

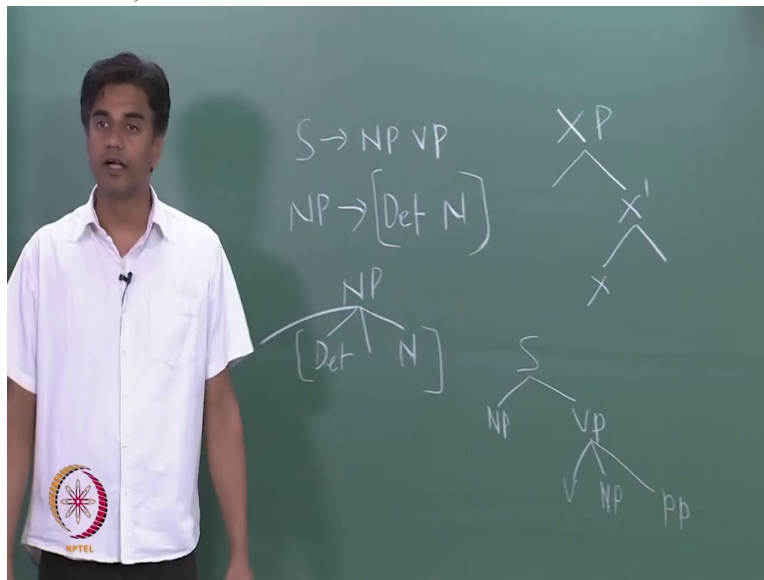
Basics of Language Science
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Lecture 21
X-Bar Theory

We started looking at the structure of a phrase. First, we looked at what is a phrase, how do we make a phrase, how do words group together to make a constituent and which in turn becomes a phrase. How do we name a phrase and then now we are looking at what is the structure of a phrase? How do we name a phrase? Why do we name a group of words a noun phrase?

Student: The most important part of that phrase. Everything relates to the noun.

Professor: Everything relates to nouns, the most important part of that phrase is noun and everything, determiner and some other components are directed towards nouns, therefore a noun phrase and likewise for everything else.

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Then we started looking at the structure of a phrase and in which we saw that the structure is such that we have this. This is going to be the structure of a phrase. Now, I want to take you a little bit back to put the whole thing into historical perspective. So, first we looked at what we said, phrase structure rule, right, understand this? We looked at this thing and we said this is phrase structure rule. This gives us, this is a blueprint of a

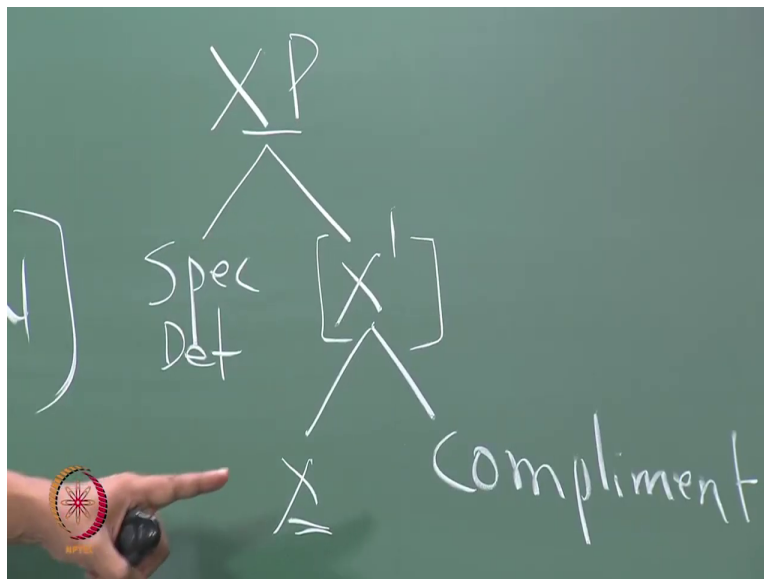
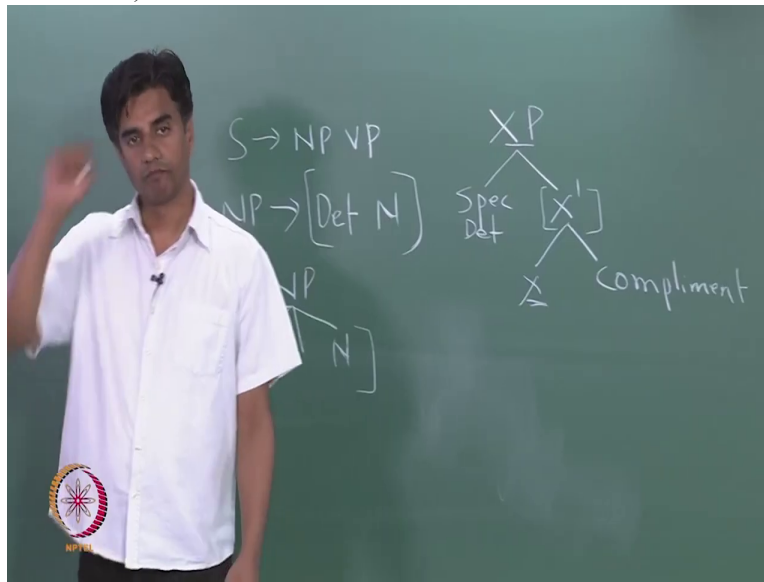
sentence. This is how we get a sentence in every language. So, this was nice but merely a statement of a sentence.

Then the next step was when it was looked at as, so for example, if we have an NP and this had let us say a determiner, an N, so structurally this was represented as determiner and N. The point here was or what was missing from here was both of them were equally, both of them were equal. They had equal status.

