Indian Institute of Technology Madras
Presents
NPTEL
NATIONAL PROGRAMME ON TECHNOLOGY ENHANCED LEARNING
Introduction to Modern Linguistics
Lecture-23
Syllable – Based Generalization

Prof. Shreesh Chaudhary
Dept. of Humanities and Social Sciences
IIT Madras

Good morning okay we have been talking for some time about organization of his speech sounds in natural languages and we have claimed that many variations many variations sound taking one form in one context the same sound appearing as another variant in another context etc has a pattern they are predictable now if that claim is right if they are really predictable if we can say it will look like B when it comes before C then we should be able to write machine readable rules .

Then we should be able to write algorithms that will predict that A becomes B when it comes before C or A becomes X when it comes before Y as in other aspects of nature how is that rule written in phonology in linguistics generally and in phonology in particular so today we will look at some conventions these are not god given rules these are man-made conventions okay just as you have many others social conventions .

In some countries you greet the elders with your hands folded before you in some other countries they greet the elders by bending low in some other countries when they see a stranger they stand straight maybe bend backwards but they give their hand and shake you know there are variations similarly in Sciences there are conventions of rule right in today's session we will look at convention of rule writing in phonology .How do we write rules to predict variations in speech sound right.

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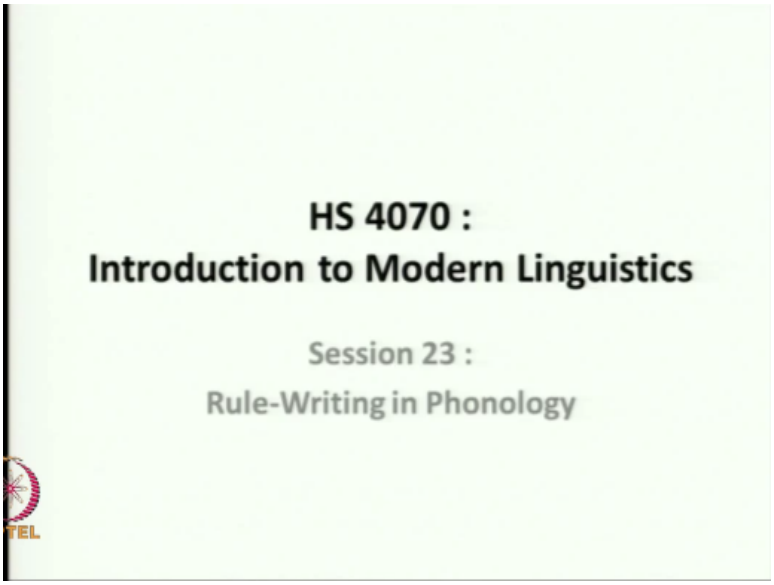

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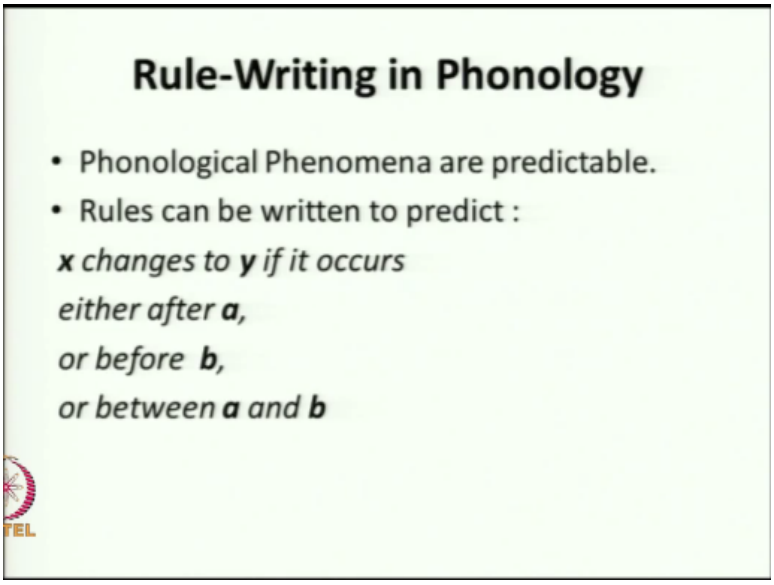

Basically this is the skeleton of any rule you know what you see on the screen is the skeleton of any rule in phonology you have a phenomenon you have changed in the phenomenon and you have context of the phenomenon so for example you can say X changes to Y or I said A changes to B you know one changes to two choose what you like X changes to Y so you have a phenomenon the phenomenon is X you have a variant the variant here is y Y okay X takes the form of Y when does it do that either you know these are all imaginary either it when it comes before either when it comes after A or it comes before B you can also say either it when

it comes before A after B in other words you have to have for rule writing you have to have these three things .

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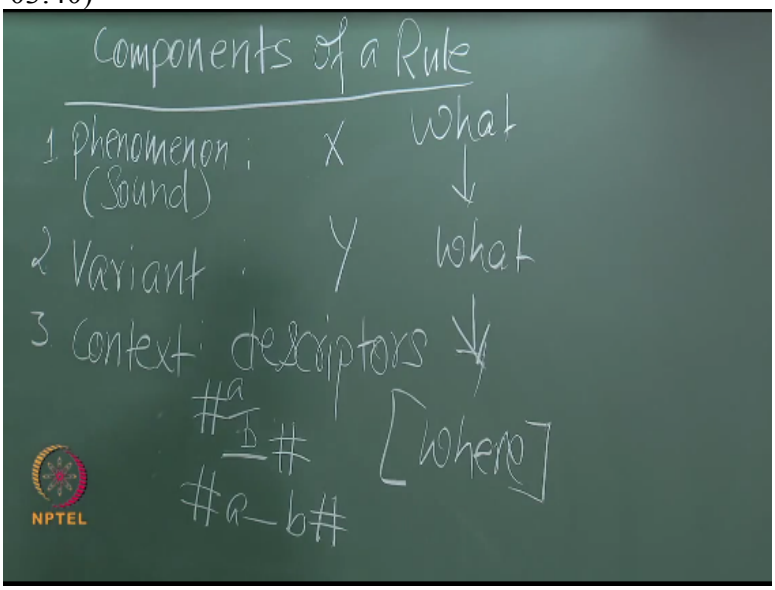

Components of a rule what are the essential components of a rule when you write number one it is a phenomenon in this case you can call it sound it is a particular sound okay which sound are you talking about or which feature are you talking about okay then it has a variant that is another sound or another feature a variation you know this changes into that so you need this and you need that okay and then third is pretty simple you need context .

