Basics of Language Science
Professor Rajesh Kumar
Humanities and Social Sciences
Indian Institute of Technology Madras, Chennai
Lecture 11
Vocal Apparatus and Salient Features of Sounds

Professor: We will continue looking at sounds which we have seen last time a little bit.

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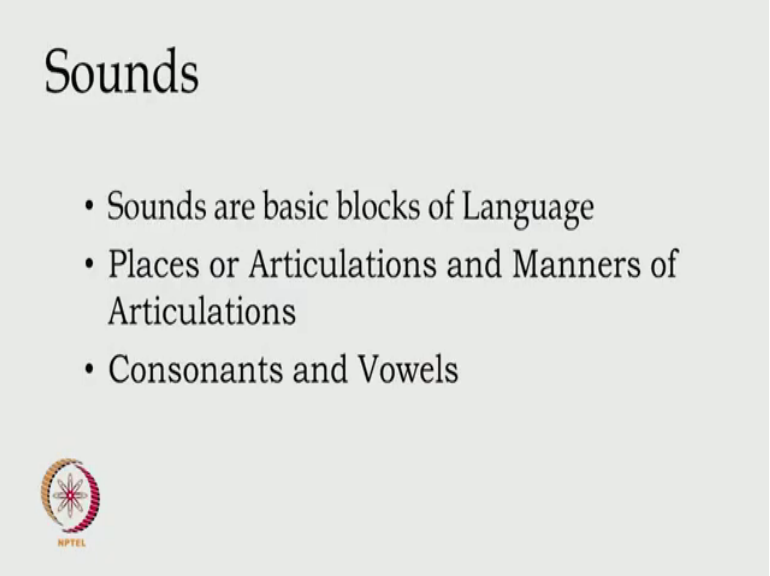

We started with the idea that sounds are basic blocks of language. Remember there are not infinite sounds in any language. Set of sounds in any language is limited in number, and all languages share sounds. Some would share more, some would share less nonetheless there are distinct patterns, distinct sounds in every language, 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, very quickly, what would be the most significant distinction between a consonant sound and a vowel sound, anybody?

Student: Obstruction through the passage.

Professor: Obstruction of airflow, obstruction of exhaling flow of air in the oral cavity. If it is obstructed at different points in different ways at different places of articulations and with different manners of articulations then they become consonant sounds. However, if there are,

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 word formation. Because, we see in empirical evidence across languages that there is no word possible without a vowel sound, which tells us vowel sounds are fundamental to language.

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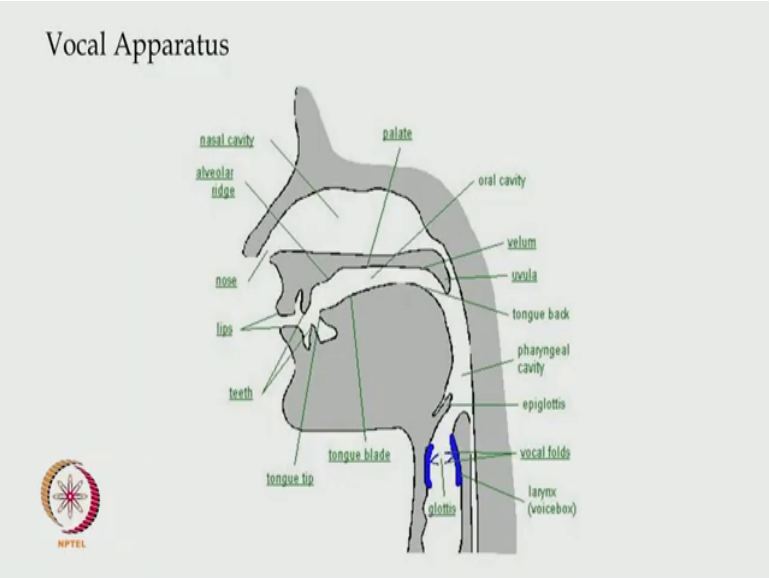

So, let us look at some more places of articulation. We will keep coming back to this picture several times. I do suggest you take a look at this picture very carefully when you are looking at it at home on your machines as well. In this picture, we have seen that there are two important places to begin 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, do you see this place, 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. You see this thing, alveolar here and then this is, in the oral cavity, we have this line, as we say, tongue. This is the back of the tongue; this will be the tip of the tongue.

