Sociology of Science

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Lecture – 06
Ethos of Science: Robert K. Merton

Dear students, today I am going to discuss ethos of science by Robert Merton. Now, since we have started teaching this course we know that this is a course on Sociology of Science. So, we are going to look at the social aspect of the scientific community, the social nature of science. See, the scientists are human beings. The science may be neutral, but the practitioners of science may not be neutral. The many factors which affect the bearing of scientists, there can be social factors, there can be economic factors, there can be political factors, there can be ideological factors, there can be culture, there can be norms, there can be certain values which guide the scientific research.

Now, today I am going to discuss the ethos of science as formulated by Robert Merton. Now, who is Robert Merton? A little bit of introduction is necessary; Robert Merton is a renowned sociologist from United States of America who pioneered this branch of sociology that is Sociology of Science. The development of sociology of science is credited to Robert Merton; his time period was 1910 to 2003 or 4. So, it means that his academic career started in the beginning of 20th century and ended towards the end of 20th century.

He has contributed immensely not only to sociology of science, but to sociology in general, even awarded so many times by multiple agencies, by multiple universities for his contribution to sociology. He took his Ph. D from Harvard and he spent his time as a professor of sociology at Columbia university. In fact, interestingly his Ph. D thesis was on the inter linkage between the social needs and scientific research in seventieth century in England which later on he published as a book which we shall be discussing very soon as a part of this course. In ethos of science, he has identified certain ethos which the scientist within the scientific community are governed by they follow this ethos.

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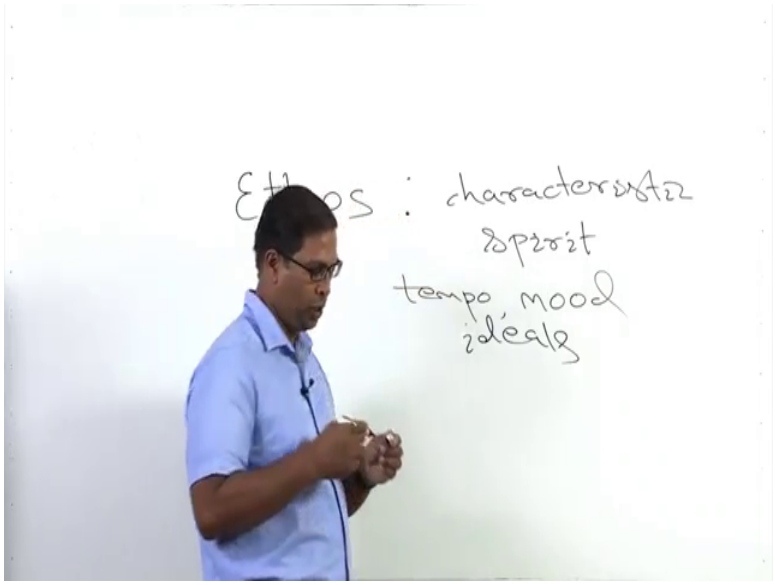

Now, what are these ethos, how do we spell it? Ethos implies the characteristic spirit, the tempo, mood, so there are certain characteristic spirit, there certain ideals which the scientific community is guided by this is what he tries to identify. Now, remember I told you in the beginning that his time period was 1910 to 2003 or 4. So, when he was formulating this area of research that is roughly the time between the two World Wars - first World War and second World War, this was a time of political turbulence. So, his scientific research in the area of sociology of science also reflects the concerns of that period and the ethos that he has identified anyway talks about the social context of his time.

Now, when we begin this lecture, we begin by defining what is science as defined by Robert Merton. When he begins to talk about the ethos he also talks about what science is how can we define how can we understand science. He puts it in three-four ways.

