Sociology of Science
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Lecture – 09
Matthew Effect in Science: R.K. Merton-Part I

Dear students, we are discussing the different topics which come under Sociology of Science. In this lecture, I will discuss Matthew effect in science. Now this is a concept or thesis given by none other than Robert Merton. You are already familiar with Robert Merton and his extensive research in the field of Sociology of Science.

Now Matthew Effect in science is one of his most popular contributions in this field. It got wide spread popularity and lead to lot of research; no other social scientists, sociologists who wanted to explore it in different fields. Now what is this Matthew Effect?

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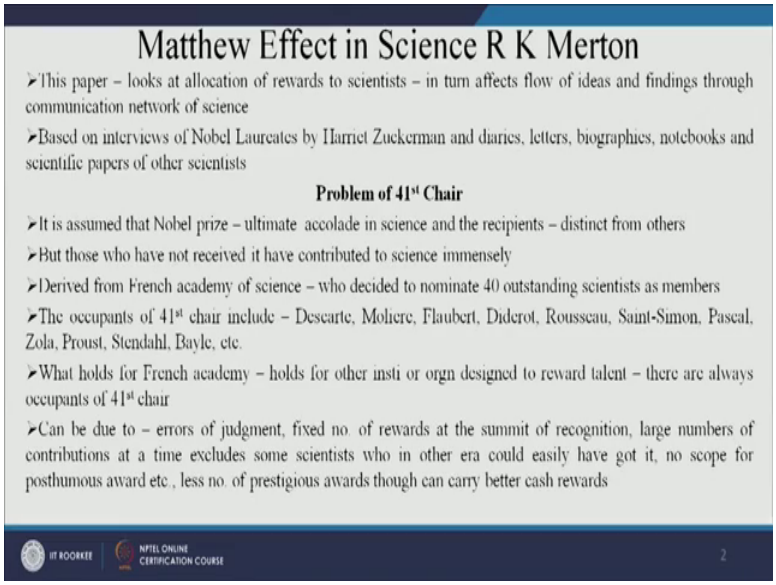

Matthew Effect essentially looks at the allocation of rewards to the scientist within the scientific community and how it affects the flow of ideas and findings through communication network of science.

Now, how did he develop his thesis of Matthew Effect? He relied upon the interviews conducted by Harriet Zuckerman; his collaborator, interviews with the Nobel laureates, which was conducted by his collaborator Harriet Zuckerman. He relied upon the diaries, the letters, the biographies, autobiographies, notebooks, scientific papers of different scientist.

He studied, read, analyzed the notes, the diaries, the scientific papers, the letters written by the Nobel laureates and other scientists, within the scientific community. He conducted interviews with the Nobel laureates and based on a this data he developed his thesis of Matthew Effect which essentially looks at the allocation of rewards in the scientific community rather we can put it in this way Matthew Effect is all about in equal allocation of rewards to the scientist within the scientific community.

Now, he starts with the issue of problem of 41st chair. Now, what is this 41st chair? It is derived from the French academy of science. Some time back in the beginning of 20th century, the French academy of science decided to honour 40 French scientists for their immense contribution to French science as well as World science.

Now this list excluded such important scientists, philosophers, scholars such as Descartes, Moliere, Flaubert, Diderot, Rousseau, Saint-Simon, Pascal, Zola, Proust, Stendhal, Bayle. All these people are not part of this 40 eminent scientists chosen by the French academy of science rather they were excluded.

Now, one can always wonder, why this great scientists, philosophers, political scientists, social scientists were they excluded. There are lies the problem of 41st chair; justice those people who get Nobel Prize are supposed to have made tremendous contribution to science in general. There are people who have not received Nobel Prize; they also have made contribution to the number to the scientific community.

Generally, we give; we tend to give more importance to those people who have got Nobel Prize. But those people who have not got Nobel Prize, but have made equal contribution they get left out. This thesis of Matthew Effect discusses that iniquity in distribution of rewards and resources to scientific community.

Now, what holds for french academy? It holds for other institutions and organizations which are designed to reward talent. They will always be fourteen occupants of the 41st chair; there will always be some people who will be left out. There will be people who will be left out of the Nobel prizes though in a particular year or in a particular period of time or there will be people who were left out of other notable renowned awards or rewards.

