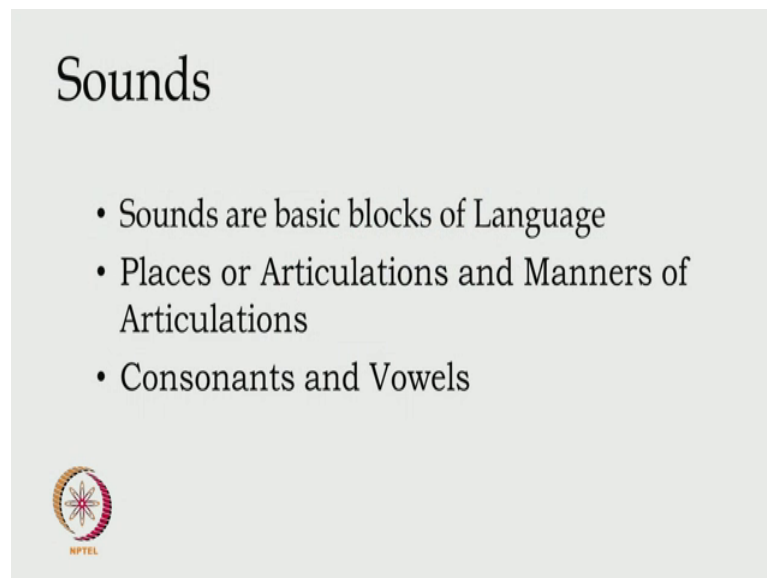


Principles and Parameters in Natural Language
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Lecture - 10
Sounds (Vocal Apparatus)


So, we will continue looking at sounds which we have seen last time a little bit.

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Sounds

- Sounds are basic blocks of Language
- Places or Articulations and Manners of Articulations
- Consonants and Vowels



We started with the idea that sounds are basic blocks of language. Remember, there are not infinite sounds in any language; set of sounds in any language is limited in number. Also all the languages share sounds some would share more, some would share less nonetheless, there may be distinct sounds in every language.

And then we will begin looking at places of articulations and manners of articulations today again. And mostly we will be talking about places of articulations of consonants today and we have looked at the distinction between consonants and vowels. Very quickly what would be the most significant distinction between a consonant sound and a vowel sound?

Student: Obstruction.

Anybody?

Student: Obstruction (Refer Time: 00:00)

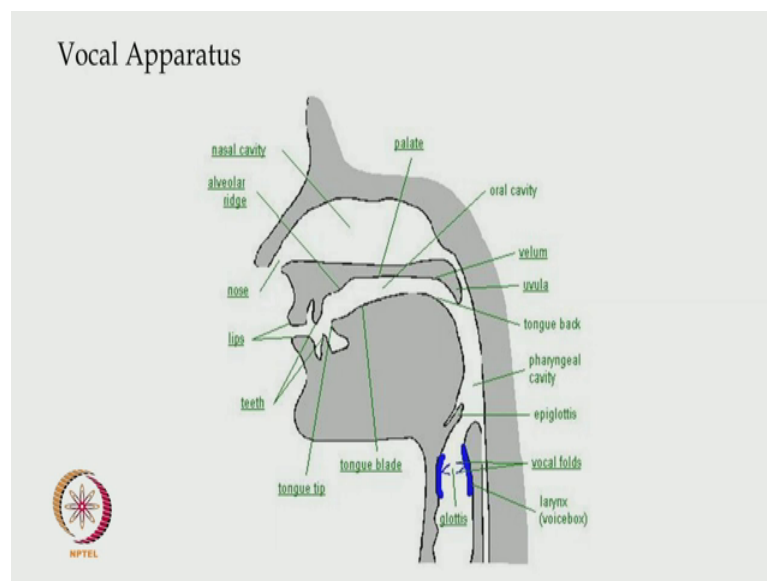
Obstruction of?

Student: Airflow.

