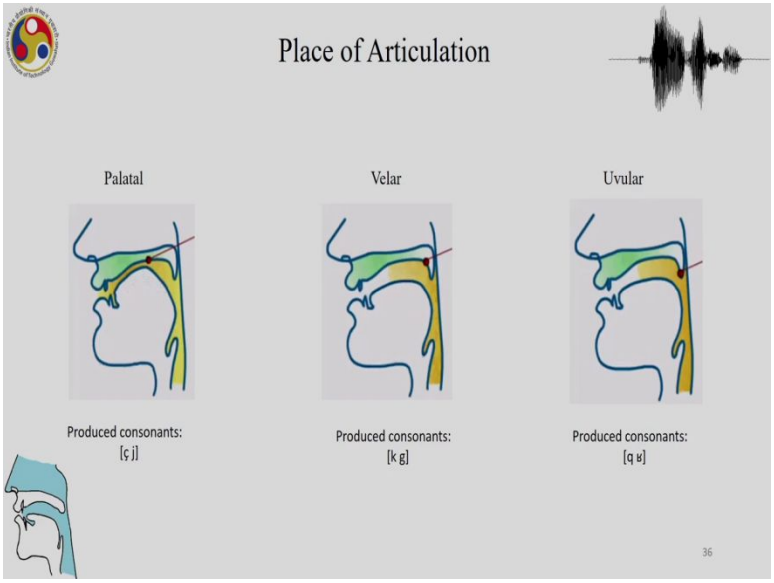

We will look at palatal sounds, velar sounds and uvular sounds in the rest of the lecture.

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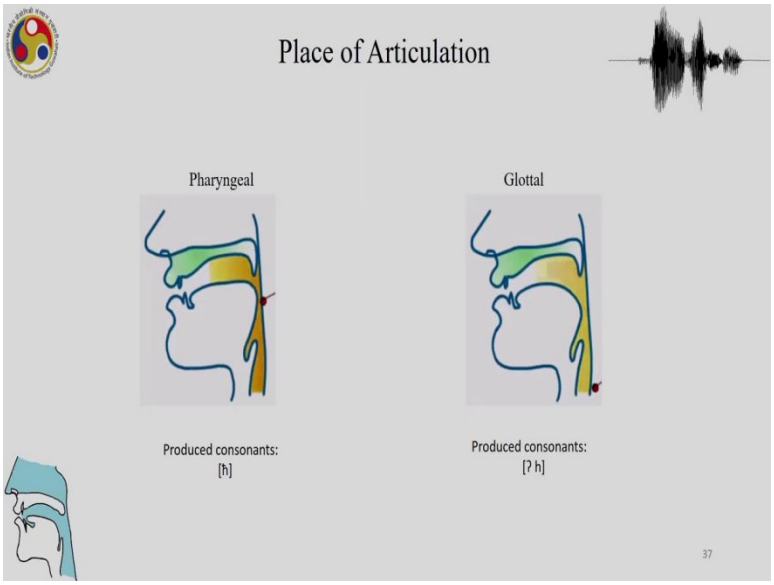

Also, pharyngeal sounds and glottal sounds.

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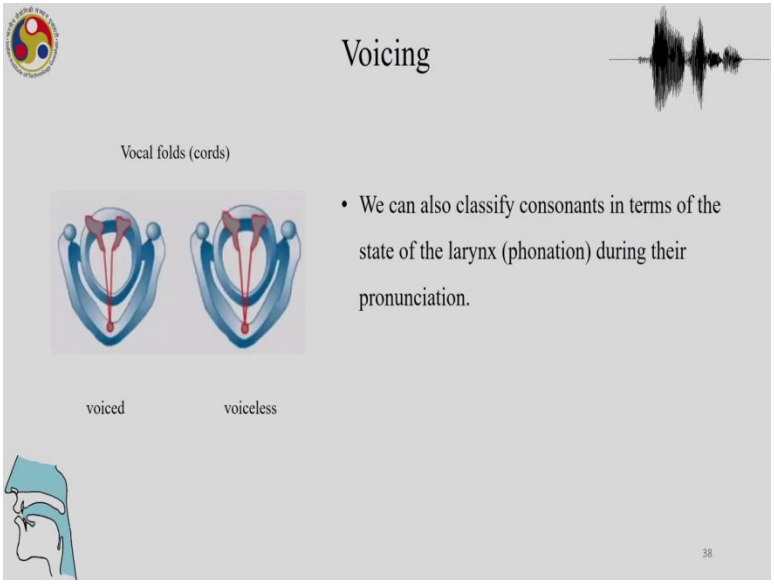

Most of the sounds will be voiced or voiceless. So, that is the state of the glottis.

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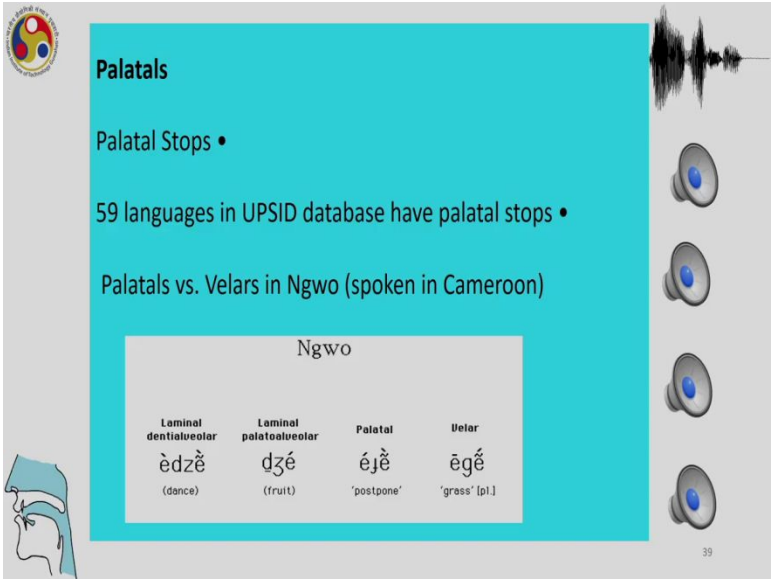

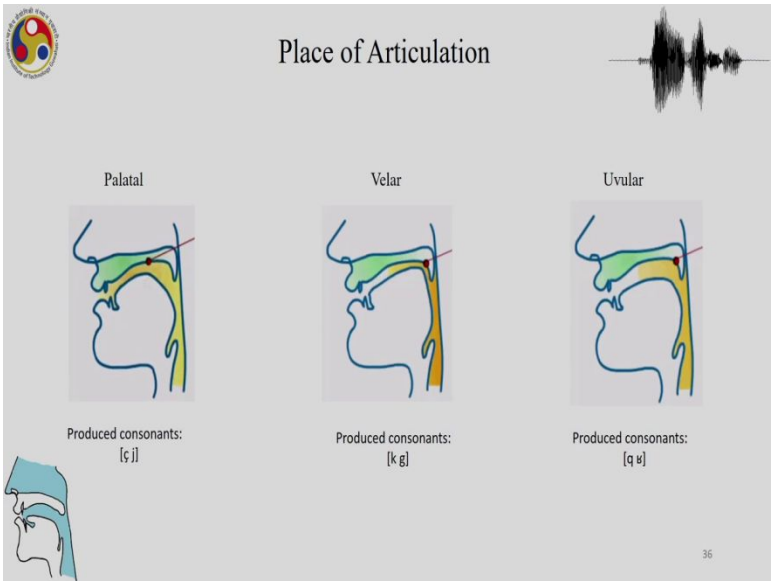

So, we just talked about palatals. So, that is the palatal region. So let us look at this language spoken in Cameroon. So, Ngwo has (pronouncing Ngwo) palatals versus velars so the first sound is the laminal dental alveolar. The second one is the laminal palatalaveolar. The third one (pronouncing Ngwo) is the palatal. The forth one (pronouncing Ngwo) velar. So, this is the (pronouncing Ngwo) stop that we are talking about in Ngwo.

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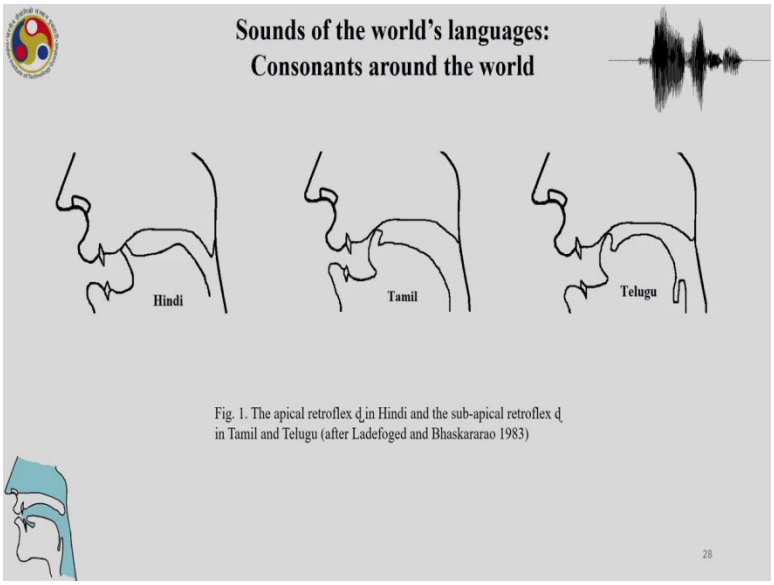

So, these are three different types of retroflex sounds that are possible and you can see in the diagrams that whereas Hindi is apical and Tamil and Telugu have slightly different way of producing the retroflex that is subapical, that is the part of the tongue tip, which is used is the part which is below the tongue tip. So, the curling goes way back at the portion below the tongue tip, which is used for producing the retroflex.

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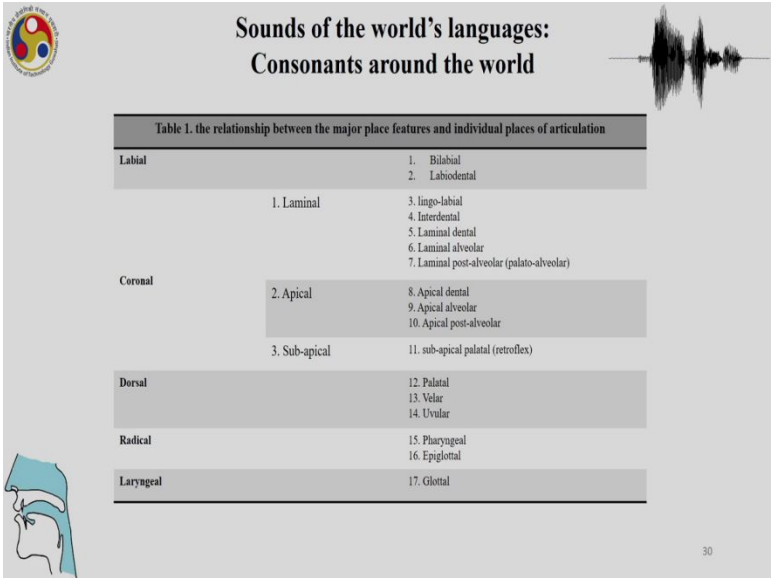

The relationship between the major place features and individual places of articulation can be seen in this table. And we can see that with the lips very many articulations are possible. So, we

can see that the lips can produce bilabial and labiodental sounds and along with the tongue you can have linguo-labial or interdental or laminal dental, laminal alveolar and laminal postalveolar.