Now context requires descriptors you describe the context what can be the context something comes before something comes after something comes in middle so a context can have descriptors those elements that describe the context so the context can be at the beginning of the world suppose in linguistics we use this what do you call it we call it double cross or word boundary this indicates if you write it this way then this is the beginning of a word.

But if you write it this way then this is the end of the word so you know the so you either something comes at the head of a word either something comes so you know you can have A you can have B here let us say the phenomenon is X the variant is Y and the descriptors can be either A or B or between a and b okay in other words a rule can be written so long as you know what changes to what and where this is what changes to what and where linguistic theory .

So far has not made much attempt there have been some feeble attempt some half-hearted attempts to describe why but so far you know there is not a consistent body of literature and knowledge that says why exchanges into why why a changes into B but we have reasonably good amount of knowledge and literature on what changes to what and where so a rule necessarily has these three components can you close your eyes and listen to me and then repeat number one what changes to what it changes variant and then where it changes context what does it take to write a rule can you close your eyes and tell me.

What changes to what it changes and where it changes to describe where you need a minimum of two things between what or before and after what you can say either after A or before B or between a and B okay let us look at some examples.

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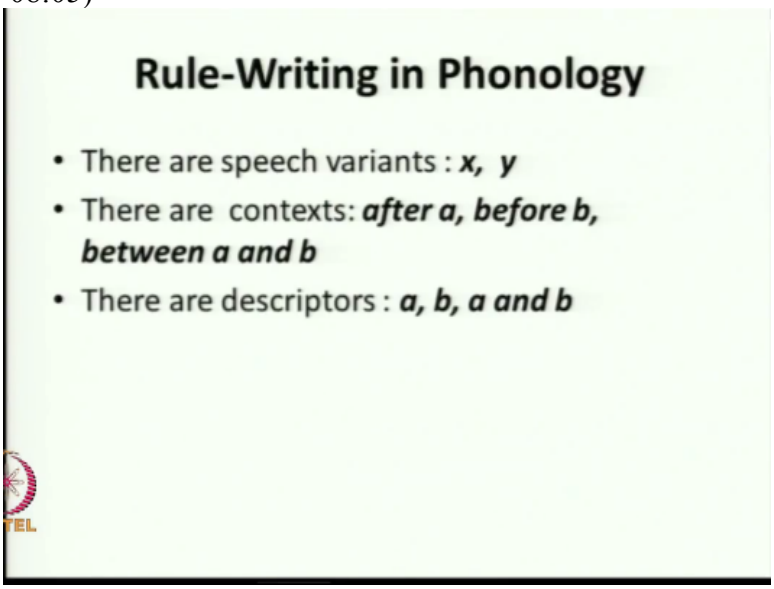

So you know there are speech variants x and y there are contexts after a before b between a and b and there are descriptors a ,b or a and b simple let us apply look at these data .

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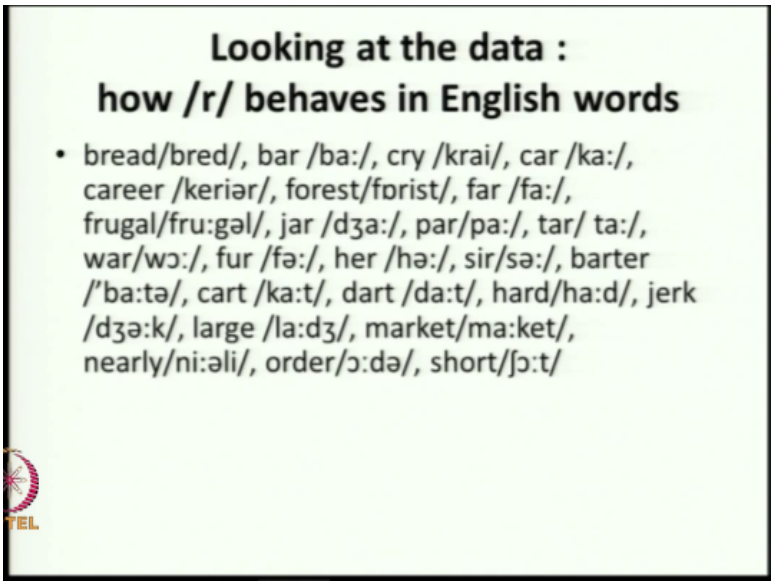

Some words from English and look at how r behaves the sound rule behaves in English words I will give you full two minutes please look at all the words and just try and note mentally first there may be on your notebook do you see any peculiarity in the behavior of r in these words in this language am i clear to you please yes or no everybody please yes or no okay I am asking you to look at r look at the behavior of in these words and if you note any peculiarity please make a mental note or write it on a notebook .

And then the third thing will be do you see any pattern do you see where it behaves in a particular in a peculiar manner okay right you would like these three tools to come here right how is it okay please take a couple of minutes look at the variations this is an exercise in you know observation a good scientist must be a very good observer are you able to see from here you can discuss among yourselves if you like you can talk to each other but you will be able to talk to each other better if you observe it silently first.

That is where your training as a scientist comes you okay a good way to do so is okay let me come the 4th camera okay a good way to observe no I am talking off you know I am just trying to I'm going a little beyond strictly speaking in linguistics and I am trying to advise you into observation you know how you observe it may not be a bad idea for.