So, the criticism of this was why do we need to make it so fancy, stuff like structure and trees? We can do it with a bracket. And we still know this is a phrase. So, what is the need of this thing? Because if there were three constituents in a phrase then they would go for three. If there were four, they would go for four, so there was no restriction on branches. See the point?

So, a sentence was given like you have a sentence. It was given like an NP and VP and then again VP was V, NP, PP. So, the problem was capturing some of the things but again for many things it was putting in such a way which sounded more or less like in a statement. Therefore, a little later it became like this one where the idea was, we are going to have only binary branching and then we came up, this notion came up and this is why this whole thing is known as X-Bar Theory.

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As you can see, we have a phrase and then we have head of that phrase. There is no such category as X-bar. It is just a hypothetical node for giving us a binary branch, all right. And this is the place for, which is called a specifier place in which we put things like determiner and some other stuff whatever qualifies to be a specifier and this place is going to be a place which is called complement. This is the place which is going to be called a complement. Let me show you once more a sentence before I talk about a specifier and complement. Everything making sense on the slide?

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Sentence

- [Students of physics like pizza with their friends in the evening.]
 - Subject: Students of physics
 - Predicate: likes pizza with their friends in the evening
 - Verb: like
 - Object: pizza



3

We have a sentence and then we are just giving its categorical description in terms of what we have seen. The sentence is, students of physics like pizza with their friends, sorry?

Student: Like to eat pizza.

Professor: Sorry?

Student: Like to eat pizza.

Professor: I have removed “to eat” from here. Is that a good sentence still? They like pizza.

Student: Yes.

Student: Second part does not make sense.

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Phrase structure Rules

- Students of physics likes pizza in the evening.
- S = NP VP
- NP = N PP
- VP = V NP PP
- NP = N PP
- PP = P NP



4

Professor: Okay take this sentence as, can you write this down, the sentence? I think I intended some modification in this, I did not do. Students of physics like pizza in the evening. Okay?

Students of physics like pizza in the evening, this one. The idea is I mean we can add students of physics like to eat pizza with their friends in the evening that is not a problem. The idea is I wanted to simplify the sentence for you to see some other stuff. Is this phrase structure okay, can you quickly check for this sentence?

The sentence is NP and VP, NP is N and PP and then VP is V, NP and PP and then NP is again N and PP and PP is P and NP. Is that, are these rules of phrase structure describing the sentence before? Pay attention to this carefully and if you have any doubts or questions, please let me know.

Do you agree and understand that, students of physics is the subject of this sentence? The whole thing, not the students but, the students of physics, is a subject of this sentence which is an NP but this NP has a PP in it. This is why the first NP is N and PP. When you see the VP, you have a V and NP which is, like, and, pizza, is NP and then, in the evening, is PP. Can I move, is this okay?

Students: Sir, in VP equal to V, NP and PP, V is for, like.

Professor: Right.

Students: The pizza is NP.

Professor: Right.

Students: And, in the evening, is PP.

Professor: Right.

Students: So, we should have one more, that NP is just equal to N because there the noun phrase does not have two parts, noun is just a single pizza.

Professor: Yes, you can do that. That is also possible but how about, you are in a way right. But I am trying to put it as pizza in the evening as NP.

Students: Then maybe it should have been V and NP alone.

Professor: V and NP alone.

Students: The third line, we had our PP, trying to break into three parts.

Professor: There is a reason why I am putting an NP there and this is why I said you are right. You are right when you are saying that NP should be just N, you are right, but the reason why I was putting here NP as N and PP is because I am putting pizza in the evening together but again you are right that in that case it should be just V and NP. You are absolutely right; I am glad that you are following this.

But I want to make it, the reason why I am putting NP and PP both there okay is because I want you to see, in the following few minutes that there is a distinction between pizza, and in the evening, which is to say, now let us backtrack a little bit. The verb, like, let us look at the nature of the verb, like, is this a transitive verb or intransitive verb?

Student: Transitive verb.

Professor: Sure? Should not be any, nobody should have any confusion, it is a transitive verb. The moment we see it is a transitive verb, is it going to have an object, right? Most

of the time objects are NPs. So, therefore that NP, pizza, is the object of this verb phrase, this verb. In the evening is not the object. It is an additional component in the verb phrase. It is part of the verb phrase but it is not, not the object of the verb. Getting this point? It is not the object of the verb. What we are saying again is subject, verb and object, where the verb decides about its object, these are the required things in a sentence.

We could have more parts of a sentence, more components in a sentence but they are going to be merely additional information, therefore, in the evening. In order to retain simplicity of this sentence, I could have just dropped, in the evening, and given you a pure bare sentence but I want to make this point that pizza is the object of this verb, like, which is a required element in the sentence, whereas, in the evening is not a required element in the sentence. That does not negate what you were saying. You get my point? You are right but the reason why I am putting this PP here is for that reason, okay?

Now, see, I have put a term here called recursion. You understand the meaning of recursion? Okay, I will talk about recursion, why I put recursion here a little later. Let me go back to recursion, is it okay, let me briefly mention it. Recursion is a property of phrases and phrases have this recursive nature and recursion is also one of the properties of a phrase or a sentence which can give you infinitely long sentences. And again, we will come back to this and talk about them later. Also, there is a reason why I wanted to put a bigger subject of this sentence as a bigger phrase and I am going to show you that part also in a moment.

