

**Symbolic Logic**  
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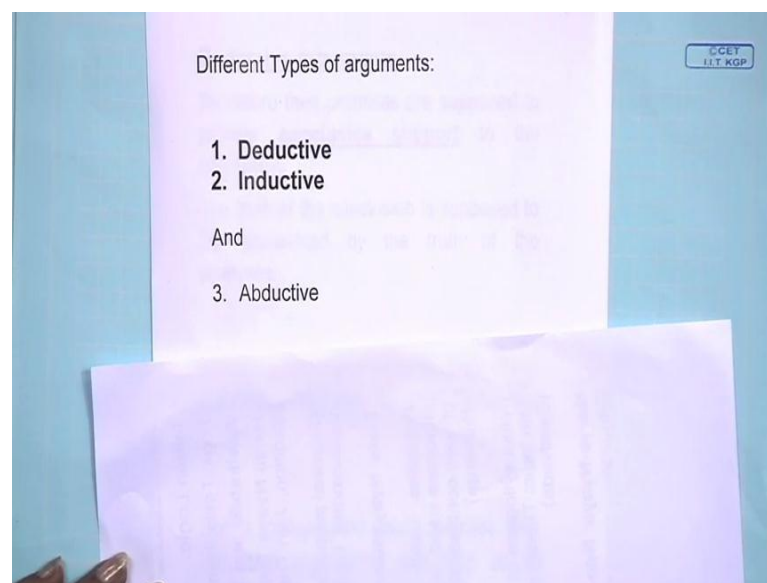
**Lecture – 04**  
**Types of Arguments, Types of Logic**  
**Deductive and Inductive**  
**Different Logic and Norms to assess Different Types of Arguments**

Hello to Module 4 of the NOC course Symbolic Logic. We have done 3 modules already together.

So this is Module 4 where will be looking at; what are the different kinds of arguments. Depending upon their type different types of logic that we required? Mainly will be looking into the difference between deductive and the inductive. I am sure you heard these names earlier deductive and inductive. We will like to learn what is deductive argument, what is inductive argument, exactly where do they differ by contrasts sometimes the identification becomes easier. And then we will talk about what are different criteria that we require in order to address this difference that exists in the arguments.

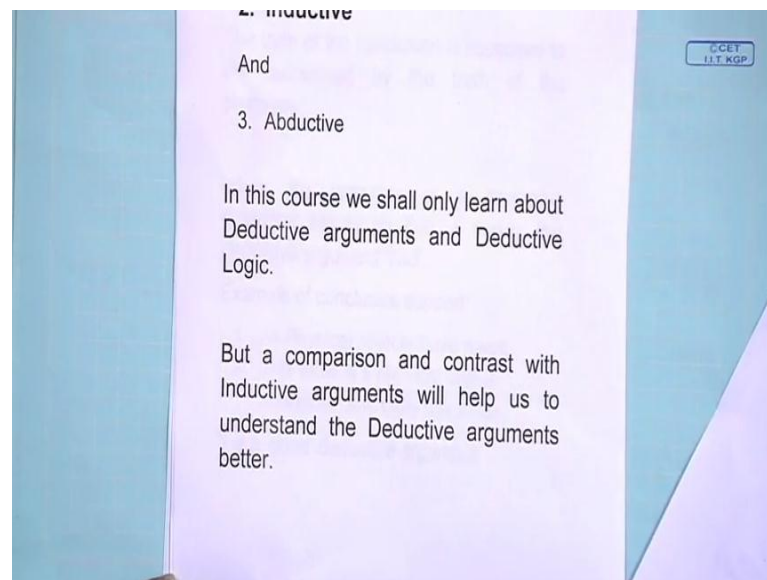
So this is our plan for Module 4 different types of arguments. See we have talked about what arguments are, that they are set of claims of certain types.

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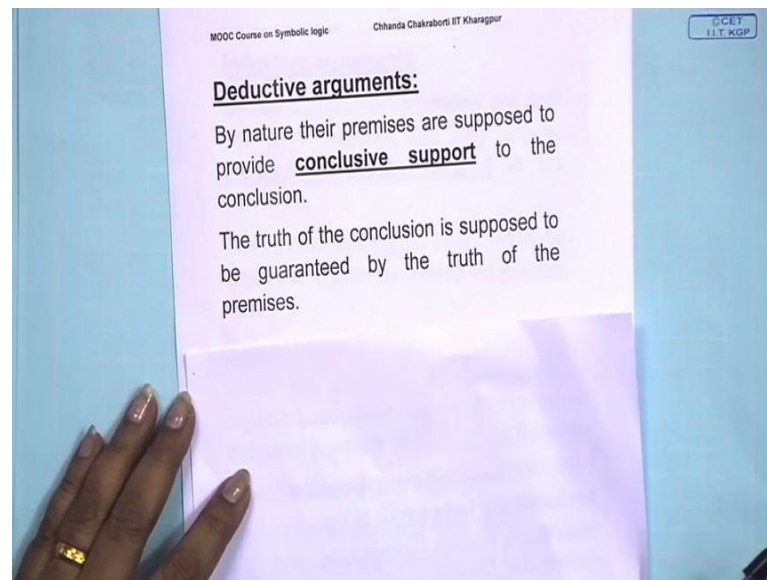
Then there can be special characteristic of these arguments which make them very different from each other. And basic types are more than one. So, we have the deductive kind of argument, we have the inductive kind of argument, we also have the abductive kind of argument.