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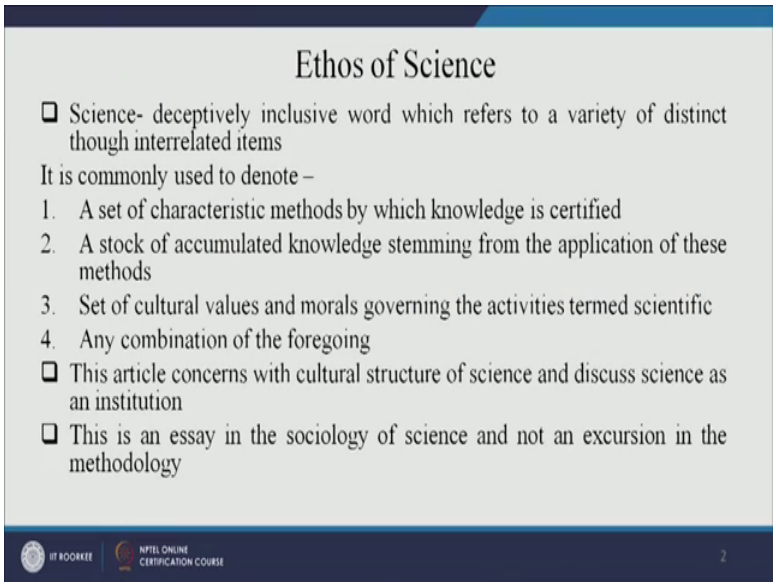

One way is that science is a set of characteristic methods by which knowledge is certified; a set of characteristic methods through which knowledge is certified. Knowledge - scientific knowledge, scientific knowledge whatever knowledge we produce through scientific research through different methods by making use of different methods, we produce certain facts, and those facts become scientific knowledge. Once it is accepted by the scientific community, once it is certified by the peers within the scientific community, so science for him is a set of characteristics method by which knowledge is certified. Once that is certified by the scientific community, it becomes universal truth.

Another way in which we can define science is it is a stock of accumulated knowledge stemming from the application of these methods. A stock of accumulated knowledge the scientist all of the world were doing research on different aspects. And once that they come up with the final results with their findings that is subject to rigorous testing by the scientific peers. Once it is accepted by the scientific peers, this is an addition to the existing knowledge, and increment to the existing knowledge, so an accumulated knowledge. Science is essentially a stock of accumulated knowledge, and which stems from application of these scientific methods. How do we produce come up with scientific knowledge by applying by making use of certain scientific methods.

Science also can mean the third way in which he defines a set of cultural values and morals governing the activities term scientific. Now, this is what we are more interested in this lecture. A set of cultural values and morals governing the activities termed scientific. Scientific community consists of human beings like us and they are always guided by governed by restricted by controlled by determined by prevailing socio cultural values and norms, which has a bearing on the scientific research on the way they go about their research.

Now, this lecture we will be discussing those cultural ideals, those characteristics spirit of science, the ethos of science. So, this here Merton says in this discussion that his discussion on ethos of science is concerned with the cultural structure of science and discuss science as an institution, as a social institution, having its own set of rules norms values which is binding upon the scientific community. Hence, he says this is an essay in the sociology of science, this discussion on ethos of science; he calls it an essay on sociology of science, not an excursion in methodology. He does not tell you what should be the method applied to come up with scientific results; he is more concerned with the cultural aspect of science, the value aspect of science, the normative structure of science.

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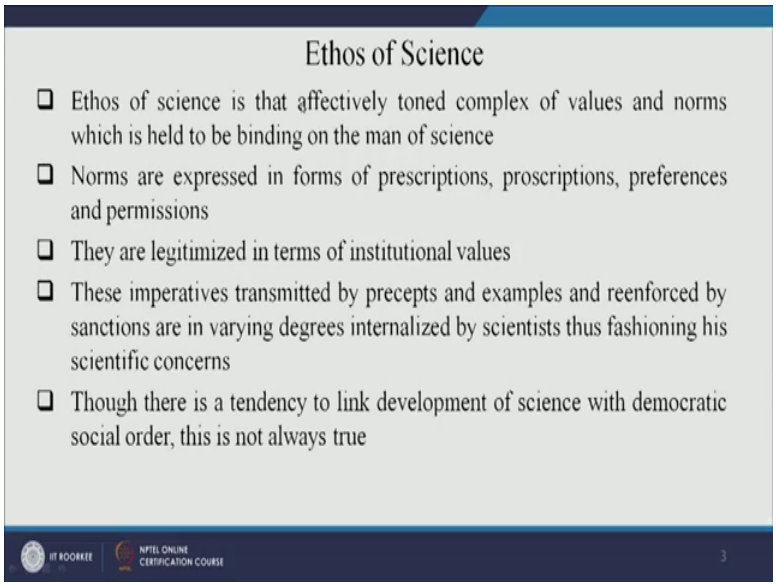