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Phrase Structure Rule

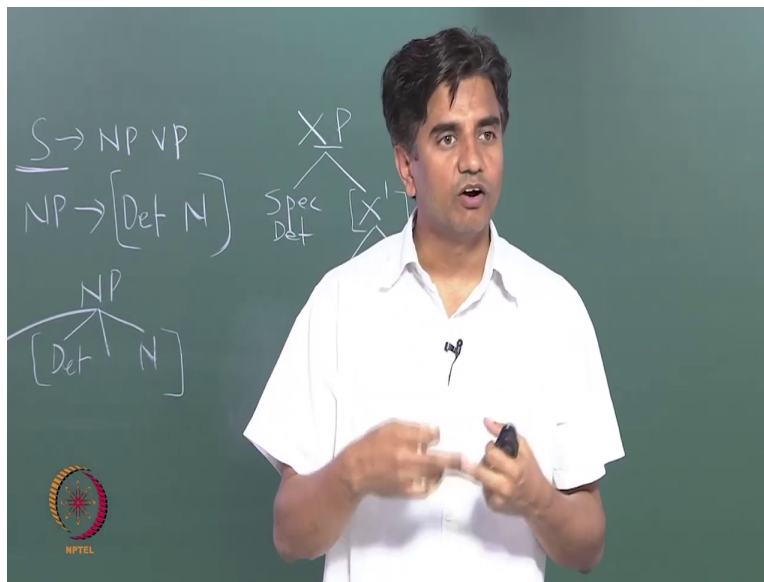
[S/IP/TP/AgrP [NP Students [PP of physics]]

[VP likes [NP pizza [PP in [NP the evening]]]]]

S = IP = TP = AgrP



5



So, let us look at this. This is what I was trying to do here. Now, look at this, this is okay? Again, the questions that both of you were raising are not taken care of in this sentence. This is exactly what you have seen before. It is just giving you phrases. Making sense?

Now, there is just one additional point that I want to make through this is when you say a sentence and this is going to be more significant when we discuss a little bit more about phrase structure, sorry a little bit about X-bar theory, that what we said sentence here, this is also a phrase by itself.

And some people call it IP, some people call it TP and some people will call it AgrP. Do these terms make sense to you? AgrP is agreement phrase, TP is tense phrase, and IP means inflectional phrase. If you are taking notes, which I sincerely encourage you to do, can you please take a note of these things? These are important terms.

IP is inflectional phrase; TP means tense phrase, and AgrP means agreement phrase. At the same point I can also tell you that in the second chapter of the book that I have sent you, these phrase structure rules are described. So, you can also take a look at chapter two of the textbook.

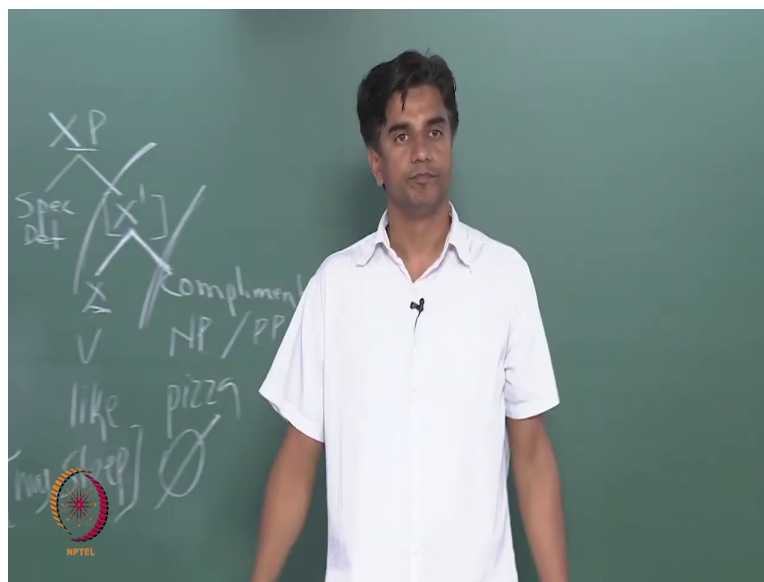
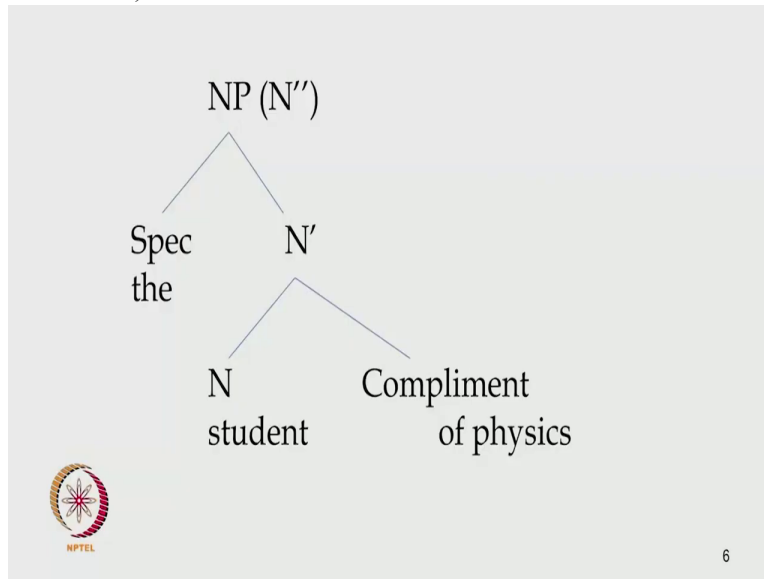
Again, a brief note on IP, TP and AgrP, I think they should follow from the discussions that we have done so far. What is that, okay, let me put it this way. Remember two types of things we have seen, lexical categories and functional categories. Words like student, physics, pizza, like, evening, these are lexical categories. And then we saw functional categories like agreement, tense, aspect, the part of agreement was number, person, gender, all such sometimes together or individually are functional categories.