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But we are not going to look into all these variety with equal time or at all. In fact, our course is going to be completely focused on deductive argument, because symbolic logic is a deductive logic. So, we will be looking into deductive arguments very very thoroughly. Just to have a comparison in a contrast done we are now going to look into inductive arguments also, because sometimes the comparison and contrast sort of helps. So, that is our plan for the next few minutes we will be talking about what deductive arguments are, what inductive arguments are and exactly where to the differ, how do you approach them and why do you need to approach them different. That is what we are going to learn in this module.

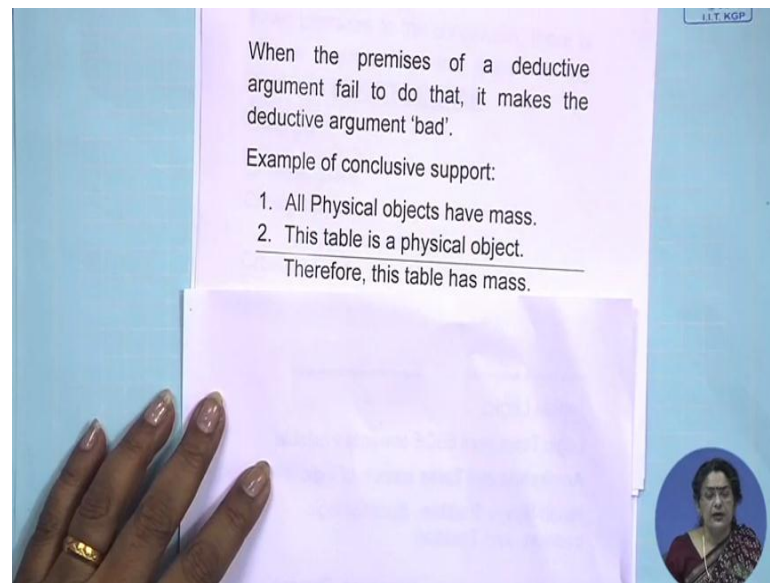
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So deductive argument; what are they, how do we define them and so on. See main thing to remember is that from deductive arguments our expectation is completely different. What is our expectation, that their premises will provide conclusive support for their conclusion? See every premise supposed to provide support to the conclusion you know that. That is what their role is in an argument. But when you dealing with deductive argument what make an argument deductive is the very claim that our premises are going to provide conclusive support to the conclusion.

Conclusive means what? Conclusive means certain, absolute so that there no room for doubt. The premises are such that they will necessitate the truth of the conclusion. That is the kind of expectation from deductive argument. This is the reason why it is said that the truth of the conclusion in deductive argument is supposed to be guaranteed by the truth of the premises. If you come to know that the premises are true in the deductive argument you can be assured that from that the truth of the conclusion will follow. When that does not happen, when that is the premises of deductive argument fail to provide this kind of conclusive support that is when we call deductive argument bad. So, the default expectation from deductive argument is that the premises are going to provide conclusive support for the conclusion. When they cannot or when they do not that is when we call those deductive arguments bad, because it is failure of what the premises were supposed to do. And that is the nature of the deductive argument.

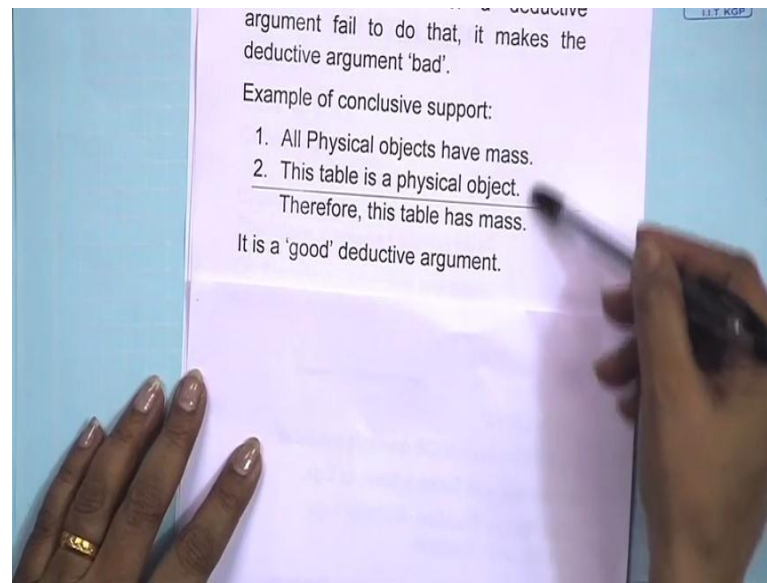
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Let me show you some examples as we go along. We have seen this argument earlier in another context, but let us do this again. All physical objects have mass second premises this table is a physical object. The truth of this together conclusively makes this conclusion true, this table is a physical object and if it is true all physical objects have mass it has to follow that this table too has mass.