You to make two or three columns on your notebook okay and if you find there are two or three different kinds of behavior of these words a particular sound in these words then make those two or three sets say how does the rah behave when it comes before a consonant how

does it behave when it comes at the end of a word how does it behave when it comes before a vowel okay look at it that way they and you might perhaps notice patterns okay you may look at these patterns.

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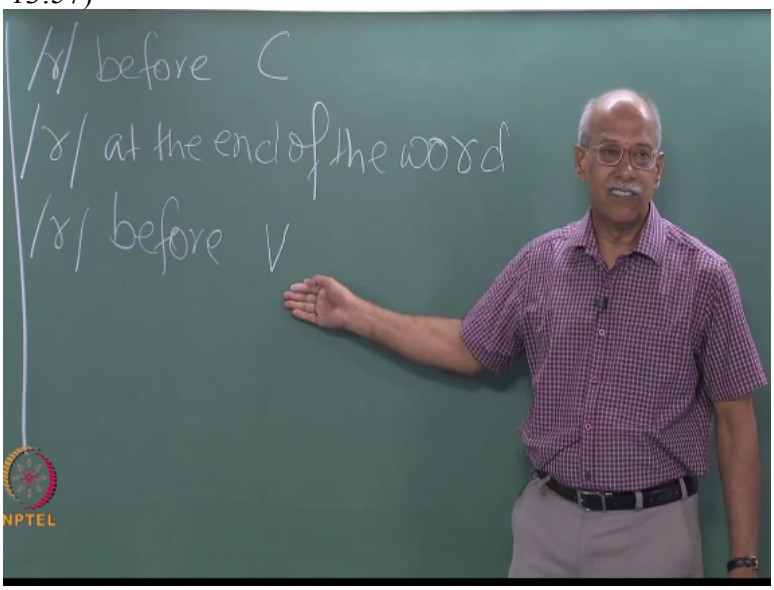

You may look at these patterns rah before consonants rah at the end of the word and rah before a vowel do you see any pattern just observe I am trying to help you give I am trying to give you some guidance okay but later you can have more and more complicated data and you should be able to look at the context you know half the research lies in finding patterns in your data no matter what you are researching it might be the behavior of molecules it might be the behavior of a variant a speech sound .

You know observation is required and acute accurate if any one of you finds a pattern please raise your hand you have found a pattern yes then you have some right what pattern do you find when rah comes after or before okay what pattern do you find when rah comes before a consonant can you speak up can you please capture by friend on the camera can she speak while sitting or would you like her to stand up can you please stand up yeah the sound is lost when R comes before the consonant R is lost.

Do you notice any pattern here please sit down anybody else where is you do you notice any pattern here at the end of rah at the end of a word we do not pronounce the word rah is deleted not only before a consonant it is deleted also at the end of a word before silence in this variety of English okay what happens when rah comes before a vowel can you please speak to

the camera can you please speak to the camera what happens when rah comes before a vowel processing you know how much every second here costs rise pronounced obviously say it again Mahesh tell the camera rise pronounced speak you know it looks like you are very sorry saying stating God's truth run is pronounced when it comes before vaa you can classify your data.

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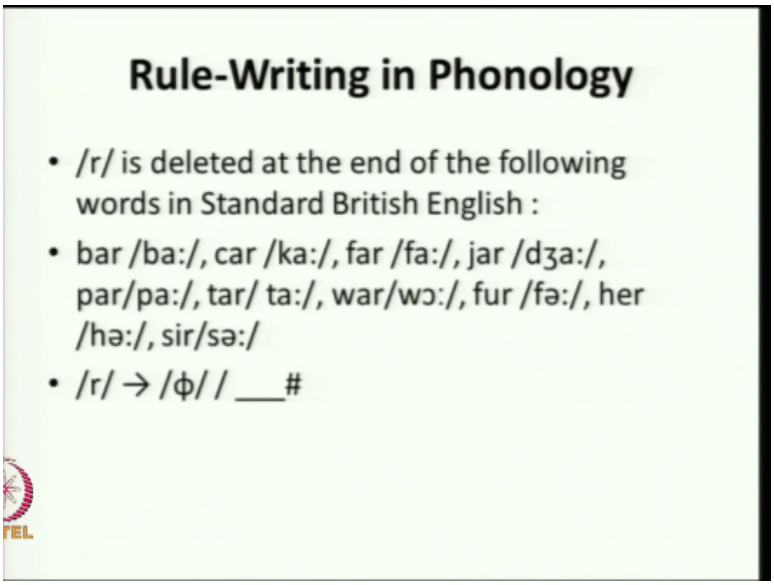

You can say rah is deleted at the end of the following words in a standard British English you know look at the data can you try and write a rule without looking at what I have written write it in words or maybe you know I have already written so you can copy it this is how you predict you know rah is deleted you know that sign indicates zero null actually this is also a symbol for a particular kind of speech sound I will change it later okay it should be this symbol the null symbol can you.

Please can I take about a couple of seconds of your time null symbol is not written this way null symbol is written this way this is null that is not straight about 45° angle meant that sort of thing okay right so you know what you write is what changes that is are changes to what null it is deleted it becomes zero okay where when it comes at the end of the word when it is the last sound of the world when it comes before silence had the word boundary okay this is the convention of rule writing .

Can you attempt writing a rule can you attempt writing a rule for this following the same convention can you please try write a rule saying rah is deleted before a consonant please write I would like to check your notebooks okay you saw in the in some words you saw here that rah is deleted also before a consonant writer would just as you have written this rule rah is deleted at the end of the word similarly please write rah is deleted before the consonant in this variety of English would one of you please like to come to the board and write it here for all of us okay.

Take the chalk piece write the rule here to describe this phenomenon the chalk piece is there yeah just write large hands right there yeah yes and write the rule to predict this just as we have written here .