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. Do 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.

Professor: Vibrations of what?

Student: Strings.

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

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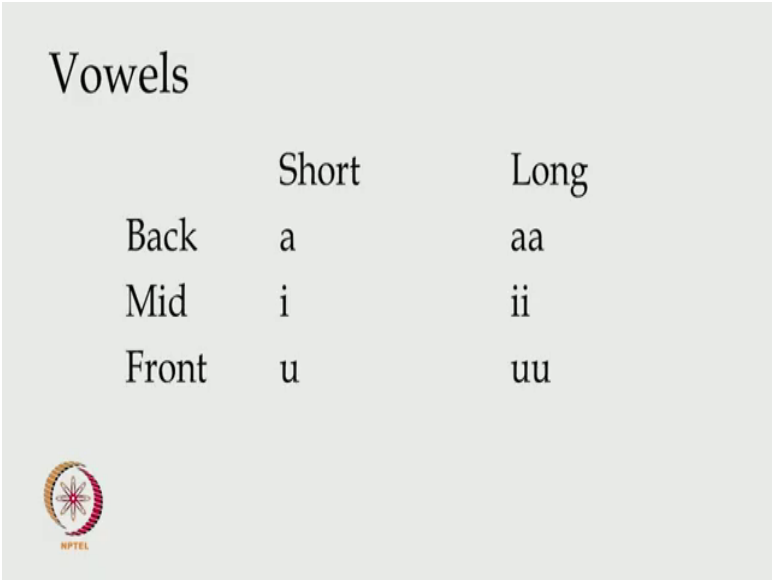

Did we see vowel sounds last time? What is very crucial to refresh is there are only three places of articulation, that is, we have divided the entire oral cavity into three parts, one is back, mid and front. The reason why it has been divided only into three parts is because the obstruction of sound is very minimal. So, for the back vowel whatever 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 u and uu you see it being some sort of obstruction 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 asked you questions about how many vowels there are in English and 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?

Besides that, now is the time to look at it more carefully, where the distinction between, a vowel sound a and aa is only in terms of the duration of these sounds. And that duration is also relative duration, which is if aa is longer than a has to be shorter than, ii if it is longer than the short one has to be shorter than that. So, 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 vowels, 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 a long time ago, that was around 2500 BC by a 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, you, okay.

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. That is not very crucial for what we are discussing, but it is important to locate it in time and history, time and place particularly, he studied it in the range of Hindu Kush mountains, which are now parts of Northwestern Pakistan or Afghanistan. The idea is probably that 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 systems 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 in the sense that they are part of all the languages, all the languages, the languages that were there during Panini's time or may not be now or the languages that we have today or may not have been around during the time of Panini.

Two crucial examples are Hindi and English and many other languages that we speak get this thing, all right.

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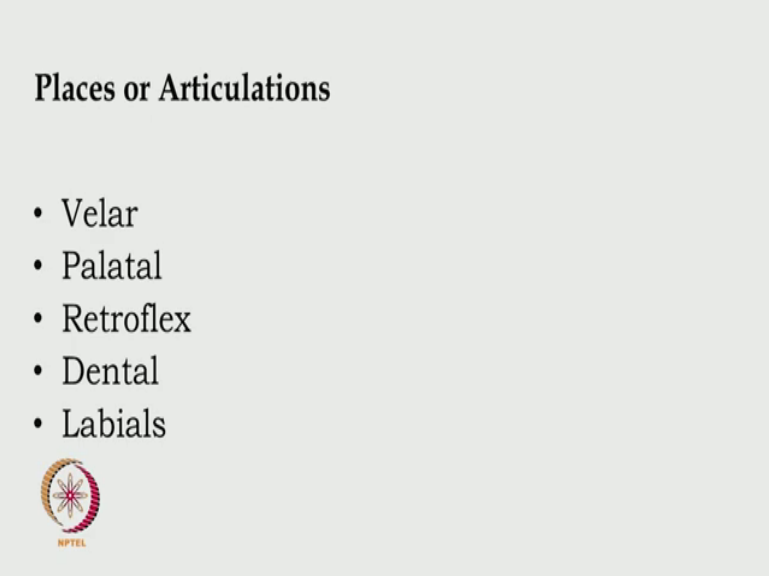