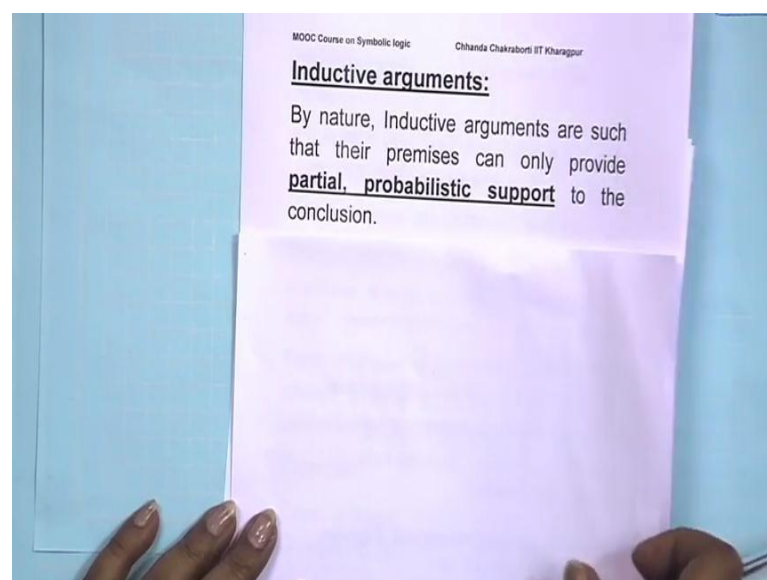
You see the force in with which the premises support the conclusion. You see the way the premises sort of conclusively push the conclusion ahead. If the premises the truth there is no way the conclusion can be false that is also part of that and that is the mark of deductive argument.

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And that is the mark of a good deductive argument. The goodness comes from the fact that the premises have done their job. The job was to provide certainty for the conclusion. This is one example of a deductive argument, this is an example of a good deductive argument with the premises have done their duty. If you understood that then let me work you to the inductive argument little bit.

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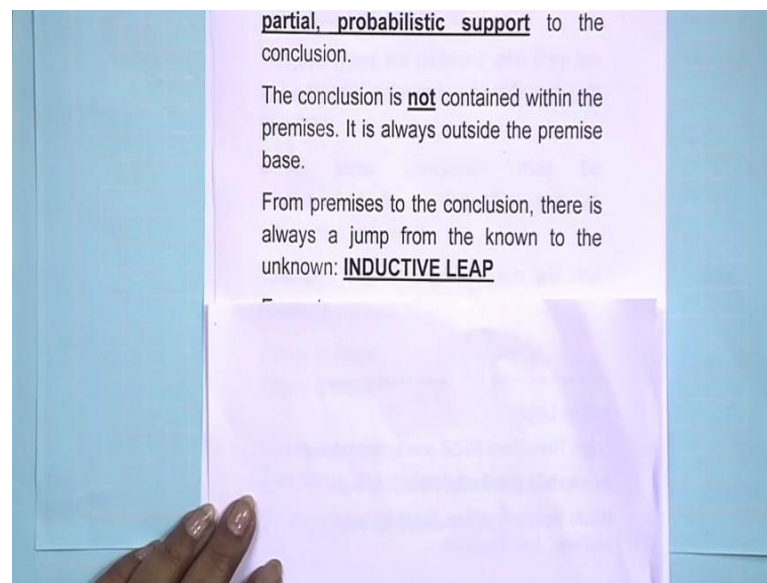


The inductive arguments are of a different nature altogether. By nature inductive arguments such that their premises can only provide partial, that is only part support and

probabilistic support for the conclusion. So, this is where here is a complete departure from the expectations that we have towards deductive argument. The inductive argument, even the best of the best of the inductive argument will also provide partial and probabilistic support. That is their nature, that is how you will see the example you will understand better perhaps, that that is the very nature of inductive argument that even when they are at the best form day will only provide probabilistic support.

So, you cannot have the same expectation that you had from deductive argument, say why cannot they provide conclusive support because that is not what they are. They are inductive arguments and their job is like this. This is our expectation from inductive arguments premises that they will provide partial and probabilistic support. So, that is the first thing to remember.