So, in the coronal gesture we can have the apical dental, apical alveolar and apical postalveolar, the subapical is restricted to the retroflexes sounds. And then in the dorsal region we could have palatal, velar, uvular sounds and also the ones which are called radical are pharyngeal, epiglottal and laryngeal one is glottal, the radical one are pharyngeal and epiglottal.

So, these are the major place features and again I repeat that we did not see these distinctions when we studied place of articulation or when we, when we looked at articulatory phonetics. We look at only the very basic places like labial, dental, alveolar and postalveolar and velar. So, we can see that there are very many more places of articulation available that are a possible in the languages of the world.

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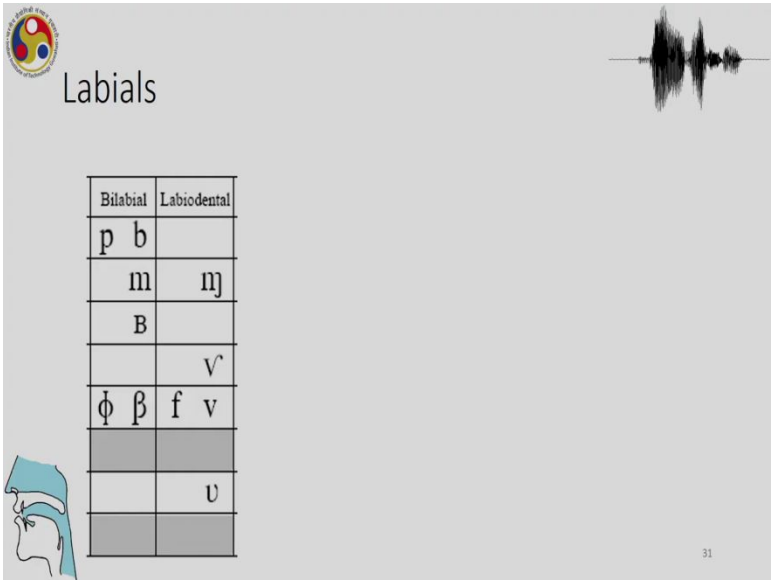

So, these are the labials which are possible and are found in languages and this is IPA symbols that you see here. So, we have pa, ba which are the stops and ma which is, ma bilabial stop and labiodental nasal m and here we have a trill and we have a labiodental as well and we have these fricatives, bilabial fricatives, labiodental fricatives and also an approximant.

So, all these possibilities are there in languages of the world and however among these so bilabials stops and the labiodental stops along with the bilabial fricatives are commonly seen, the trills and the labiodental nasals are there in languages but not as common as a bilabial stop and

the labiodental fricatives and also the bilabial fricatives are found more often in the language of the world.

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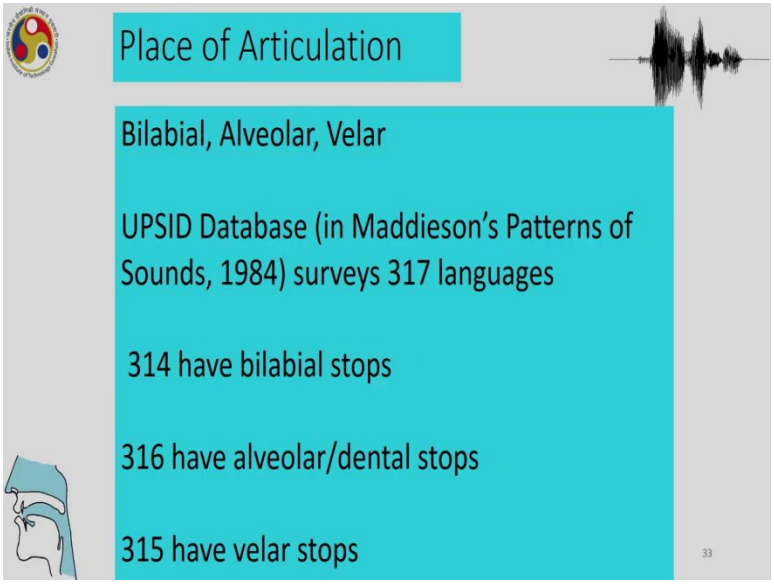

So, in the database of Maddieson's patterns of languages we have a survey of 317 languages of which 314 have bilabial stops, 316 have alveolar dental stops and 315 have velar stops.

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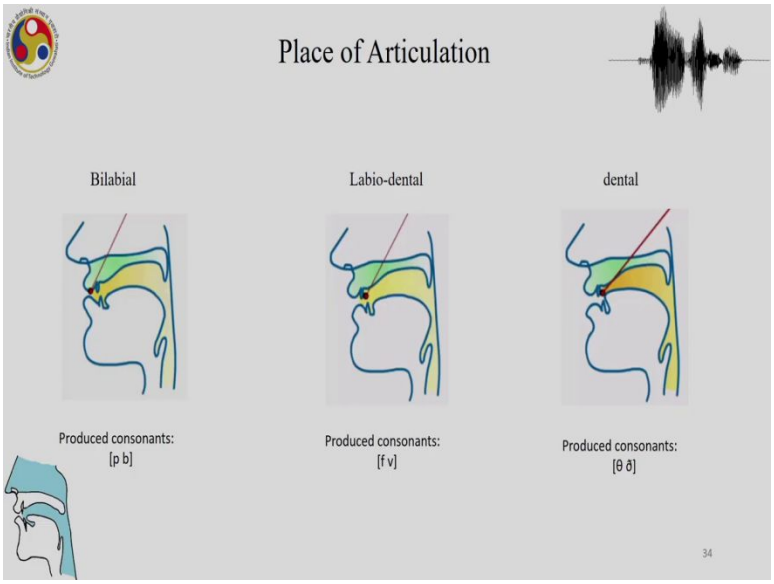

So, we have already seen these places of articulation.

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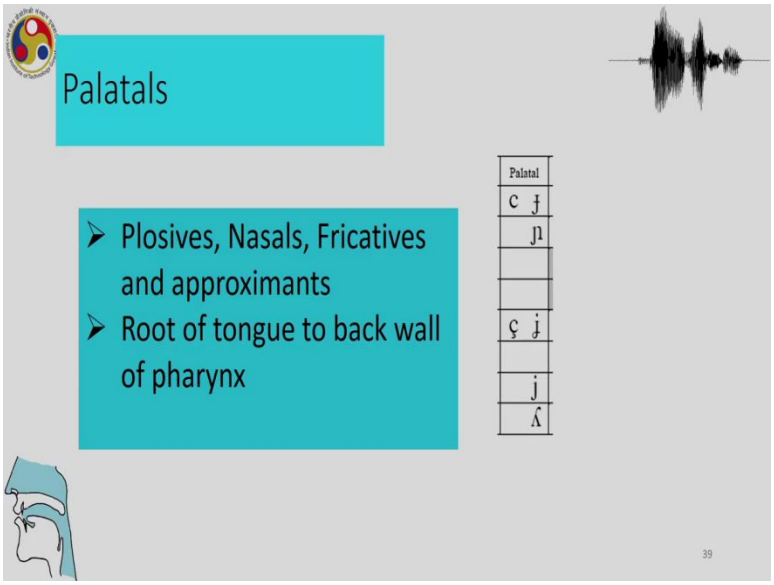

Coming now to the other places of articulation, for instance, palatals. The palatals here we can see there are palatal stops, we have palatal nasals, we have palatal fricative and palatal approximants. So, we do not have palatal trills etcetera, unlike the labials. So, how is a palatal sound produced. The root of the tongue makes a constriction and goes to the back wall of the pharynx. So, root of the tongue moves towards the target is the back wall of pharynx and that gives us this sounds. So among 317 languages, 59 languages were found to have palatal stops.

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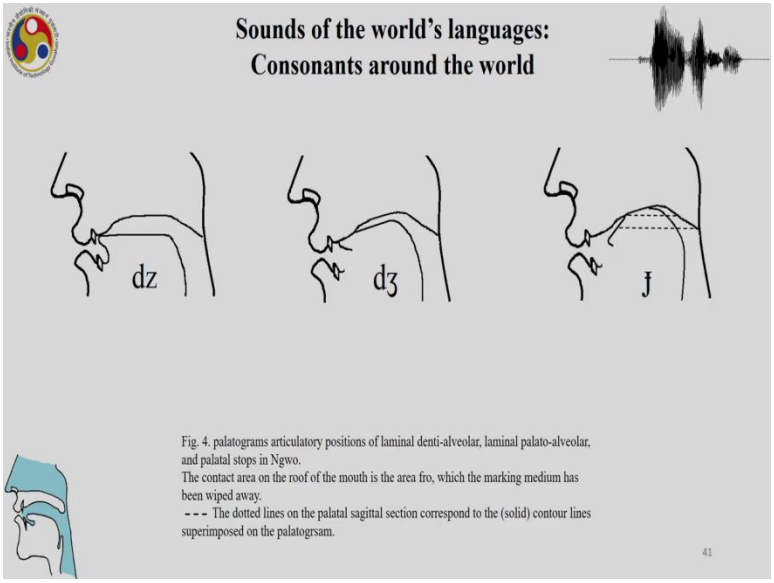

These are the palatograms of the articulatory positions of laminal, denti-alveolar as we know the laminal sound is produced by the blade of the tongue and then we have laminal palato alveolar again the blade of the tongue and then we have the palatal stop which is at the back of the tongue making just a movement towards the roof of the mouth.

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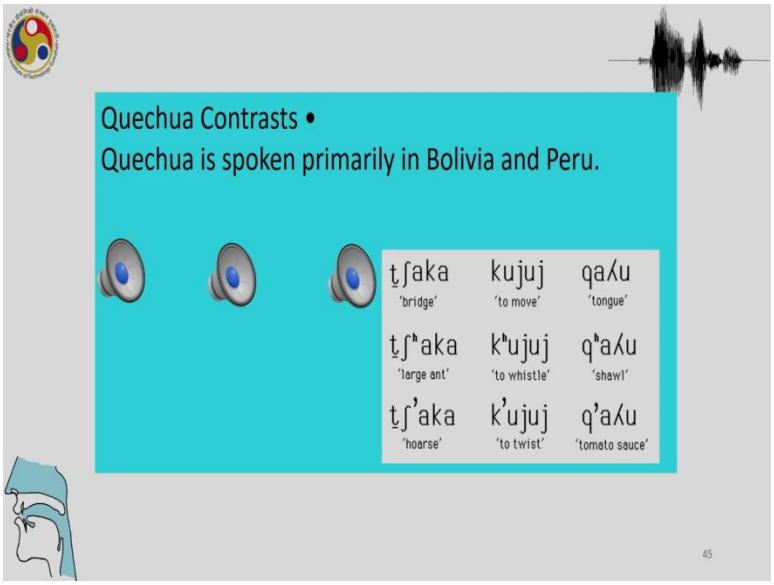

In Quechua, which is spoken in South America in Bolivia and Peru also we have (pronouncing Quechua) palatals.