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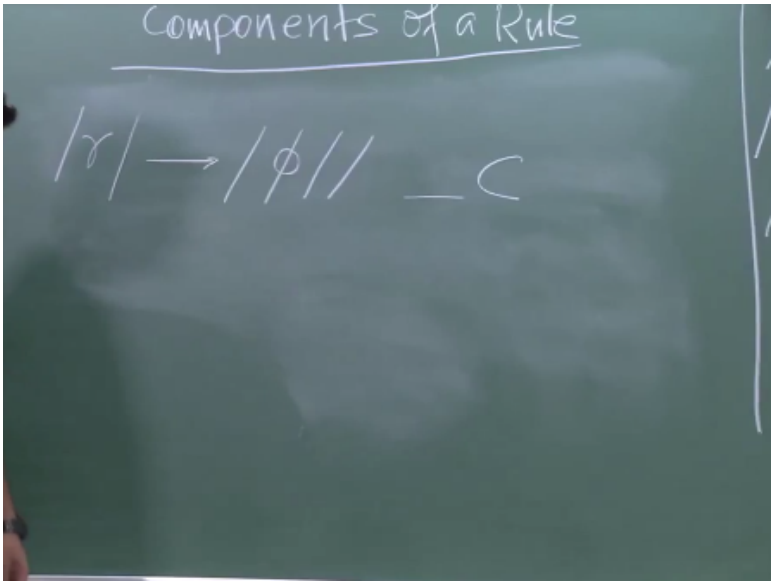

Similarly yes simple great yes that is it shall we clap for our friend please okay you can convert this rule into more sensible something into a tree diagram okay rah goes to zero before the word sorry at the word boundary you see there is onset there is rime and in the beginning you know you have take a word like far you have rah at the end but in this variety if that is the last sound of the word okay then rah is deleted a rhyme was earlier branching.

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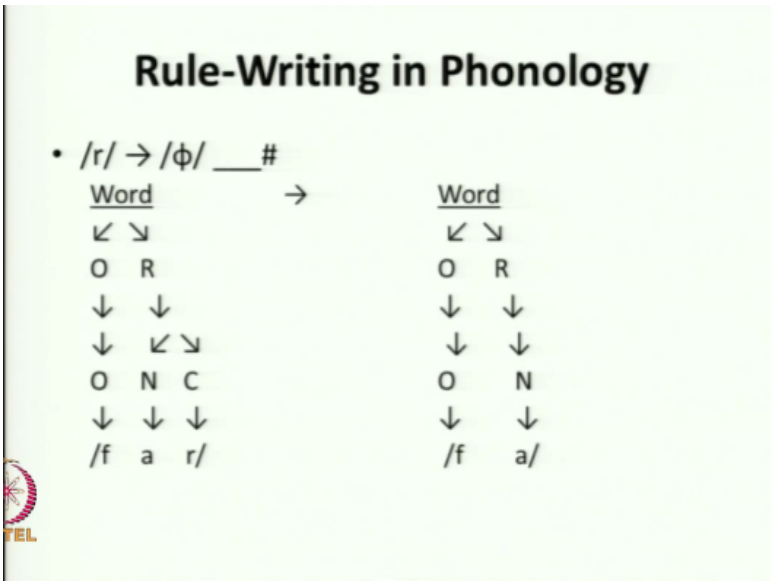

If you look at the left-hand derivation you see rhyme is branching but if you look at the right-hand derivation you find rhyme is no longer branching it becomes it loses a node if what does it lose it loses the coda you can see the branching rhyme had both nucleus and coda but now this rhyme has only nucleus okay you are able to state the entire change and the reason also for change much more succinctly rather than say X goes to Y okay.
Let us look at some this rule okay.

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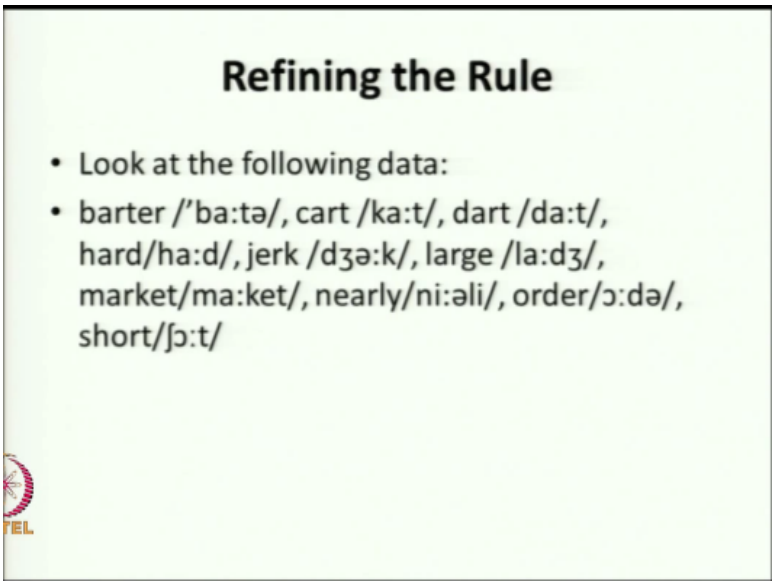

Can you convert this you see here are the data you know you have words like barter where rah is deleted with futa you are caught where is deleted before table you have dot you have

Hardware jerk your large your market um nearly okay sorry this nearly is wrong because it comes at the or maybe you can keep it leave it as it is can you can you know the rule has been formulated can you convert this rule into tree diagram on set time what is lost what stays can you try and do that just see here you know earlier rule.

Rah is deleted at the end of the word just observe copy this rule may be on your notebook then you will be able to I am sorry I have used broken arrows I did not know how to use mathematical derivation so I have used word file you can have a straight lines and when it branches you can have it accordingly just copy it both left-hand and right-hand column left-hand is input right-hand is output .

The example on the left hand is your input that is rah being the last sound of the word output it is deleted because it is the last sound of the word okay now if you have copied it then you understand the convention now write this rule write this rule using tree diagram can you do that write this rule using tree diagram do you understand the task please okay I am asking you to write a rule to predict that rah is deleted before AC before a consonant in a standard British English .