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Then you also should know that in case of inductive argument the conclusion is never contained within the premises, whereas in the deductive argument the conclusion is supposed to be in away contained within the premises. Let be remained you if you are still read Sherlock Holmes for example. You know Sherlock Holmes series at the (Refer Time: 08:35) So, Sherlock Holmes is supposed to be a master of deduction, Watson always praises Sherlock Holmes saying excellent deduction. And what deductions we see somebody coming and Watson sees the same person, Sherlock Holmes sees the same person but then Sherlock Holmes starts making this conclusions about this person that

Watson is amazed about how do you know this and Sherlock Holmes tells it is nothing but deduction; is already given, it is already there.

So in a way he is saying that the conclusion was already contained within the premises. Whatever fact am telling you about the person whether he was from Afghanistan, whether he was in (Refer Time: 09:17), etcetera, etcetera. All these are just given facts; I am just eliciting them, I am just deducing them and that is a nature of the deduction. Now note that induction does not work like that. In inductive argument the conclusion is never contained within the premises, it is always outside the premise base. So, there is a jump and will talk about that in the minute, but notice that the premises take you up to a point and then the conclusion is not there to be found within premises. No matter how much analysis you do, the conclusion is outside the premise base. And that is what is being induced from the premises.

So, there is a jump as I was trying to say. In inductive arguments from the premises to the conclusion there is always a jump. From what is known to what is not known or unknown. So that is known as the inductive leap, leap means jump; that inductive leap. And that is the marker of inductive argument is that by characteristically there has to be an inductive leap for the inductive argument to work. Let us now look into an example and maybe we can plug the scene what we are talking about better with the example been shown.

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base.

From premises to the conclusion, there is always a jump from the known to the unknown: **INDUCTIVE LEAP**

Example:

Crow<sub>1</sub> is black.  
Crow<sub>2</sub> is black.  
....  
Crow<sub>n</sub> is black

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Therefore, Crow<sub>n+1</sub> will be black  
Or, therefore, all crows are black.





Suppose you have come to our campus and the first day I do not know why but you noticed the crow. You saw that the crow number 1 the first crow that is saw is black. Next day you also see another crow that too is black. Suppose you are staying in our campus for slightly longer time so you are collecting evidence and every day you see a crow that is black. Maybe it is the same crow, maybe it is not the same crow, but you are watching these crows.

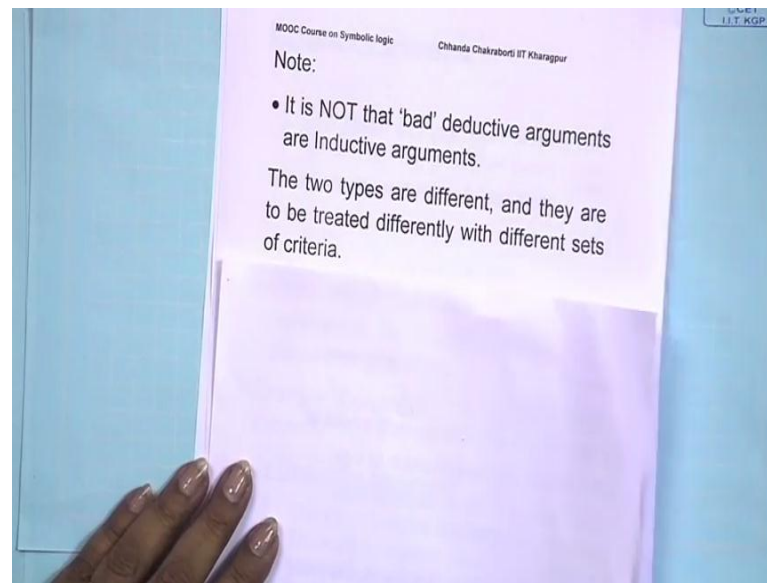
So, when you seen the  $n$ th crow and it is still black you can now conclude. You might say, that the next crow that I will see which is the crow  $n$ th plus 1 that too will be black or if you are slightly casual then you might say that all crows are black. And this is what we would call an inductive argument. You have just seen an example of inductive argument. Let us watch this. See these are your premises which you have collected over days or maybe years I do not know, but that your premise.

Please note that this conclusion is not contained anywhere in the premise base, it is something else something outside the premise. Moreover please note that even if each of this is true that true does not provide guaranteed support to the conclusion. Why not, because the next crow that you will see may not be black, you know there are they may be a (Refer Time: 12:26), white crow. Do you know for sure that the next will be black? There is a small gap, there is a small uncertainty.

So, that is what makes the inductive word leap. You know this much, you do not know completely and for sure with certainty that the next crow will be black or that all crows are black, that is the generalization, but none the less it is a good art. In fact, the more crows that you observe if you are observation base is very large then the more support you will get. But you understand that there is a big difference in nature between these two arguments. You cannot expect from this conclusive support and the probabilistic support will not work in the case of deductive argument. So, these are two different types of arguments.