Now, how does he define ethos of science? For him, it is an affectively toned complex of values and norms, which is held to be binding on the man of science, affectively felling. The scientists are bound by complex of values and norms, when they undertake the

research in their laboratories, in the universities, in the research centres. And these norms are expressed in terms of prescriptions, proscriptions, preferences and permissions that is the certain norms. What are norms? Norms are informal rules, informal rules are as important in social life as are formal rules, codified rules as important as law. Informal rules or norms guide our day-to-day behaviour, guide the day-to-day behaviour of every human being on earth.

The norms can be culture specific. Now, norms can be society specific, norm can be community specific, the norm can be religion specific, the norms can be universal as well. There are certain universal norms which guides the scientist and within the scientific community. And these norms can be in the form of prescriptions things that is that the scientists are supposed to do things that a scientist ought to be doing. Prescriptions - forbidden things the scientist should not do or are not supposed to do. Preferences the scientist have to follow certain preferences.

Now, this norms are legitimized in terms of institutional values. The norms have become institutionalized, has become part of the social institution. So, a set of scientist who do their research then they die that replaced by another set of scientist, they also do the research all of them are guided by the same set of norms or the ethos that is how the system institutionalizes norms. We set of individuals do our work then we go we leave this world, we were succeeded by another set of human beings. The human beings change, human beings come and go, but this norms, this prescriptions, this ideals, this ethos that remain because it has been institutionalized.

And it is not only institutionalized, this is also internalized by the scientist which determine, guide, fashion, the scientific concerns. They internalize this more is this ethos this characteristic spirit, which is the hallmark of science. Now, having defined what science essentially is into three ways and having said that he is more concerned with the cultural aspect of science, the social aspect of science. Then he goes on to talk about what ethos are how they are institutionalized, how it is internalized by the scientist, how the ethos of science are the guiding principle which determine the course of research within the scientific community.

Then he changes track then he talks about the fact whether there is a link between different kind of political structure and development of science. He contests the idea that

only the democratic social structure, a democratic political setup provides impetus to science. See, I told you that his time period in the beginning of his academic career it, it coincides with the political upheaval all over the world in the 1930s and 40s, where there was a concern with the dictatorial states the Nazis, the Mussolini, the Hitler, the Japanese and all other dictatorial states, the political states. There is a concerned that science may not grow may not develop as much as it would grow in a democratic setup, let us say in America, let us say in United Kingdom of England and Scotland and Wales.

But he contests that idea. He says Monarchy's which are kind of totalitarian states, the earlier monarchies in 16th, 17th, and 18th centuries in Europe, they have supported scientific research. For instance the Charles Second of England, he granted a charter to Royal Society of London and sponsored the Greenwich observatory. The Greenwich observatory which is a platform for astronomical calculations. And France for instance he says The Academy the Sciences was founded under Louis 14th who was himself a monarch and a dictator. Then Frederick, the first endowed the Berlin Academy in Germany. And Saints Petersburg Academy of Sciences was instituted by Peter the great another monarch.

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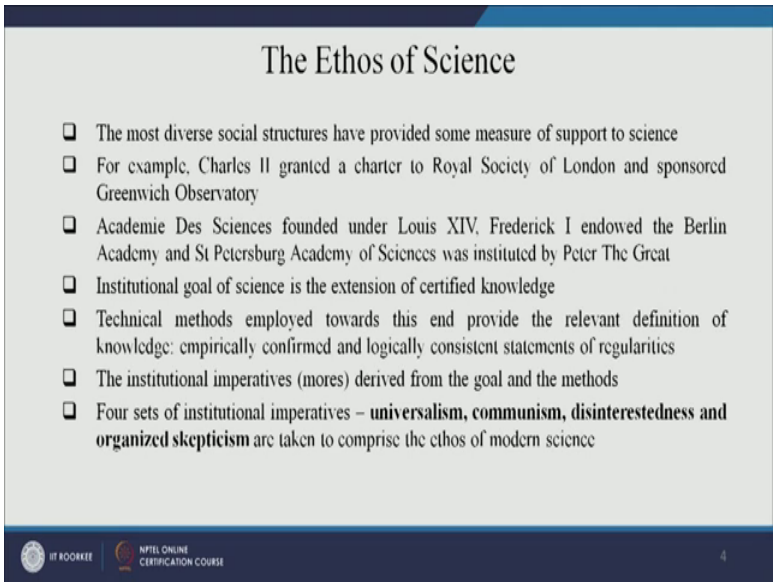