Airflow, obstruction of exhaling flow of air in the oral cavity; if it is obstructed at different point, in different ways that is at different places of articulations and with different manners of articulations then they become consonant sounds, however if there is very little obstruction and the flow is not totally obstructed, then they are vowel sounds.

Vowel sounds are fundamental to words to the process of flow information because we see in empirical evidence across languages that; there is no world possible without a vowel sound, which tells us vowel sounds are fundamental to language. So, let us look at some of more places of articulations.

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We will keep coming back to this picture several times, I do suggest you to take a look at this picture very carefully when you are looking at it at home on your machines as well. In this picture, we have seen that there are two important places to begin with one is nasal cavity, the other is oral cavity. And this place uvula is one very crucial organ which is responsible for nasal quality of sounds, in the sense that if airflow is allowed to move through this cavity, then we get nasal quality in sounds.

If uvula is raised and this nasal passage is closed then we get only oral sounds. And then we come to other places of articulation, where the important ones are going to be look at this; you see this place? Which is called a velum. You see this place? This is called palate then things like these, which are teeth and then lips and then right close next to teeth, you see what we know as alveolar ridge. This is you see alveolar ridge is here and then in the oral cavity we have this line, as we say tongue this is the back of tongue, this will be the tip of the tongue alright.

So, I am only drawing your attention to some of these places which are going to be responsible for a large number of sounds again. One more thing which you should look at is this, you see this thing? This is called glottis and vocal cords are located here. Anybody plays any musical instrument? No? Yes? So how do you get sound out of musical instruments?

Student: Vibrations.

Vibrations of what?

Student: Strings.

So, there are strings in some of the or many of them and then when you try to vibrate them in variety of ways, then you get different combination of sounds; that is all I can say about them. And that is visible, you can see people doing that and then there is underlying system mind that, those who know how to do it well they can come up with more combination of sounds.

So, look at this there are vocal cords located here in the glottis. So, these are going to be important places for us to look at. Then we see vowel sounds, last time what is very crucial to refresh is there are only three places of articulations; that is we have divided the entire oral cavity into three parts. One is back, mid and front though the reason why it has been divided only in three parts is because the obstruction of sound is very minimal.

So, for the back vowel whatever a little obstruction that you see is in the back of the oral cavity. For mid vowels the little bit of obstruction that you will see is in that part and then for front vowels like [FL] and [FL] you see it being some sort of obstructions in the

front. And then we have seen according to manners of articulations, there are two of them; one is a short vowel, the other is long.

We started talking about vowels, when I had asked you questions about how many vowels are there in English? Remember? We had seen there are 5 vowels and then we talked about them a lot and we also talked that there is nothing called A for apple; remember those things?

Now, besides that now is the time to look at it more carefully where the distinction between [FL] a vowels sound [FL] and [FL] is only in terms of the duration of these sounds and that duration is also relative duration, which is if [FL] is longer then [FL] has to be shorter than that.

[FL] if it is longer, then the short one has to be shorter than that. So, that there is no time defined for these short and long vowels, this duration is relative. And they have been very carefully classified in the studies of these sounds short, long, short, long and short long. All three back vowel, mid vowels and front vowels have their three longer counterparts.

And then there are more vowels; I told you last time that this classification was done long time ago that was around 2500 BC by Grammarian Panini, who studied these things; does anyone know where he lived? Where he studied these things? Last time I remember somebody was telling me about Panini somebody.

