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Now in what follows we shall make a few critical comments of popperian methodology as well which is as many detractors as admirers how come draw an invidious distinction.

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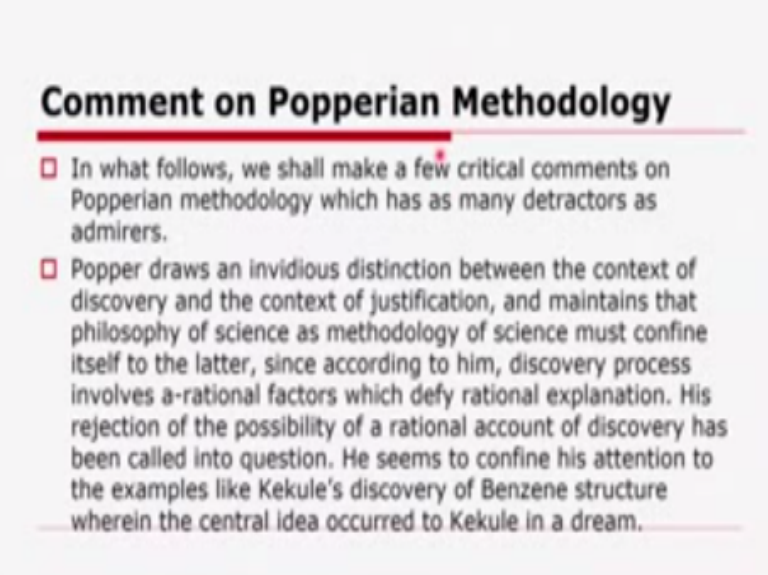

Between the context of discovery and the context of justification and maintains that philosophy of science as methodology of science must confine to the context of justification without dowelling up on context of discovery he refigures to say anything about context of discovery only he try to provide the context of I mean he try to dwell up on the context of justification.

Why according to him according to popper discovery process the process of discovery involves a rational factors which defy I mean a rational factors I am not tell you irrational factors but a

rational factors which may be rational may not be rational okay factors we defy any kind of rational explains.

His regression of the possibility of a rational account of discovery has been called into question is hence to confine his attention to the examples of kekule's discovery of Benzene structure where in the central idea occurred to Kekule in a dream. This is I mean context of discovery perhaps did not catch the attention of popper only context of justification he was referring but not all cases extended.

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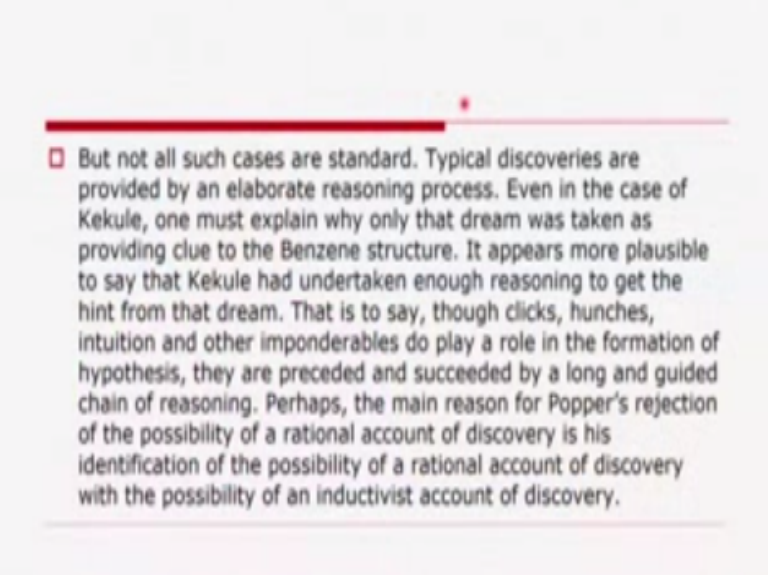

Typical discovers are provided by an elaborate reasoning capacity I mean reasoning process. Even in a case of Kekule one must explain why only that dream was taken as providing clue to the benzene structure, it appears more plausible to say that Kekule had undertaken enough reasoning to get the hint from that dream. That is to say though clicks, hunches, intuition and other Imponderables do play a role in the formation of hypothesis they are preceded in succeeded by a long and guided chain of reasoning.
Perhaps the main reason for poppers rejection of the possibility of rational account of discovery which is identification of the possibility of rational, account of discovery with the possibility of an inductivist account of discovery.

