Sociology of Science
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Lecture – 15
Science as Falsification: Karl popper- Part II

Dear friends, we are discussing science as falsification by Karl popper. In the previous lecture, I told you that he was concerned with the problem of demarcation. Ha that is, what is for him is the problem of demarcation? How to distinguish science from non-science or pseudoscience? How to distinguish a scientific theory from a non-scientific theory? Now I told you that he felt Einstein's theory of gravitation as a scientific theory.

Because it could be disproved, it could be it had a scope it provided a scope to refute it to falsify it; that is, if the Eddington experiment had gone wrong, the theory could have been refuted or falsified. For him that is a very strong criterion for deciding a scientific theory. That is a scientific theory is one which can be falsified. Not which can be was verified. You see, we already know that this man Karl popper was a logisist with a logician.

So, he was applying logic to understand the nature of scientific theories. We have already discussed that he felt Marxian theory is nonscientific. He already expressed his disappointment at the pseudoscience nature or of Marx historical materialism. He was not at all happy with a glorion explanation of theory of inferiority complex. He also was exposed to the theory of psychoanalysis of Id ego, and super ego of one of the greatest psychologists of all time Sigmund Freud. But he felt this is very significant.

Whatever Sigmund Freud says, makes sense probably it is true. But it cannot be considered as a scientific theory. It is not in testable form, it can be easily falsified, it cannot be falsified, it cannot be refuted. Now I will just give us a short introduction to Sigmund Freuds theory of Id ego and super ego. So, that we know why it cannot be falsified.

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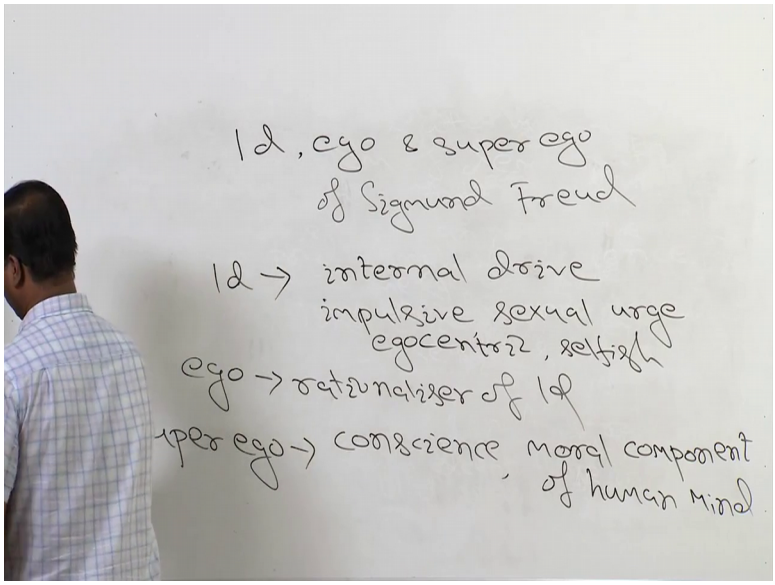

Now, very briefly Sigmund Freud argues that our mind has 3 sides. Id ego super ego. Id is an internal drive, the impulse the impulsive part of our personality; which also constitute sexual biological urges. It is egocentric, it is selfish, it just wants to do whatever it desires right. But that is always controlled regulated, rationalized by ego, ego part of our personality, which is not to be confused with the dictionary definition of ego. It always rationalizes Id, through control through denial through judgment then comes a super ego which is the moral component of our mind there is a conscious.

This is not supposed to be done. This is not we are not expected to do this, when we say that basically we mean that we are talking about the influence of the value structure, influence of religious customs, the norms on our day to day life, social norms, things that we are not supposed to do not expected to do. This is the because the the this the moral part of our mind. Now this is fine we understand, purposes we understand it has some implications for human behavior this theorization, but how do we test it.

It is not in testable form, if it is not in testable form. And then how will you prove that this is a scientific theory, a scientific theory should be falsifiable. This theory that mind has 3 sides to it, one side is egocentric impulsive has biological urge the other side is trying to control that and the third side has the moral component, which sticks adhere to the societal norms, and values how are we going to prove or disprove it this is completely

non-falsifiable. And anything which is non-falsifiable for popper, that is not a theory. Now let us look at the principles of falsification as stated by Karl popper.