So, the reason why a sentence is called an IP is all these functional categories together are called inflection. These are, they represent themselves in terms of inflection on different components in a sentence. So, the idea is some people consider agreement as the most important part of the sentence, that is, without agreement you do not have a sentence. Therefore, the sentence equals an agreement phrase. At the same time some people consider tense as an important part of a sentence. There are two types of sentences, one could be tense-less sentence and the other is sentences with tense and that is an important part.

Some third group came up and combined the two. That both tense and agreement are part of inflection. They are functional categories; they are part of inflection so there is not much of an advantage of calling one over the other. Let us put them together and call it an inflection phrase. In other words, the whole idea of a sentence is not about a lexical item or its different lexical items like students, physics, like, pizza, or evening.

The idea of a sentence is about its underlying hidden characteristics, hidden features such as functional properties and therefore these names, clear? So, and we will reach IP, TP all these things when we are done with the X-bar. It is all taken care of into X-bar. I will show you that when we reach the sentence level.

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Now, this is what we have been looking at. So, when we say, when we look at this part, I can get rid of this also. It is the point that I discussed here, is this clear to you? That this was a phrase structure rule in historical context around 1965. A little later, this was not

adequate, people started talking about structures of a phrase but the structural description was not adequate enough to capture everything that people wanted to say or they came up with more stuff.

So, these things became historically a little bit insignificant. Where we stay now, is this. So here we have a specifier and head and a complement. The thing is this, what do you see here. This gives us, we have already talked about this part and I think I have repeated this enough times so that you understand the requirement and function of this part.

Look at this, structurally the specifier is higher than its head and complement both. Making sense? Structurally specifier is higher than its head and complement which means whatever is going to be the specifier or determiner has a scope over this whole thing. So, specifier does not simply belong to nouns. In a phrase it is specifying everything that is under its scope and this thing is nicely captured by this hierarchical configuration.

Second part which is important is compliments are always going to have a sister relationship with its head. So, if something is a compliment to the head it is always going to be in a close relationship which is called a sister relationship. By sister relationship it simply means both of them have equal status.

So, what we have been looking at so far as an object. I will come to that when we are talking about a VP but since we have been looking at transitive verbs and objects of a verb, so let me give you an example from there and then I will come back to NP. The complement of a verb, sorry, the object of a verb is called the complement of a verb.

If there is a complement, it is going to come here. If this is a VP, then this is V and this is where you are going to have the NP. If there is no object in the verb, so in a sentence like, like and pizza, are going to be in this configuration. Imagine you have a verb which does not have a compliment and has something else. For example, let us say, can you give an example of a verb which does not have an object?

Student: Sleep.

Professor: No, no. That is true, the verb sleep is an intransitive verb and it will not have a complement, right, but I want something more. It has something else. Okay, take the verb sleep and put it as sleeping in the evening. John was sleeping in the evening. Is there an object in this sentence? No.

So, in that case sleep is the head of this phrase and there is no complement. Now the PP, in the evening is not the complement of that verb. The PP, in the evening, is not the complement of that verb therefore you do not get a PP here. Are you with me? Do you see this thing?

Now, the point I making is, it is not that a PP cannot be a complement. In some cases where a PP will be the object of the verb or the complement of the verb, then only it can come in this place. In the cases where a PP is not the complement of a verb, like this one, it is not going to come in this place.

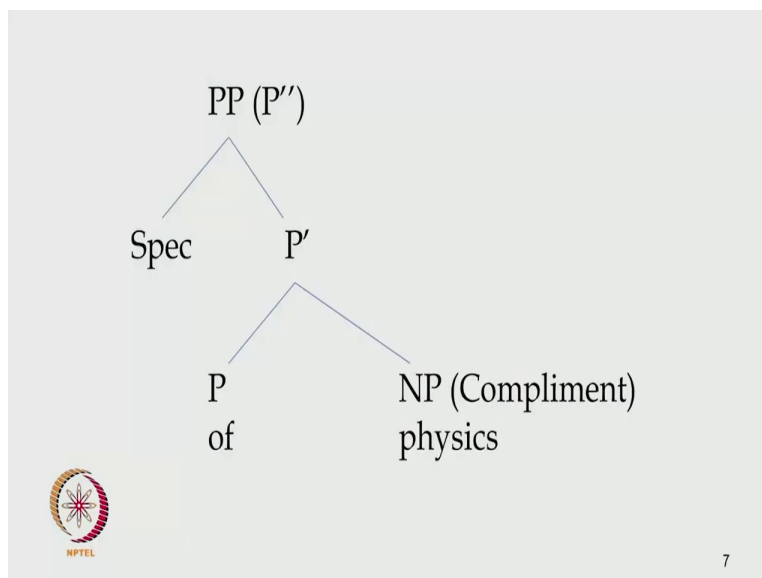
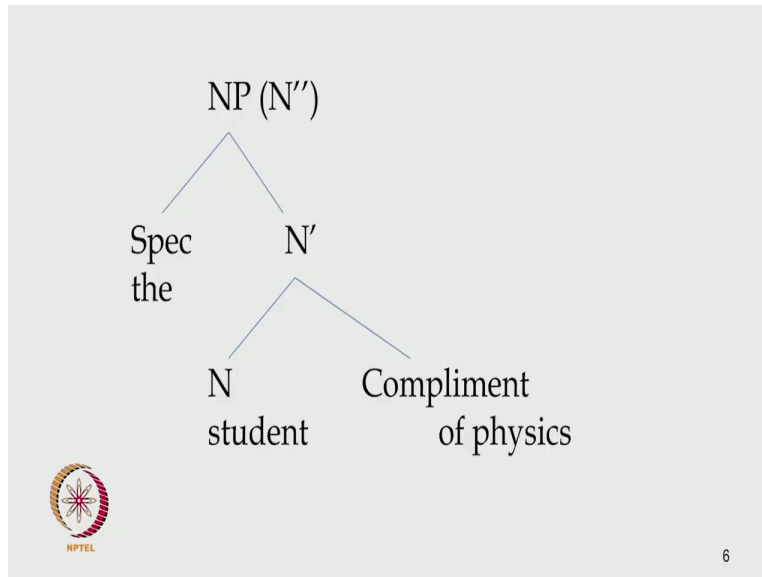
Then it has to go somewhere else. Right now, I am not showing you where, but it has to go somewhere else. This is the significance of this position. In an X-bar configuration, I am trying to show you the significance of this position, complement. In this position either you will have only a complement or nothing. This position can stay vacant but it does not allow anything else. Therefore, the head and its complement are going to be in an equal sister relationship. Making sense to everybody?