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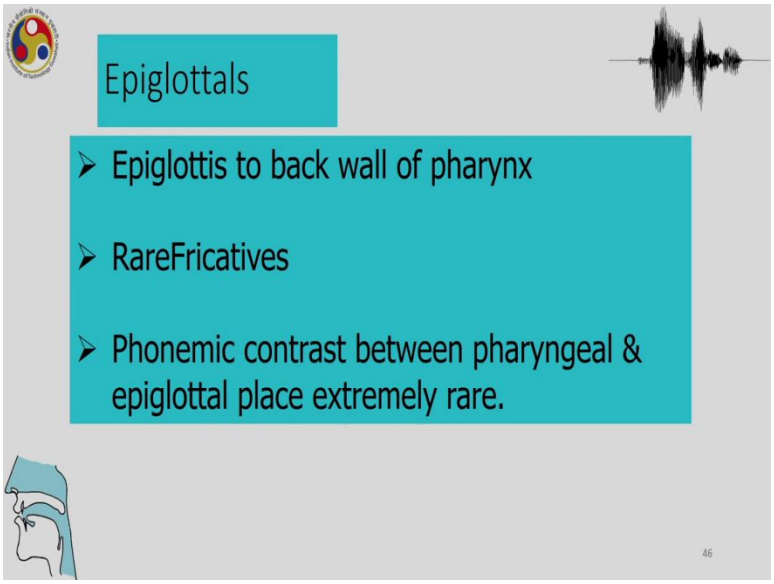

So, how do we pronounce Epiglottals? Epiglottals are produced by putting the back wall the epiglottis to the back of the pharyngeal region. So, the fricatives are rare and the phonemic contrast between pharyngeal and epiglottal place is also extremely rare.

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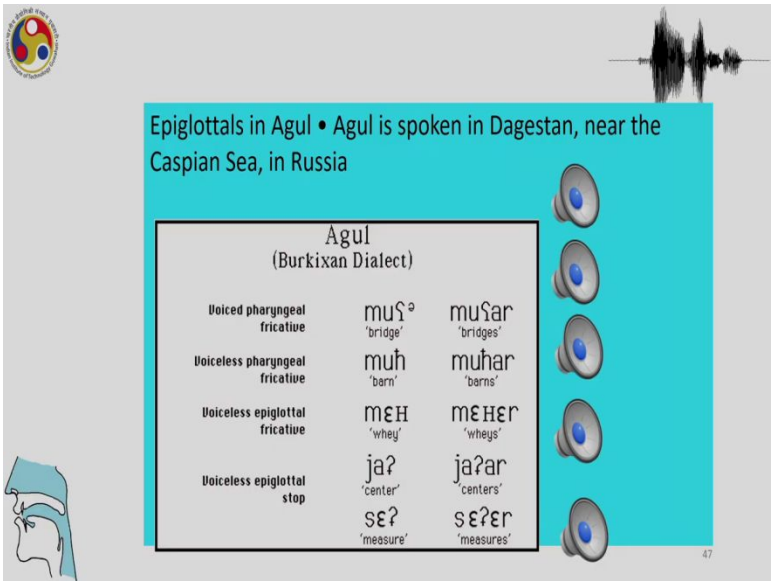

So, here are the Epiglottals in Agul (pronouncing Agul) spoken in Dagestan (pronouncing Agul) voice pharyngeal fricative (pronouncing Agul), voiceless pharyngeal fricative, voiceless epiglottal fricative (pronouncing Agul), another voiceless epiglottis (pronouncing Agul).

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So, we have labialized velar stops from Idoma which is a language (pronouncing Idoma) spoken in Nigeria. So, that is a labial (pronouncing Idoma), labial velar (pronouncing Idoma), velar (()) (33:12), labial (pronouncing Idoma).

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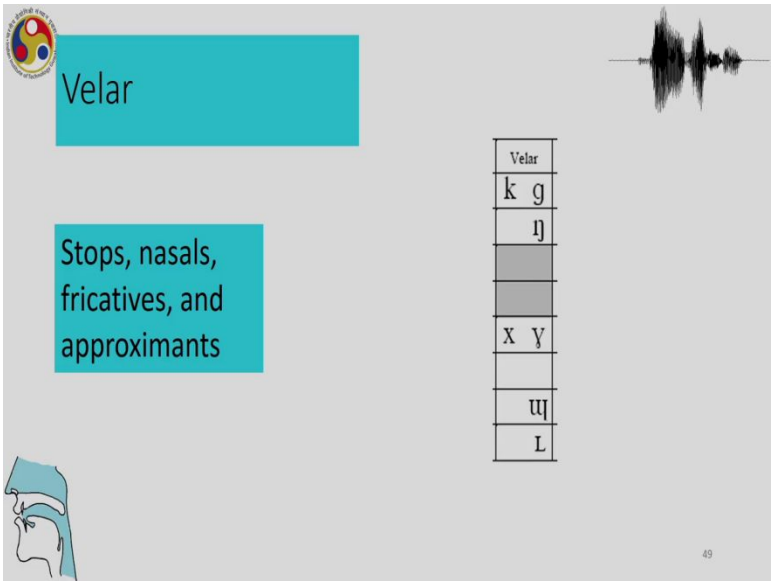

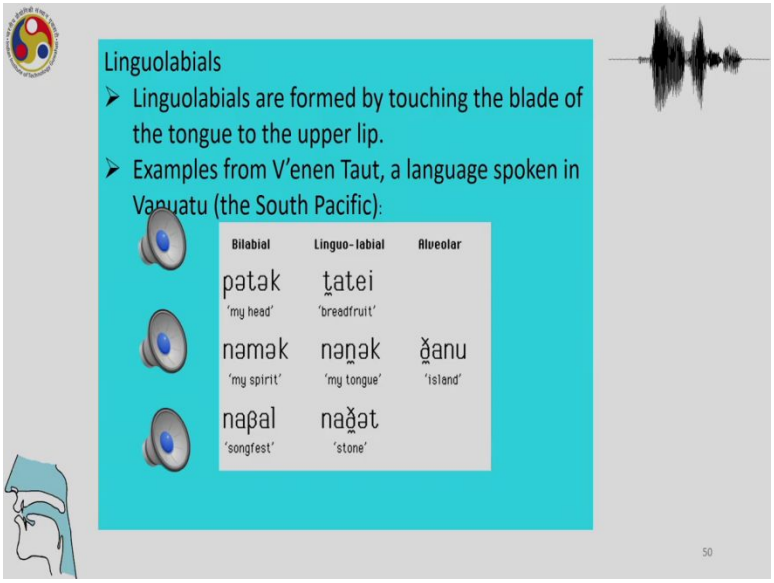

So, among velar we have stops nasals fricatives and approximate, so we have the stops, nasals fricatives approximants and (pronouncing linguolabials), these are linguolabials. Linguolabials are produced by touching the blade of the tongue to the upper lip. So, the examples are from V'enen Taut language spoken in Vanuatu.

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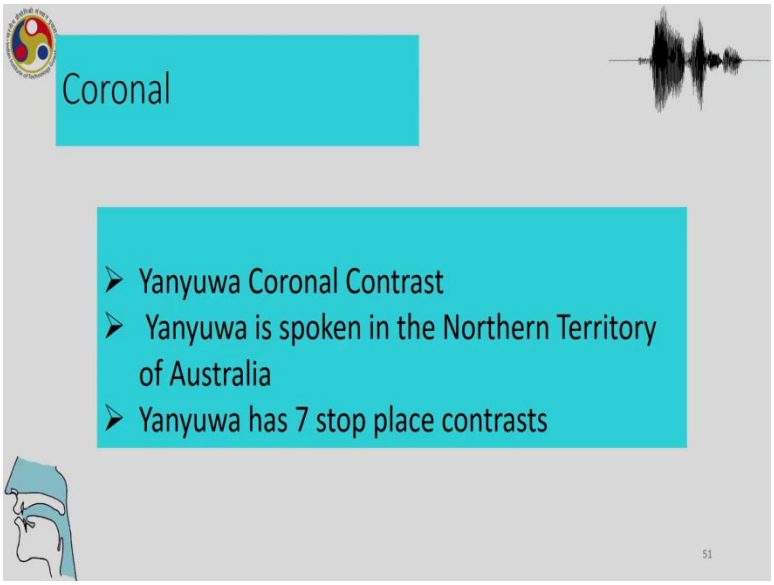

So there is a language called Yanyuwa which is a spoken in the Northern territory in Australia, which has 7 stop place contrast and which is what we will play in the next slide; (pronouncing Yanyuwa) that is bilabial, (pronouncing Yanyuwa) laminal dental, (pronouncing Yanyuwa) apical alveolar, (pronouncing Yanyuwa) apical retroflex, (pronouncing Yanyuwa) palatoalveolar, (pronouncing Yanyuwa) front velar, (pronouncing Yanyuwa) back velar.

So, there is the dental and the alveolar different in terms of gesture of laminal versus apical and the retroflex is apical and then there is a palatoalveolar and there is a front velar and there is a

back velar. So in languages, the velar's can have a distinction based on the part of the velic region, which is the target of the gesture. So, you could either have a front velar or a back velar.

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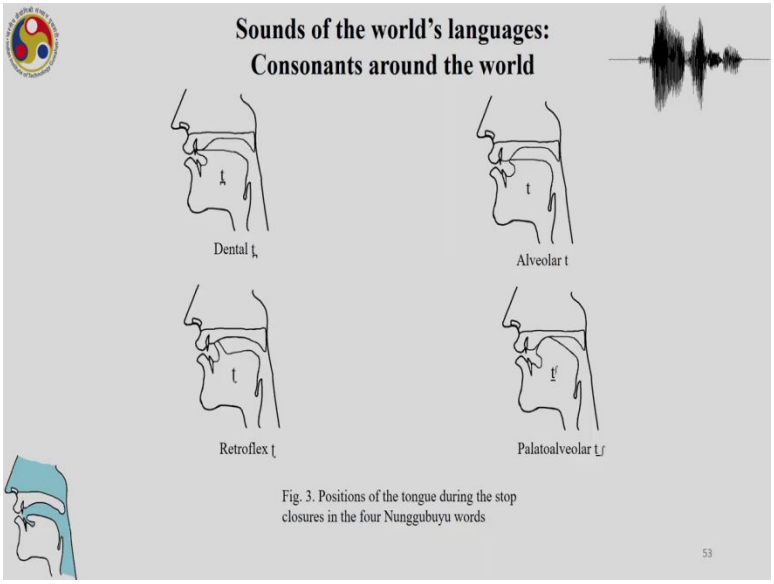

So, another language Nunggubuyu which has these different stop positions. So, there is a dental t, alveolar t and there is a retroflex and a palatoalveolar jha. So whereas it might seem that it is difficult to have both dental alveolar retroflex and palatoalveolar, but there are very many languages. If not, very common, there are quite a few languages which have these 4 contrast and the dental, alveolar, retroflex, palatoalveolar seen in a few languages.

