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SCIENCE TECHNOLOGY AND SOCIETY

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You know if we look at all mean what we have discussed till now we have discussed the matching expect in sign okay in detail we discussed natural effect enzymes in terms of reward and communication system.

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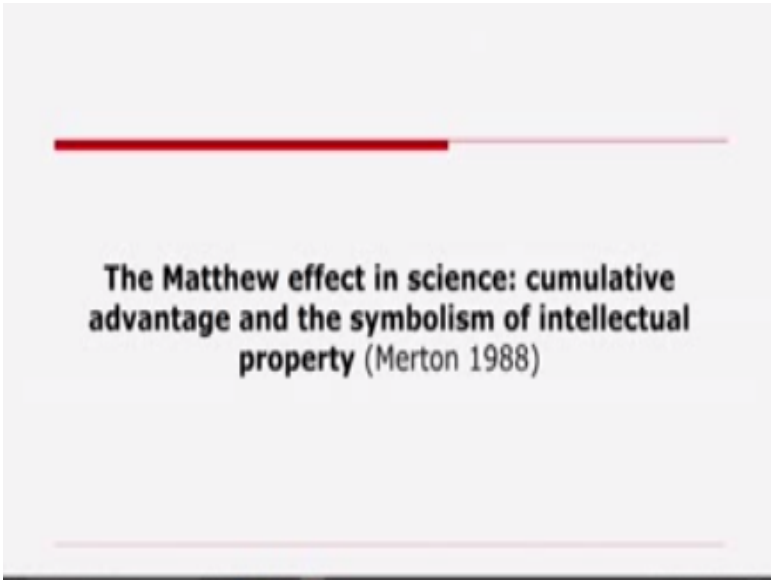

And then we moved on to the mat effect enzyme in terms of cumulative advantage and in terms of intellectual property symbolism of interpreter then we discussed what is unity advantage in sign which refers to the social processes through which various kinds of opportunities for scientific inquiry as well as the subsequent symbolic and material rewards for the results of that in credit tend to accumulate for individual practitioners of science.

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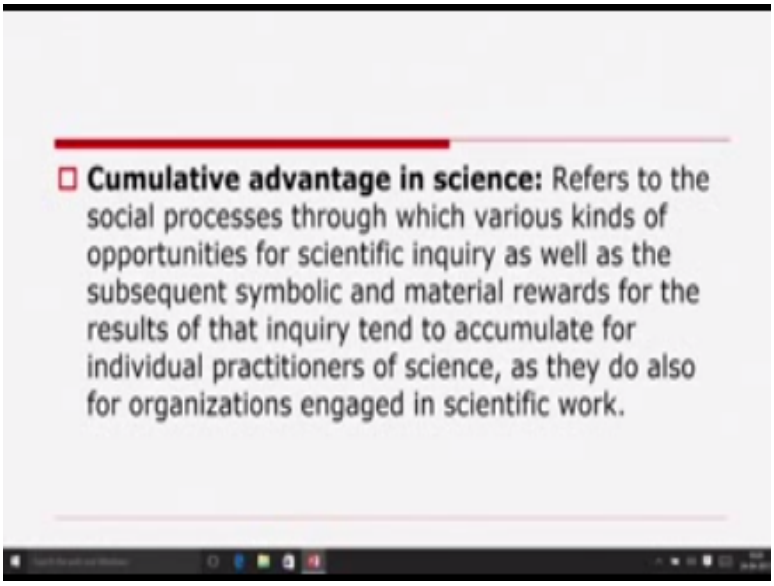

I mean scientists themselves as they do also for organizations engaged in scientific work we also discussed how cumulative advantage in sign directs our attention to the ways in which initial competitive advantages of trained capacity structural location and available resources make for successive incrementsof advantage such that the gaps between the haves and the has not ten times as in other domains of social life widen until dampened by countervailing forces and - in today's lecture we are going to discuss two things.