Moving ahead. Now, we want to look at consonant sounds. In the set of sounds that we are going to look at and that is very common in most of the languages that we speak, almost all the languages that we speak, these are 5 different places of articulation. So, in the oral cavity, you will see the location of these 5 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, the palate gives us palatal sound, teeth, dental sounds, lips, labial sounds and there is something called retroflex, which I will show you in a moment. So, let us look at some more on manners of articulation.

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	Oral Sounds				Nasal Sounds
	-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 some of these sounds and then this manner of articulation or places of articulation will make more sense. Do these sounds sound familiar? When we say ka, let us talk about a couple of generic things first to establish certain fundamentals. And then we will look at their classifications according to places of articulation and manners of articulation.

When we say ka, which language does this sound belong to? Is this sound in Telugu, Tamil, Malayalam, Hindi, Sanskrit, English, in a way all the languages that you may be speaking. And bear 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 specific to a language.

Similarly, there are the manners of articulation that you see on the vertical axis. So, if ka is a velar sound, it is not going to change depending upon different languages. This point makes 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 is 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 the language.

Remember the distinction that we established between language and languages, right. So, when we look at these things or in particular, in these manners, then we are talking about language, we are not looking at languages. 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 may, you have said this sound a 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. Well, 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 are coming from velum. So, can somebody say the sound loudly, Sandeep? Can you say this sound loudly, ka?

Student: Ka.

Professor: Ka. Do we see that this is located in this area? Not exactly at this point, in this area. Do you see that? When we say ka, do you see any involvement of lips in that? Teeth, tongue? Do you see that? What is the involvement of the tongue in the production of ka?

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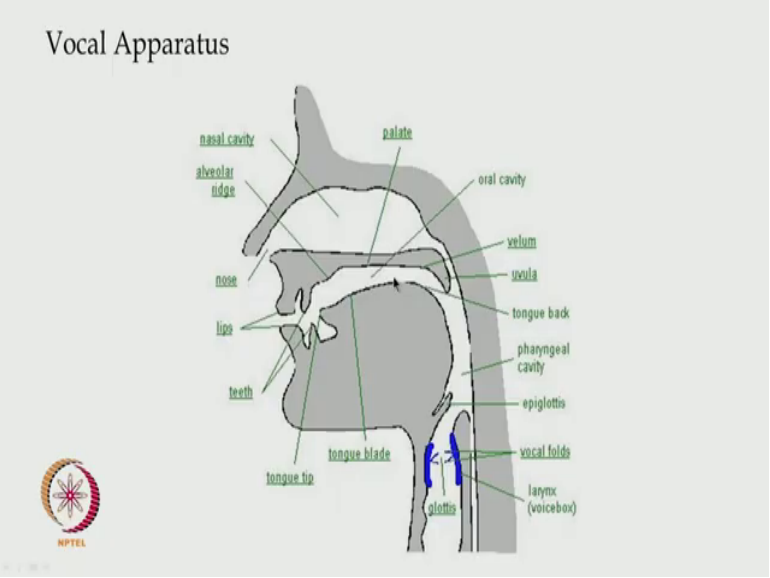

So, this is the place and this is the tongue back that is back of the tongue. Tongue is a long, long muscular thing in the oral cavity. It is not a very good-looking organ in any sense.

But we know how it looks, we see that almost every day. So, and if we divide that also into several parts, that is the 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 that have a huge role to play in production of a particular sound. So, when we say ka, what happens to the tongue back? It raises a little bit, right?

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 raising of the back of the tongue upward towards the velum blocks the flow of the air. When it is released, the sound that we get from that part is called ka 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 these sounds. 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, for us to be saying the sound ka 100 times a day, 1,000 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: Ch.