And specifier and rest of the two, specifier and head and complement are in hierarchical relationship. This notion is captured, this fact is nicely captured with binary branching. Any question, any difficulty?

Student: Sir, V will be was sleeping then that will be fine.

Professor: The sentence will be was sleeping, right? Right now, yes, we can put, was sleeping, but the reason why I put only sleep here is because, was, goes somewhere else. Let me come to that level and then you will see. It goes somewhere else but for the time being we can say yes, this whole thing is the verb, so ((???) (26:08) here. All right, very nice.

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So, let us look at this one, the subject that we had in this sentence and then we go to the sentence level. This is the subject that we have, students of physics like pizza in the evening. This is the subject we have. The subject is an NP and this is how that NP is represented. Please pay attention to this to the fact that of physics is the complement of the noun, student okay. Why it is a compliment, is what I will show you, is what I will discuss with you.

And how do we know that this is a compliment. Why, just now we saw, in the previous example I do not have everything on the slide, in the previous example, that John was sleeping in the evening, in the evening which is also a PP. Is this PP, in the evening? Which is also a PP and is not a complement. In this case, of physics, which is also a PP, we are saying this is a compliment. So, there has to be a logical grounding on the basis of which we can say some PPs are compliments and some PPs are not.

This decision cannot be arbitrary. This decision cannot be, okay, let us consider this PP as complement. Let us consider certain PPs as not complement. The things that are not complement in this structural configuration are called adjuncts. So, some PPs are compliments and some PPs are adjuncts. There has to be a reason why some PPs are compliments and some PPs are adjuncts.

I will show you that as well. Now, this is a PP, of physics. This is how we get. In this configuration, of is the head of this phrase being a preposition, and physics is an NP, complement of this preposition of, clear? And there is no specifier. So, from these two structures you can see we have positions of, in every phrase, we have position for three things, specifier, head, and a complement.

Head is a required thing, only then you have a phrase but sometimes you may have a complement, sometimes you may not have a complement. Sometimes you will have a specifier, sometimes you will not have a specifier. In this case you have both. Specifier and complement, both are available in this phrase, the student of physics. When we talk about PP, of physics, there is no specifier. If we go in a recursive fashion and breakdown this NP complement in this structural configuration, what do we have and what do we not have, quickly?

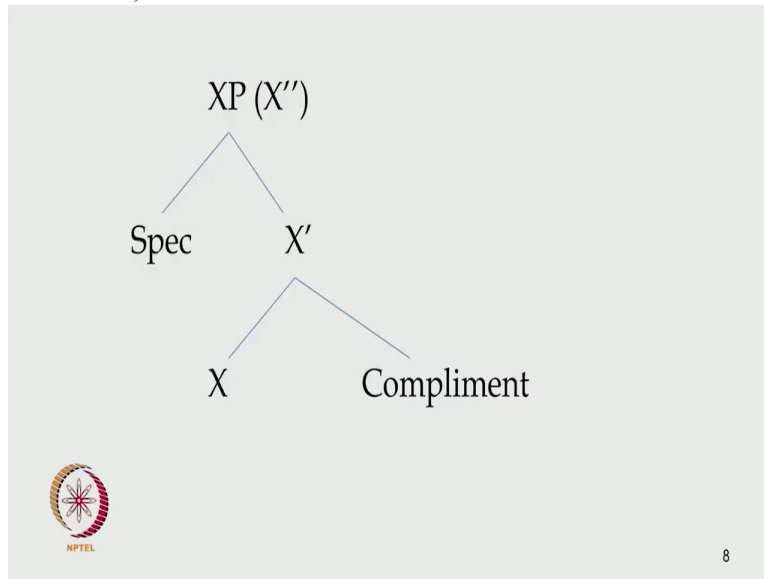
Student: ((??)) (29:42) no compliment.

Professor: We have no complement and?

Student: Specifier also.

Professor: Do we have a specifier, no specifier. Do you understand this question and answer, everybody? Yes, no. Do not be shy. Please tell me. The answer is correct but I am just trying to make sure that everybody follows the question and the answer, both. Okay, all right.

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This is what we call and this is why we call them X-bar. This is how we get the whole phrase.

Student: So, physics has no specifier and no complement in the diagram which you just showed?

Professor: Yes.

Student: Why is it?

Professor: What I am saying is, if you break this down further, see in this phrase what is the head, of, and the compliment is.

Student: Physics.

Profession: Which is an NP, right? If we give its full configuration.