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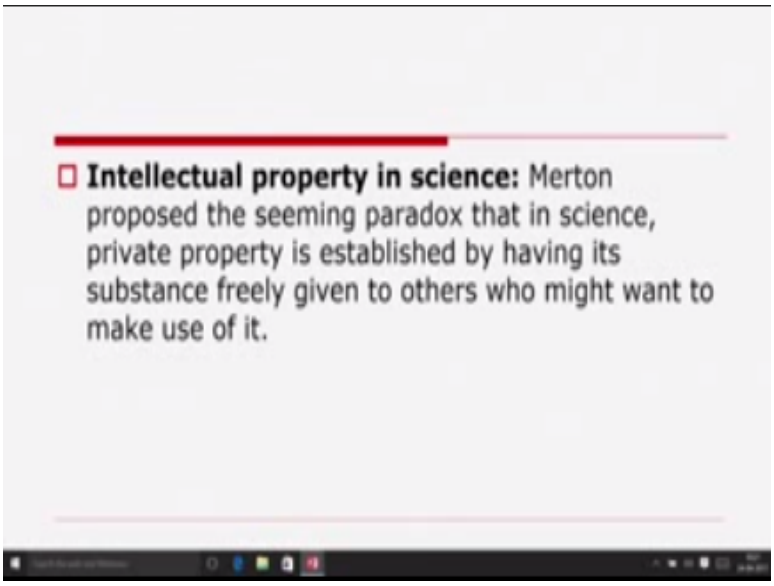

One is countervailing processes and the other the symbolism of intellectual property enzymes then what is that intellectual property in science as we have discussed Morton proposed the seeming paradox that enzymes private property is established by having its substance freely given to others who might want to make use of it okay and such an institutionalized aspects of this property system chastely in the form of public acknowledgement of the source of knowledge.

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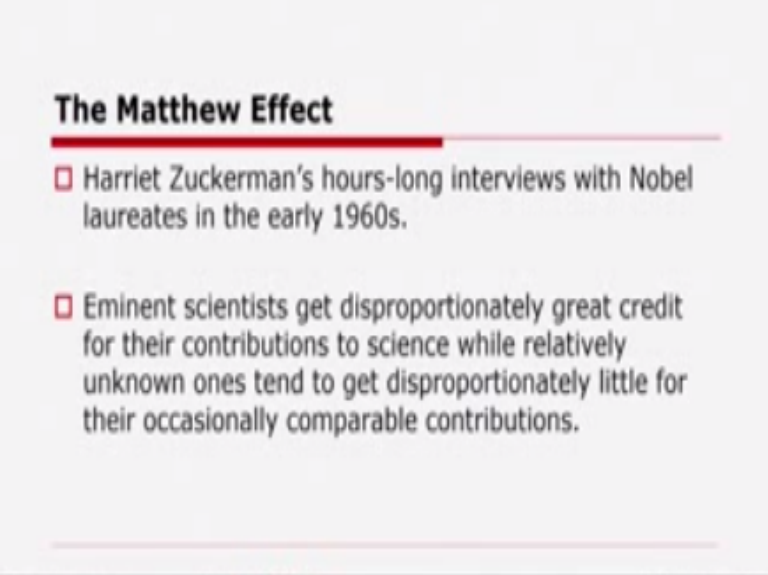

And information thus freely bitched out on fellow scientists relate to the social and cognitive structures of science in interestingwaysthat affect the collective advancement of scientific the McKean affecting its generality what we find on the basis of Harrietjudgement hours long interviews with Nobel laureates in the early 1960s the eminent scientists they disproportionately great credit frothier contributions to science while relatively unknown one tend to get disproportionately little further occasionally comparable contributions.