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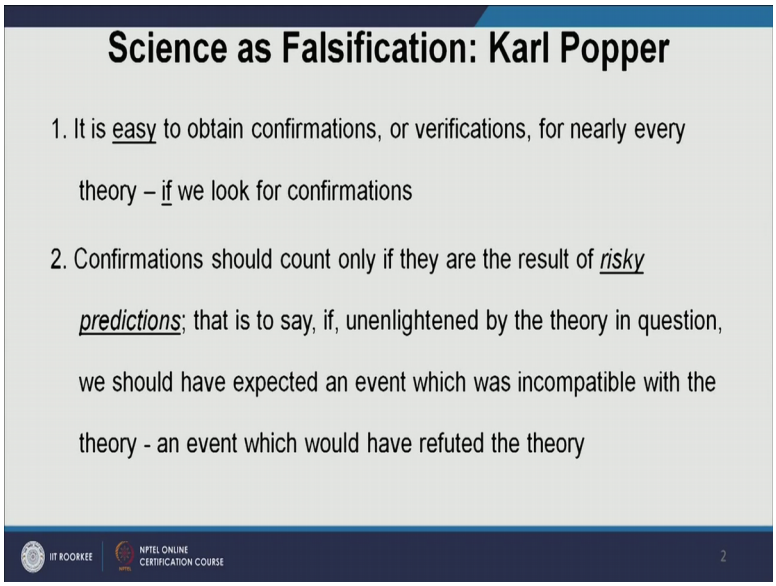

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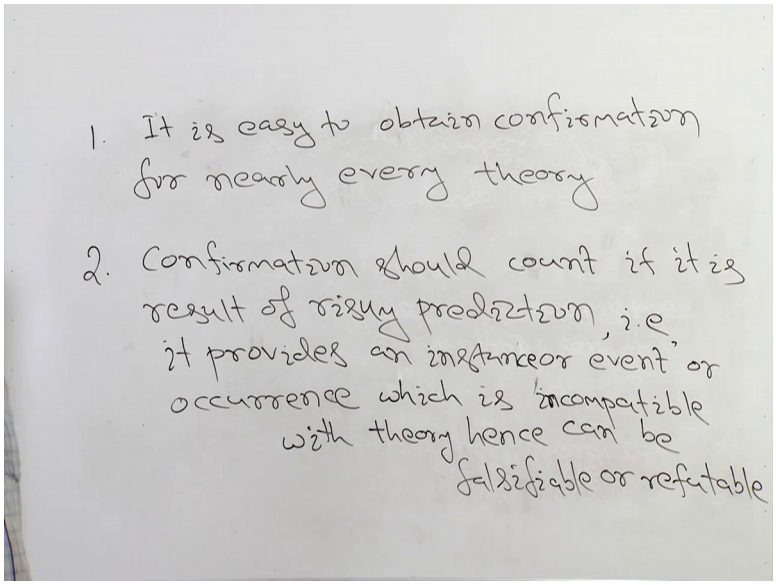

The first thing that he says, is it is very easy to find confirmation of a theory, if you are looking for one. If you looking for confirmation, if you are looking for verification, we

will always get it let us think of Karl Marx theory. Now the purpose is the original theory of Karl Marx had certain risky propositions, which could have been easily falsified.

And that would have made it a very sound theory. But the later Marxist they started adding auxiliary statements. They started writing clauses to the original theory to make it full proof. And that is what not a scientific theory according to popper. Because it cannot be falsifiable. Now he says when you open the newspaper every news event Marxist would say can be explained within the Marxist framework. There is no chance the letter Marxist do not give any chance for others the for other academicians to falsify Marxism.

They do not give any chance for others to say that see Marxism does not work here Marxism fails here. Everywhere they would provide certain confirmation certain verification of Marxist theory for Karl popper, that does not constitute a sound scientific theory. Because it cannot be falsifiable. If you are looking for confirmation, you will always get it will always find a way to to confirm a theory, to verify. A theory, remember one of the statements, I wrote on the blackboard all swans are white except those found in Australia, that is non-fancy falsifiable, why?