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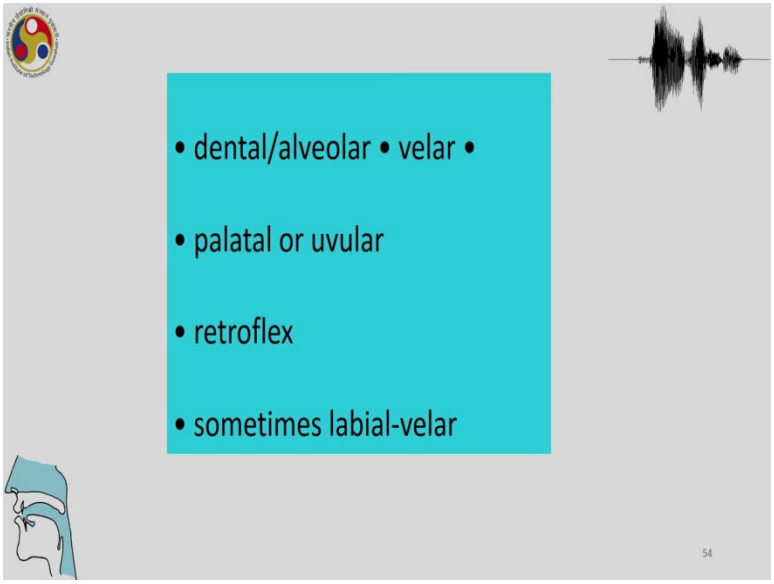

So, coming now to the final analysis languages most commonly will have bilabial dental or alveolar and velar contrast as seen quite often in languages of world. If they have one more contrast, then could be palatal or uvular and additionally if there is another contrast it could be retroflex, furthermore if there is a fifth place of articulation that the language could have that is sometimes labial velar. So, these are the possibilities that we have in terms of place of articulation of mainly stops.

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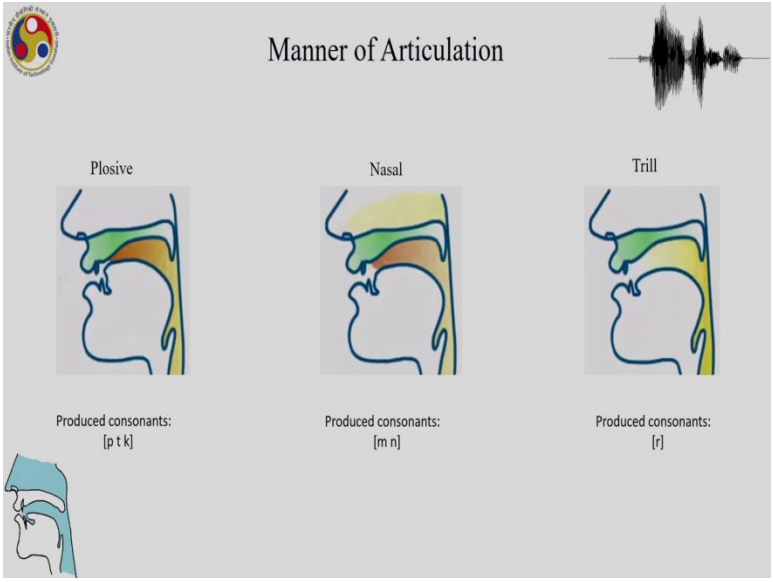

Coming now to manner of articulation, we have already seen these differences in the previous lecture on manner of articulation and articulatory phonetics. So, this is a plosive which requires a

complete closure and the release. Then we have nasal where you have a closure in the mouth and the lowering of the velum and the air released through the nasal cavity. Then we have others like trill etcetera and you can see the rapid movement against the articulators, rapid movement against each other and that produces a trill.

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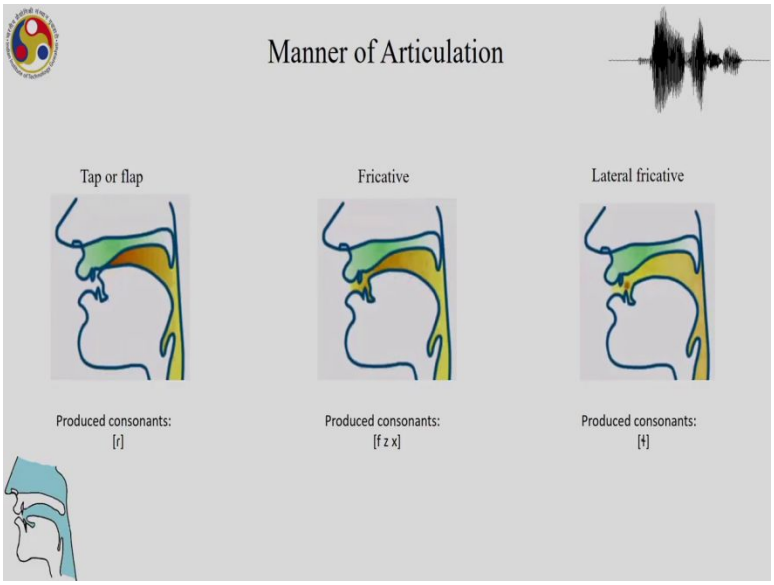

And then we have others like a tap, which is one tap against the moving articulator making a gesture towards the alveolar region and making one tap unlike the trill where you have repeated rapid movements. So, and then fricative we have closure but it is partial and we have very slow release and then we have others like lateral fricative. So what is the difference between centralized fricative and lateral fricative, lateral fricative the release will be through both sides of the articulators where as in centralized fricative that will be through the centre.

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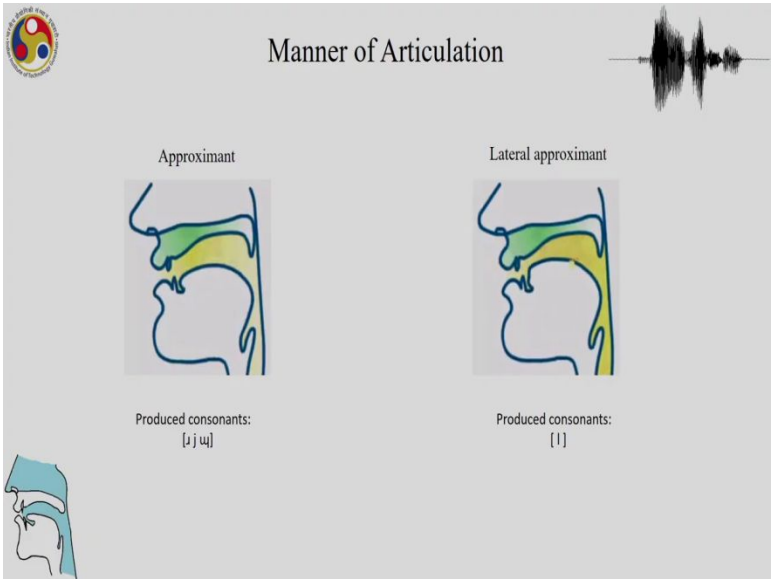

And then we have approximants where we have a gesture of moving towards of one articulator towards the other articulator and then there is a, even though there is a closure it is not as strong as that of a stop and then we have lateral approximants, just like the lateral fricative where the release is through the both sides of the articulators.

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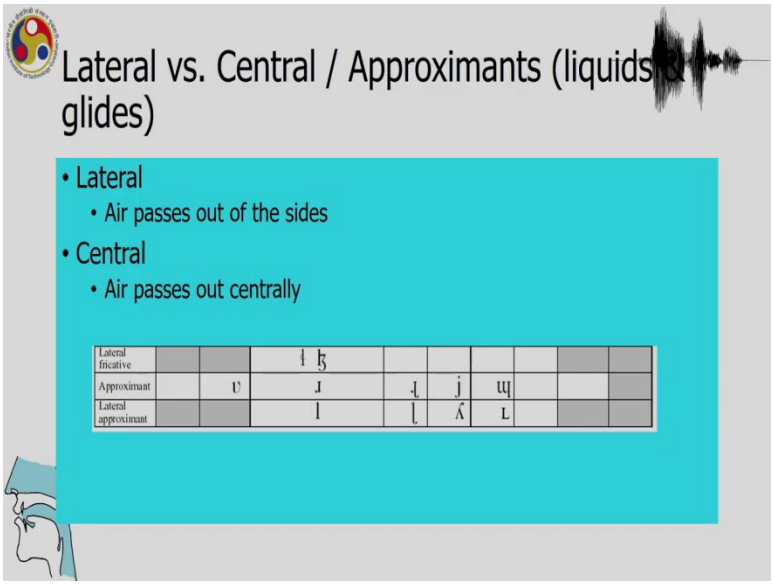

So, we have in the languages of the world quite a few lateral fricatives so these are the symbols that we have for these lateral fricatives and then we have lateral approximants. So, the four lateral approximants and two lateral fricatives which are possible in the languages of the world.

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Now, summarizing the various distinctions that we saw, we still have to discuss airstream mechanism direction which we will proceed to in a few minutes and then we saw that the glottal state is important, the state of the larynx and part of the tongue which is employed the apical versus laminal versus dorsal versus subapical these distinctions are important to characterize sounds. And then the primary place of articulation and the manner of articulation, centrality, nasality these are the additional considerations that we have to keep in mind while discussing the articulatory aspects of sounds.

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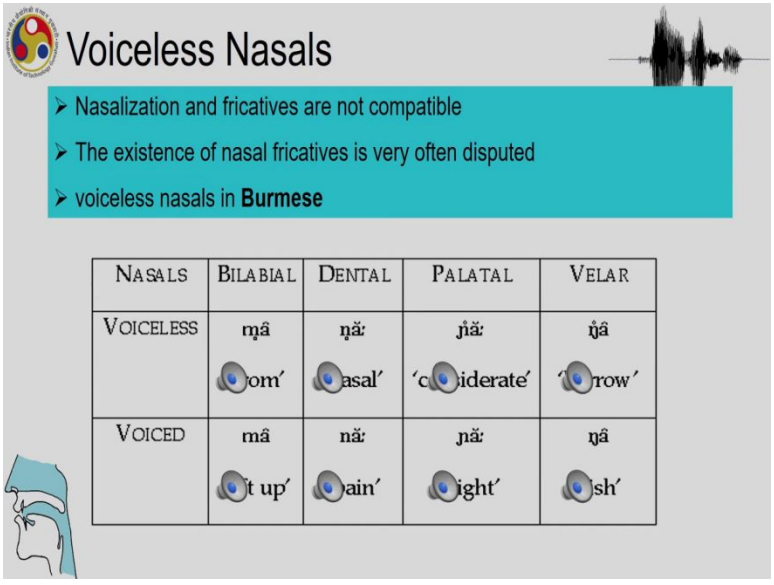

So, some other things that we have to keep in mind, voiceless nasals, for instance, nasalization and fricatives are not compatible. So, there are very many reasons as to why that is not often seen and very few nasal fricatives, which have been tested in the languages of the world have been a bit controversial. So, it is often disputed. However, voiceless nasals are found in the languages of (pronouncing Burmese) Burmese here, (pronouncing Burmese) those where the distinctions between bilabial, dental, palatal and velar. Those are voiceless nasals versus these (pronouncing Burmese) voice commands (pronouncing Burmese).