Here are your data at the end semester examination I might give you some data from an unknown language and might ask you to write rule predicting these variations so please do learn it finished come let us try can you take the duster clean this portion or maybe you can use this side if you like there itself okay can I write bigger hand and deeper so that you know the camera otherwise and a lot of people not here are also going to look at it .

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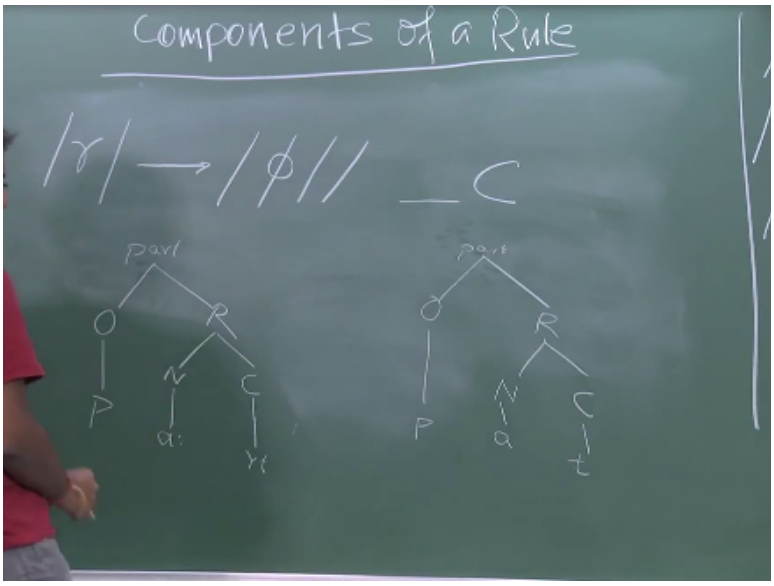

Yes actually just wait a minute you will be able to show it better if you make if you have branch here as well you can have branch here as well this is here you have only one note great shall we clap for you please okay see many of these things can be done very mechanically your computer can generate give them the words asked him the question write rules for these words and you will see they produce very neat across-the-board algorithms but the catch is you will be able to get these neat algorithms only if you are able to observe well .

So the key to research in Sciences is good observation very penetrating very you know accurate missing no variation at all so that you can write correct rule.

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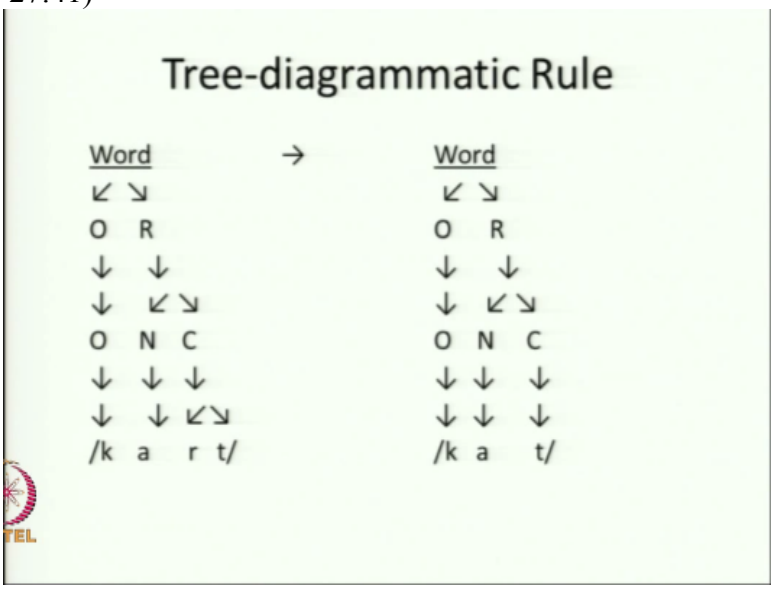

The same thing you know you can see that the tree on the left hand has branches even in the coda okay but tree on the right hand which is the output has no branch in the coda it is only the one single node and you are able to capture the fact that in this variety of language in this variety of English rah is deleted when it occurs before a consonant actually you need not have two rules.

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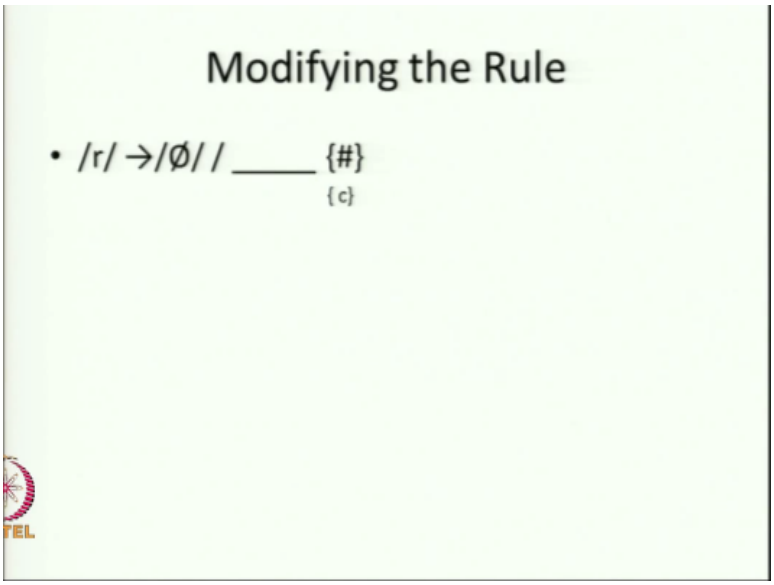

You need not have two rules saying before this before this you see you have at the moment you have rule one you have rule two can anybody here try and write both the rules in one go can anybody here please try and write both the rules in one go in one algorithm you can say in words computer please please delete whenever you see rah coming before silence or before a consonant whenever you see coming at the end of the word or coming before a consonant how can we write it in an algorithm would you like to try I will give you 60 seconds please try think.