Because we have already added that auxiliary statement, that clause except those found in Australia all the swans are white. Hence you cannot falsify that. Karl popper had a problem with that, with such kind of statements, such kind of formulation. So, kind such kind of theorization second confirmation should count if it is the result of risky prediction; that is, it must provide an instance or occurrence or an event which can be falsifiable.

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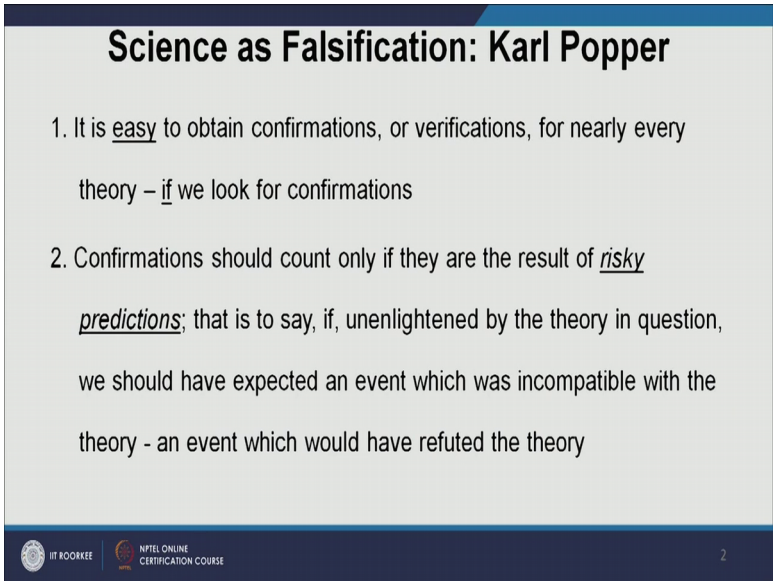

Or which can be refutable. Example Einstein's theory of gravitation he says. It is the result of a risky prediction that the light gets attracted by heavier bodies, and hence the distance the the the original location of the stars appears shifted ah, they look distant further distant from the sun all this could have been rejected falsified easily, but it got corroborated. He says that risky prediction makes a theory a sound strong scientific theory.

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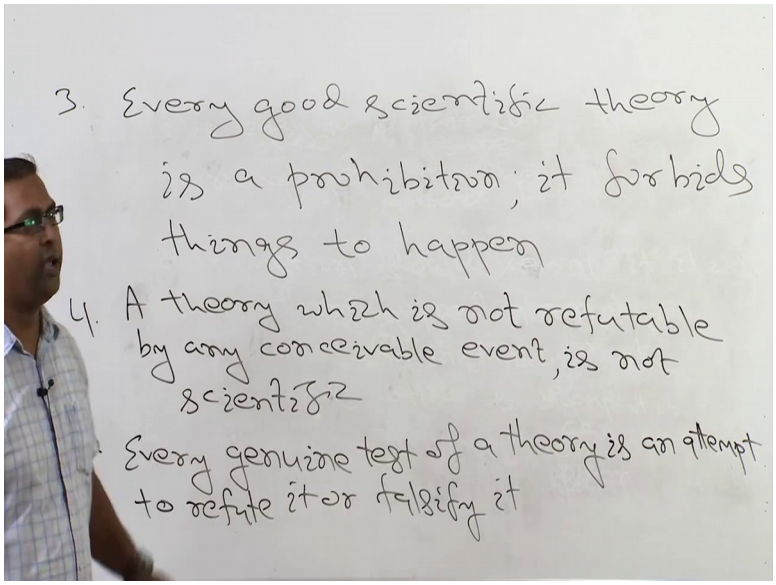

Every good scientific theory is a prohibition, it forbids things to happen. The more a theory forbids.