Student: (Refer Time: 10:14)

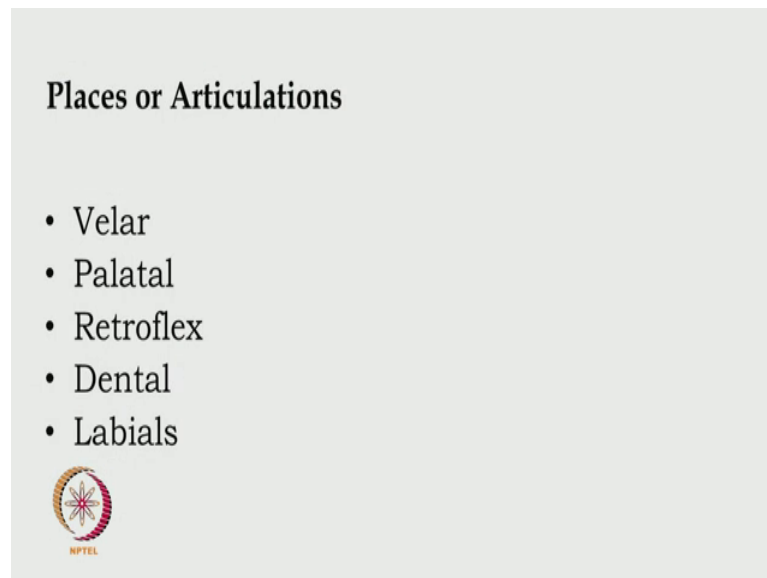
You? So, do you know where; I mean this is not just for him anybody can answer this question. Do you know where he lived? Where he did these things? No, but that is not very crucial for what we are discussing, but it is important to locate it in time and history place particularly. He studied it in the ranges of Hindu Kush mountains, which are now parts of northwestern Pakistan or Afghanistan, the idea is probably he studied these things at Takshashila or around that area.

Another important part is in these many years; 2500 years studies after studies of sound system and anything that we know today in modern science about sounds, such studies have not contradicted anything that he was talking about. And I think I remember now

when last time; before we stopped last time, I told you that these sounds are unique sounds in the sense that they are part of all the languages, the languages that were there during time during Panini's time or may not be now or the languages that we have today or may not have been around during time of Panini.

Two crucial examples are Hindi and English and many other languages that we speak; get this thing?

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All moving ahead, now we want to look at consonant sounds. In the set of sounds that we are going to look at and that are very common in most of the languages that we speak; almost all the languages that we are speaking, these are five different places of articulations.


So, in the oral cavity you will see the location of these five places which we have looked at and we are going to see that again. The sounds that come from velum, remember that place velum in that cavity? No, we are going to look at that in a moment; such sounds are called Velar sounds, palate gives a Palatal sound, teeth; dental sounds, lips; labial sounds and there is something called Retroflex which I will show you in a moment.

(Refer Slide Time: 13:35)

Manners of Articulations

| | | | |
|--------|--------|--------|--------|
| -asp | +asp | -asp | +asp |
| -voice | -voice | +voice | +voice |


Fricatives



So, let us look at some more on manners of articulations.

(Refer Slide Time: 13:43)

| | <i>Oral Sounds</i> | | | | <i>Nasal Sounds</i> |
|-----------|--------------------|----------------|----------------|----------------|---------------------|
| | -asp -voice | +asp -voice | -asp +voice | +asp +voice | |
| Velar | k | kh | g | gh | ng |
| Palatal | c | ch | j | jh | ny |
| Retroflex | T | Th | D | Dh | N |
| Dental | t | th | d | dh | n |
| Labial | p | ph | b | bh | m |



Let me first show you actual some of these sounds and then this manner of articulation or places of articulations will make more sense. Do these sounds sound familiar? When we say [FL] let us talk about couple of generic things first to establish certain fundamentals and then we look at their classifications according to places of articulations and manners of articulations. When we say [FL] is this which language does this sound belong to?

Student: (Refer Time: 14:23)

Is this sound in Telugu, Tamil, Malayalam, Hindi, Sanskrit, English.

Student: (Refer Time: 14:36)

In a way all the languages that you may be speaking and bare with me; I am not just counting these languages for the sake of their names or the languages that you may be speaking, I am trying to draw your attention to the fact that these sounds are not a specific to a language. And similarly there the manners of articulations, that you see on the vertical axis; so if [FL] is a Velar sound, it is not going to change depending upon different languages.