It is an exercise in thinking absolutely simple if you think hard you will know you can you need you do not really need two rules you can state that in one rule okay how do you do that yeah y right how would you write it in this form write it in this form write it in the form of an algorithm finished done okay one convention is to save time .

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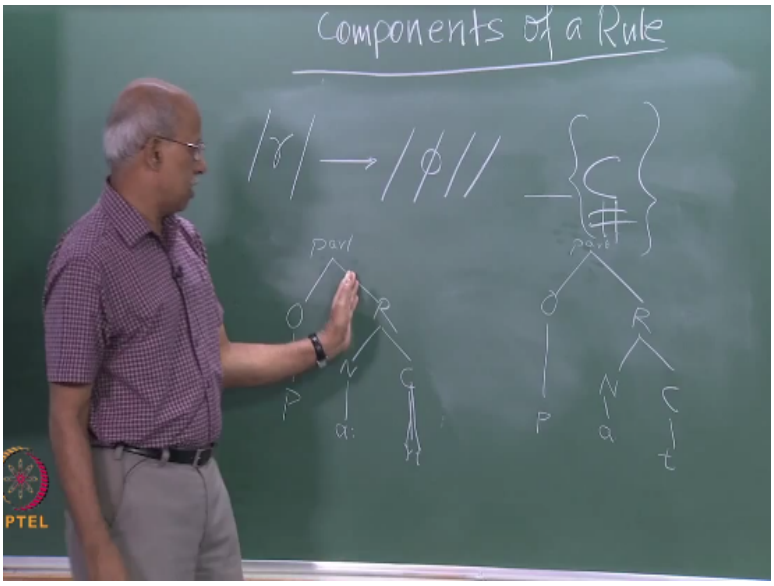

You know I am going at one convention is put a brace and just add here so you have consonant and you have word boundary it applies to both here again you can okay you can do the same thing that you know a branching coda becomes unbranching because it either comes before silence or it comes before another consonant okay these things are pretty simple you know this is a matter of writing convention you can do it in many ways but the point here is come back to the point rule writing in phonology is nothing but making predictions on the basis of please note patterns that you observe. The rule is nothing but a pattern that you have observed on the basis of some data okay.

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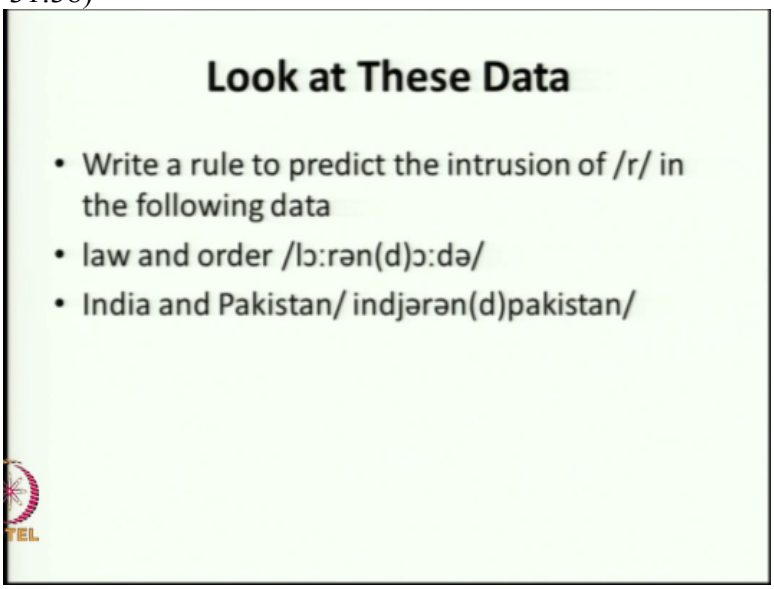

Look at these two words these two phrases I expect you to write a rule on your own now okay in these two phrases law and order India and Pakistan and extra rahh comes between law and can you see the extra rule here can you see in the standard varieties of English in the UK you know this is typically this is peculiarly British for the point here for us is where the British are Indian whether American or Nigerian language phonological context phonological variations are often predictable .

Phonological variations are most of the time predictable we can write rules and we can say this is how would it would go can you write a rule predicting this intrusion you see law and order India and Pakistan you can see here how does it get in can you write a rule on your notebook you can write it in this manner first and if necessary I will ask you to convert it in this manner later okay who would like to go to the board and write can you come please pick up a chalk piece use the right side of the board that part.

But write bigger hand you and need yes that is it pretty simple you know like a rah can go to zero so zero can also go to rah can we convert it into three diagram can we convert it into tree diagram please okay can we convert this rule into tree diagram.

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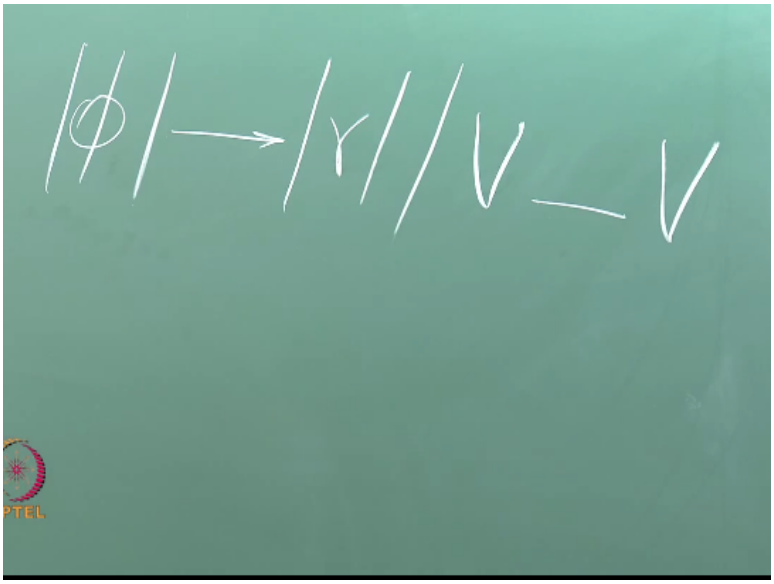

Try not difficult at all do not look at my derivation until you have done yours but if you get stuck I have left it there you see make your own quota of mistake make your share of mistake if you wish to learn okay if you really wish to learn then make your share a mistake do you

remember anyone who learnt riding a bicycle without falling , I know one person but she doesn't ride bicycle any longer okay so I am leaving the screen on but do not look at it until you have derived your own.