Why does it happen, why there are people who deserve to get award, they get left out; why does that happen? There can be various factors for that; one of the factors can be simple errors judgment. The jury, the panel who decides whom to give the award, particular award in a particular year then can make errors of judgment; human errors.

So, they may give award to a undeserving person, but they may leave out, exclude a deserving person. Also there can be another factor, then fixed number of rewards at the summit of recognition. For instance, Nobel Prize in phases cannot be given to 10 people in a year or it cannot be given to 5 or 6 people in a year; it can only be given to certain number of people 1 2 3 f maximum.

Similar in different awards, certain awards are given only to 1 person or 2 persons. So, such fixity of awards, it leaves out many deserving candidates in that particular year or in that particular time period or it can be that large number of contributions have been made during a particular time period.

Hence, given the fixity of awards that the only fixed number of awards can be given in a particular year, you can only choose among those contributions, you only choose 1 or 2 persons. So in that way, many people may get left out, many deserving people may get left out.

And they, it is quite possible that in another era, in another time period this deserving people would have easily landed those prizes. It can be Nobel Prize; it can be any other top prize in scientific field. So, that can be a reason why the always the occupants of the 41st chair or in certain awards for instance in Nobel, there is no scope for posthumous awards.

So, many people who have made the contribution, but have unfortunately died, they are not given posthumous recognition. And the final reason can be that there are less number of awards within the scientific field in different scientific field in physics, in chemistry, in engineering, in social sciences. There only fixed number of prizes, relatively less number of prizes and more aspirants hence many aspirants or many deserving scientists, social scientists, natural scientists, they miss out.

So, these are the factors which lead to this problem of 41st chair. And what is this 41st chair? It is in relation to the French academy of science deciding to honour 40 scientists, great scientists of French society who have made tremendous contribution to French science in a historical context.

So, that left out many people and hence, it lead to the problem of 41st chair there is so many deserving people who were left out. Now, why are we discussing this problem of 41st chair?

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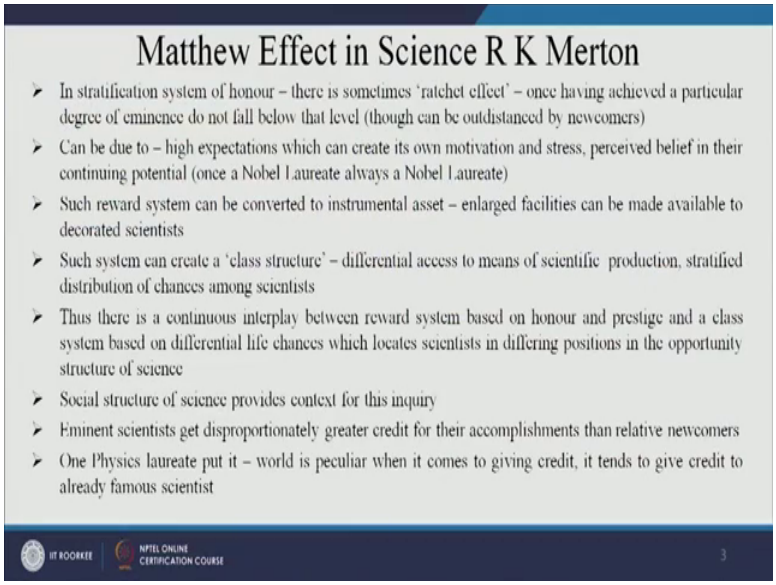

Because we are connecting it to the Matthew Effect as proposed by Robert Merton, he says in the stratification of honour there is something called ‘ratchet effect’.