This point making sense, the place of articulation is not going to change depending upon different languages. Therefore, we are talking about the process of sound production which are not specific to a language. At this point also if I can remind you about the things that we established way early in the beginning; that these are the ways to look at fundamentals of language; remember the distinction that we established between language and languages?

So, when we look at these things or in a particular in these manners then we are talking about language, we are not looking at languages alright. So, it will be helpful if you can say some of these sounds and really see whether these; we do not have to locate velum, but we can see those areas in your oral cavity, whether they are really true or not. You do not have to say it too loudly, but you can say; you have said this sound million times by now; by Million I simply mean uncountable numbers. Probably we do not even remember how many times a day we say these sounds.

Where one more time does not make much of a difference and that time is going to be the time when you are really going to see that these are Velar sounds; that is coming from velum. So, can somebody say this sound loudly? Sandeep, can you say this sound loudly?

[FL]

Student: [FL]

[FL]

Student: [FL]

Do we see that this.

Student: [FL]

Is

Student: [FL]

Located in this area; not exactly at this point, in this area do you see that? When we say [FL] do you see any involvement of lips in that Teeth Tongue?

Student: Tongue?

You see that? What is the involvement of tongue in production of [FL]?

Student: (Refer Time: 18:10)

So, this is the place and this is the tongue back; that is back of the tongue. Tongue is long muscular thing in the oral cavity, it is not very good looking organ in any sense, but we know how it looks, we see that almost every day. So, and if we divide that also into several parts that is tip of the tongue and then you see the sides of the tongue, they are called blades of the tongue and then we have back of the tongue. I promise you, we will not talk about these things any further. It has all such parts have a huge role to play in production of a particular sound. So, when we say [FL] what happens to the tongue back?

Student: Rises.

It rises a little bit and then probably it is going to be touching that velum part, in that process it blocks the flow of the air completely. And then when the release takes place, the blocking is not responsible for the sound, the rising of back of the tongue upward towards velum, blocks the flow the air. When it is released, the sound that we get from that part is called [FL] and we give them a name it is called Velar sound. Once again what is important for us again to keep in mind is; this is we are not aware of all these things happening. We are not doing anything on purpose; remember just a moment ago I told you we do not even know how many times we say this sound.

We do not pay attention to this process that we are talking about therefore, we do not know. Therefore, we take a moment to think what is going on with the back of the tongue and velum and all that I do not know.

So, in order for us to be saying this sound [FL] hundred times a day, thousand times a day; we really do not have to pay attention to its mechanism; the motor movement available for this sound. However, when we look at it in terms of what is happening then this is where we get it, clear? Palatal sounds, so what was the next one palatal?

Student: [FL]

[FL]

Student: [FL]

Once again for a genetic information, is this sound available in all the languages that you speak? [FL] Now when you say the sound [FL] do you see the difference in place of articulations between [FL] and [FL]? Yes and as you can see in the picture, it is moving forward. Velum is toward the back of the mouth and palate is almost in the middle. So much so that we can feel that, there are two parts of palate one part is called hard palate the other part is called soft palate; that distinction is not made in this picture, but there are two parts of this.

That distinction is also important for several sounds may not be important for the sounds that we are talking about now, but there may be some sounds in some language which may have Palatal sounds which are coming from soft palate and our Palatal sounds coming from hard palate. If there are sounds which are coming from both of them, some sounds from hard palate and some sounds from soft palate; then they are given different names.

For the sound [FL] we call it Palatal because that distinction is not important here. And I am talking about only; I will repeat this thing again I am talking about only five places of articulations because I am trying to restrict with this description only to some sounds. This is not to say that there are only five places of articulations in the oral cavity, for continental sounds; understand? There could be more and not could be, there are more for other languages. It is just that we are not talking about lot of them here, at the end of

it I will give you some of them, some such sounds which will have different places of articulations, which we are also familiar with; just to see.