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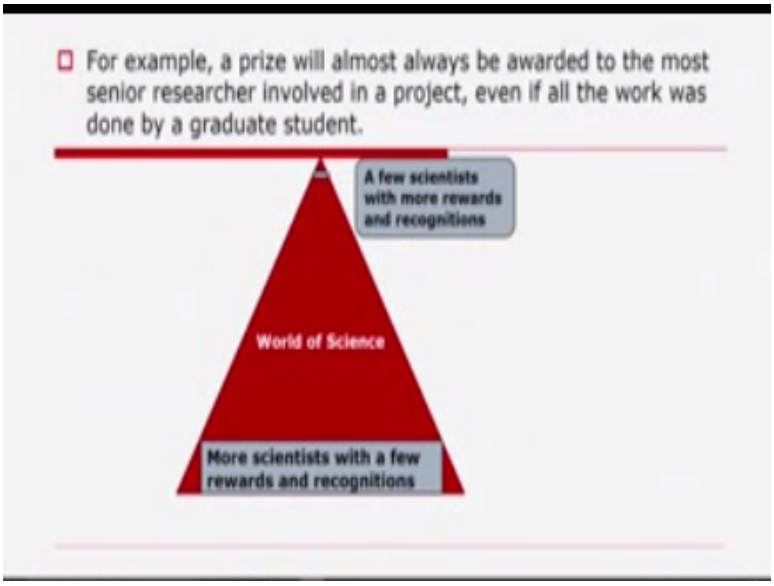

That is what we discussed the world of struck the world of science is structured in such a way that more scientists at the bottom are found with few rewards and recognition whereas Avery few scientists at the top that which are found with more genetic resistance let's say for example a for price I mean a price will almost always be ordered to the most senior researcher involved in a project even if all the work was done by a graduate student or page editor scholars or I mean or junior scientist okay.

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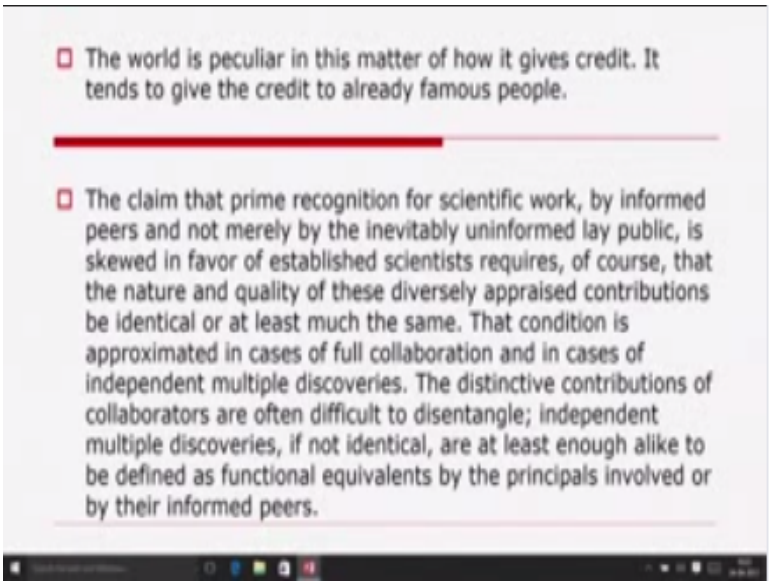

Next a laureate suggests said I am just coating that that the world is peculiar in this matter how it gives credit it tends to give the credit to already famous people okay the claim that prime recognition for scientific works by informed years and not merely by the inevitably uninformed be a public is killed in favor of established scientists requires of course that the nature and quality of the diversity apprised continuance the identical or atleast much the same that condition is approximated in cases of full collaboration.

And in cases of independent multiple discoveries in the context of independent multiple discoveries we have discussed the controversies between controversies so far as the owner sleep between Newtonian leibnizare concerned the distinctive contributions of collaborators are often difficult to disentangle independent multiple discoveries is not identical or clay or a case another like to redefined as functional equivalent by the principle involved or pers.