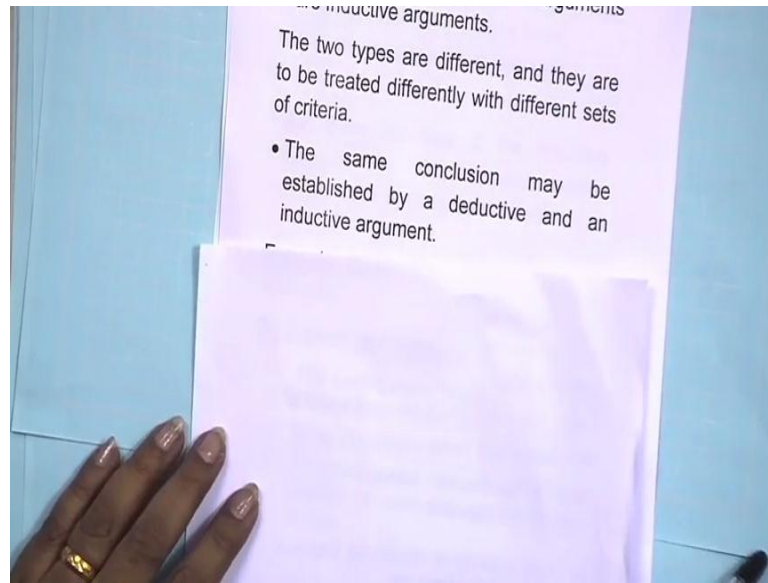
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Let us summarize, I hope you understood the differences but still let talks about. Now what I did not say, I did not say that the bad deductive arguments are inductive arguments. Whenever the deductive arguments fail to provide conclusive support they become inductive argument; no. The nature, the process in which or the way the arguments is developed are completely different. These are apples and oranges, so let us not mix them up. What our expectations are from deductive argument is quite different, what our expectations are from inductive arguments are also very very different.

So, let us not mix them up. Now because there are two different kinds so they have to be treated differently. Meaning; that if you are going to assess them, if you are going to say that this is a good argument that is a bad argument you cannot use the same criteria to judge these two types. We are going to learn that for deductive arguments we have separate criteria and we will talk about it module number 4 in at late. And if you are dealing with inductive arguments then you are dealing a complete different set of things and you need separate set of criteria to sort of approach those.

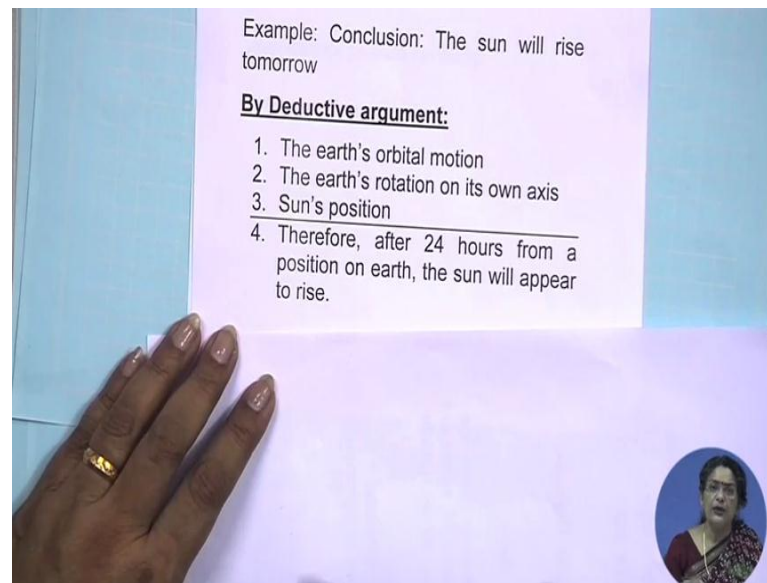
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Second, I think it needs to be said that they are different. Deductive arguments and inductive arguments are completely different we said that. But, at the same time they are not separate in the sense that their domains do not overlap. In fact, it can be that you may have the same conclusion, but you are arriving at that conclusion in two different ways; by deduction and by induction.

So, let me give one example of that. You know that the difference is there, and difference is to be appreciated, but that does not mean that they are mutually exclusive complete. In fact, sometimes we use both, sometimes there are arguments that are sort of follow up on another, sometimes there is a conclusion as I am trying to say is that, but it can be reached in from two approaches deductively as well as inductively. Let me show you one example of that.