So, in the production of Palatal sounds we are moved forward and now velum is not responsible; what is responsible is palate when we say [FL] I am sorry for this arrangements now. We leave the next one for a moment, we go to the dental ones; that dental sound is called [FL] do you hear this sound clearly? [FL] can you say that?

Student: [FL]

[FL] can you give me a word where you see these dental sounds, a word with [FL].

Student: [FL]

[FL] very nice.

Student: Thinking.

Thinking is different.

Student: (Refer Time: 24:33)

We say; thinking is different, let us leave this for a moment [FL] somebody from there [FL] is one.

Student: Tennis.

No, I am coming to tennis in a moment; remember these words thinking and tennis both.

Student: [FL]

[FL]

Student: [FL].

[FL] what is the word for [FL] in Telugu? Or for that matter Telugu.

Student: [FL]

[FL] Nobody told me, what is the word for [FL] in Telugu? You are a send [FL].

Student: (Refer Time: 25:13)

[FL] oil.

Student: (Refer Time: 25:16)

Do you hear the sounds [FL] in Telugu?

Student: Yes.

That is the sound we are talking about. Now what is the place of articulation for this? What is going on with this sound?

Student: (Refer Time: 25:35) tongue is touching (Refer Time: 25:38).

Upper teeth? Say it again.

Student: (Refer Time: 25:44) [FL]

[FL] say it again pay more attention to this and then tell me. What you have said so far is right.

Student: [FL]

It [FL]

Student: [FL] (Refer Time: 25:55)

So, that is fine; tip of the tongue which part of the tongue? Tip of the tongue.

Student: Tip of the tongue.

Has something to do with teeth, what does it actually do? Touching that upper part is also kind of true end of fine and he does more than that.

Student: Subtract to me either (Refer Time: 26:17).

That that is given for all the sounds; see this is why we have already talked about abstraction of air in the beginning. And now we are talking about a specific mechanism, it is just that you need to focus a little bit more when you are saying [FL].

Student: [FL] (Refer Time: 26:38) kind of federation and then we release the pressure is (Refer Time: 26:42).

That is also true; it is true just like its true for [FL] just like its true for [FL] the difference is because velum is too far back or palate is centrally located. So, when the airflow is completely obstructed; we do not feel what you say pressure. And because we are allowing the flow of the air to come all the way towards the front of the mouth therefore, you feel the pressure; that is given, but nice observation. This is something else that is happening, which is very clear, nobody wants to say that?

Let me say this to you and then tell me whether it is true or not. The tip of the tongue goes in the middle of both upper teeth and lower teeth, when you say Telugu [FL] and [FL]; does it? Or does it not? You can only feel this when you say this, does it? Or does it not? See it is too obvious also in the sense that it is too much in the front and why you may be thinking that it does not go in the middle of the teeth is also something that I am going to show you and I am going to tell you. But first say the word Telugu, the way we say or [FL] or [FL] or many other words with [FL] we are not talking about [FL] like table; can you give me a couple of more words with [FL]?

Student: Tea

Tea, table.

Student: Top.

Top, we are not saying these sounds; we are talking about dental sounds like [FL] Telugu, [FL] and more. Do you agree with this thing or you are in agreement with this because I am saying so?

Student: (Refer Time: 29:15)

Do you feel the tip of the tongue going in the middle of the upper teeth and lower teeth? Now it is too fast, you cannot hold it for a long time; if it does not stay there for you to feel it. See teeth is a very sharp object, at the same time tip of the tongue is the softest thing. If it is stays there any longer, you can understand the violence that can happen, you see this thing.

Therefore, however that happens every time we say that alright and it is observable when you say this sounds in isolation, you simply say [FL] only then you see it happening. When you say words fast because when you say words fast, you do not see that happening; obviously, because there may be more than one sound [FL] in a word. When we say word which may have four or five sounds in it, we do not pay attention to the places of articulation of each sounds. And a word may have a sound, Palatal may have a; dental may have a wheeler; all kinds of sounds are possible in a word.