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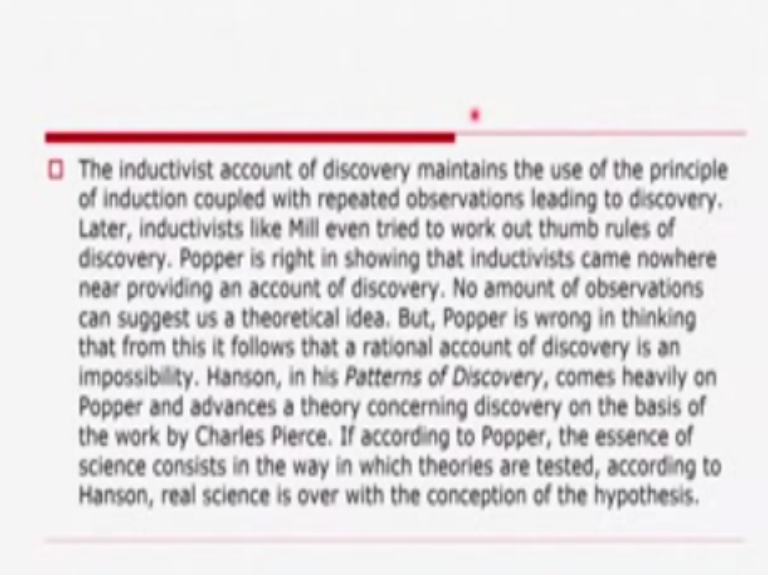

Then what is inductivist account of discovery inductivist account of discovery maintains the use of the principle of induction coupled with repeated observation leading to discovery. Later inductivists like joins to at mill even try to work out thumb rules of discovery popper is right in showing that inductivists came nowhere near providing an account of discovery no amount of observations can suggest as a theoretical idea.

But popper is wrong in thinking that from this it follows that rational account of discovery is an impossibility in Hanson in his patterns of discovery comes heavily on popular and advances a theory concerned and discovery on the basis of the what by Charles spheres if I could not popper the essence of science consist in the way was in theories are tested according to Hanson real science is over with the concepts in the hypothesis if you may conjecture if you make hypothesis if you formulate hypothesis then there is no place of real science for in a because why because conjectures hypothesis their not a part of the real word according to in our Hanson to court let me court in our Hanson okay from his book.

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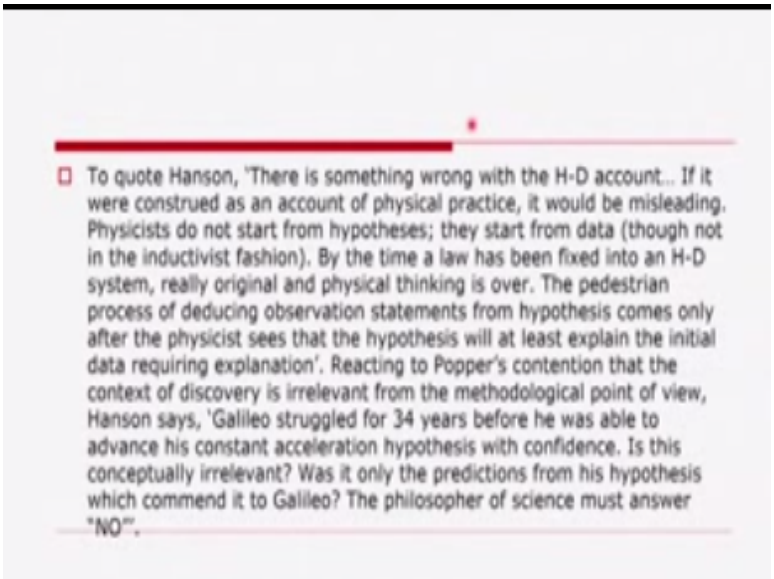

Patterns of discovery okay there is something wrong with the HD account I mean hypothetical would detective account if it were constructed or if it where construe the gene account of physical practice it would be miss lading, physicists do not start from hypothesis they start from data, do not in the inductive is fashion by the time law has been fixed into the hypothetic detective system, really original and physical thinking is over the pedestrian process of deducing observation statements.