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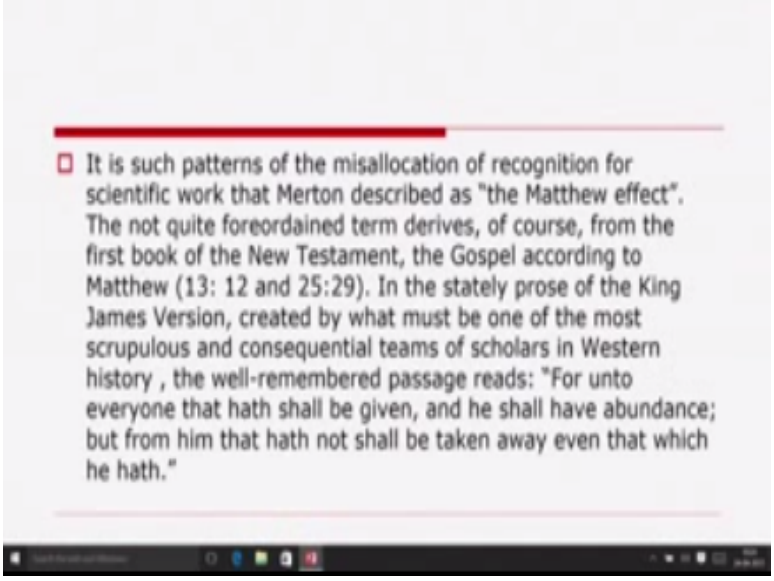

In frontiers it is such patterns of being of the myth allocation of recognition or for scientific work that martin described as the methane effect the not quite for or dense term derives of course from the first book of the New Testament the Gospel according to the Matthew according to Matthew in the stately prose of the King James Version created by what must be one of the most scruples and consequential themes of scholars in Western history the well-remembered passage read for unto every one.

That hath shall be given and he shall have abundance but from him that has not shall be taken away even that which head I mean for unto every one that head shall be given and he shall have abundance and from but from him that has not shall be taken away even that which he had I mean such a spiritual account of inequalities in time let us try to make a fifth from such spiritual accounts of the inequalities in science to a more secular worldview okay.

The metal effect in its generality is the accruing of large increments of period listen to scientists of great repute for particular contributions in contrast to the minimizing or withholding of such recognitions for scientists who have not yet made their mark the Bible code parable generates the corresponding sociological parable that is why we discovery said let us make a fifth from a spiritual account to a more secular account of the inequalities in fact firm this is the for midfield that the distribution of psychic income and cognitive wealth in science also take.

And how this comes to me and with what consequences for the fate of individual scientists I mean practitioners of science and the advancement of scientific knowledge are the question then

we have discussed accumulation of advantage and disadvantage among the young scientists junior scientists research scholars graduate students and so on special problem in the accumulation of advantage and disadvantage that derives from an institutionalized bias.

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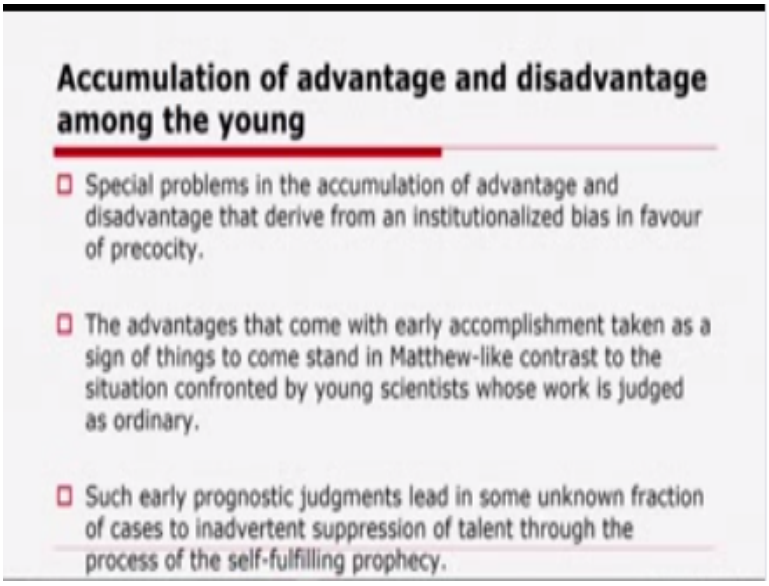

In favor of precocity the advantages that come with early accomplishment taken as a sign of things to come stand in natural light contrast to the situation confronted by young scientists whose work is just as ordinary such early prognostic judgments leading some unknown fraction of cases to inadvertent suppression of talent through the process of thyself-fulfilling prophecy furthermore it is more likely to be the case in a society such as the American society where educational institutions are so organized as to put a premium on relatively early manifestations of ability.