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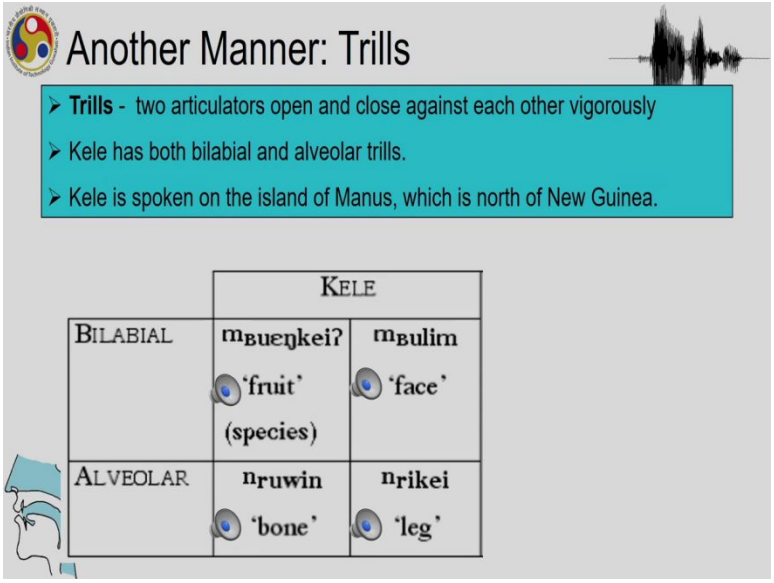

Another manner that we have not discussed extensively so far is trills. So, trill as we saw in the video before this, two articulators open and close against each other rapidly and Kele is the language spoken in New Guinea in the island of Manus and it is this both bilabial and alveolar trills (pronouncing Kele) that is the bilabial trill, (pronouncing Kele) that is also the bilabial trill and here is the (pronouncing Kele) alveolar trill.

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This brings us to the discussion on airstream mechanism. So, as we had previously discussed the air that we use to produce sounds is pushed out from the lungs then we have the we use the pulmonic air stream or we can use the air trapped inside the glottis then it is a glottalic air stream or we can use the air from the velaric region and then we have the velar airstream. And apart from the airstream mechanism where the air is pushed out; pulmonic, glottalic or velaric, we also have direction.

So, the most common direction is egressive the air pushed out from the lungs is normally almost all the time that is the air stream which is used, however there are also instances of ingressive air stream where air is inhaled in and the sound is produced as a result of that inhalation.

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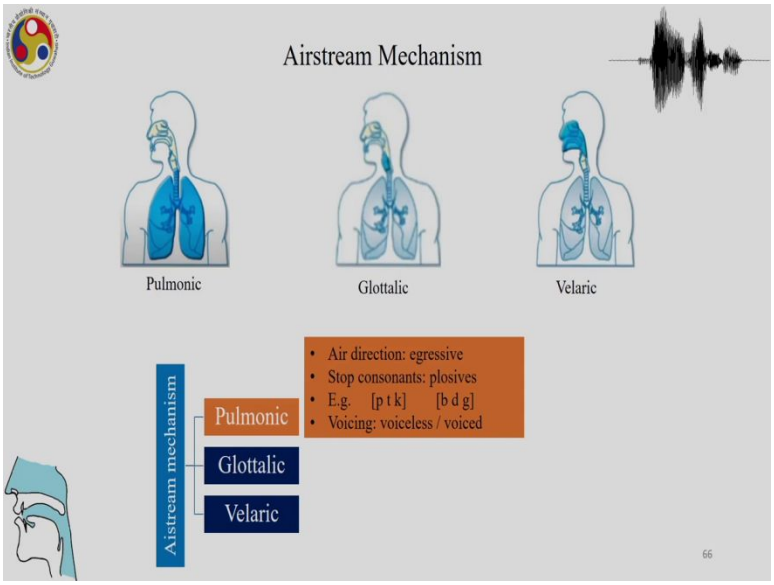

So, pulmonic air stream, the air inside the lungs; the glottalic air stream, air used here inside and the velaric here in the velic region. So, along with the airstream mechanism we can also have a direction, which is, it could be either egressive and as if we have egressive then we have like stop consonants plosives etcetera, pulmonic egressive almost all sounds are produced with the pulmonic egressive airstream.

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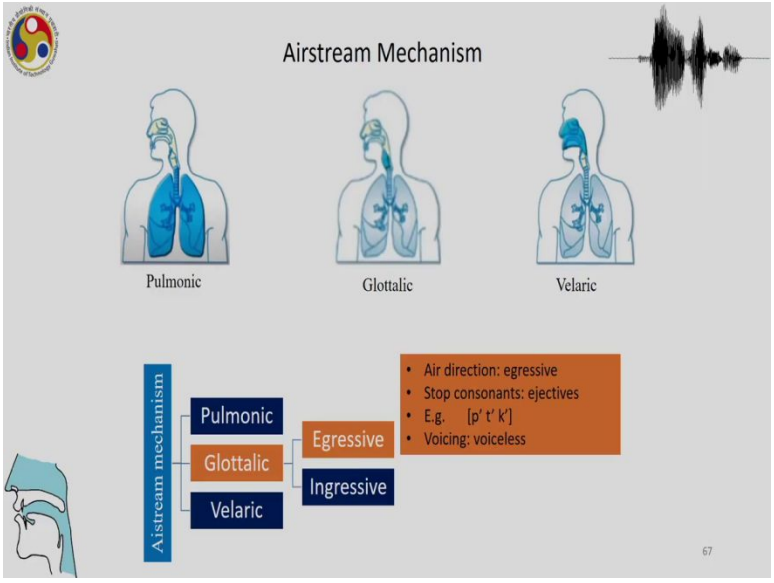

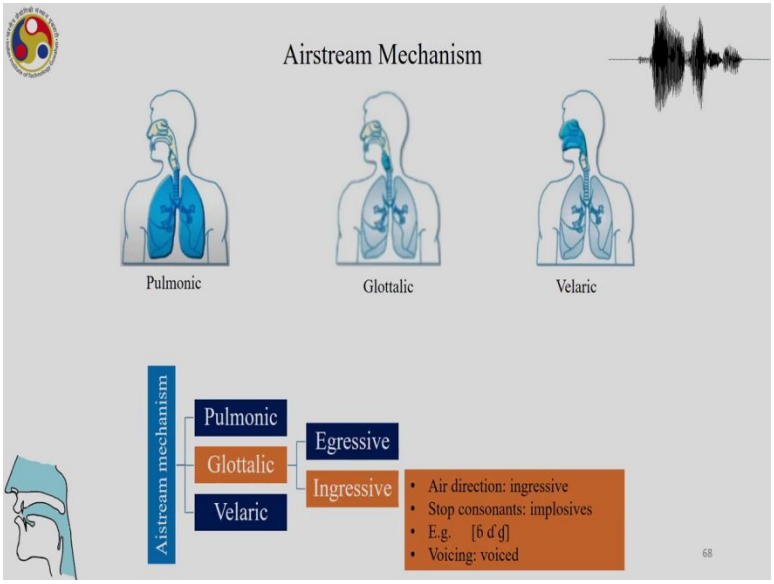

However, we have a few other ways of producing sounds and one is glottalic with egressive and ingressive. So ejectives are the glottal egressive sounds, the ingressive are the voice the stop consonants which can be produced as a result of the glottal ingressive air stream and implosives are the result of those. So, as a result of glottalic egressive, we can have ejectives and as a result glottalic ingressive we can have implosives.

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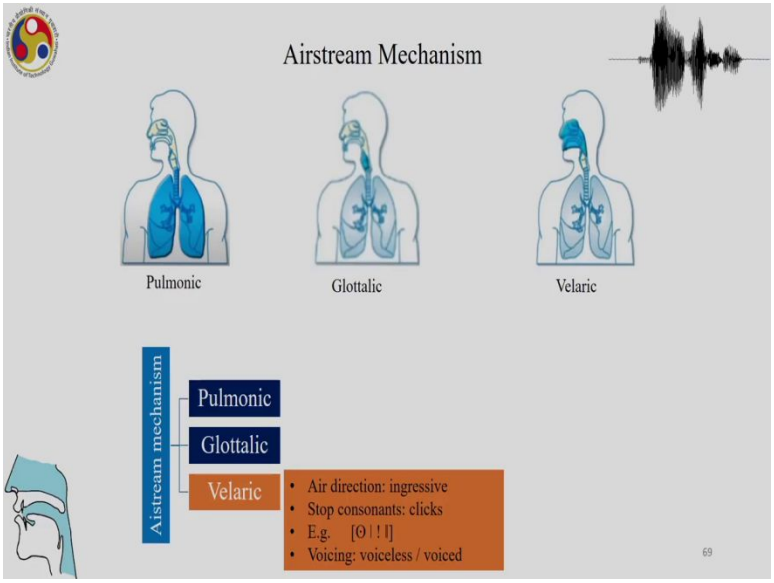

Now, the third airstream mechanism that is velaric, so one particular very unique sound is produced as a result of this, which is known as clicks.

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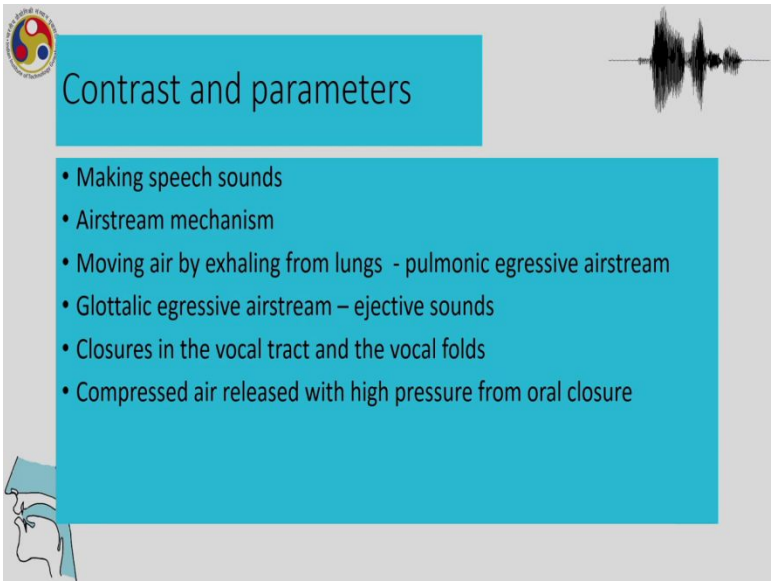

So as we have just discussed making speech sounds involves airstream mechanism and moving air by exhaling from lungs is a pulmonic egressive air stream and apart from pulmonic egressive we have the glottal egressive which produces ejective sounds. And then the production of glottalic egressive involves closures in the vocal tract and the vocal folds and the compressed air is released with high pressure.