From hypothesis comes only after the physicists see is that the hypothesis will at least explain the initial in data requiring explains, reacting to responding to poppers contains and that the context of discovery is irrelevant from the methodological point of view, Hanson's suggest Hanson says that Galileo struggle for 34 years before he was able to advance is constant acceleration hypothesis with confidence, is this conceptually irrelevant was it only the predictions from is hypothesis which command to.

Galileo the philosopher of science must answer no, the kind of debate which Hanson NR Hanson in his patterns of in his patterns of discovery reached the I mean the kind of debate see raised that in that sources how not only context of justification but also context of discovery, is important and whether it is important or not that is also a secondary equation the primary question is it possible to provide or rational account of the context of discovery, okay which popper negative.

Popper said no it is not possible to provide a rational account of discovery and it is absolutely in possible rather we must only talk about context of justification, a you methodological ration but

for Hanson I mean as create it to popper in methodological schema, okay he always he question that no it is not impossible to provide the rational account of the context of discovery okay discussing in detail the process.

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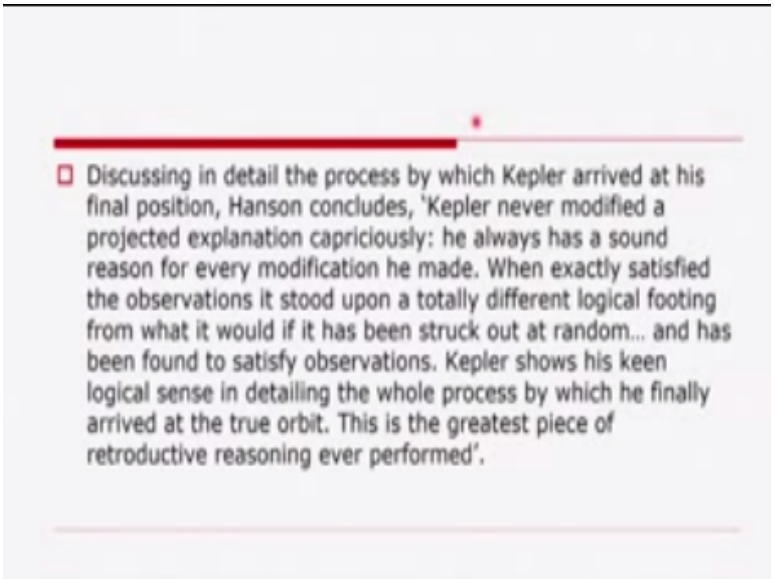

By which Kepler arrived at his final position Hanson concludes Kepler never modified the projected explanation capriciously he always has a sound reason for every modification he made. When exactly satisfied the observations it stood upon a totally different logical footing from what it would if it has been struck out at random and has been found to satisfy observations. Kepler shows his keen logical sense in detailing the whole process by which he finally arrived at the true orbit. This is the greatest piece of retroductive reasoning ever performed.

The type of reasoning that we are talking about which is gone into the thinking of Kepler has in characterizes retroductive.

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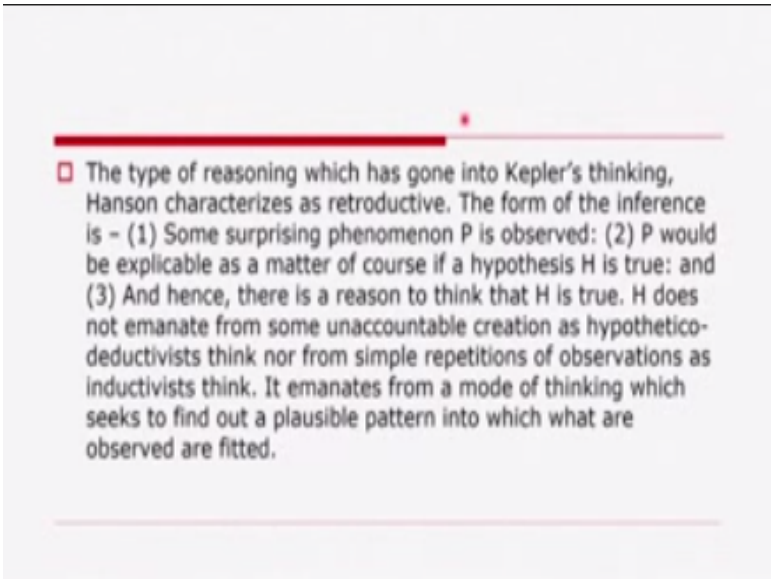