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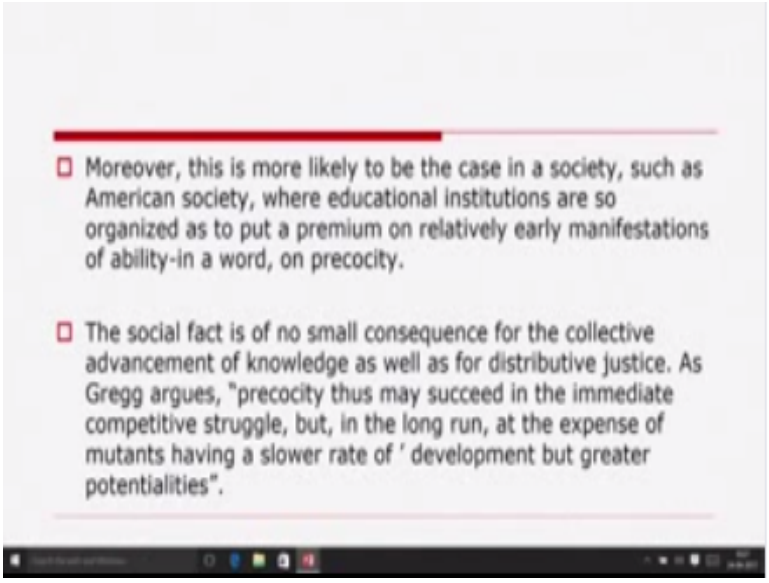

In a world of precocity on precocity ok the social fact indarkanian's sense okay is of no small consequence for the collective advancement of knowledge as ales for distributive justiceGraig argument the COS city does may succeed in the immediate competitive struggle but in the long run at the expense of mutants having a slow rate of development but greater for certain safety okay.

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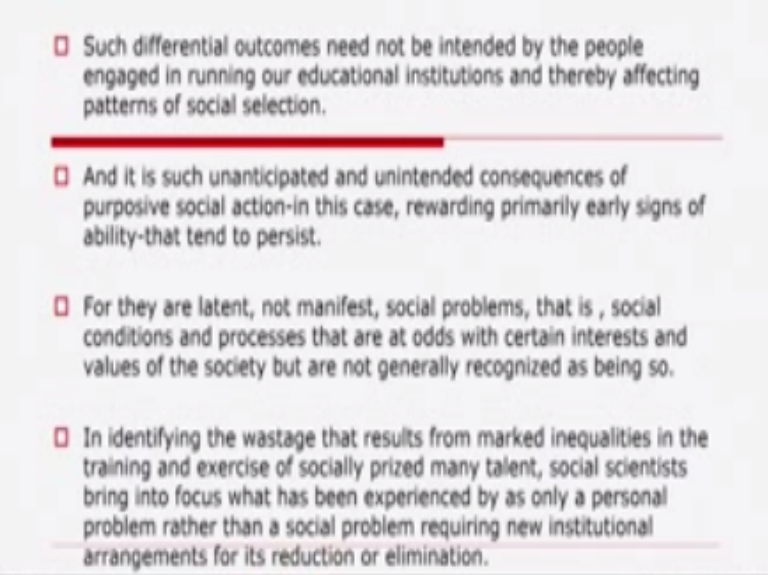

And such differential outcomes in the form of in the form of slower rate of development but laterpotentialitiesdifferential outcomes need not be intended by the people engaged in running our educational institutions and thereby affecting patterns of social selection okay as we have already discussed which collection based on cultural drilling in you know in the sense of Weber an methodology of surfactant.

And it is such unanticipated and unintended consequences of purposes so selection in this case VOD primarily only finds of ability that tend to persist okay what is this what is thither are there are two three things here one is an antique expected or unintended consequences of purposive social action okay courses of social action is alternatively known as goal-oriented social action there are in whether Ian typology of social action.