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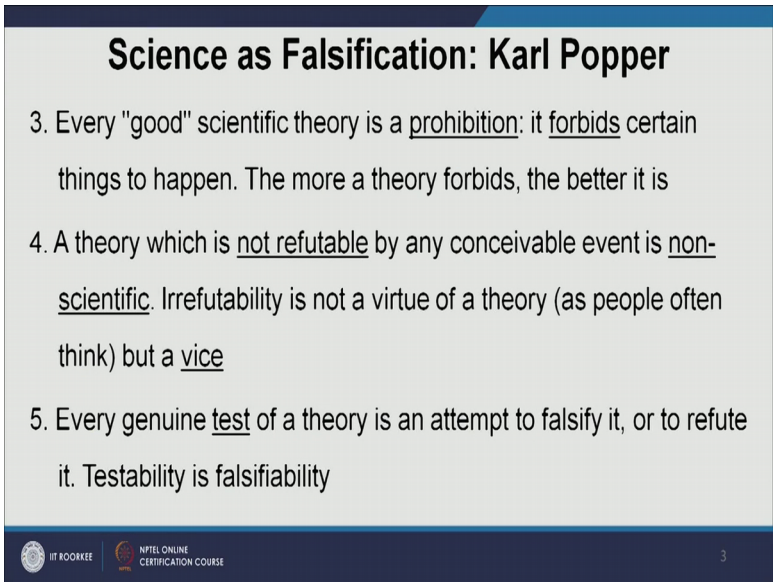

A better it is it must have something which can be easily falsifiable, which can be refuted. And if you can refute a theory, it is a sound scientific theory according to popper. See his his logic is very simple. He says it is absolutely impossible to verify.

Each and every aspect of a theory, it is very difficult to find verification confirmation, for each and every instance of a theory. But it is absolutely logically possible to produce one counter instance, a counter instance which would go on to falsify the theory. So, that is simply the logic that he adopts is impossible to verify every aspect of a theory. But it is easy it is quite possible logically possible to reject it, by one counter instance by one counter observation.

Hence why not take falsifiability as a criteria to decide the scientific status of a theory, why take verification as a scientific status of the theory generally we verify things we do experiment, and that experiment is tested through verification. Once we verify, then we say that this is our theory it says know let us make falsification as a criteria to decide the scientific status of a theory because it is impossible logically to verify each and every

aspect of a theory.

But it is completely logically possible to produce one counter instance which would negate the theory which would falsify the theory. Let us use falsification as a criterion for selecting a or deciding a theory to be scientific..

So, for him any theory which is not refutable by any conceivable event is nonscientific. Irrefutability for him is not a virtue of the theory as people often think, but a vise that is if a theory cannot be rejected cannot be refuted it cannot be considered as a good theory. It is not it is strength, but it is it is it is weakness. A theory which cannot be rejected it is not it is strength, but it is a weakness of the theory, that is how popper logically argues. Every genuine test of a theory is an attempt to falsify it, or to refute it. For him testability is falsifiability, testability is not through verification, you do not test a theory through verification, you test a theory through falsification.

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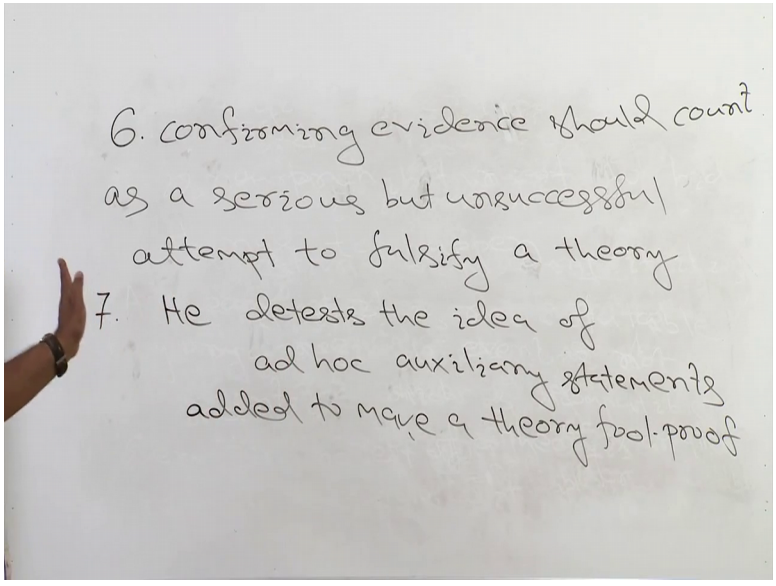

For him confirming evidence should not count, when it is the result of a genuine test of a theory.