So, this monarch's who ruled over the country with absolute control can be considered as totalitarian states, but this monarchs in this totalitarian states in this dictatorships science has flourished. So, we cannot say that only democratic structure is conducive for

scientific development. As he is giving example from various countries in Europe in the 16th, from the 16th then 17th then 18th century, then he says that the institutional goal of science is the extension of certified knowledge. I have already told you that for Merton define science as certified knowledge which is produced through a set of scientific methods.

And here again he repeats the point, when he says the science the institutional goal of science, the official goal of science is the extension of certified knowledge that is diffusion of scientific knowledge, spread of scientific knowledge. And how does that happen? This diffusion of scientific knowledge is possible because the scientist make use of empirically conformed and logically consistent statements of regularities. They make statements which are logically consistent, which are statements which are backed by empirical results, empirical evidence. And this becomes this empirically conformed, logically consistent regularities that define scientific facts then they had become scientific knowledge. The scientific knowledge is then spread diffused within the scientific community and that is official goal of scientific of science that is diffusion spread of scientific knowledge, certified knowledge, knowledge that has been certified by the scientific community.

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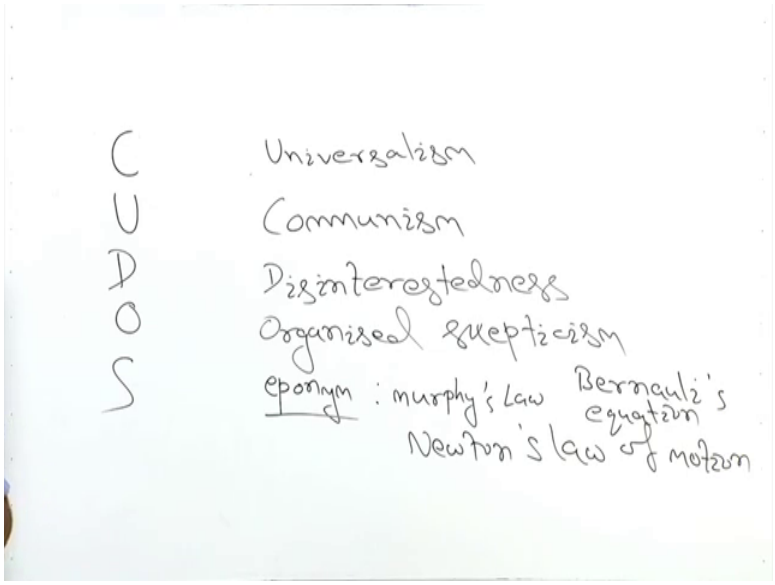

Now, I come to ethos of science. What are those exactly the ethos of science. There are in fact four – Universalism, communism, disinterestedness and organized skepticism. In

fact, he calls this as CUDOS. As a mnemonic device, as a memory device, we can remember it this ethos of science as CUDOS - C U D O S. Now, here C stands for communism, U stands for universalism, D stands for disinterestedness, OS stands for organized skepticism.