If you look at okay there are four types of social action one traditional social action too effective or emotive so selection three value oriented for selection and poor goal-oriented so selection of instrumental rationality okay for Weber traditional social action and effective or emotive so selection they are unrestricted in nature okay and hence meaning for Weber value rational social action or value oriented so selection and goal resin also selection or purposive so selection or instrumental rationality they're reflective in nature and hence meaningful okay.

In this context we are discussing for fuzzy so selection which give meaningful so selection which is reflective person in this sense we are Yogi what we do so or goal oriented so relax okay intake unintended or unanticipated consequences when we talk about okay it is it is its very specific to

Robert King Myrtle coinage of manifesting latent functions okay where do you find the what are manifest functions now manifest functions are those where you will find there is just coincidence.

I mean that that was I mean both subjective dispositions as well as objective consequences must go in fact okay and latent functions are those where we will find now that subjective dispositions and objective consequences do not want that okay in this sense Martin was using and unanticipated unintended consequences of purposes of collection purposes so selection is taken from weather and in this case you are doing primarily early signs of ability that tend to persist okay.

So they are latent not manifest social problems that is social condition and processes that are at odds with certain interests and values of the society but are not generally recognized as being so what is what will you are discussing latent and manifest functions when I said manifest functions are those where you will find subjective dispositions and objective consequences for inside and latent functions are those where you will find no subjective dispositions and objective consequences do not coincide okay.

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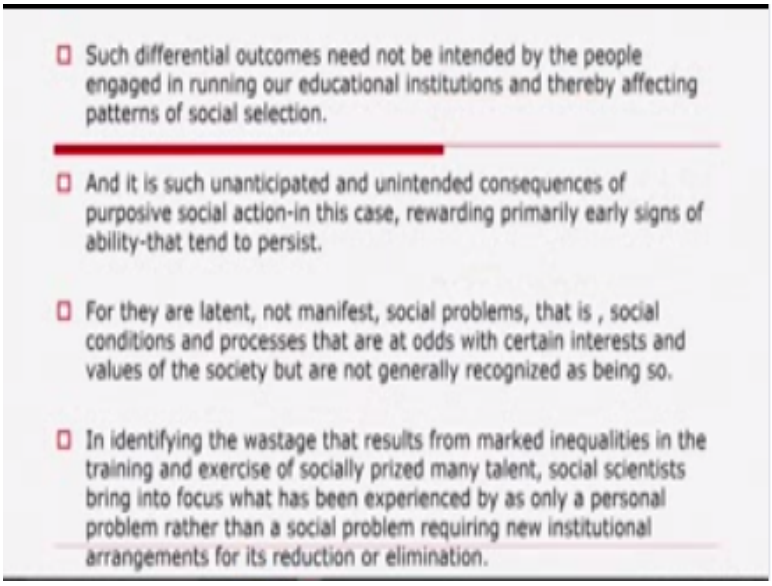

That disease I mean the consequences of social action in manifest functions and very muchIntendant and very much anticipated whereas in latent functions okay consequences of social action are unintended or unanticipated okay next why so social conditions and processes which are at odds with certain interests and values of the society but are not generally recognized as being so okay indentifying the wastage that results from marked inequalities in the training and exercise of socially priced many talent social scientists bring into focus.

That has been experienced by as only a personal problem rather than asocial problem requiring in new institutional arrangements for its reduction or elimination in this context what we find such inequalities which have which are arising in the in front from such from the ways in which the world of science has been structured okay it is not simply an individual problem but up but a social problem which requires new institutional arrangements to eliminate such inequality what do we mean by new institution arrangements new institutional arrangements may refer tone institutional mandate rules regulations.

Non values in place meaning and so on okay and those interestmeaningsvalues norms objectives goals rules regulations they must be created by our economy our culture or quality our state our society and so on okay now what holds first the accumulation of advantage and those disadvantage in the earliest years of education would hold also at a later stage for those youngsters who have made their way into fields of science and scholars who not having yet

exhibited prime performance are shunted off into the less stimulating millions for scientific work.