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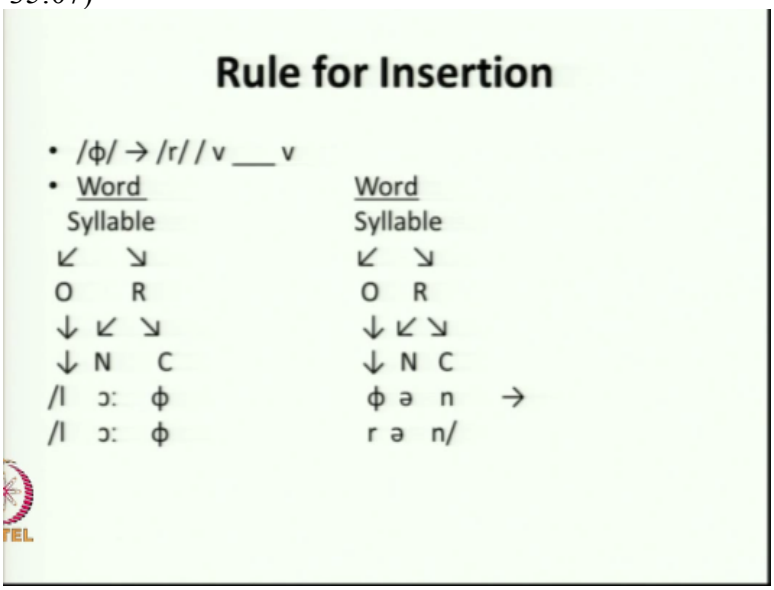

And once you have written compare your own derivation with the one given their okay any questions try and draw your similar diagrams for examples from your own language shall we move on is it okay any questions so far all we are trying to say is variations are quite often predictable rules can be written about them rules can be written in more than one way you can write them in words you can say rah deleted at the end of the word you can write using symbols algorithmic symbols slash arrow going right / 0 / then you describe the context using symbols.

No matter how you do the context can be captured and predicted in underlying all this is a very simple truth of God that no matter how big no matter how small there are patterns there are structural patterns and if you want to do something with this body of knowledge you can okay .

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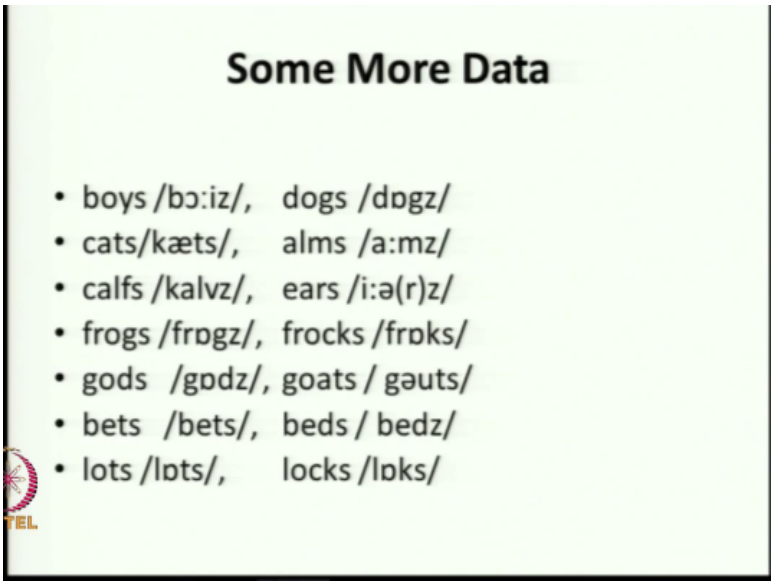

Now I want you to write the rule look at the behavior of se become somewhere sir okay can you write a rule to predict where it remains and where it becomes flat one minute 60 seconds I will start counting time please write a rule in any convention either this way or this way I do not mind this is again English standard variety of English in standard variety of English you know this happens okay anybody found this side please you can discuss among yourselves no problem okay anyone who would like to write anybody please no look at the behavior of where does it becomes after a voice sound simple.

Then why do not you say that not just consonant after a vowel also which is voiced say for example you have boys se becomes after a voiced sound whether consonant or vowel please write that rule here in the same manner saw goes to za after in this case it is before make it after would one of you please come in to the board and write we have very little time now okay the you know it is pretty simple straightforward rule sa becomes at the following a voiced sound similarly look at the behavior .

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All of these patterns are predictable look at this thing in English past tense in English is realized at da as de as it I have not given you it is it following turn and you can say wanted you can say mended okay but when it follows a voiceless consonant then it is realized as duh sorry when it is preceded by a voiceless consonant then it is realized as so you have asked but you have moved okay the same rule can be written you know that da becomes 2 or table becomes duh etc okay can you look at these data .