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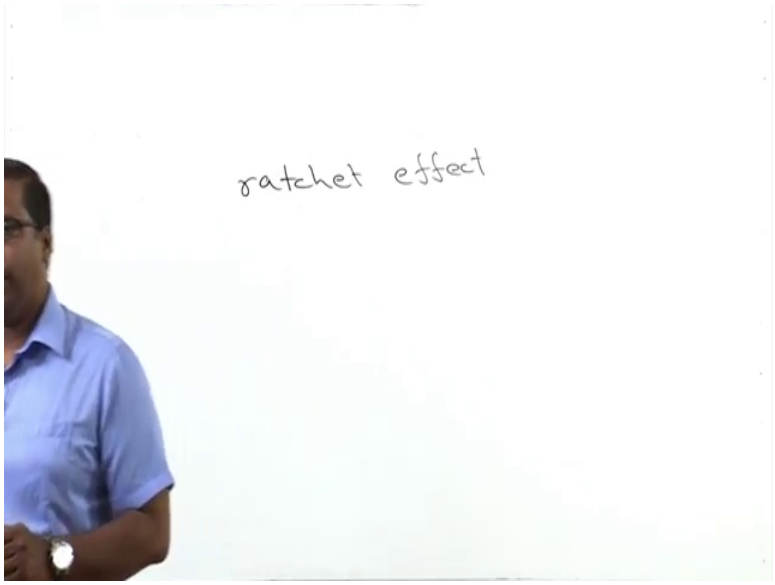

What is the ratchet effect? Once having achieved a particular degree of eminence, the person do not, person does not fall below that level. The person can be out distanced by the newcomers. Why does that happen? It can make due to high expectation which can creates its own motivation and stress.

See, once you have reached pinnacle of success, you want to stay there. You have a lot of motivation for that; because there is huge expectation attached to your contribution. So, people expect you to keep continuing similar kind of making a similar contributions. Hence, you do not fall below that level; you continue to work hard, you are continuously motivated to remain at the top or it can be stress.

It can lead to a situation where you are stressed because there is a constant pressure on you to maintain that level of excellence or it can also the why you do not fall behind, fall below that level that you have raised is because perceived belief, in your continuous potential. There is a belief, the belief that other people have that you have potential and you will continue to make tremendous contribution.

And that belief keeps you going and that belief also provides direct-indirect avenues, opportunities for your scientific endeavours. Now this such reward system can be converted to instrumental reward, instrumental assets; it can be enlarged facilities that can be made available to decorated scientists.

Now such, I told you about perceived belief that keep people at high level for a long period of time; the perceive believed that you are great and you are capable of great contribution. Hence, there are certain instrumental assets which are made available to you, certain enlarge facilities, certain facilities are made available to you.

To whom? To the decorated scientists, to the eminent scientists and such eminent scientists take advantage of such enlarge facilities, such instrumental assets and they continue to make meaningful contribution.

What are these enlarged assets, what are these enlarged facilities and instrumental assets? It can be more funding; it can be an opportunity to give keynote address at a key international conference. It can be an invitation to serve on a prestigious panel on climate change; it can be more funding, more sponsorship from the industry to set up a state of the art lab. It can be the opportunity of getting your paper published in a reputed journal. These are all enlarge facilities, instrumental assets that eminent scientist, a decorate scientist enjoys compared to a newcomer, compared to a not so well-known scientists.

Now, such system can create a ‘class structure’. A class structure, where there is differential access to means of scientific production; means of scientific production. What are the means to produce a scientific knowledge through lab facilities, through publication, by through giving lectures in prestigious seminars, by getting sponsorship to develop your laboratory to buy expensive instruments and machinery for your experiments?

So, these are the means of scientific production and that is a differential access to such means of scientific production; differential access, decorated scientist will have it easy to access these facilities. Not so well-known scientist, not so eminent scientist, a relative newcomer will find it difficult to access such means of scientific production and this is what Merton refers to, in his thesis on Matthew Effect .

There is a continuous interplay between reward system based on honour and prestige and a class system based on differential life chances, which locate scientist in a differing positions in the opportunity structure of science.

Essentially, it means that in the opportunity structure of science that people who are already famous because of immense contribution that they have made; they keep getting more opportunities, they keep getting more facilities and that further helps them to remain in the limelight, that further helps them to make more contribution, that further helps them to at the top.

They donot fall below that level, where as at the same time the newcomers, the not so well-known scientist do not get those opportunities easily; do not have access to such means of scientific production; do not get easily sponsor ship, funding to develop their lab to establish a state of art laboratory. Do not get funding to buy expensive instruments for their experiments; do not find it easier to get published in international reputed journals if you are a newcomer or if you are not so well-known you do not get invitation to serve on prestigious panels by the government, found by government to look into climate change environmental issues, nuclear policy as an example.