Professor: Ch, ch. Once again for general information, is this sound available in all the languages that you speak, cha. Now, do you, when you say the sound do you see the difference in place of articulations between k and ch? Yes? And as you can see in the picture, it is moving forward. Velum is toward the back of the mouth and the palate is almost in the middle, so much so that we can feel that. There are two parts of the palate, one part is called the 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, and may not be important for the sounds that we are talking about right now. But there may be some sounds in some languages, which may have palatal sounds which are coming from the soft palate or palatal sounds coming from the hard palate. If there are sounds that are coming from both of them, some sounds from the hard palate and some sounds from the soft palate, then they are given different names.

For the sound cha, 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 5 places of

articulation because I am trying to restrict with this description only to some sounds. This is not to say that there are only 5 places of articulations in the oral cavity for consonantal sounds. There could be more and not could be, there are more for other languages, it is just that we are not talking about a lot of them here.

At the end of it, I will give you some of these sounds that will have different places of articulation, which we are also familiar with, just to see. So, in the production of the palatal sounds, we have moved forward. And now velum is not responsible, what is responsible is the palate, when we say cha. I am sorry for this arrangement. Now the next one, we leave the next one for a moment, we go to the dental ones.

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	Oral Sounds				*Nasal Sounds*
	-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

That dental sound is called t, t. Do you hear that sound clearly? Can you say that?

Student: T.

Professor: Ta. Can you give me a word where you see these dental sounds, a word with t?

Student: Tabla.

Professor: Tabla. Very nice. Thinking is different. We say, thinking is different. Let us leave this for a moment. Somebody from there? Tabla is one.

Student: Tennis.

Professor: No, I am coming to tennis in a moment. Remember these words, thinking and tennis both.

Student: Thalaiva.

Professor: Thalaiva, okay.

Student: Tel.

Professor: Tel. What is the word for Tel in Telugu or for that matter, Telugu? Ta. But nobody told me what is the word for tel in telugu, you understand tel? Tel, oil.

Student: ((???)) (25:17).

Professor: Do you see that, do you hear the sound t in Telugu? 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: ((???)) (25:34).

Processor: Upper teeth. Say it again, t. Say it again, pay more attention to this, and then tell me. What you have said so far is right.

Student: T ((???)) (25:56).

Professor: That is fine, tip of the tongue, which part of the tongue, tip of the tongue, right has something to do with teeth. What does it actually do? Touching that upper part is also kind of true, kind of fine, but it does more than that.

Student: It is obstructing the air that is coming.

Professor: That is given for all the sounds. See, this is why we have already talked about obstruction 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 t.

Student: We are building some kind of pressure and then we release pressure.

Professor: That is also true, it is true. Just like it is true for k, just like it is true for ch. The difference is because the velum is too far back or the 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 toward the front of the mouth, therefore, you

feel the pressure that is given, but a nice observation. There is something else that is happening, which is very clear. Nobody wants to say that.

Let me say this to you, and then see, 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, tel, and table. 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 or I am going to tell you.

But first say the word Telugu the way we say or tabla or tel or many other words with t, we are not talking about ta like table. Can you give me a couple of more words with t?

Student: Tea.

Professor: Tea, table, top, we are not saying these sounds. We are talking about dental sounds like tabla, telegu, tel, and more. Do you agree with this thing? You are in agreement with because I am saying so. 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 just stay there for you to feel it.

See, teeth are a very sharp object. At the same time, the tip of the tongue is the softest thing. If it stays there any longer, you can understand the violence that can happen. Do you see this thing? Therefore, however, that happens every time we say that, all right. And it is observable when you say these sounds in isolation, you simply say t, 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 t in a word. When we say a word, which may have 4 or 5 sounds in it, we do not pay attention to the places of articulation of each sound. And a word may have a sound palatal, may have a dental, may have a velar, 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, t is a 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 the tongue.

So, what is the difference k and kh? Again, more air. Can we say a little bit more precisely? When you say more air, please pay attention to this. We are not denying that there is no airflow in k, it is only more air. And that more is kind of visible. And it is very simple. If you put your hand close to this, close to your mouth and say the two sounds you will feel more flow of air in the second one, k, kh. Do you see that? Can you do that please?

Student: K, kh.

Professor: The more depends on how much more you release, but there is more between the two. This is why and this is referred to in modern terms, the terminology that I have used is an aspiration. So, k is indicated as minus aspiration and kh is indicated as plus aspiration. So, that at least gives us one way of distinction between these two, if we are looking at the flow of air.