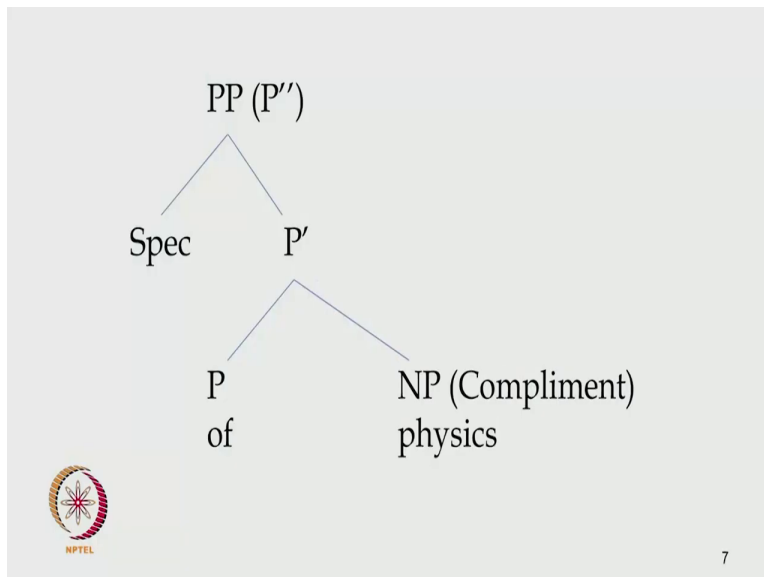
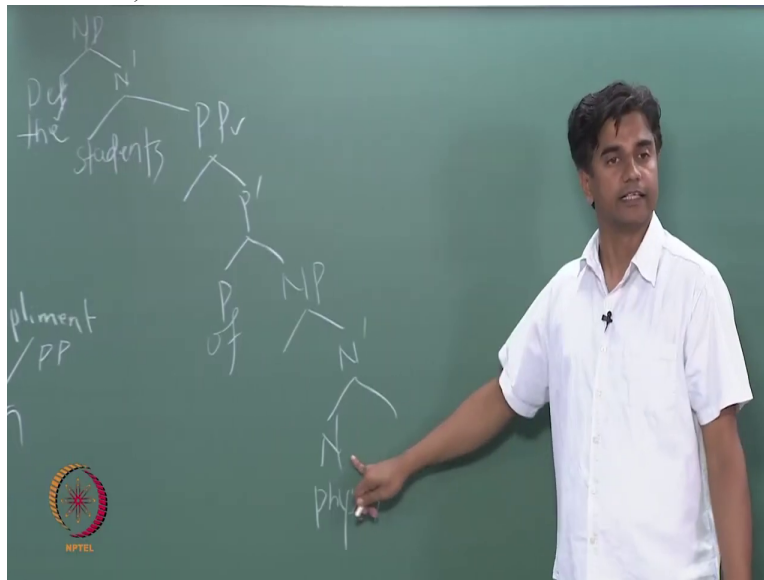
Student: Of that NP.

Professor: Of that NP, then in the specifier position you have nothing and in the complement position also you have nothing.

Student: So why don't you just call it N?

Professor: That is what we are trying to say. An N can also be the full NP. An N can also be full NP. This is precisely what we were trying to show you in the phrase structure rule. Even, so this possibility was not available in phrase structure rule.

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Here, we can show clearly that through recursive fashion that see, we have a PP, we have P and then we have another NP which will have an N, of, physics. This is how we actually get it. We can put further things like, get this thing? So, we have an NP, students of physics, this is how we get the whole structure, students of physics.

If we want to say the student of physics, then this is how we get. The point is, and now I am putting everything together. The point is sometimes in a phrase you are going to have a specifier. Sometimes in a phrase you are going to have a complement. Sometimes you may have nothing, neither a specifier, nor a complement. Nonetheless, that position is not killed. The position is still active.

So, what we do is when we are giving the structural representation instead of leaving several empty positions, we put it the way you see it on the screen. Should not be complicated for you. This is why we end up there. We do not even write complement. The whole point of putting the word complement, and the specifier is for you to understand what those things are and since we are looking at them for the first time, we are putting them. Otherwise, we are going to take it as a given thing that, the, is a specifier. Anything else here, no?

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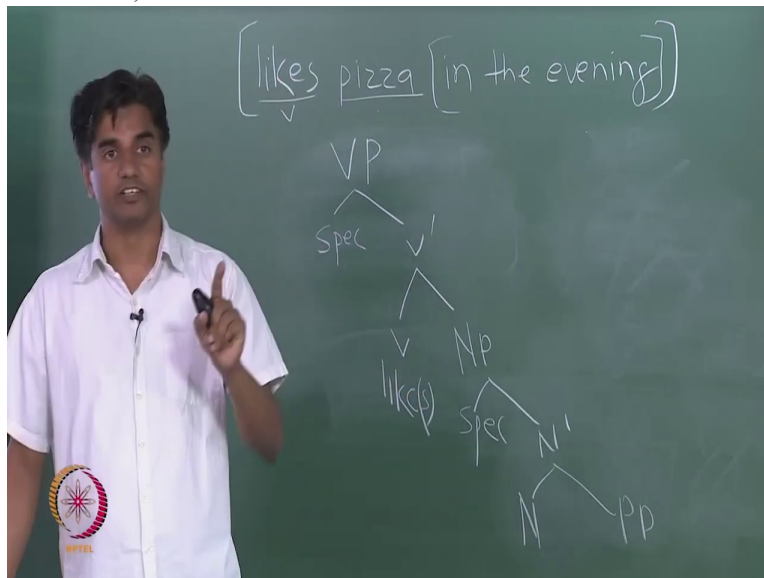
NP (Noun Phrase)