The form of the inference okay, is number 1 some surprising phenomenon P I am just using P for phenomenon is observed, phenomenon P would be explicable as a matter of course if a hypothesis H is true and hence there is a reason to think that H is true. If P is observed if P is, if P can be explain explicated as a matter of course if hypothesis is true I mean H is true in such circumstances okay, there is a reason to think that even your hypothesis is true, hypothesis does not emanate from some unaccountable creation as hypothetic or reductive thing nor from simple repetitions of observations as inductivestic okay.

Hanson try give a rid of to both inductive schema that only simple repetitions of observations or simple repetitions of observations are responsible for knowledge generation or Hanson also gave a rid of to the way hypothetical deductivists think, hypothesis does not emanate from some unaccountable creation okay. In fact hypothesis emanates from a mode of thinking which seeks to find out a plausible pattern into which what are observed are fitted. If I tell you what is your I mean going back to what is hypothesis attentive solution to a problem are hinge we are always try to provide a causal relations a causal effect relations.

In that causal relationship what we try to do suppose if I give you an example I will say population problem is the cause of under development or I will, I can also say under development is the cause of population problem. I mean we are trying to find out a plausible pattern in which they are observed, in which they can be fit into the system okay, this is how Hanson tried to bring about a critic to propene methodology.

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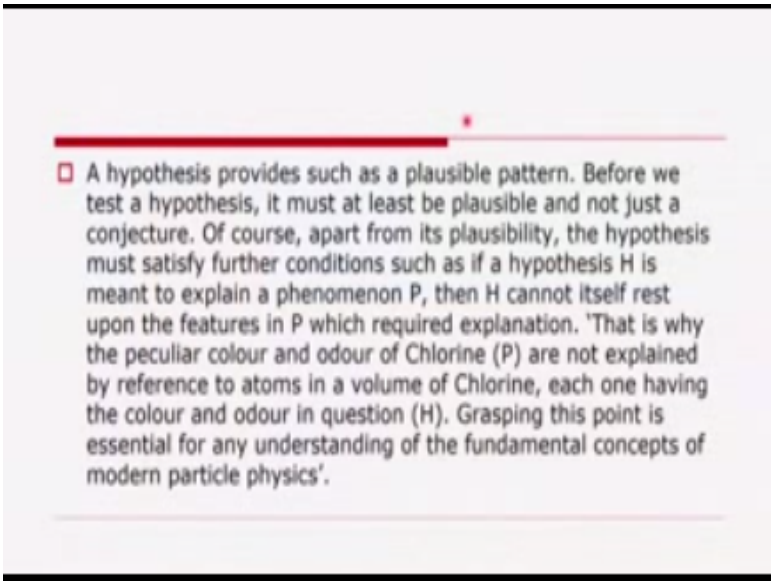

Thus, a hypothesis provides such as a plausible pattern. Before you we test a hypothesis it must at least be plausible and not just a conjecture. Of course, that is why whenever we say that we must format a hypothesis we have to back on lecture, we have to back on many other earlier works, many other earlier observations, data and so on okay, we just do not make a hypothesis in a random manner.

Of course, apart from its plausibility okay, the hypothesis must satisfy further conditions okay, such as if a hypothesis H is meant to explain a phenomenon P then H cannot itself rest upon the features in P which required explanation that is why the peculiar color and odour of chlorine are not explained by reference to atoms in a volume of chlorine, each one having the color and odour in question H or hypothesis, okay. Grasping this point is essential for any understanding of the fundamental concepts of modern particle physics, okay.