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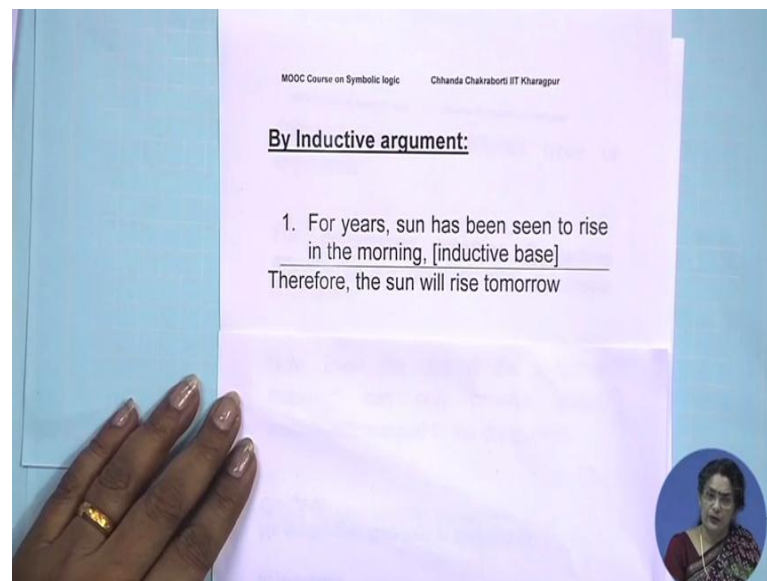
See a great example of inductive argument often is given in this way. The sun will rise tomorrow-the sun will rise tomorrow do you know that the sun will rise. If asked how you know that, you are probably going to say by induction because so many years I have seen sun to rise every day. A new day starts with the rise of the sun. And the premise base is so strong that the probabilities close to one that tomorrow also sun will rise. If you say this what are you saying that this is a clear conclusion of an inductive argument so many years day one I have seen before mean my father has seen or mother has seen and before them our grandparents have seen that the sun has risen; so now sun will rise. Is it completely guaranteed that the sun will rise tomorrow? The answer is no. It could be the day when the sun explodes; you know it is a star after all.

So the small gap of uncertainty is there you know, but the probability is strong enough to be close to one. If you go that way then you are using inductive argument, but let me show you that you can arrive at the same conclusion also deductively; how? Well, you can probably go like this that let us look into earth's orbital motion. Earth has a orbit and certain motion and that it rotates round on its own axis, all this is true given that and given sun's position what will happen in 24 hours or next which is morning time an earth will see that the sun will appear to rise from east.

So, in a way you have shown that the sun will rise tomorrow, but look at the way you are preceded. You did not come from an observation base, you took some well known

principles and you derived that the sun will rise tomorrow because of this. That is the nature of deduction. The conclusion is already contained in this, if these are true this will happen. And what was your argument, inductive argument well that was based on your observation and that sort of work like this. Look at the way this inductive argument is placed.

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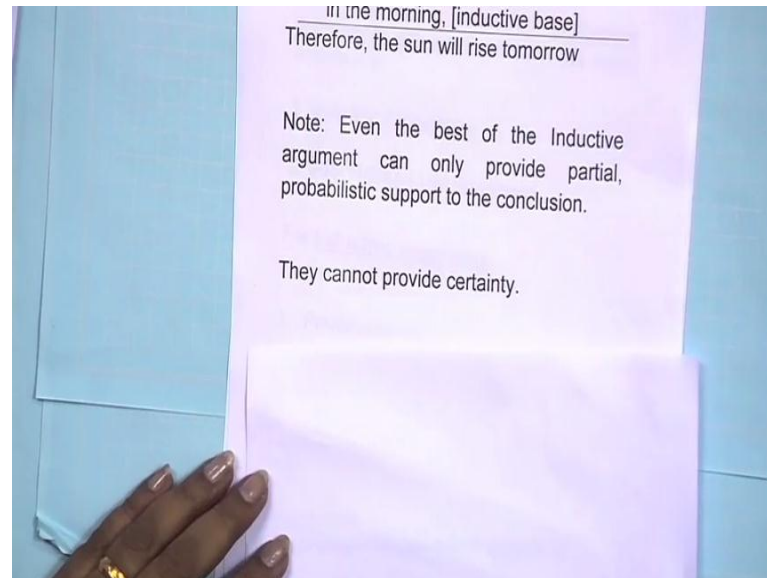


So, now if you are proceeding towards same conclusion inductively what you will say is that you have collected evidence that you have seen the sun to rise every day, every year, and so on and so forth and that is the inductive premise base, observation base. Tomorrow sun is that part of your inductive premise base; no. So, this is your known from which your jump into the unknown. And that is a leap, the inductive leap that is what we talking about. And there is this uncertainty also and look the nature of the argument it is completely different from the way the deductive argument has gone. None the less the conclusion is same.