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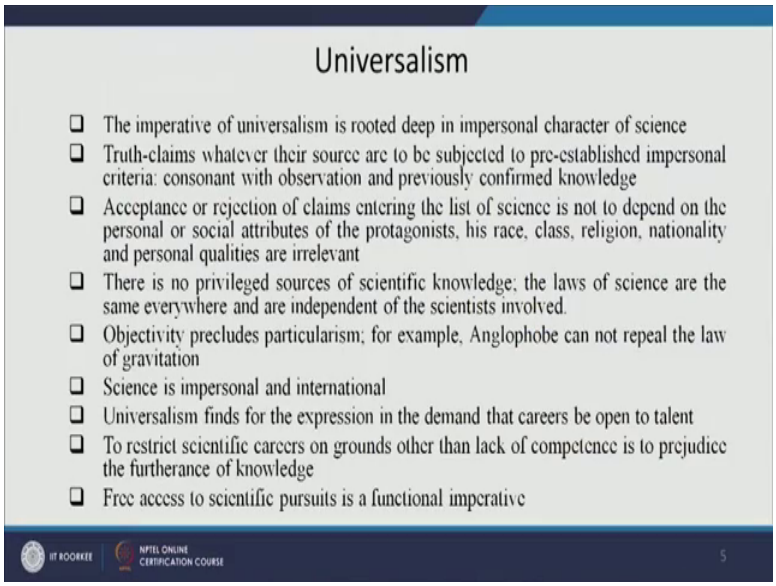

Now, what is universalism? What is universalism as one of the important ethos of science. For him it is a significant ideal which is adopted by the scientific community that is universalism. It is rooted deep in the impersonal characters of science. What is impersonal, what is impersonal character of science, that is as a term impersonal stands for it has nothing to do with the personal attributes of the scientist, it has nothing to do with the personal and social background of the scientists. The scientists when they come up with scientific facts, with their discovery, with their invention, with their findings, with their results, the scientific community should accept the results based on its logic, consistency, empirical evidence. You should not look at the social and the personal background of the scientist. We should not look at the nationality, religion, race, caste, the region he or she belongs to, to decide whether the scientific results claimed by him or her is acceptable or not.

Now, this is very now in 2017, we accept it as taken for granted, of course, why should we look at the social background of the scientist. When we look at the scientist discovery or invention, we are more concerned with a scientific claim whether it should be

accepted or not, we should look at the methodology, we should look at how logically consistent the arguments are. But as I told you Merton writing 1930s and 40s was responding to reacting to the political and social climate of his time.

Where a scientist could be a deserving scientist can be ignored because of his or her nationality, because of his or her race, skin colour black or white or a person happens to be a brown from India or person happens to be a yellow from china or Japan, the skin color determined the scientific research. The race – Aryans, non Aryans that determined the acceptance of a scientist. Nationality, the person is a German or from Africa, the person is an American or from India that is also has a bearing on the scientific at acceptability of the scientists.

In that context Robert Merton states one of this central ethos of science is universalism, which is rooted deep in the impersonal character of science that is scientists should be considered based on their discovery, invention, claim, scientificity of their claim rather than their social or personal background. The acceptance or rejection of claims entering the list of science is not to depend on the personal or social attributes of the protagonists their race or the class or the religion or nationality. The personal qualities are irrelevant. There is no privileged source of scientific knowledge. The laws of science are the same everywhere and are independent of the scientist involved, there is no privilege source of scientific knowledge that a certain monarchy.

A certain nobleman from UK can come up with a scientific discovery, and it should be accepted, no. Even if it is by a commoner and it has scientific viability and scientific argument logic. It should be accepted does not matter whether it is a nobility or the common man the scientific claim is to be subject to same rigorous testing. Objectivity should be the determining criteria for accepting scientific claims, objectivity, neutrality, nonpartisan, non-judgmental approach.

An Anglophobe for instance he himself gives an example, an Anglophobe cannot repeal the law of gravitation. An Anglophobe somebody who does not like the Englishman, a scientist somebody whose sitting on an important position in a scientific community cannot ignore, reject the thesis by Englishman, just because the person does not like an Englishman. If the scientific claim has logic, validity, it has to be accepted.

Science is impersonal and international it is beyond nationality, it is beyond personal characteristics, personal qualities personal attributes of scientists. In scientific community careers are open to talent. To restrict scientific career on grounds other than lack of competence is to prejudice the furtherance of knowledge. If you stop scientific career of a person on the grounds of race or nationality or skin colour or religion, then you are doing disservice to the science, you are obstructing the furtherance of further development of diffusion of scientific knowledge.