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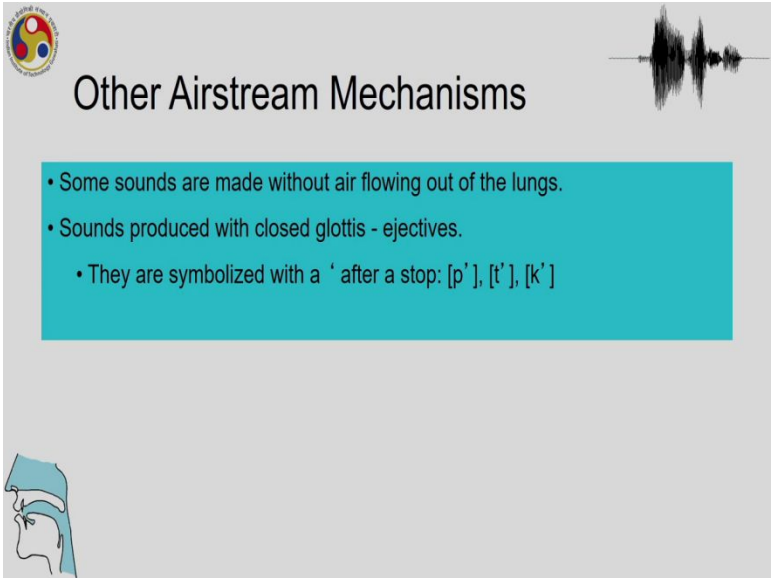

So, now we know that some sounds are made without air flowing out of the lungs and one of them is also ejectives. The symbols which are used for production of ejectives are these, so you can see the apostrophe on top of the stops this is used for ejectors.

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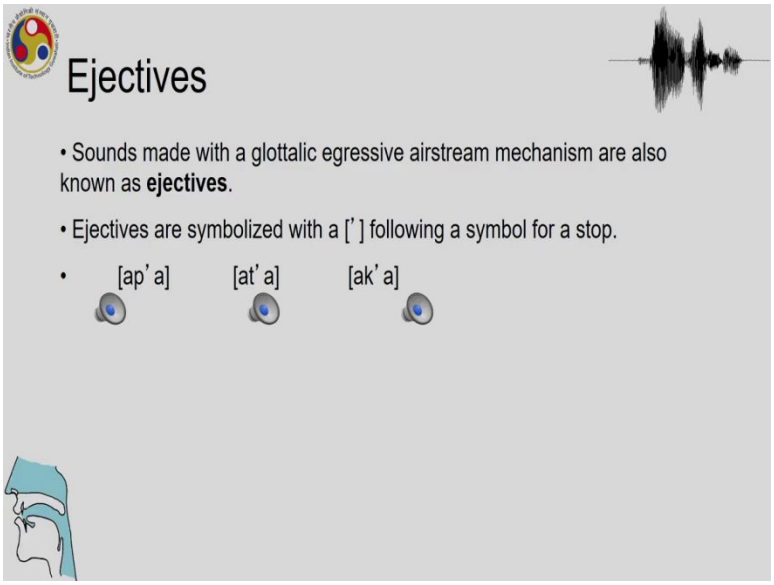

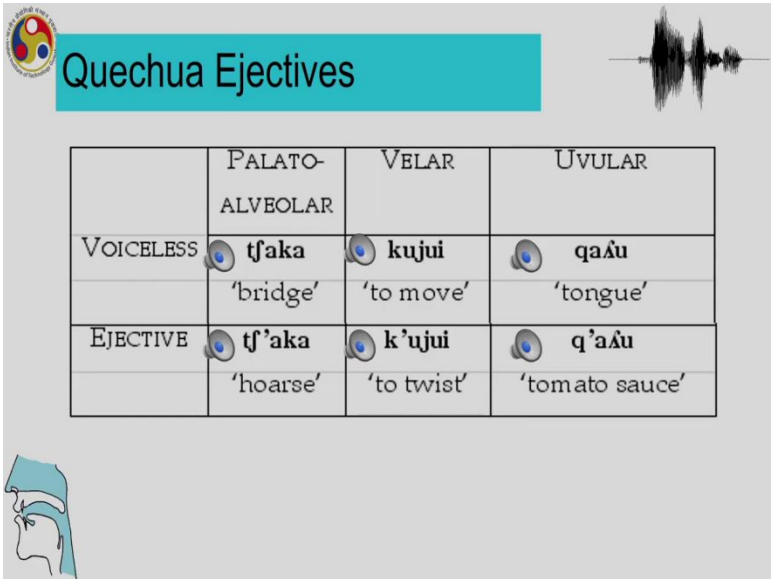

So, sounds made with glottalic egressive air stream is they are known as ejectives. Here are some examples of ejectives (pronouncing Quechua) Quechua spoken in South America and we had already shown that Quechua examples of palatal sounds, now we have this distinction Quechua has ejectors which we will hear (pronouncing Quechua) this is the palato-alveolar ejective, (pronouncing quechua) velar ejective, (pronouncing quechua) uvular ejective.

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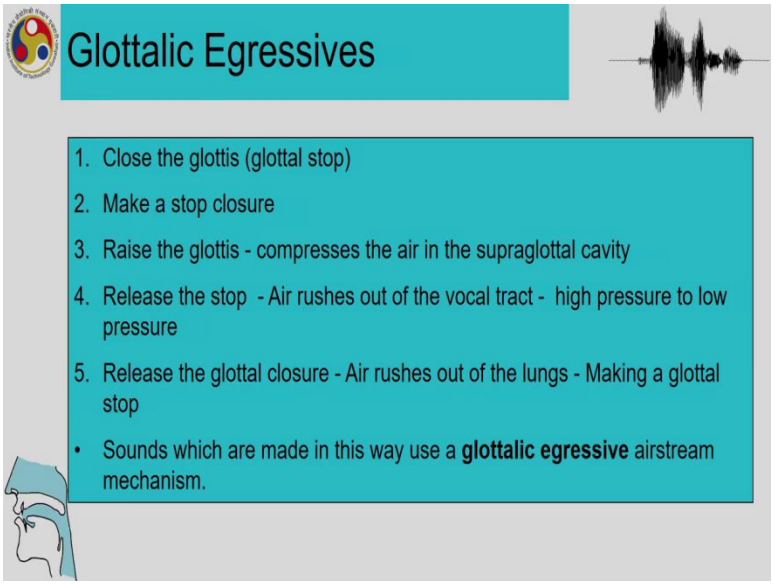

So, we saw the glottalic egressive, how do you produce it, close the glottis sort of the gestures involve for producing a glottal stop, there has to be a closure, the glottis is raised and it is released the air rushes out and creating from high pressure to low pressure and the air rushes out making a glottal stop, but the air used for producing the sound is the air trapped in the glottalic region.

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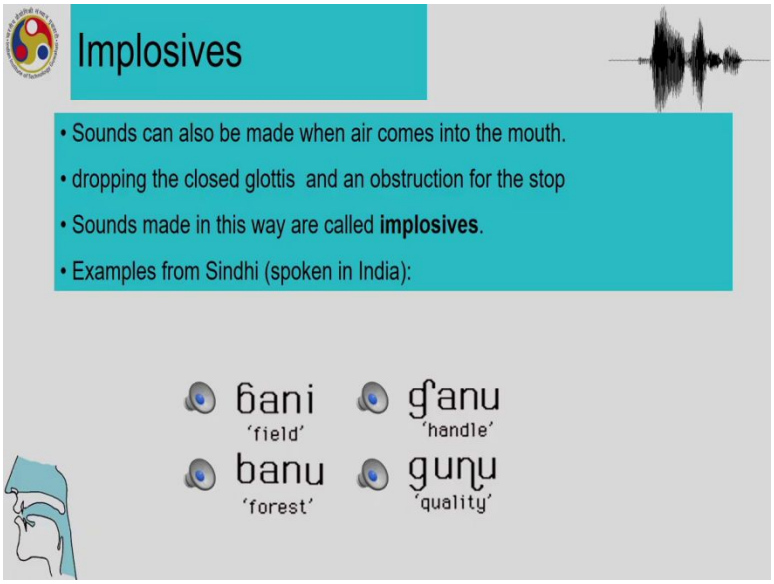

So, unlike ejectives, we have implosives, which is made with air which is coming inside into the mouth. So, it involves dropping the closed glottis and an obstruction and then the sound made in

this way (pronouncing Sindhi) are called implosives, very often found in languages such as Sindhi (pronouncing Sindhi) and here implosives that we are playing here (pronouncing Sindhi), So, you could hear the (pronouncing Sindhi) field.

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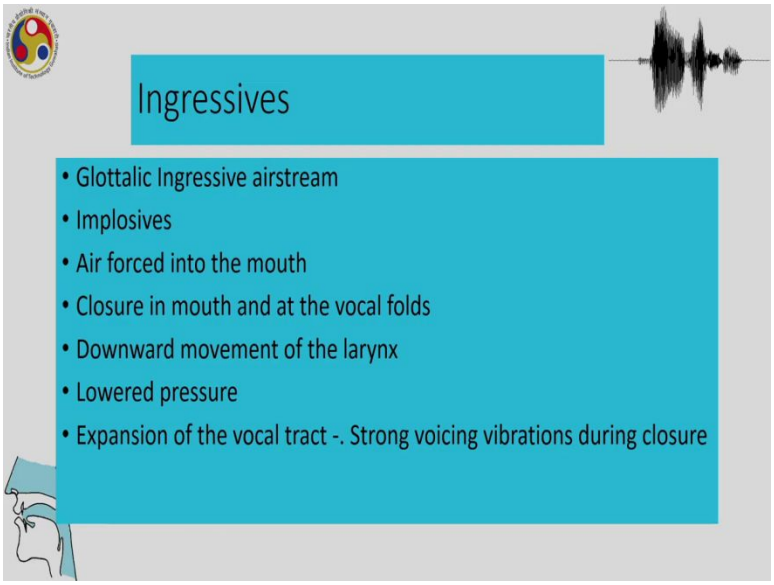

So, to summarize, the glottalic ingressive airstream is used for the production of implosives, air is forced into the mouth there is a closure in mouth and at the vocal folds, there is downward movement of the larynx that is because of the air that is drawn into the mouth, there is load pressure, there is also there has to be an expansion of the vocal tract because there are strong vibrations and that is how you produce ingressive, glottalic ingressive airstream implosive.