So, my point remains there that first of all learn to appreciate the difference between these two types of argument, and then also appreciate the fact that they are of different kinds and they both are good at gaining knowledge. Inductive arguments are not bad argument, in fact there is a lot of knowledge that you gain by doing inductive arguments. Similarly, deductive arguments also has it is place and they also provide this knowledge.

These are not to be mixed, but they are not mutually exclusive either which is what I said little bit and I hope you have understood that.

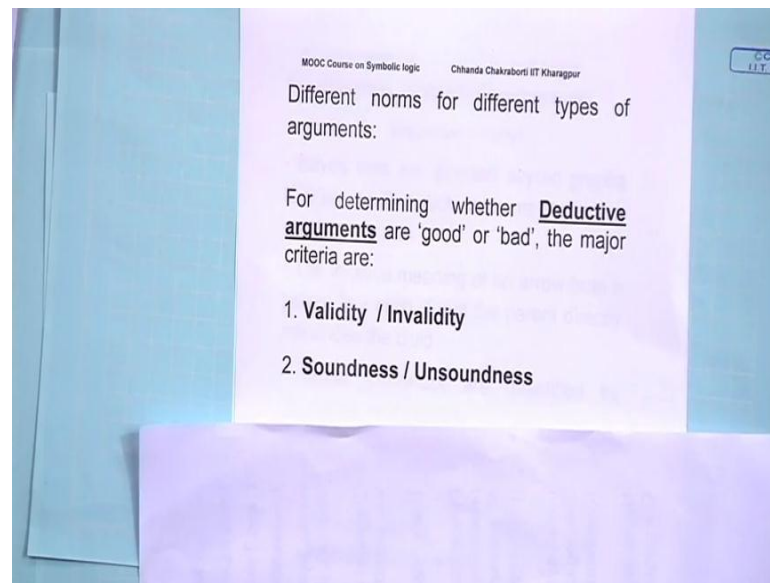
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So, before we leave the topic let me remind you ones more that the inductive argument as such that even the best amongst them will not be able to provide you absolute guarantee about the truth of the conclusion, they cannot that is their very good nature. That is unfair to expect the inductive arguments to do the job of a deductive argument, just as it is unfair to expect the deductive argument to give you new knowledge something that is not contained within the premise base.

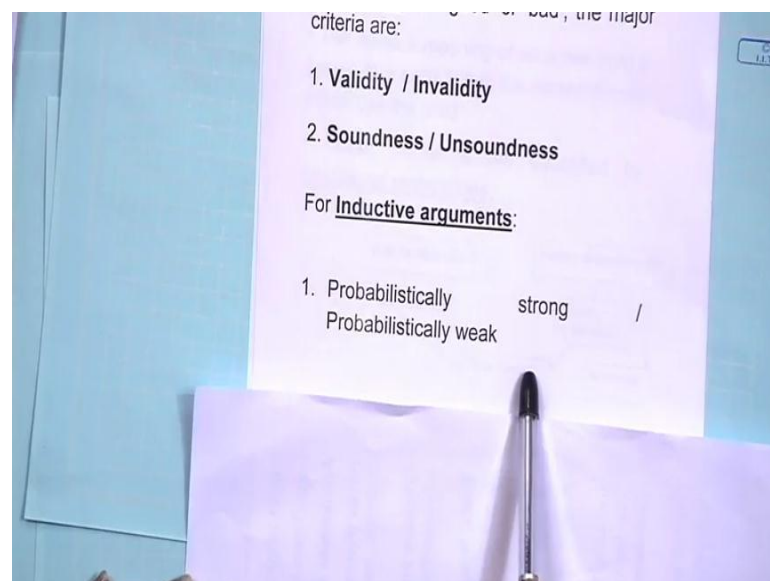
So, these have to be kept separately. One of them will provide certainty then be deductive another will give you new information that is inductive argument, both are useful and both are to be used. But will keep them separate because we are going to go towards the deductive logic and deductive arguments.

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Now, I said that because they are so different therefore there is going to be different norms, different criteria to assess them. For deductive arguments when you are trying to decide whether they are good or bad the major criteria that are going to be used are these, validity or invalidity. These are the criteria. If it is a good deductive argument it will be valid, if it is a bad deductive argument it is going to be invalid. There is also soundness. So if it is a good deductive argument it will be sound, if it is a bad deductive argument it will be unsound.