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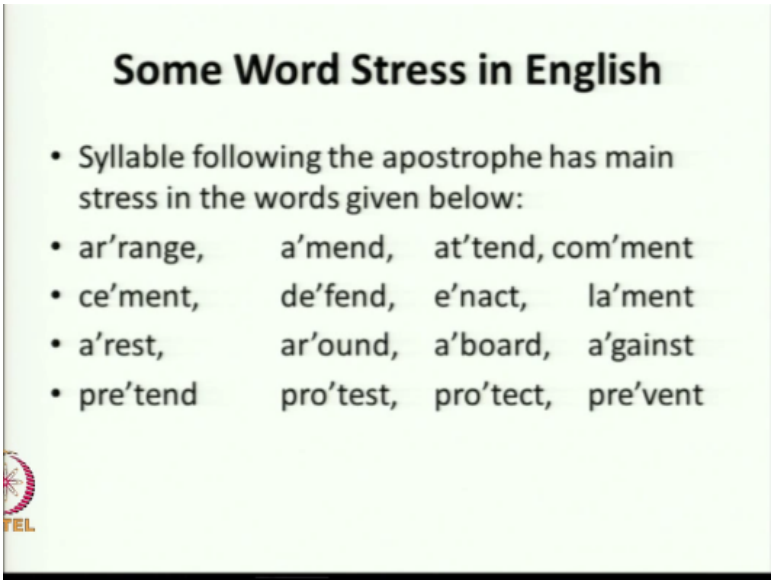

A little bit of challenge they have a class now or can I take it ok do you have a class now ok what I am going to do is look at these three slides.

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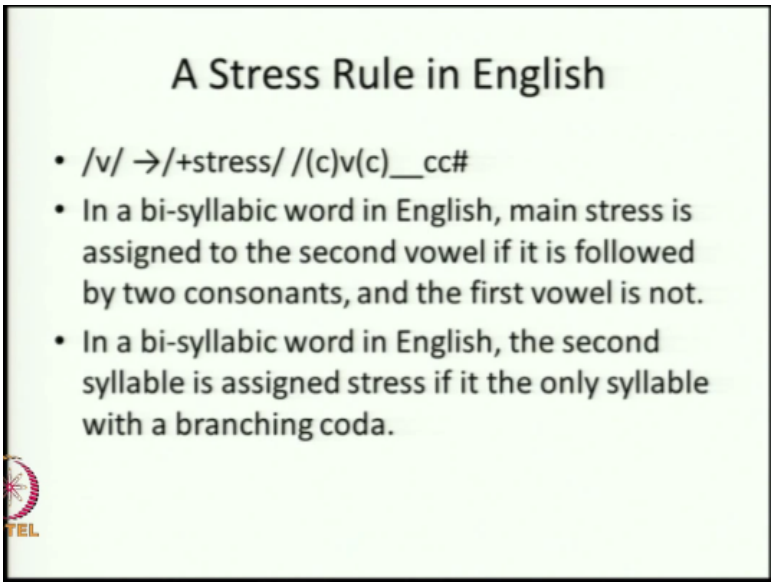

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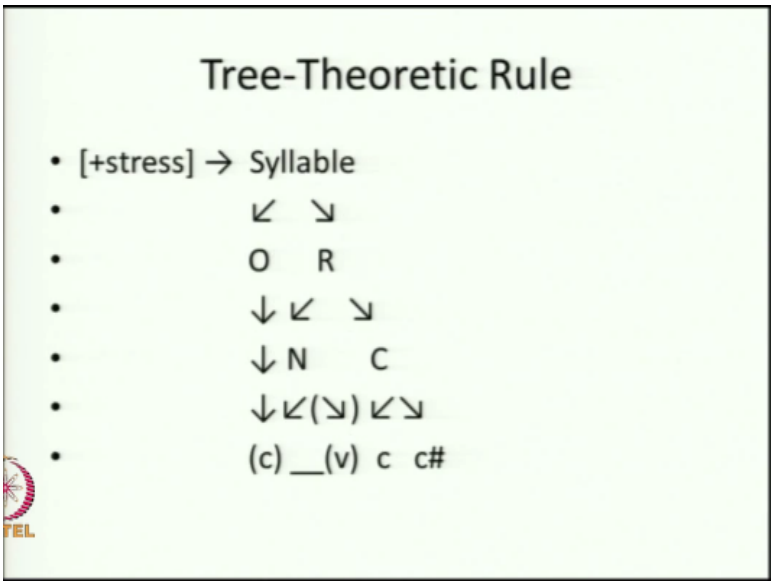

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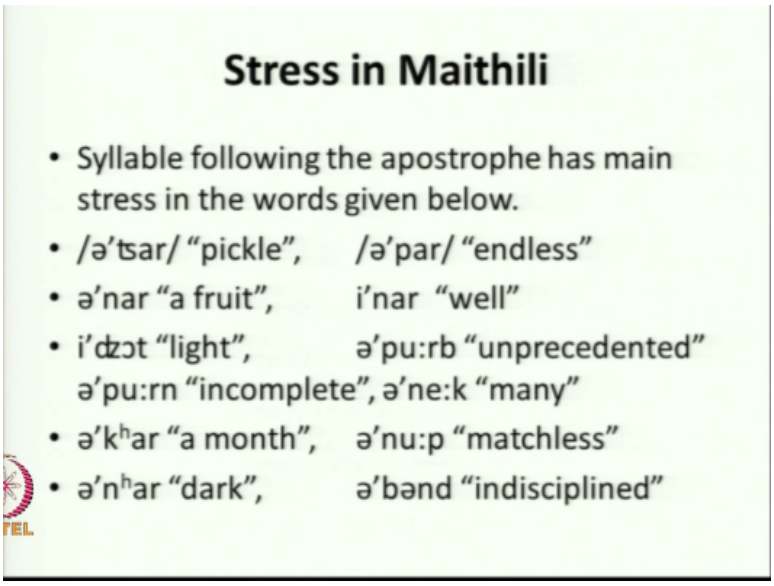

I have given you solutions do not look l at it I mail these slides to Mahesh do not look at the solutions until you have done your own rule writing okay so one two I am giving you two sets of data and their solutions their rules please can I have your attention for 10 seconds before you leave can I have all of you for another 10 seconds two sets of data .I have also given you rules I have also given you derivation do not look at dedications and rules until you have done.

Your own rule-writing then compare this will train you into rule-writing at the examination at later you will be able to observe patterns in other speech and you will learn much more that way than from no matter how long a lecture .I give you thank you have a good day.

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Animations

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