Hence, he concludes by saying that free access to scientific pursuits is a functional imperative; it is a functional necessity. What is a functional necessity, free access to scientific pursuits; everybody should have free access to scientific endeavour. One cannot restrict the entry of certain persons based on their skin colour, nationality, religion region or personal attributes. If the person has competence has talent should be accepted, should have free access that is a functional necessity that is a important criterion of scientific world that is universalism. Science is universal, it is international, it is impersonal. It has nothing to do with the personal, social, national, racial characteristics of the scientist right.

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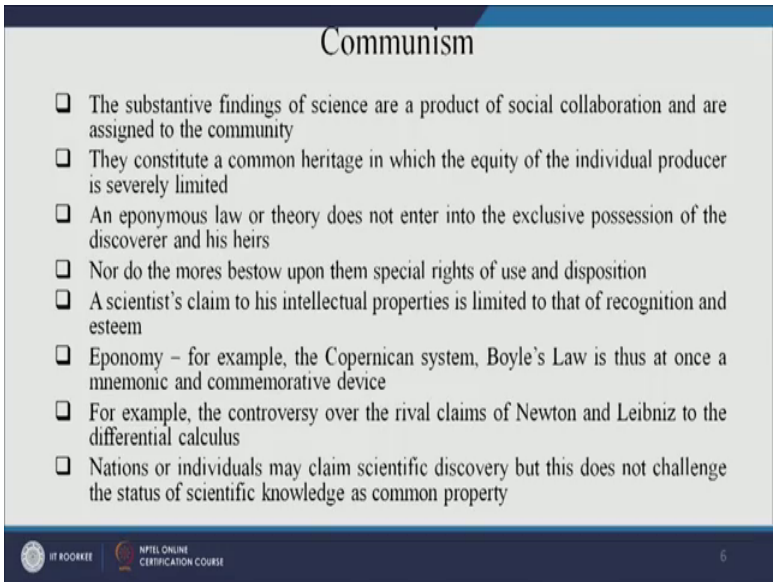

The next one is communism what is communism here communism has nothing to do with the political ideology of communism. It has nothing to do with the communalism that we discuss in terms of religion and religious bigotry or religious riots. Here

communism essentially implies communal character of science shared characteristics of science. Science is communal that is science is shared. Science is a public enterprise. Science is a social collaboration. The substantive findings of science are a product of social collaboration and are assigned to the community. They constitute a common heritage in which the equity of the individual producer is severely limited. The share of the individual scientist is limited.

Because once you have discovered something new, once you have invented something new it is in the public domain, it can be freely used accessed by everyone within the scientific community, you do not possess it. Let me sound slightly odd, we will come to that because it basically comes in conflict with the idea of intellectual property rights, but will come to that later on, but let us see what Merton has to argue in this regard.

He says an eponymous law or theory does not enter into the exclusive position of the discoverer and his heirs. What is the eponymous law eponym - e p o n y m. Here it means that something has been named based on the discoverer or the inventor, it can be Murphy's law, it can be Bernoulli's equation, it can be Newton's law of motion. When something is named after the discoverer or the inventor, this process is known as eponym. How does eponym play an important role in communism as one of the ethos of science. He says an eponymous law or theory where Newton's law or Bernoulli's equation or Murphy's law, it does not enter into the exclusive position of the discoverer and his heirs or his family members.

Newton's law is for everybody to use within the scientific community, it is not the exclusive position of the newt of Newton of and his family members that is what he means. A scientist claim to his intellectual properties is limited to that of recognition and esteem. How is that? A scientist will derive esteem and respect from his or her discovery, it is a mnemonic and a commemorative device that is it.

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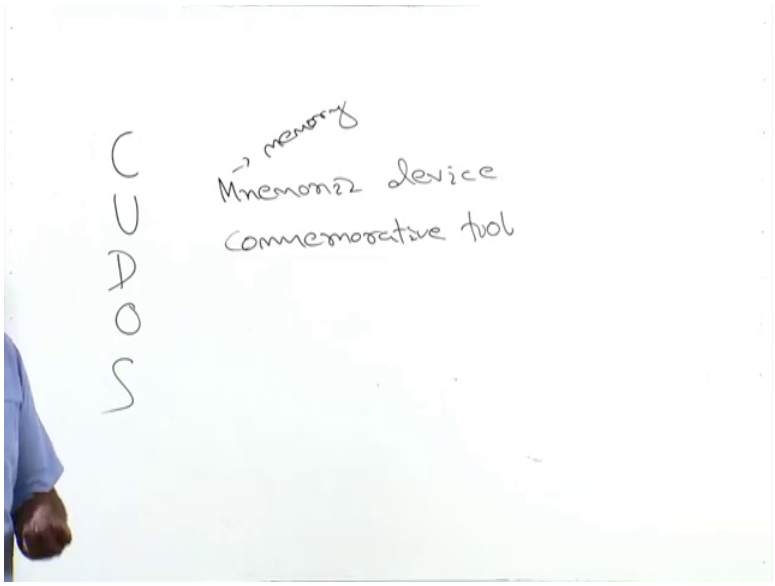