Remember these things that we have been discussing so far? When you put all these discussions in perspective then you see more clearly the generic or fundamental aspects of language that we have discussed so far. Now, so [FL] is dental sound for that purpose that we are going to see the tip of the tongue, in the middle of two teeth therefore, it is called dental.

One more point at this stage, we have talked about three Velar sounds from velum, Palatal sounds from palate and dental sounds from teeth. In all three of them, we see the role of tongue; do we see that? The back of the tongue is raised up to touch velum, tip of the tongue goes in the middle of the teeth for dental sounds. But these sounds are not named after tongue, yet that has a role; tongue has a role to play in most of them, but they are named after different places of articulation in the oral cavity.

Now, the last one is labial and the pressure that you mentioned, you are going to see that in these sounds more when you say [FL], but when you we are exaggerating some of the things little bit because we do not say the way I am saying it right now, when we say the same sound in a word; how do we say [FL]?

Student: [FL]

[FL] what is going on here? It is labial sound, what is going on here?

Student: Lips.

Lips, what is happening to lips?

Student: (Refer Time: 32:49)

So, the flow of the air is stopped and released at lips; it is very clear. To be little bit more precise, let me say that in the following since I have to look at a couple of other things for you. In the more precise way, do you see the role of both the lips or just one lip?

Student: Both the lips.

There is upper lip and lower lip; both are involved in that [FL] can you see the sound [FL] just with one lip?

Student: (Refer Time: 33:31)

No, it is just not possible. Therefore, more precisely these sounds are called bilabial sounds. I have just put labial here, for a particular reason but these sounds are called bilabial sounds; just to be really precise. Does this at least make you help the genius of a person who may have done this thing long time ago? It even now, it gives us a sense that we know these things so well; we know all these sounds so well.

We do not even need to pay attention to these things, how many times do we say any things in a day, but when these things are brought to our attention particularly with the idea that somebody paid attention to these things; not when French revolution was going on or Indian freedom revolution was going on. Long long time ago that is something something really very striking at least.

And one more thing which we should keep in mind and this genius of Panini helps us know at least is; human effort to pay attention to intricacies of language, even at the level of sounds, words, sentences or mechanism involved in production of sounds is not new. It is not done only for computers, it is not done for helping other things, it was done simply as an intellectual pursuit for someone's curiosity to understand; what is involved in when we speak, what happens when we speak? This is one question which does not strike us even now too commonly. I am not saying that people do not pay attention to these things; too commonly, there are lot of other things that are happening to us and we do not pay attention to them too commonly.

So, I am not saying that sounds are or language is the only thing which everybody should be paying attention to. There are many other things that are happening to us or we keep doing which to which we do not pay much attention. But language happens to be one of

them, I have taken you through various other discussions; about various other aspects and this is again one more. Talking about Panini is not just to talk about a great Sanskrit grammarian, who did it long time ago.

Important thing is so long time ago to such minute details that it is not just labial, it is bilabial and they have given the terms for these sounds, which help us see the precision to which they have worked on; without any instrument, without any laboratory or I mean it is easy for us to say from now it probably did not even know; the concept of laboratory at that time. But lot of times it feels like that will be too much of a claim, maybe they did maybe they we are talking about other things that we do in laboratory, we just do not have evidence of such things anymore. So, that is what these precise description tells us about that time.

Now, coming back to see more of what this system has done and why this system is called generative system. And then how it is applicable? How such things are applicable to production of other kinds of sounds? But before we go there, let us now look at what we know as manners of articulations. Please look at this chart carefully, I do not have grids here; the sounds that you see this far, these are called oral sounds.

These sounds are nasal sounds; I will draw your attention to that also in a couple of minutes. And on the vertical axis, we have different places of articulations alright and here you see this is something plus, minus things; these are called manners of articulations; they are simple things I am going to just tell you in a moment.