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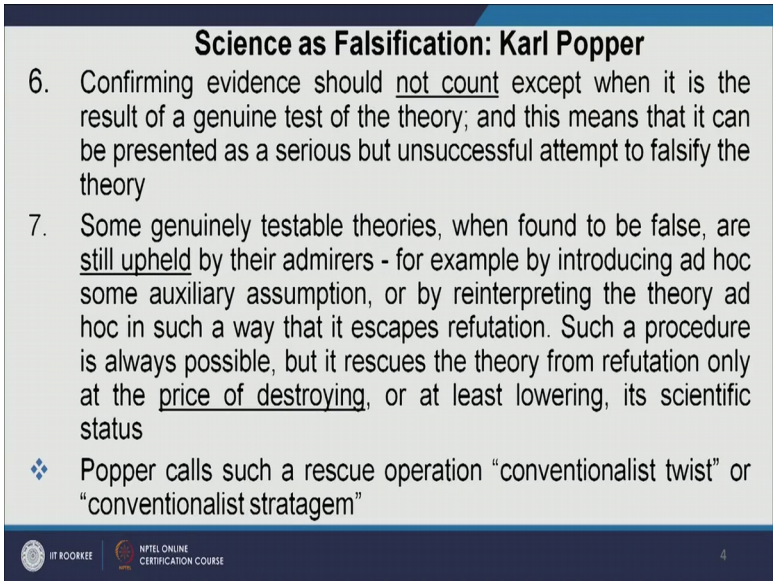

This means that it can only count as a serious but unsuccessful attempt to falsify a theory. So, when you are looking for confirmation, it should not count to as as a theory to be proved as correct rather you should be counted as considered as a serious, but unsuccessful attempt to falsify a theory if a theory does not get falsified then what happens popper it is ok; that means, the theories fitter he uses analogy from diurnal biology, when he says the theory is fitter it can survive for a longer period.

It does not mean that it is the best theory or a good theory, is that it is it can fit better to the existing data set. But sooner or later it has to be falsified for science to progress. Because once the theory is falsified, then we have a problem situation then that problem situation would lead to another theory, and that another theory would be falsified then again, a new theory would emerge. For him scientific theories evolve it is a evolutionary model. Unlike, thomas Kuhn, thomas Kuhn was talking about non-linear progress of science.

The science does not progress in a linear order, not progress does not progress cumulatively. It is through disjunction, it is through breaks it is through break in continuity in the form of a revolution, right. But popper says, theory evolve scientific progress is evolutionary in nature. One scientific theory gets falsified, then it leads to another problem situation that gets falsified, then that that that is how science develops

that is how science progresses. So, falsification is the only form of testability of scientific theory. But if it here it does not get falsified, it is just that it is better fit, it can survive for a slightly longer period of time. But sooner or later it is bound to be falsified, and then a new theory would emerge. Now he definitely did not like the idea of adding adhoc auxiliary assumption, adhoc auxiliary statement to make a theory full proof. Example I have already told you about the all the swans are white except those found in Australia which are green or black.

Now this is a the the clause of adding a green swan to the statement is an auxilary adhoc statement, which scientists make use of to make the theory full proof. Think of Karl Marx the Marxist, who interpret marxs theory and they prove that marxs theory holds true in any situation by adding such ad hoc statements. Now we look at what are these adhoc statements, how he was not in favor of any theory which could explain everything.

And which could not be falsified at all. We will see that, but before that when we talk about this adhoc auxilary statements, he has a term for that he has a jargon for that, he calls such a rescue operation of adding a adhoc statement to make the theory full proof, as conventionalist twist or conventionalist stratagem; that is, the theorist they try to make their theory full proof by adding certain clauses to it.

There for instance think of that statement, for metal there is a temperature there is a temperature at which it melts. For every metal there is a temperature at which it melts. It cannot be falsified, and for popper that is logically unsound logically incorrect if a theory cannot be falsified.