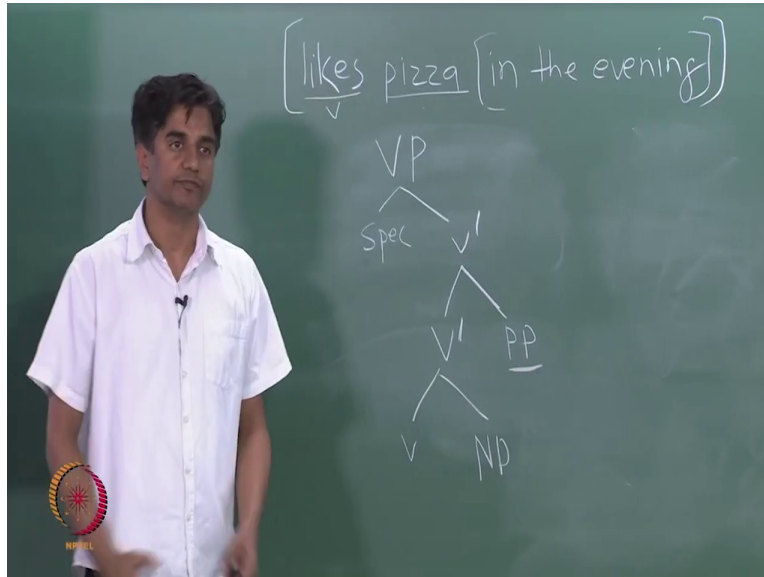
- The king of England
- A student of physics
- A student with long hair
- A student of physics with long hair



Since we are talking about the structure, I want to move a little bit further in the structure and then come back to the whole notion of why some PPs are complements and why some are not, that is, some are adjunct. I am going to come to that notion a little later. So, we get this thing clarified. Nobody has any question or any doubt here, right?

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Phrase Structure Rule

[S/IP/TP/AgrP [NP Students [PP of physics]]

[VP likes [NP pizza [PP in [NP the evening]]]]]

S = IP = TP = AgrP



Phrase structure Rules

- Students of physics likes pizza in the evening.

- S = NP VP
- NP = N PP
- VP = V NP PP
- NP = N PP
- PP = P NP



Now, I want you, let me go back to my sentence, I want you to draw the structure for the whole VP, likes, pizza, in the evening. Can you try drawing that? Can I delete this part? Is this clear to everybody? So that we have more room on the board. So how do I begin? If I have to talk about VP, how do I begin?

Student: Specifier.

Professor: We will have a specifier, nice and then we have here, V bar. And then we are going to have V and NP, fine? So, we get, V is our, it is only, like, but for the time being I am putting here as, likes, and our NP is, again it can be expanded further but we only have here as pizza. See this thing? Now go back to the preliminary ideas that we have discussed. I think we have spent three-four, at least three hours on that to talk about the whole predicate, the notion of predicate, object, verb and subject. Can we call this whole thing predicate? This is part of predicate but we are saying in the predicate we have a verb; we have an object which is the compliment of this verb but this is not part of the complement of the verb.

So, one way was to expand this further and see that this N has the PP compliment, N has the PP compliment and then we go from there. Are you with me? But since we are saying this is not part of the object, therefore it does not become the complement of this N. Now

just a moment ago I told you what is the distinction between a complement and an adjunct, I am going to talk about that, the following discussion is that.

But right now, so we are not, that simply tells us that we are not making an arbitrary decision that this is not part of the complement. There is a reason why we are making this decision that this is not a part of the complement but the question is if it is given that it is not part of the complement, how do we represent this in a sentence?

Student: For NP we will ((??)) (38:21).

Professor: So, this is what I am telling you. We have this option. We can do this. We can say, we can expand this and say a specifier this one, hold on, hold on, do not write this thing, N and PP. Do you see this thing? We can do that, but what we are saying is not part of the complement. This is what these people were saying at that, remember? Remember the phrase structure where these people were saying that this V, if this PP is part of this complement, then it should only be V and NP and then NP can further be expanded as N and PP.

That is exactly what their question was. Am I clarifying that and they are right? I said it at that time and I am saying it now also. They are right that this is not part of the complement. So, if it is not part of the complement then this expansion does not work. And if we represent this PP like this, then we are eventually saying this is part of the complement. Get this thing?

This distinction whether something is part of the complement or not has to be conceptually represented. In other words, these things are categorically clear in the human mind. Therefore, their representations are different. How do we make that distinction is the question? I do not want to lose track of what we are actually doing here.

We are not just doing some fancy stuff. We are talking about, we are still relating this and we want to retain the idea of acquisition, the idea of I-language and what we said that how acquisition works at the level of human mind, how we have figured out the rules that is how a child has figured out the rule. It is just a description of what is it that they have figured out.

A native English-speaking child has figured out this rule that in the evening is not part of the complement of this verb. So, in that case, how is it that it is represented and when it is part of the complement like here, when we say, students of physics, so, student, and of physics is a complement of this student.