So, Newton's law or Murphy's law or Bernoulli's equation they are just mnemonic device or a commemorative tool, commemorative tool or a mnemonic device. Here you see mnemonic is a spelt as m n e m o n i c, where m is silent which otherwise is known as is pronounced as mnemonic device that is a memory device. What is the memory device? This is a memory device CUDOS. If I tell you that in your assignment, if I tell ask you to discuss the ethos of science formulated by Robert Merton, you will remember when you are writing your assignment you will remember C U D O S, CUDOS. And automatically it will spring to your mind the C stands for communism, U stands for universalism, D stands for disinterestedness, OS stands for organized skepticism. It is a memory device.

Like for instance the states of the country in our schools in our childhood we have developed our own coding system, our own memory device to remember the states of the country, to remember the districts of the state right. So, remember the first 20 elements of the periodic table. Now, all developed our own mnemonic device or memory device. So, this is an example of what is mnemonic device a memory device.

Now, for Robert Merton, the discovery or the invention by the scientist only acts as a mnemonic device for the scientific community. As soon as they see Newton's law, they remember Newton and his laws three laws of motion that is it. It helps us to remember the three laws of motion of Newton that is how the mnemonic device works or it works

as a commemorative tool. Whenever we utter the word Newton's law automatically we give prestige respect to the person who has discovered this law that is a Newton or Ohm's law, Coulomb's law Bernoulli's equation. It all acts only as a mnemonic device and commemorative tool. It allows us to remember the person and the law the equation the formula or it acts as a commemorative tool, we give respect by naming the law, by naming the equation, by naming the formula by naming the machine the gazette after the discoverer or inventor we are automatically bestowing prestige and respect to the person, that is it.

The scientist should not expect anything more from his or her discovery or invention that is according to Robert Merton. Because science is communal, science is shared, science is a social collaboration at best it acts as a the invention of the discovery acts as a commemorative tool or mnemonic device that is it. For his example he says both Leibniz the German and Newton the Englishman, both he and his supporters and his scientific followers may argue that differential calculus has been invented by either Leibniz or by Newton, but one has to accept that whoever has invented it differential calculus belongs to the scientific community. It is accessible to the scientific community, it is a common property anybody can make use of differential calculus.

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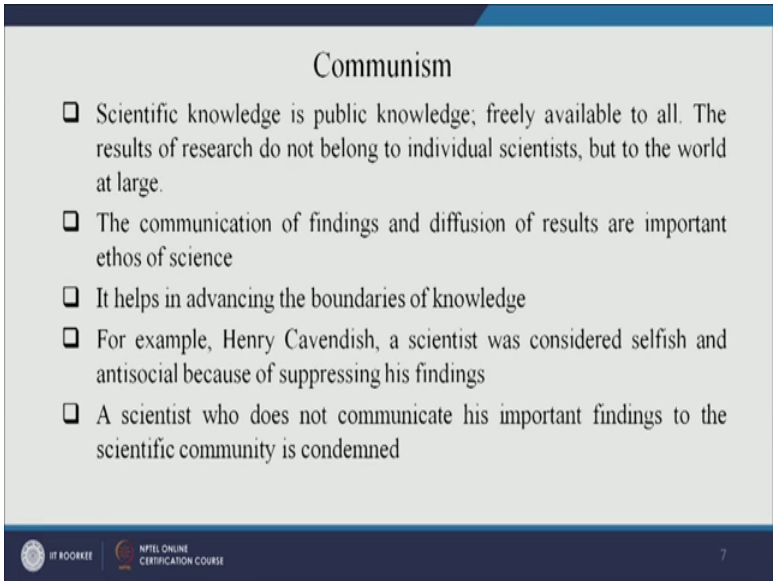