Then that is not a good theory. Because for him the simple logic is that, it it is absolutely possible to reject a theory. One counter instance can reject a theory. But it is not possible to confirm to find evidence to prove every theory. So, why not take falsification as a criterion. We have already discussed about Adler and a theory of inferiority complex. Now let us look at these 2 statements.

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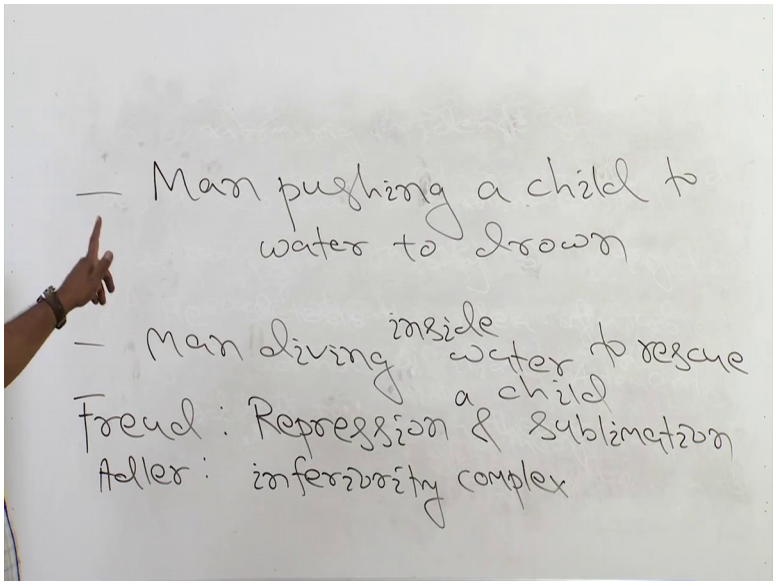

If you look at those 2 statements. The in the first case a man pushes a child to water to drum. In another situation man diving inside the water to rescue a child. Now, popper argues that if it were Freud he would have argued both this completely opposite diametrically opposite phenomenon with a single theory of repression. And sublimation what is the repression in Freudian theory, the repression is the behavior of human being under the influence of super ego, which forces him or her to antisocial or destructive activities.

So, under the influence of it is the psychological mechanism of repression which works when a child when a child is pushed into water by a person. But when a person is diving inside the water to save the child, it is sublimation and what is sublimation according to Freud sublimation is when our emotions our sexual energy, our erotic energy is channelized into artistic pursuit, literary pursuit, to something do to do something constructive. So, when a person dives inside water to save a child it is the sublimation the working of the sublimation of human mind that is working right.

So, popper says this is wrong. You are explaining 2 very different phenomenon 2 opposite phenomenon with the help of a single theory of repression and sublimation. Same holds true for Adler and his theory of inferiority complex. Why person is pushing a child into water to drown is because the person has tremendous inferiority complex. He wants to

prove to himself that he can dare to push a child into water. And why a person is rescuing the child from water is because of the same inferioirity complex which is at play which is at work. Now the person wants to prove to others that he has the guts he has the courage to save a child from water. Again 2 very different phenomenon being explained by one single theory. He says this kind of approach is this kind of approach cannot constitute the theory. A theory which cannot be falsified it is not a theory at all. He has a problem with Marxian theory, he has a problem with a Adlerian theory.

He has a problem with Freuds theory. But he is with Einstein's theory. Now it does not mean that Einstein's theory fall in into the natural sciences. Hence it is considered as a sound scientific theory by him and that this theory is fall into the domain of humanities or social sciences; hence these theories are rejected by popper. Popper does not look at the disciplinary background of the theories. What he looks at is whether a theory is a scientific theory or not.

For him a theory can be a scientific theory if it can be falsifiable. Not if it can be verifiable, that is a simple logic because he fells that a theory it is impossible to find confirmation find to to verify every aspect of a theory. But it is logically possible to produce a one produce one counter instance which will reject the theory or to refute the theory. Hence testability should be falsifiability testability should not be verifiability.