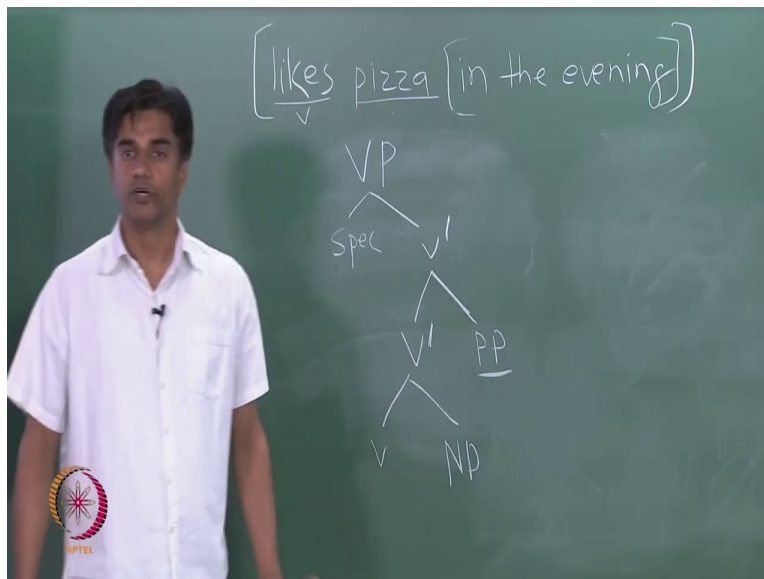
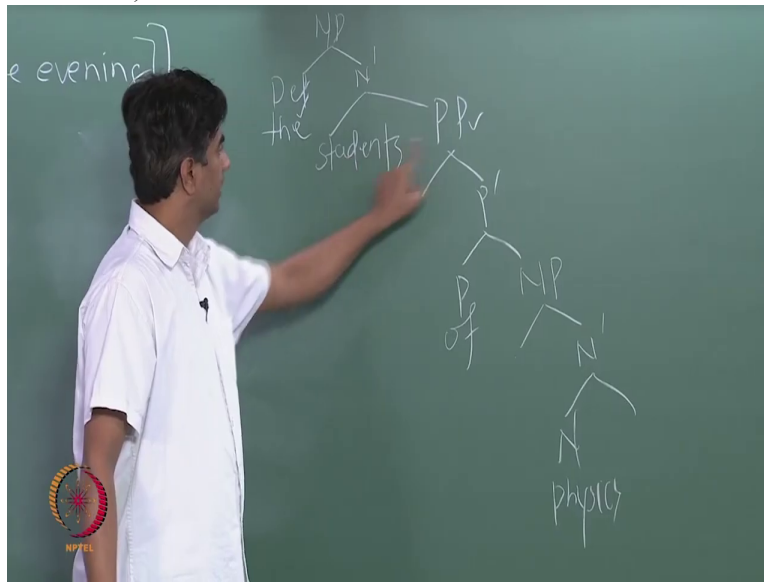
If it is a complement of this noun, then we represent it this way. This PP is not the complement of this verb. This is what you see here. Students of physics, of physics, as a PP is part of this. In the evening is not part of the NP. It looks like that in the phrase structure because there is no other way to represent this in the phrase structure and these things were the problems in phrase structure.

So here is how we represent this. This is not a big deal. We only need to find a technical tweaking here. You see, do you see what we want to distinguish? Yes or no? I do not want to lose the majority of the class. Are you with me? Do you see the distinction that we are trying to make? That distinction will be captured and if there is any confusion please raise your hands and let me know.

That distinction is captured also with the help of this intermediate category. The job of the intermediate category is to give us binary branching and also the job is to give us more positions. So, what this does actually is it retains, it gives us to represent an adjunct. What we do is, we create one more space with the help of this intermediate category.

We are not changing anything. We are still retaining the whole notion of head and complement, see this thing? We are still retaining Spec. We are still retaining the notion that a Spec is higher than the head and complement. And we are retaining that the head and complement are in close sister relationship. So, we are not breaking any principle. We are only creating one more space and then we say this place is adjunct.

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If this was a complement, then we get it this way, equal relationship. If this was not a complement, then we just create one more and get it additionally adjoined and not disrupting the adjacency between head and the complement, not disturbing the complement itself. Are you with me? Do you see this point that, likes, pizza, in the evening, will be represented this way. Is this representation clear to everybody or do you want me to draw this thing? You can draw this on your own in your notebook.


Before I conclude, I want to tell you, I told you I am going to talk about the distinction, what makes the distinction between an adjunct and a complement, how do we know

which phrase is a complement in a sentence and which phrase is an adjunct, we are going to see. In fact, we know half of the answer. We know which phrase is a complement. When it comes to a verb, the complements are always the objects and additional PPs are going to be adjuncts.

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NP (Noun Phrase)

- The king of England
- A student of physics
- A student with long hair

 A student of physics with long hair

Can you look at these phrases? The king of England. A student of physics. The next one is a student with long hair. Do you see any distinction between, student of physics, and a student with long hair, in terms of its meaning? Do you see any distinction between that? Structurally both are the same, student of physics and a student with long hair.

What I mean by saying is both of them have a PP within an NP, but do you see any distinction between the two, do you feel any distinction between the two? The reason why I am asking you this question is in one case PP is a complement, in the other case the PP is an adjunct.

Student of physics with long hair. That is also an NP. The reason why I am giving you these four phrases is before I talk about the distinction between complement and adjunct to you, please think about these four phrases. When you are thinking about these four phrases, please leave everything that you know about the language English aside. I want to convince you that I am not talking about English. The idea is not to teach you English grammar or for that matter Hindi, Hindi rules, or grammar or anything else.

The idea is to see what is a complement and what is an adjunct in any language. The reason that you are going to find behind these two sentences, the difference between these two sentences is going to apply to all the languages of the world. So, please think about these four sentences like you have seen what I said about likes, pizza, in the evening.

So, next time we are going to discuss two things. We are going to discuss the distinction between complement and adjunct and then we are going to see further up, how do we combine subject in the VP to get a sentence, what we call IP. No, not a complicated thing. Again, you can see IP will be drawn under the X-bar. We only have to see where does VP come and what is the VP complement of in an IP. That is all we are going to see and it is going to be very simple thing and once you realize it is simple, it is going to be fun.