So, first all these sounds here that you see on this horizontal axis; all of them are coming from velum, they are all Velar sounds and what are they? When we say, what is the next one when after [FL]?

Student: [FL]

[FL] and after that?

Student: [FL]

And after that?

Student: [FL]

All let us just stop there, even this much was great, we just saw that this gives us a good feeling to understand; this sound [FL] has a place of articulation which is called vellum. Even this much is great, looks fine; but look at the further details of this; what is the difference between [FL] and [FL]

Student: (Refer Time: 39:40)

If this is a very simple question that anyone can ask you.

Student: More air.

Right, more air; see this thing more air, you may have seen this chart many times; has people here studied Devanagiri chart? You may have seen this chart, what I am trying to show you is; what you have not seen so far; what is shown to us, what is done to us in schools; what is done to us in a schools with English alphabet, I have already told you.

What is done to us with this kind of chart is we are given this thing and we are not given these things; that is ok, I mean we do not have to blame people. Right now, what I am doing is we are telling you what we are not told ever, we are looking at something that is not visible; that is not clearly told to us. So, what is the difference between [FL] and [FL]? Again more air, can we say it a little bit more precisely. When you say more air, please pay attention to this we are not denying that there is no air flow in [FL] it is only more air. And that more is kind of visible and it is very simple, if you put your hand close to your mouth.

Student: (Refer Time: 41:14)

And say that two sounds, you will feel more flow of air in the second one [FL] you see that; can you do this that please.

Student: (Refer Time: 41:27)

The more is depends on how much more you release, but there is more between the two. And this is referred in modern terms the terminology that I have used is aspiration. So, [FL] is indicated as minus aspiration and [FL] is indicated as plus aspiration. So, that at least gives us one way of distinction between these two, if we are looking at only flow of air. Now look at [FL], so when we say [FL] and [FL] there is no flow; both of them have

similar flow of air, but still there is a difference between the two. When we say [FL] and [FL] there is a difference between the two; is there a difference or not? [FL] and [FL].

Now, if we only put aspiration in picture then it fails to account for the distinction between [FL] and [FL]. Flow of air, more flow of air which we know air aspiration; accounts for the difference between [FL] and [FL] very nicely, but again when you want to look at the difference between [FL] and [FL] we see no difference; in terms of flow of air therefore, that parameter fails.

However, what we observe empirically is there a difference between the two, so we need to account for; whatever is responsible for that difference we need to articulate that. Again when we say [FL] then we see the difference, but what we see is the difference between [FL] and [FL] and [FL] and [FL], again we do not see the difference between [FL] and [FL] in terms of flow of air and we have similar kind of flow of air for [FL] and [FL], but it still many the difference between the two; am I making sense to everybody?

So, just flow of air that is aspiration is not telling as much, so there has to be something more, which should be responsible for the difference in these two sounds. Now, let us go back to vocal cord; what we saw in the picture and remember where it is located? It is located in glottis. So, what is after aspiration that you see in this chart? It is called voice.

Voice is the term for vibration in the vocal cord; if there is no vibration then that is minus voice and if there is vibration then that is called plus voice. Now this vibration is very minimal, it is hard to distinguish, but that is the voicing; that is the vibration which is responsible for the distinction between [FL] and [FL]. However, hard that maybe it is possible, where do you think will be glottis located? Somewhere here, so if you put your this thing here and say the two sounds [FL] and [FL], [FL] and [FL].

Student: [FL]

[FL] it is not as nice as it comes out of musical instruments, but you do see more vibration, when you say [FL]. And that is the voicing which makes the difference between [FL] and [FL] and also between [FL] and [FL]. So, [FL] becomes a sound which has no vibration, no air, [FL] is a sound which has only more air, but no vibration. [FL] is a sound which has no air, but vibration and [FL] is a sound which has both; more air and vibration get this thing?