So, social structure of science provides context for this enquiry. We are looking at, what we are looking at? We are looking at the social structure of science; we are looking at not the scientific knowledge the scientist have; we are not looking at the technical aspect of science. We are looking at the social structure of science which the in equal access of scientist to means of scientific production which makes it so difficult for certain scientist to come to the limelight. And which makes it further easier for eminent scientist to hug the limelight to come to the fore keep continuing to make contributions.

Now, eminent scientists get disproportionately greater credit for their accomplishments than the relative newcomers. This is a point I have been making like, I will now give some examples which is quoted in Robert Merton's article on Matthew Effect, one of the quotations that I am putting here is by even Nobel laureate in physics, who says the world is peculiar when it comes to giving credit, it tends to give credit to already famous scientist.

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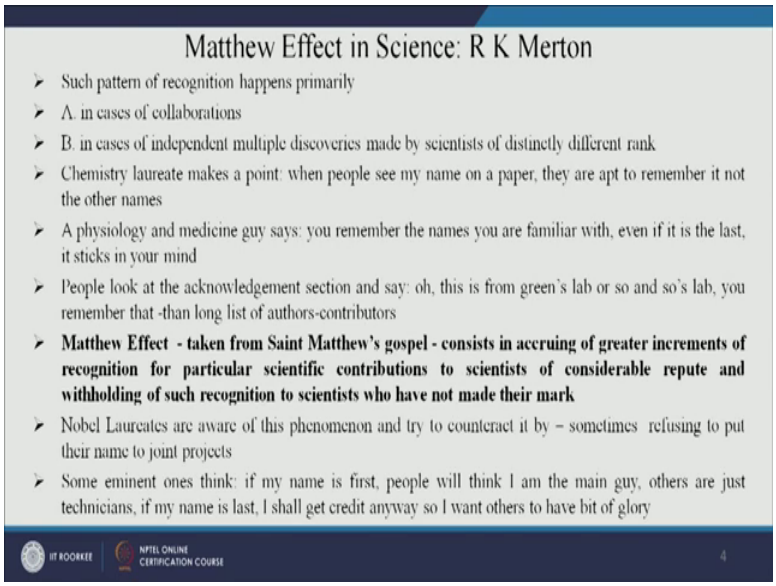

Now, such a pattern of recognition happens primarily in 2 cases. In case of collaborations and in case of independent multiple discoveries made by scientists of distinctly different rank. Why such unequal credit given to scientists? Essentially it happens because of 2 reasons; first it happens in case of collaborations, where more than 1 scientists are involved in a project in writing a paper and publishing in certain experiments or in case of independent multiple discoveries.

In both the cases the eminent scientist takes away all the credit. In case of collaborations, if there are more than 2 persons, more than 3 persons, more than 4 persons; it is always a well-known person who will attract the attention of the reader.

A chemistry laureate makes a point, when people see my name on a paper; they are apt to remember it not other names. A chemistry Nobel laureate says that if I am involved in a collaborative research and there is a joint publication of more than 1 person. Then, people will always notice the name of the eminent person; they will tend to ignore the other names, the junior scientists.

A physiology and medicine guy, a physiology medicine Nobel laureate, he says you remember the names you are familiar with even if it is the last it sticks in your mind. If you look at the papers and look at the opposite even if the eminent persons name is at the end; the first author, the second authors or junior scientists or not so well known scientists who still, our attention gets drawn to the familiar name, the person who is eminent, who is famous, who is received certain awards and that creates a problem that directly or indirectly creates Matthew Effect.

People look at the acknowledgment, even if your name is not there in the list of authorship, but you are acknowledged at the end of the paper, at the end of the book; still people will look at the acknowledgement section and say: oh, this is from green's lab or so and so's lab. So, you remember that than long list of authors or the contributors.

So, even if your name is not there in the list of contributors, but you have been acknowledged, in the acknowledgement section of the book or the thesis or the article; people tend to notice that and they would say: oh, this is from this particular persons lab or this is from that particular persons group, research group.

Hence, automatically credit is given to the person who is well known and those persons who are the first authors, who are the second authors who have made probably worked harder and have done most of the job work, they tend to get ignored and that is what Robert Merton labels as Matthew Effect. Why Matthew? It's because it is taken from biblical reference; as a biblical reference where he quotes Saint Matthews gospel.

And what is that gospel? It essentially means in simple language that it consists in accruing of greater increment of recognition for particular scientific investigation to scientist of considerable repute and withholding of such recognition to scientists who have not made their mark.