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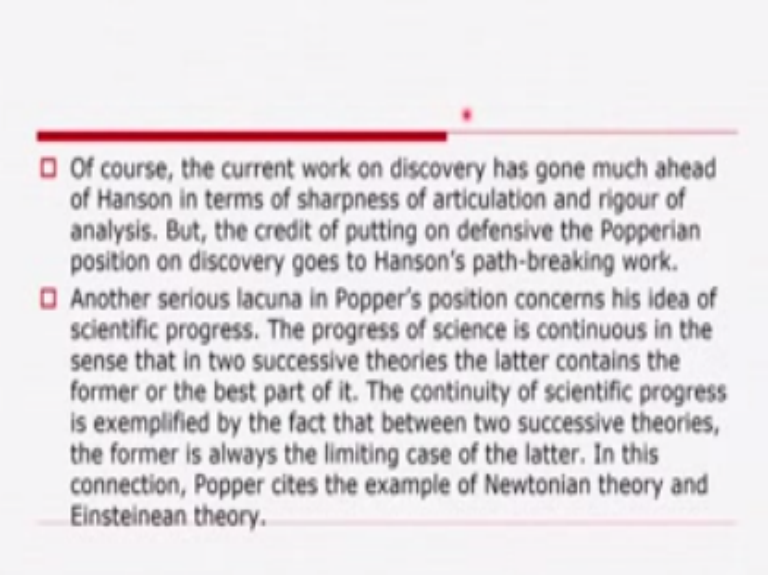

Of course the current work on discovery has gone much ahead of Hanson in terms of sharpness of articulation and rigour of analysis but the credit of putting on defensive the Popperian position on discovery goes to Hanson's path- breaking work in the patterns of discovery. Another serious lacuna in popper's position concerns is idea of scientific progress. The progress of science is continuous in the sense that in two successive theories the latter contains the former or the best part of it the continuity of scientific progress is exemplified by the fact that between two successive theories the former is always the limiting case of the latter.

In this connection popper cities the examples of Newtonian theory and Einsteinean theory okay, but it is not always the case but popper first overlooks the fact.

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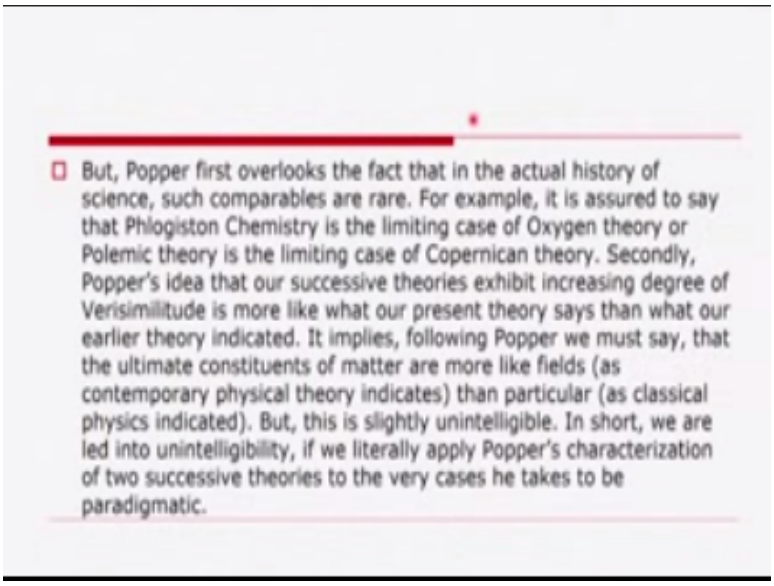

That in the actual history of science such comparables are there that is why I said this is always not the case okay for example it is assured to say that Phlogiston Chemistry is the limiting case of oxygen theory or polemic theory is the limiting case of I mean polemic theory is the limiting case of Copernican theory okay I mean the one existing theory and bitter theory okay, if I say progestin chemistry is the limiting case of oxygen theory or polemic theory is the limiting case of Copernican theory polemic as I said in the context of astronomy which when he suggested that you know the sun moves around the planets including the earth and the planets including the earth do not move the remain constant okay.

I mean polemic theory is the limiting case of Copernican theory Copernican revolution okay and secondly poppers idea that our successive theory is exhibit increasing degree of very similitude I mean close to the troth is more like what our present theory says then what our earlier theory indicate it, it implies that following popper we must say that the ultimate constituent of matter are more like fields such as con temporary physical theory indicates then particular a classical physics indicated it.