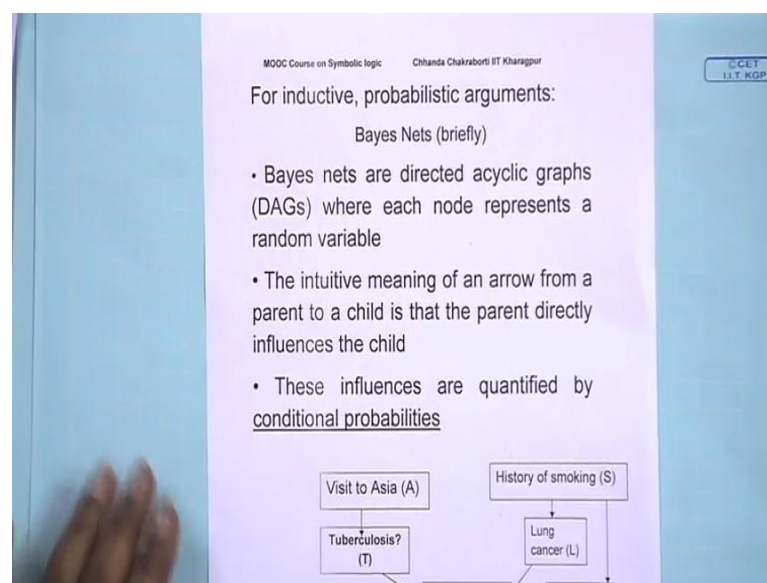
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In comparison inductive argument we do not even apply the soundness and validity. What do we apply? We talked about their strength whether inductive argument is probabilistically strong or probabilistically weak. The better inductive arguments are strong. So, the higher the probability is or higher the probabilistic support is from the premise base the inductive base the better the inductive argument is and the weaker it is the words it is in the run. Look at the criteria very very different. Once we are going to look at validity invalidity and soundness here we are only taking about strength and weakness. And this validity and soundness criteria we are going taking up in the next module will talk at length as I said over this.

But let me just show you the inductive argument because we are not going to talk anymore about inductive arguments. So, this is our last chance to sort of tell you that what we are going to need for inductive argument is the probabilistic logic.

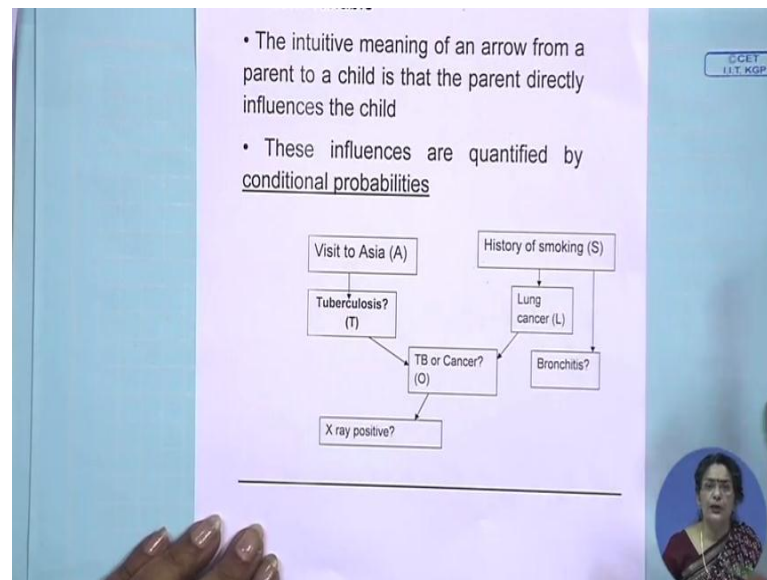
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Where conditional probabilities are used let me a Bayesian nets are sometimes used, Bayesian theory is applied here to calculate the probability the conditional probability and so on.



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So, those are few who can follow the conditional probability you understand, then how to assess an inductive argument. Let me just in a very colloquial survey way in a more ordinary every day survey let me explain. Suppose that the doctor is seeing a patient who is complaining some lung trouble. Now, if the doctor and the patient are in a different continent and they are trying to understand what could have happened to this person, what is the problem with his lung? Suppose that you get to know, the doctor gets to know there was the recent visit to Asia. Remembered they are from different continents.

So, there has been a recent visit to Asia. The moment it is said because certain diseases lung diseases is endemic in Asian continent, for example tuberculosis. So, they might as given there has been recent visit that conditional probability. How probable is it that the person has tuberculosis. It may be so that the patient also has a history of smoking, so there a certain (Refer Time: 24:23) goes up in the mind of the doctor is it lung cancer, because there is a non causal connection between history of smoking long history of smoking and lung cancer.

And then put it be bronchitis what are we looking at look at arrows what they are doing is saying that given the history of smoking how probable is it that the person has lung cancer, given the history of smoking how probable is it that the person has a bronchitis. This is conditional probability. We are not talking about guarantee, but only probability

how high the probability is. And then between this we are asking is TB or cancer which one is it. One way to find out probably would be X ray and other things. So, you see this is the conditional probability network and this is how inductive arguments are often approached.

So, today's module was about this different kind of argument and we learned about the deductive arguments and inductive arguments so that we can make the compare and the contrast and we understood that they are very different kinds, not mutually exclusive but they are different kinds and that we need different criteria to approach them. The remaining part will take it upon other module.

Thank you very much.