With their limited resources therein lies the source of inequality the structure of inequality and time is not an exception today absent or in short supply of or absenter in short supply are the resources of access to needed equipment and abundance of able assistance time institutionally set aside for research and above all perhaps a cognitive micro environment composed of colleagues at the research front who are themselves workers of excellence bringing all the best in the people around them not least is the special resource of being located at strategic nodes.

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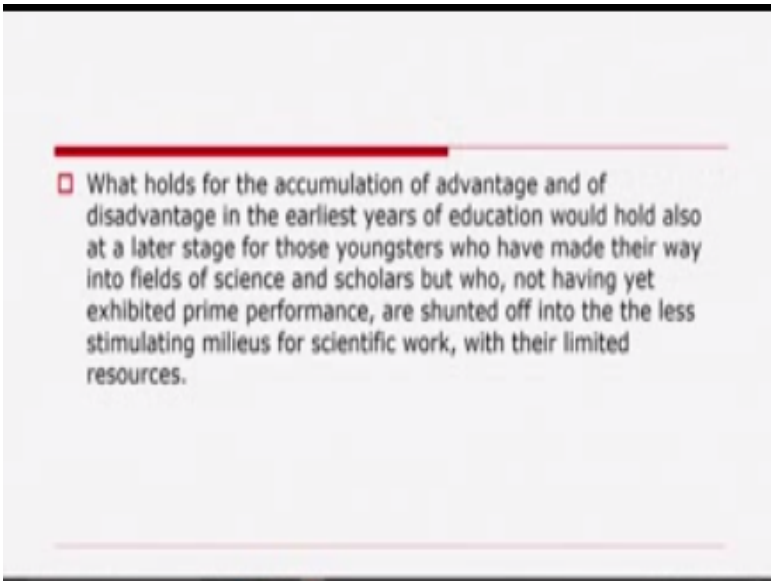

In the network's of scientific communication that provides ready access to information at the frontiers of research by hypothesis some unknown fraction of the on frequencies of workers in the wineries of science are caught up in a process of cumulative disadvantage that removes them early on from the system of sterna scientific work and scholarship then the kind of other social and cognitive context which may make for such factor and differentials of cumulative advantage disadvantage

We have already discussed I mean social and cognitive the term social and cognitive cannot be separately examined they must be examined in relation to each other okay and any attempt to treat them separately would be misleading ok and a German suggests as an example that Justas

class origin may differentially affect the rate so at which potential late bloomers remain in the educational system long enough to bloom.

So academic disciplines may differ in an unplanned tolerance for electrum disciplines in which scholars often develop comparatively let us say the humanities presumably provide greater opportunities for late bloomers than those in which only maturation is more common mathematics and the physical and biological sciences generalized these conjectures holds that contextual differences such as social class or fears of intellectual activity as wells individual differences in the pattern of intellectual growth affect the likelihood of success.

And failure for potential networks difference will in individual capacity capability aside then processes of cumulative accumulative advantage and disadvantage accentuates inequality recent and learning inequalities of peer recognition inequalities of access to resources and inequalities of scientific productivity individual self selection and institutional social selection incorrect to effect successive probabilities of beings located in the opportunity structure of times okay.

This is very important when we select it is as it is based on cultural relevance for Weber okay and we discuss inequality jobs your recognition inequalities of access to resources inequalities of scientific productivity okay and more importantly when you talk about democracy freedom to dissent is very much integral to the idea ofdemocracy this is such inequalities in the context of freedom to different okay in such inequalities in the context of freedom to distant must be examined at Clinton in detail okay.