We have seen that to produce the glottalic egressive, we had for ejectives, it was the air which was already going out of the mouth but for ingressive the air has to be pushed in, that results in a lowering of the glottis. So, we have seen ejectives, we have seen implosives. Now, we move on to the velaric air stream, which is used in the production of clicks.

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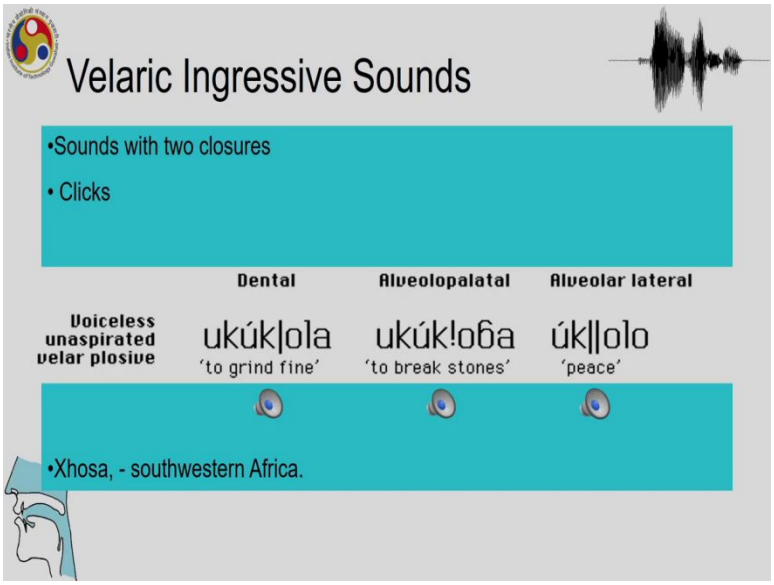

So clicks are produced with two closures. Here is an example from Xhosa southwest western Africa one is a dental click, alveolar palatal click and alveolar lateral that is from AC Xhosa is language spoken in southwestern Africa.

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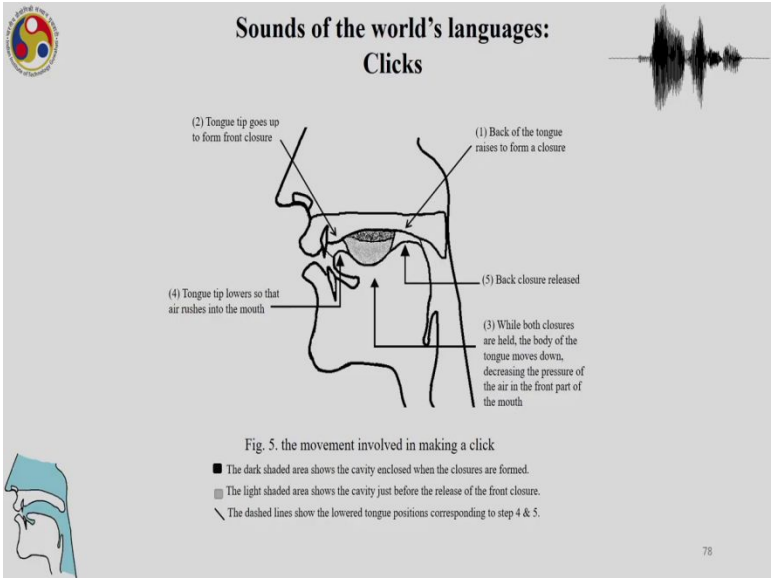

So, these are the movements in the production of a click. So, this has to be cavity and the light shaded shows, area shows the cavity just before the release of the front closure and the lines in between shows the lowered tongue region and which is responsible for change in the pressure in the production to click.

So, the back of the tongue raises to form a closure and the tongue tip goes up to form the front closure, so we have two closures. Finally, both closures are held, the body of the tongue moves down decreasing the pressure of the air in the front part of the mouth. So, the two closures and the body of the tongue goes down and the tongue tip lowers so that the air rushes out and it makes a large sound. And also the back closure is released.

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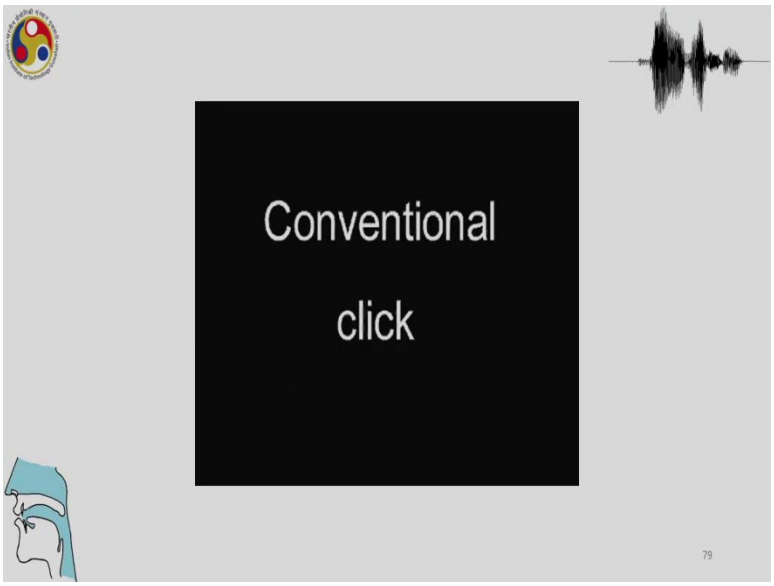

So, here is a convention click from the Ladefoged website UCLA, which is freely available.

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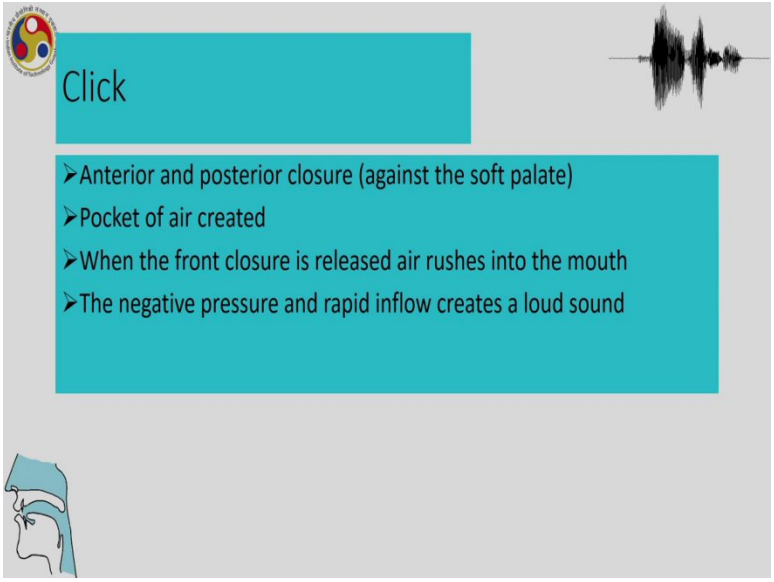

Those are clicks produced with anterior and posterior closure and the pocket of air is created and when their front closure is released, air rushes into the mouth and a negative pressure and rapid inflow creates a very loud sound that is one of the identifying properties of clicks that they make a loud sound.

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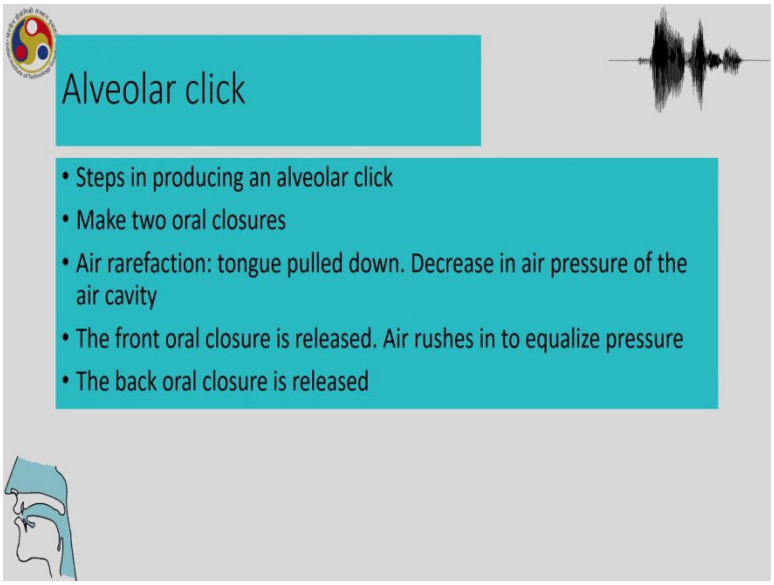

So, repeating what we had earlier seen in the diagram to produce, for instance, an alveolar click one has to make oral closures and the tongue is pulled down creating a low pressure area and the front oral closure is released, air rushes in to equalize pressure and the back closure is released after that.

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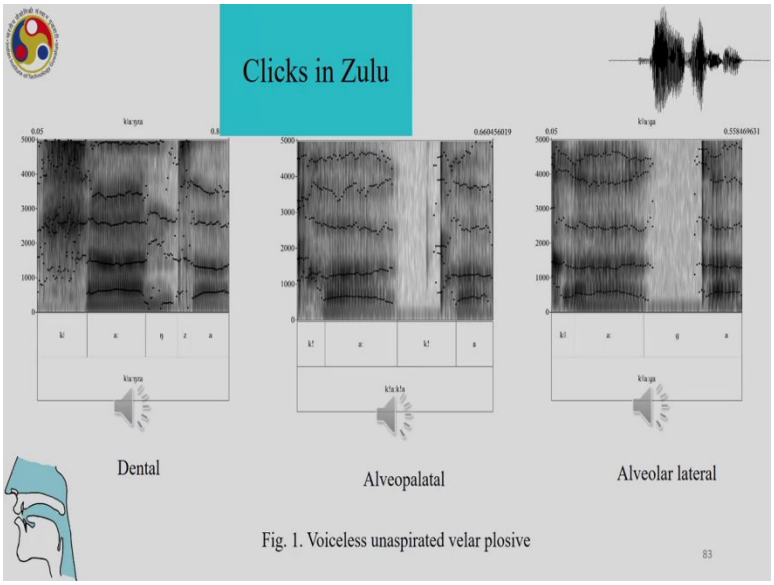