I mean I repeat I must retain it that the ultimate constituent of matter and more like fields then particular effects okay but this is slightly unintelligible in such we are lead in to unintelligibility if we latterly apply popper characterization of two successive theories to the very cases we takes to be paradigmatic okay and finally in charactering the old theory has an approximation to the new one popper assumes that the general locations of the new theory imply the same things as in

the old one that is to say popper assume that when a fundamental shifts in theory takes place okay the meaning of the terms remain in variant. They do not vary.

This assumption has been called in to question by some philosophers of science who shoe that the terms like mass force etc have one meaning in Newtonian framework and another in the pose Newtonian frame work, for example Thomas S. Kuhn and Paul Feyrabbend okay whose views we will discuss in the following lectures okay have convincingly argued that is shift from one theory to another is accompanied by a shift in the meaning of the works that are common to both the theories if so popper's characterization of growth of science as continuous collapses okay.

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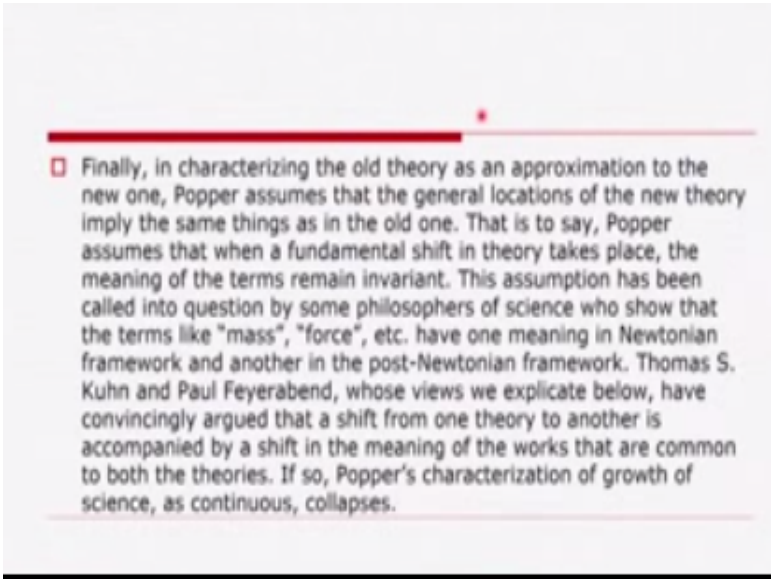

I mean what we have discussed in this lecture okay at what are we got what are we learnt okay, as we started with methods of science having discussed the ontological questions as well as the normative structure of the science we came to the methods of science and we made a leap from the goal of science to the method of science from the objectives of science but how are these objectives make with the methods from to the methods okay methods are important very important to meet the objectives in and there we have discussed inductivism hypothesim projectivism.

And the methodology of the systematic specification as propounded by Pop very quickly will see what kind of steps that Popper follows okay very quickly popper starts with step 1 Identification of a problem okay I will just go back little I mean as inductivism said no we must start with observation then observation without recourse to any theory then it attentive generalize which we must verify.

Thirdly conclusion okay hypothesis claimed that no we must start science must start with hypothesis okay then attentive solution to a problem or must be provided and I mean hypothesis I mean much be the provider that it must start with the hypothesis then hypothesis must be tested right or wrong if it is tested right then it must be accepted if it is tested wrong then the hypothesis is must be wrong okay.

In the positivism schema science also starts with objectivism then the premise number one suggests that it must start with I mean from observation we come to set of large the premise number two suggests that the we must have a set of statements describing the initial conditions and then we must arrive at a explanation I mean a statement describing the phenomenon to be explained okay.

Where this is about inductivism hypothesim and projectivism okay for popper science must start with the problem to address that question we must suggest a hypothesis which is a attentive solution to a problem I mean to address a particular research question one must have a hypothesis for popper but for hypothesis that no science much start with the hypothesis proper rejected, popper said no science must start with the problem.

If you do not have a problem what kind of hypothesis you are going to formulate perhaps for this reason he always his head is in mind that we must be able to identify what is research program research question once the problem the research problem is identified then we must formulate our hypothesis we must suggest the hypothesis oaky.