Now, look at g, g. So, when we say k and g, there is no flow, both of them have a similar flow of air. But still, there is a difference between the two. When we say k and g, there is a difference between the two. Is there a difference or not, k and g? Now, if we only put aspiration in picture, then it fails to account for the distinction between k and g. The flow of air, more flow of air, which we know as aspiration accounts for the difference between k and kh very nicely.

But again, when we want to look at the difference between k and g, we see no difference in terms of the flow of air, therefore that parameter fails. However, what we observe empirically is that there is 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 gh, then we see the difference. But what we see is the difference between k and kh and g and gh. Again, we do not see the difference between k and g in terms of the flow of air, and we have similar kinds of the flow of air for gh and kh. But still, there is a difference between the two, am I making sense to everybody.

So just the flow of air, that is aspiration is not telling us 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 the vocal cord, what we saw in the picture, and remember where it is located, it is located in the glottis. So, what is after aspiration that you see in this chart 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 k and g. However hard that maybe it is possible, where do you think will be glottis located, somewhere here. So, if you put this thing here and say the two sounds, k and g, k and g, k, g, it is not as nice as it comes out of musical instruments.

But you do see more vibration when you say g. And that is the voicing, which makes the difference between k and g and also between kh and gh. So, ka becomes a sound which has no vibration, no air, kh is a sound which has only more air but no vibration. g is a sound which has no air, but vibration and gh 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 the picture, then we can assign distinctive features to each one of these sounds, even though the place of articulation is the 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 distinctions, which we call manners of articulation because it is about more air, less air, more vibration, less vibration, these are termed as manners of articulation. And different locations in the oral cavity are called places of articulation. This may not have been told to us for a reason, but when you look at these sounds, then you see why they are arranged the way they are.

Now, since we are looking at this chart, I should also draw your attention to one more thing, which one of these 5 places of articulation 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 articulation is easy to see?

Students: Lips.

Professor: Lips. They are quite in the front and are observable. Still, when we see the chart and this classification, what we see is that they are starting at a 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 that this chart wants to tell you without writing or without saying that.

Student: ((???)) (40:41).

Professor: That is fine. That is absolutely true. So, in the labial that place is lips, and in velar, that place is velum. But why, that is fine though, what I am asking is. And please look at this question carefully. What I am asking is why this arrangement does not start with a labial, because labial sounds are very easy to see. Remember, even kids start watching movements of lips. Therefore, they end up saying words like Papa, Mama, Baba, right?

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, Papa. The child may not know anything about Papa, 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 start with labials first and then velum because labials are more visible. And if anything, that is true about velar, velum is not visible at all. So, what the person who did this arrangement, what is the rationale behind that? Is there no rational or is there some rationale, which is not as stated, but it is for us to see.

Student: The ordering of the sound shows that they start up at the back of…

Professor: They started the back of.

Student: Then they gradually move out from the throat, then palate, then and up to finally through lips.

Professor: Absolutely true.

Student: But why is lips at the end and others first?

Professor: It has an answer in what you said.

Student: Because we have distinguished between ((???)) (42:29) sounds and oral sounds.

Professor: Not true, but not the answer.

Student: You learn from sound and not side.

Professor: 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 the production of sounds which are air, inhaling air or exhaling air?

Student: Exhaling air.

Professor: Exhaling air starts modification where 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 the production of sounds. You see this thing. If someone did this today, there is no Nobel Prize for linguistics.

If someone did this thing today, and talked about all these things, I am not sure about the Nobel Prize, but this must have got them some name. But this person did not even write the things, they knew about it. Trust me, this arrangement could not have been possible without the person knowing about these things. See the point that I am trying to make. So, it is not a coincidence that it starts with velum and goes to labial.

It is moving gradually from velum to palate to dental and others to lips. So, you could have gone all the way backward. But not going backward simply tells you that I am talking about the directionality of sounds, the directionality of flow of air, which is responsible for the production of sound. Get this thing. There are a few more things, salient features of these sounds, and a little bit more about manners of articulation that we need to discuss, which we discuss tomorrow when we meet at 1. Thank you.