So, it is an additional or incremental recognition, accumulated recognition for particular scientific contribution to scientist of considerable repute. So, you keep adding more recognition, you keep giving more recognition, you continue to give more attention to a scientist who is reputed, who is well known, who is famous and we you tend to withhold, you tend to ignore scientist who have not made their mark.

So, it is plus-plus for reputed scientist minus-minus for not so repeated ones or the newcomers; plus-plus the person is already successful, already made a mark, has already got something; you keep giving more opportunities to develop their labs, to publish in better journals, to serve on prestigious panels, to allow the scientists to get sponsorship or funding to buy new instruments more expensive instruments.

So, it is plus-plus for the already repeated ones at the same time a newcomer; new comer if you put it at just minus position because the person has not yet made a mark, you do not give such opportunities extra additional opportunities for means of scientific production to those newcomers are not so well-known once. So, that becomes minus-minus.

So, it is anyway double injustice; double injustice. Justice giving more preference to 1 person or a set of persons who are already famous; not giving enough opportunities to those who are relative newcomers or not so well known ones and mostly happens in case of collaborations, when a famous one is collaborating with not so well known ones or the newcomers or it can happen in the case of independent multiple discoveries.

Where, discoveries have been made by more than 1 person, same discovery the person who is more famous that person is given more importance that persons claim is taken into account that yes, this fellow must have discovered this; because this person has a strong credential. Then, you tend to ignore another person who has made a similar discovery, but not so well known. So, in that context, one of the Nobel laureates says that we are aware of this phenomenon; we know that this happens in the scientific community and we try to counteract it by say by sometimes refusing to put our names to the joint projects.

Now some eminent ones, some eminent scientists think that if my name is first, people will think I am the main guy. If my name is first in the list of authorship in a book or in a scientific article; then, people will think and I am the main guy, although are just technicians. If my name is last; if my name is put in the last; then, I shall get credit anyway. So, I want others to have bit of glory. So, I do not in many cases there are certain scientists not all; they are familiar, they are aware of this situation, they aware of this Matthew Effect.

Where, eminent scientists get disproportionately more credit. Hence, they tend to withhold their names altogether from authorship even if it has come from their research group; it's come from their own lab, from their own departments. Now we have established, what is Matthew effect? With such examples as means of scientific production; where, the facilities are provided to certain people, but such facilities are relatively withdrawn to with held to relative newcomers and not so, eminent ones.

Now, we know what is Matthew Effect, how it works, how it is double injustice that it is unintended, it is not intentional; it is unintended, but that is how it happens that eminent ones get disproportionately more credit. The relative newcomers are not so eminent ones somehow get ignored.

Now, can Matthew Effect be functional? Can Matthew Effect? So, what we have discussed till now, it appears as if Matthew Effect has a negative connotation; that it is injustice, it constitutes injustice to scientist who are yet to make their mark and it is incremental facilities, incremental opportunities to eminent ones. So, in a way, it has certain negative connotation. But, can it be functional? Can it have positive connotation as also? Robert Merton says yes, it is possible.

The Matthew Effect at individual level may have negative connotation for individual scientists particularly those who have not made their mark, but it can have positive connotation or it can be functional in Robert Merton's terms; functional and Dysfunctional. Functional is positive. Dysfunctional is negative. It can be dysfunctional for individual scientists, but it can be Functional for science as a whole or it can be functional or beneficial for scientific community as a whole. How is that?

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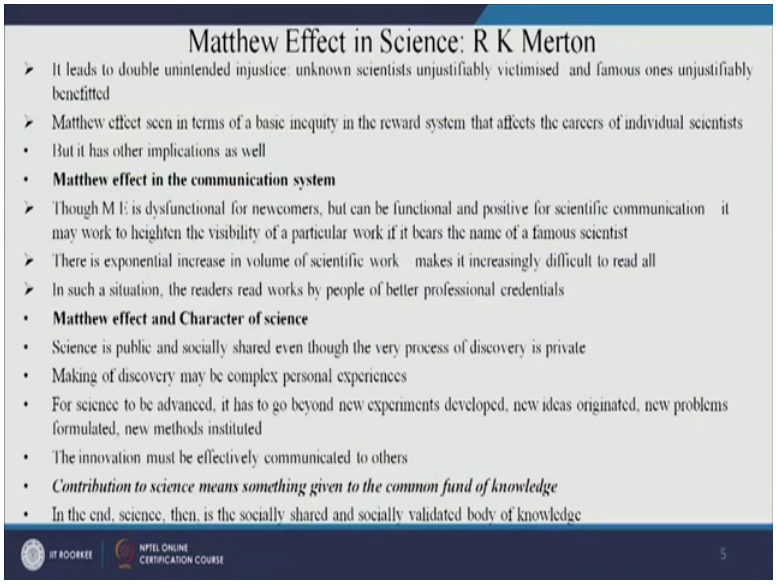