And that hypothesis as in the hypothesis schema was subjected to text here also it is in the context of proper schema also it subjected to text but in the not to prove or disprove or to accept or reject okay but though hypothesis must be evaluated on the basis of systematic falsification the method must be systematic falsification as in the unlike the context of unlike in the context of positivism.

But we are doing we are doing systematic verification okay as positivism that the almost of science consist in the fact that all scientific statements must be systematically verified and popper replaces verifiability with falsification that is why when the hypothesis is tested not to verify but to falsify and such systematic falsification may result in at least I mean it may result in the form of the way at a particular hypothesis any be tested right or may be tested wrong if it is I mean if is falsified I mean if in the process of by the method of systematic falsification, if hypothesis is tested wrong then it is subject to refutation.

It must be refuted and if the through the methodology of systematic falsification a hypothesis is tested right, we are not going to accept it permanently as in the case of hypothesis schema but we are going to keep our hypothesis attentive and it is subject to collaboration.

Then that is why the logic of scientific discovery in the conjecture and refutation, mo might the structure of on the method of science by mentioning that systematic falsification may lead to refutation in the case of, if the hypothesis is tested wrong and systematic falsification may lead to collaboration if hypothesis is tested right. I mean under what limiting conditions you are going to keep your test your hypothesis to be right.

Not under all conditions because we are also not aware of all conditions okay, all conditions are known to us and in this sense the science is supreme. Precisely because science is an enquiry, science is a method, science is a subject area which as taught us the way we must understand the relative ways to understand any particular phenomena. Science does not teach us to follow absolute teaching, science always teach us how to follow relative ways. That is why theological stage is if you see that the proponents of where we use to say that truth is absolute.

But in the context of science at least in propodiance schema okay perhaps positive also said that science is absolute okay. But they also provided, these absolute can be questioned, where it offer went a ahead further that no science is also not absolute it is also relative okay. In this context this is very important that we must remember that no science can ever be or any subject matter, I mean we are not talking about, we are not trying to attribute okay absolutism to any particular phenomena as the proponents okay.

This is why science is supreme, this is why hypothesis, even later on we will find that Kevin coon and Paraben they always felt the need and urgent need to make a democracies between

science and non science. It is very important to understand this okay, then what we are going to do in the lectures to follow. We will try to look at how popper was also questioned by coon and subsequently we will also find all these historical traditions, so far the methods of science are concerned they were also challenged.

But for time being please remember we are not going to, let me also say, it is not that this is the end of these debates okay so you will feel that know with fair bend we are going to have the last word no it is not the case our job is not to find out only difference methods our job is to find out two know to understand the context in which these methods have emerged this methods have not immersed as an automats as an isolated activity these methods are deeply socially culturally economically.

And politically embedded these social political economic cultural and institutional and logical embededness of such methods with the goals and imperatives of science must be understood that is why we started with ontological questions then science then from within echo science we trying to look at goal of science and imperatives of sciences that's why now we said when the goal of science is the extrusion of certified knowledge the imperative on science.

Derive from goal and its technical methods and there we discussed goals of model science in the form of the science then we moved to the methods of science if the methods of science will be an independent science then I think it is arrow less it has some critical arrows brave arrows we must be able to examine methods of science in relation to the science or in relation to the objectives of science either the goals of science.

Okay these things instrumental rationally to which science has always appropriated okay this is what we are trying to do okay then what we way proper to start with the central position of philosophy the problem of cosmology I mean the program of cosmology is the program of understanding the world including ourselves as part of the world they we provide it I mean there we started the discussion on context of justification and references is to I mean refuges to say anything about the context of discovery okay because he thought that.

No context of discovery I mean it is impossible to it is not possible to provide rational account from context of discovery that why you only on context of justification. And how you providing justification or the modules for your explanations I mean that you made and then he provide it

proper provided certain states of scientific method I mean problem identification is suggestion of a hypothesis systematic pulse and that systematic pulsification we went through.

And then we provide we have also discussed they have provided certain examples through which you been identified you can learn the differences between inductiveness and postiveness on the one hand and hypothesis on the other hand it is very important. Okay inductiveness and positives on the one hand and methology on the other from here onwards we will see whether we are taking while a linear method which goes beyond systematic verification and systematic as well we will see in the context of tome's rule in the next thank you

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