Scientific knowledge is public knowledge it is freely available to all. Hence, he says communism or communal character of science is a important ethos of science. The

results of research do not belong to individual scientists, but to the world at large the communication of findings and diffusion of results are important ethos of finding scientific research. See, how does something become public property, how does something become accessible to everybody when it is communicated to the scientific world. When it is communicated to the scientific community, so every scientific result and finding has to be should be communicated to the world at large. It helps in advancing the boundaries of knowledge.

For example, if you do not do that we were considered as a selfish that is if you do not communicate your scientific findings to the scientific world, we are considered as selfish and antisocial, because you are suppressing your findings. Henry Cavendish was a great scientist, but he was considered as selfish and antisocial, because he did not communicate his most of his findings to the scientific world. A scientist who does not can communicate his important findings to the scientific community is condemned is criticized.

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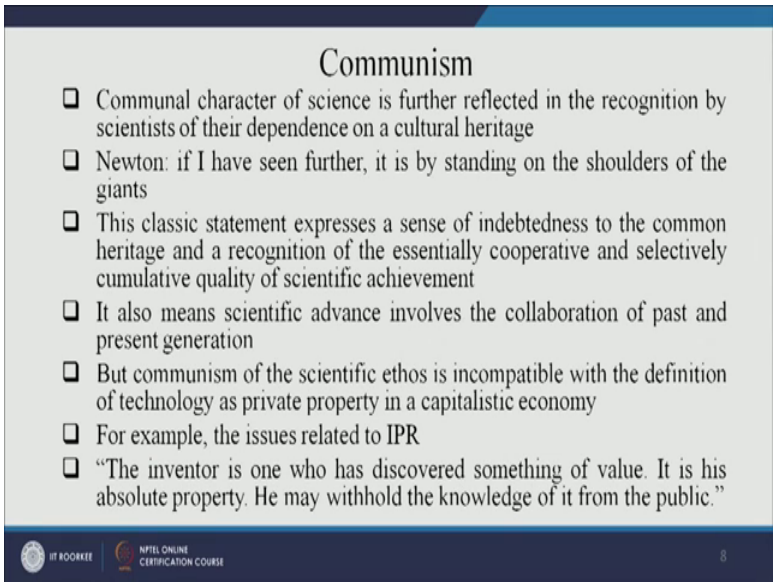

Another point regarding the communal or the shared characteristics of science is that the scientists are dependent upon their predecessors for their own knowledge discovery. Anything that we come up with we must give credit to the our predecessors, because best we have always gone backwards to take draw inspiration from the previous work and that has moulded shaped our own work. In that context, Robert Merton quotes Newton

who says that is Newton says if I have seen further, it is by standing on the shoulders of the giants. This classic statement expresses a sense of indebtedness to the common heritage and a recognition of the essentially cooperative and selectively cumulative quality of scientific achievement cooperative and selectively cumulative quality of scientific achievement.

It also means scientific advance involves the collaboration and past and present generation. When Newton says that if I have seen further, it is by standing of the shoulders of the giants, he gives credit to those predecessors whose repository of knowledge he has drawn upon for his own inventions and discoveries. It shows the collaboration of past and present scientist in formulating future scientific endeavours of future scientific laws or inventions.

So, till now we know that science is also a communal shared, it is a social collaboration of scientific community. The scientists should not expect anything from their own discovery except that it is a mnemonic or a commemorative device. But at the same time, Robert Merton himself is aware of intellectual property rights. He says communism of the scientific ethos is incompatible with the definition of technology as private property in a capitalist economy. For instance issues related to IPR, we know that if you have discovered something of value, it is your absolute property you can sell it, use it in whichever way you want. You may also withhold the knowledge from the public view.

So, in this context, towards the end of discussion on communism he admits that communal character of science may come in conflict with intellectual property of the scientists, but essentially science is universal and science is shared. Now, I will discuss two more ethos of science - one is disinterestedness, the other one is organized scepticism. So, I take a short break stop here.

Thank you.