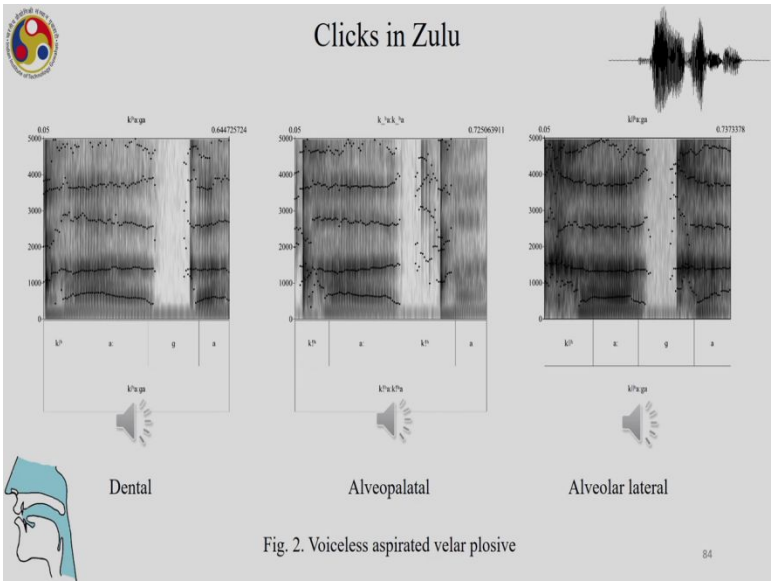

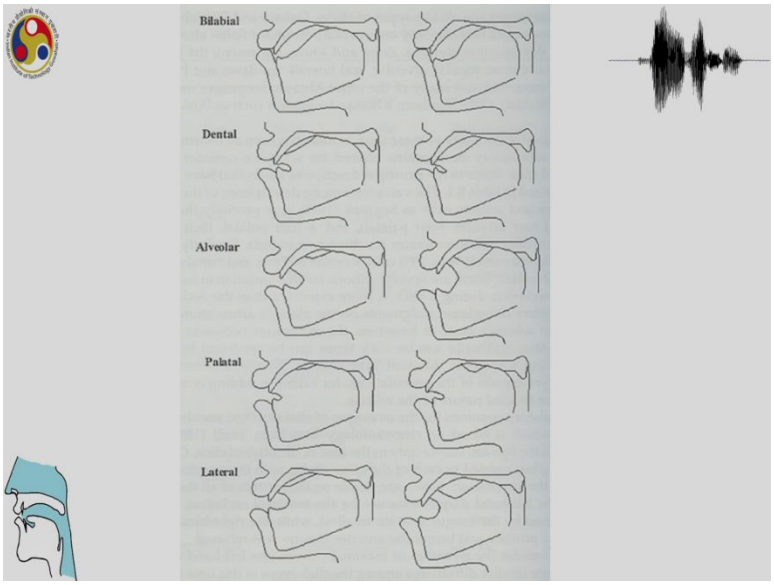

So these are some Zulu clicks and this is (pronouncing Zulu) dental, (pronouncing Zulu) alveolar, (pronouncing Zulu) and alveolar lateral. So we have included spectrograms to show the release of the click. So, you can see sort of release with almost two releases because of the two closure alveopalatal, alveolar lateral then we have a dental (pronouncing Zulu) and alveolar lateral (pronouncing Zulu), (pronouncing Zulu). These are the diagrams of clicks of the movement required to produce clicks.

So, for bilabial you can see that there is a closure at the lips and there is a closure at the back and for dental closure at the dental region as well as a closure there at the back of the tongue making another closure, the roof of the tongue and alveolar closure again discussed is that the alveolar region the tongue tip makes a closure and another closure at the back and for palatal same that we need two closures, for lateral also we need a similar closure like the alveolar one, but it is just that the release is different for the lateral.

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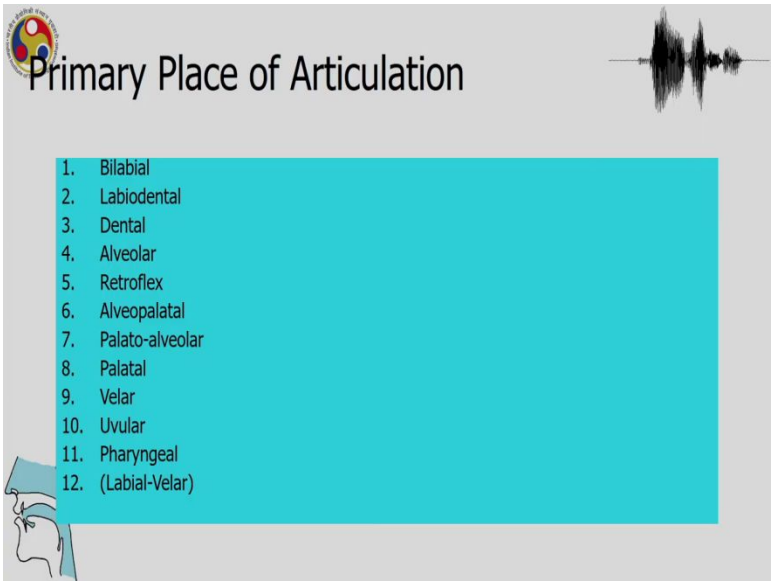

Now, so far we have covered place of articulation, manner of articulation and also air stream and the direction of air stream. So either whether the sounds are pulmonic, glottalic or velaric and along with that whether the air is pushed out of the lungs or the glottal region, then we would have the egressive sounds or the air is brought inside the mouth and then the air rushing in is released because after being trapped in either the glottalic region or the velaric region and then we produce ingressive sounds.

So after that there are other factors which colour the sounds that we produce which we have not discussed so much is the state of the glottis, we only discussed voiced and voiceless. There could be other properties such as murmured, laryngeals and closed. So, part of the tongue involved, you could have apical, laminal, dorsal, we could also have subapical. And then we have these various places of articulation that we have shown so far, that we have palatal, velar, uvular and pharyngeal. Also labial velar along with the ones that we had discussed before, bilabial, labiodental, dental, alveolar, retroflex, alveopalatal, palato-alveolar, palatal, velar, uvular, pharyngeal and labiovelar.

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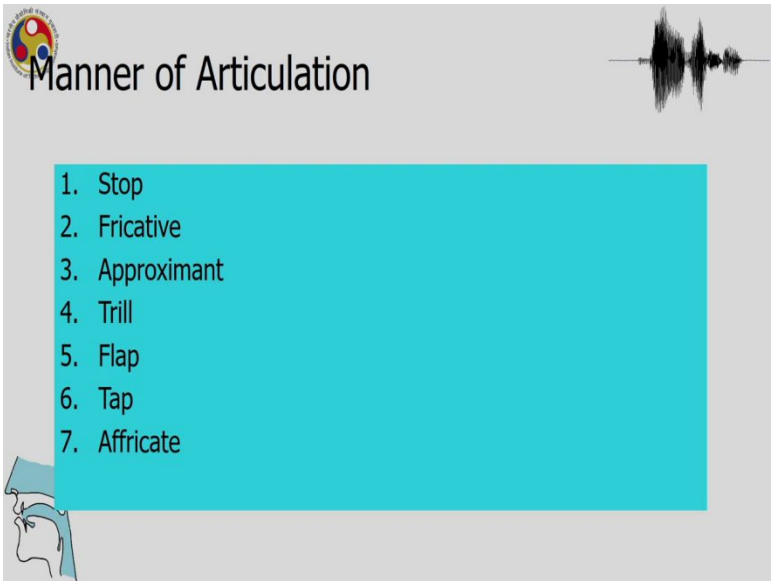

So, we have discussed manner of articulation extensively stop, fricative, approximant, trill, flap, tap and affricate.

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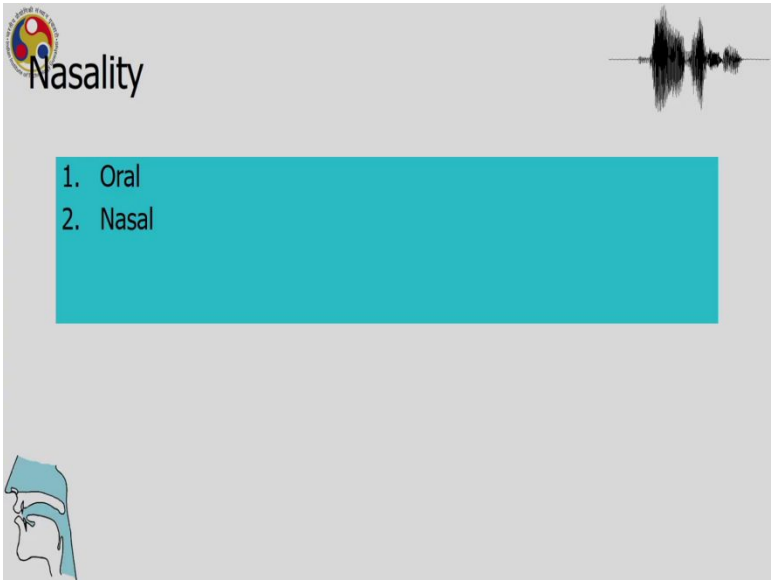

Centrality also has been discussed whether there is released centrally or laterally from both sides. There could be a difference in nasality; the sounds could be oral or nasal.

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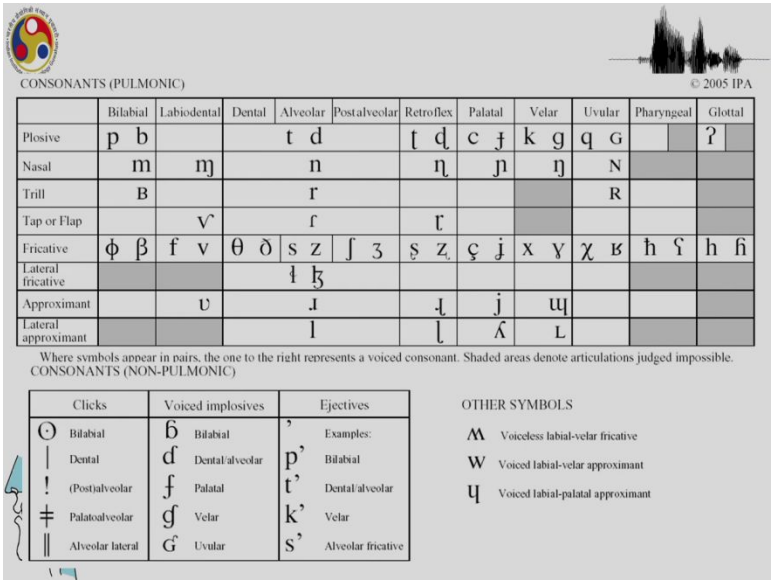

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k g	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Clicks	Voiced implosives	Ejectives
ʘ Bilabial	ɓ Bilabial	’ Examples:
ǀ Dental	ɗ Dental/alveolar	pʼ Bilabial
ǃ (Post)alveolar	ʄ Palatal	tʼ Dental/alveolar
ǂ Palatoalveolar	ɠ Velar	kʼ Velar
ǁ Alveolar lateral	ʛ Uvular	sʼ Alveolar fricative

OTHER SYMBOLS	
ʍ	Voiceless labial-velar fricative
w	Voiced labial-velar approximant
ɥ	Voiced labial-palatal approximant

So, finally, these are the symbols that are used for the various sounds that we have discussed so far, the plosives, nasals, trills, tap, flap and fricatives, lateral fricative, approximant, lateral approximants and then the manner of articulation clicks, voiced implosives, ejectives. So, we have covered pretty much a lot of the complexities involved in the production of sounds and we will continue discussing this in the next two classes. Thank you for your attention, and we will see you again in the next class.