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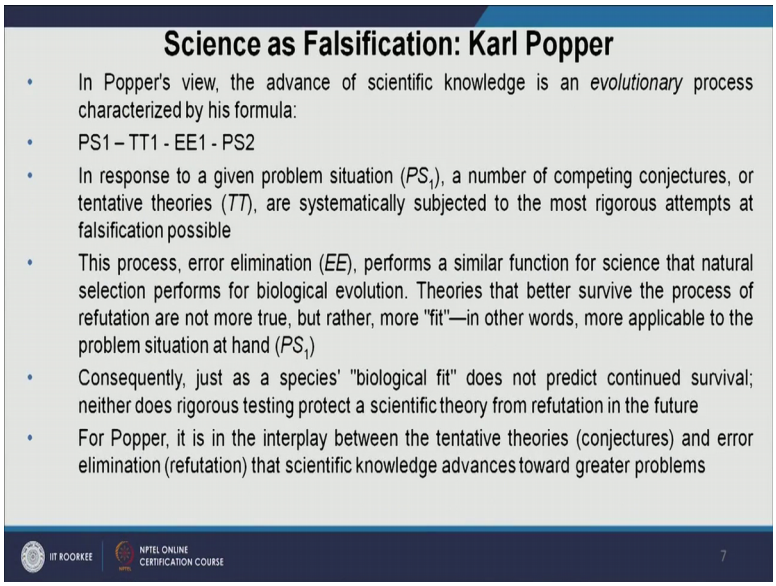

Finally, as I have already explained for popper the theory advanced scientific theory advances in evolutionary fashion. For him it is not revolutionary like tom thomas Kuhn argued for him.

One theory gets rejected who gets falsified then we have a problem situation to then that problem situation to leads to certain error elimination, error elimination is nothing but falsification, then it leads to problem situation theory, problem situation free and that is how science advances right. I just put it in the form of an equation.

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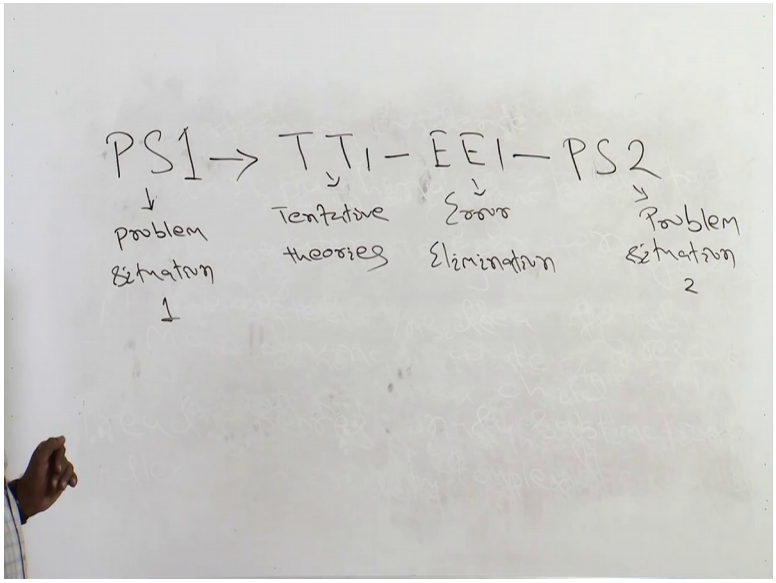

So, finally, this is how the evolutionary structure of science of falsification of Karl popper can be presented PS1 is problem situation one which leads to certain development of tentative theories. Then this will be subject to rigorous testability in the form of error elimination, which is basically the falsification or refutability of the tentative theories. Then that will lead to problem situation 2. And then again this is how the science grows science advances. One theory getting rejected, then then it leads to another theory right.

But if certain theories survives the falsification, as I told you earlier this is because, it can better survive the process of refutation. But it does not mean that it is truer, rather it is fitter. That is more applicable to the problem situation at hand. Consequently, just as species biologically fit does not predict continued survival. Neither does rigorous testing protect a scientific theory from. Refutation in the future any theory would be ultimately

refuted or falsified according to popper. And this is how the scientific knowledge advances towards greater problems. So, here I end the discussion on Karl poppers sciences falsification.

Thank you.