That is because he makes an argument that you see nowadays it is becoming extremely difficult to keep track of all the publications, all the books, all the articles in a given field. In other words, it if we are a psychologist, if you are a sociologist, if you are a philosopher, if you are a political scientist, if you are an economist, if you are a physicist or even a bio technologist it is not possible for an individual scientist to read go through the articles and books academic contributions made in his or her field; is difficult to cover each and every academic contribution in his or her field because of exponential rise in academy publications in every field.

Hence, what do you do in that case? You pick up when you open a journal, when you look at a book in a bookstore; now, name that strikes you most is the one that you are familiar with, also you pick up the book; you buy the book or you flip through the journal content and you see a familiar author, you tend to go through that, you read that.

Because you are making a choice, you are making a selection and their selection is based on familiarity that can be dysfunctional for individual scientists, but it can be functional, beneficial for science as a whole. How? Because, what is one of one of the ultimate aims of science? If you remember in one of the last classes, what I discussed. The ethos of science, Robert Merton says that advancement of scientific knowledge, diffusion of scientific knowledge is the ultimate goal of science and that is possible if communication is made to the scientific community that is if scientific communication spreads to the scientific community.

And that is possible if you read something; then, that knowledge that scientific knowledge automatically gets diffused. So, let us take an example of Amartya Sen, eminent economist, Nobel laureate in economics from India. You are in a railway station and Delhi, you waiting for your train to arrive and you look at the bookstore in the platform; you see that there is a book by a Amartya Sen; the Argumentative Indian. There are other books also; that attracts your attention, you pick it up because you are familiar with the name and you buy the book, you read the book.

Whatever that is communicated in that book, the argument, the ideas that is communicated in that book by Amartya Sen; it gets diffused, it gets spread. That is ultimate aim of science, is the diffusion of scientific knowledge and that is possible even if you pick up a book by a famous scientist; if you even if you go through a article by famous scientist, it serves the purpose.

At least you get to know the new ideas, new arguments, new knowledge; you get exposed to the new knowledge that is how scientific knowledge gets diffused. So, in that way Robert Merton says that scientific sorry Matthew Effect is functional, beneficial in the communication system of science because the tendency to read books by credentialed authors directly or indirectly leads to diffusion of knowledge.

Because, it is not possible for us to read each and every book or article in our area, in our search area, in our field of specialization. So, we pick things that we are familiar with; we pick authors whom we know or who have already made a mark. That way, the ideas, arguments, the new knowledge that is being propounded it gets communicated, it gets diffused, it reaches to the readers and there is diffusion of scientific knowledge.

An ultimate goal of science is diffusion of scientific knowledge; because one of the aims of science is that the scientific innovations must be effectively communicated to others because contribution to science means something given to the common fund of knowledge. And when we read books by eminent scientist; then, that knowledge adds up becomes an increment, addition to the common fund of knowledge that is how knowledge grows, scientific knowledge grows that is how science advances.

So, Matthew Effect can be functional for scientific community as a whole, but it can be as we discussed in the beginning it can be not so beneficial; it can have negative connotations. It can be dysfunctional for the individual scientist that is the not so eminent ones, the newcomers find it difficult to make a mark because already established scientists getting more opportunities, additional opportunities, incremental opportunities, the opportunities we have already discussed.

So, I stop here in this lecture. I take forward this discussion of Matthew Effect in my next lecture. Well, we will talk about the Social and Psychological basis of Matthew effect. Then, we will talk about the symbolism of intellectual property which is also linked with Matthew Effect in the next lecture. Now, I stop here.

Thank you very much.