Now, if we put this binary distinction of more air and voicing in picture; then we can assign distinctive features to each one of these sounds. Even though the place of articulation is same for all of them, so in that case we can say Velar plus voice plus aspiration and then we know which sound we are talking about. We have to say nothing of what we have discussed so far or to put it differently, we only need to say that much and that accounts for everything that we have done so far.

So, this whole thing the distinction; binary distinction which we call manners of articulations because it is about more air, less air, more vibration, less vibration; these are termed as manners of articulations. And different locations in the oral cavity are called places of articulations, this may not have been told to us for a reason, but when you look at these sounds then you see why are they arranged the way they are arranged. Now, since we are looking at this chart, I should also draw your attention to one more thing. Which one of thus these five places of articulations that you have seen so far is more audible? Which sounds that we discussed a few days ago; that children can see more visibly? Which of these places of articulations is easy to see?

Student: That is lips.

Lips, they are quite in the front; it is observable. Still, when we see the chart and this classification; what we see is they are starting at the place which is not visible, what would be wrong, if they started this whole chart with Labial sounds first? In other words my question is, can you see the underlying precision; unstated fact.

Student: (Refer Time: 49:21)

That this chart wants to tell you without writing or without saying that.

Student: Precision of the (Refer Time: 49:28) where we have the stop (Refer Time: 49:30).

That is fine.

Student: (Refer Time: 49:32).

That is absolutely true. So, in labial; that place is lips and in velum the Velar.

Student: (Refer Time: 49:39)

That place is velum, but why? That is fine true; what I am asking is and please look at this question carefully, what I am asking is; why this arrangement does not start with labial? Because labial sounds is very easy to see. Remember even kids start watching movements of lips therefore, they end up saying words type [FL] they see the movement of lips, they are not really imitating; they are only trying to move their own lips as well and they end up saying these things, which we think they are saying [FL]. The child may not know anything about [FL] what it means or what the word actually means.

Now, you see why that might be happening, but my question is more fundamental before we stop; why not starting with Labials first and then velum; because Labials are more visible and effect anything that is true about Velars. Velum is not visible at all; so what the person who did this arrangement, what is the rational minded? Is there no rational? Or is there is some rational; which is not a stated, but for us to see.

Student: Sir ordering of the sound shows that this chart of the back of (Refer Time: 51:00)

They started the back of.

Student: And then they gradually move out.

Very true.

Student: From road, then palate then up to final lips.

Absolutely true.

Student: But why is lips at the end and not at the first?

It has an answer in what you said.

Student: Because the Velar distinguish between as in terms of (Refer Time: 51:18).

Not; true, but not the answer.

Student: Maybe you learn from sound and oxide.

No that is also true, but not the answer to this question, the simple answer is; it is not mentioned categorically here, but remember what is responsible for production of sounds; which air? Inhaling air or exhaling air?

Student: Exhaling air.

Exhaling air starts modification where?

Student: Glottis.

Glottis and upward; without writing this arrangement tells you that please know that while arranging this thing in this particular way, I know that inhaling air is not responsible for this thing. So, I am giving you the direction in which the flow of air is responsible for production of sounds; you see this thing? If someone did this today, there is no Nobel price for linguistics.

If someone did this thing today and talked about all these things, I am not sure about Nobel price, but this must have got them something; with this person did not even write the things they knew about. Trust me this arrangement could not have been possible without the person knowing about these things.

See the point that I am trying to me. So, it is not a coincidence that he starts with velum and goes to labial, he is moving gradually from velum to palate to dental and others; to lips. So, he could have gone all the way backward, but not going backward simply tells you that I am talking about the directionality of sounds, directionality of flow of air which is responsible for production of sound; get this thing? There are few more things; salient features of these sounds and little bit more about manners of articulation, that we need to discuss; which we discuss tomorrow, when we meet at 1.

Thank you.