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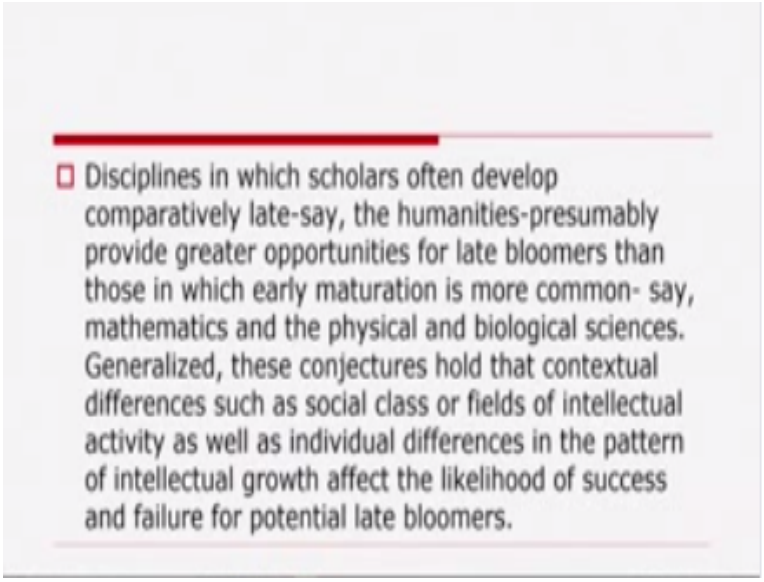

When we talk about the process of democratization we talk about there must be three accessibility to scientific knowledge Democrat I mean democratization in the context of scientific knowledge we are discussing here not democratize s and per se okay I mean whenever we talk about the process of democratization we talk about the process of democratization in the context of democratization of science in the context of accessibility to scientific knowledge equality of opportunities to-do science.

I mean to practice science but more importantly we must look at the aspect of freedom to dissent which is integral to the idea of democracy itselfokaysuch inequalities in exercising one freedom to decent must be integral to the idea of time filter okay that's how time should be made more democratic okay and when we talk about individual self selection and institutional self selection then we talk about that we can go back to new HD general arrangement okay.

When we talk about newinstitutionalarrangement okay our what our selection it is also determined by the institutional mandate new institutional arrangement norm values room regulation I mean institutional framework as such okay that’s why I mean I do not carry out study but just as a curiosity driven research but also as the part of contract ability that's a that's where the aspect of intellectual property Rises if you look at the way scientific knowledge the way science has been pursued practiced okay.

Science scientific research has been conducted okay it has made a fist from being a curiosity driven research to a level where it can be considered a part of contract immediately okay let's say

individual self selection and institutional social selection must interact to effect successive probabilities of being variously located in the opportunity structure of time when the scientific role performance of individual mega sox2 or conspicuously exceeds the standards of a particular institution or discipline.

Whether this be a matter of ability or of chance that begins the process of cumulative advantages which those individuals tend to acquire successively enlarge the opportunities for advancing their work and the rewards that go with it even further okay since stop match institutions elite institutions has comparatively large resources for advancing research in certain domains talent that finds its way into these institutions only has the enlarged potential of acquiring differentially accumulating advantages and the systems of reward allocation of resources.

Another elements of social selection the operate to create and to maintain a class structure in science by providing a stratified distribution of chances among scientists for significant scientific work what we have been doing we have been using these this third-class okay Morton Shearer was using both Marxist tradition as well as American tradition I mean Weber an tradition though ever from Germany.

But he gives on now social structure in use on class rings on starters rings on pottery he moves on different social problems okay they are very much there in general they are assigned to the American press okaying this sense Merton was using both the training for math classes are the manifestations of economic differentiated classes are for once again classes are constituted north on the basis of income but on the basis of the position one occupies or the function one performance in the processor production for example there are two blocks made one the owner.

And the other paid worker both belong to two different classes not one ok not so is not the first to discover social classes of that like many philosophers did it before him but math into the center stage when he said the philosophers have only interpreted the world in variouswaysthe point however is to change it imagine simply that he was he was not attributing any significance to interpretation but for him not simply interpretation but the desirability to secure changes to all to go to have changes and he greater significances more important.

Then what is class for Weber for whether classes are determined or based on the kind of life chances and causal component that that mean okay and Martin was influenced both by both these

traditions both these thought processesokayin terms of manifest difference of economic differences as proposed by marks well edge in terms of life chances and causal component as proposed by Maxwell okay.

And when we look at this that vector and the systems of reward and location of resources and other elements of social selected by the by I mean institutional social selects and not individual self selection but institutional social selection I mean it is always I mean it is often determinedly the kind of structure that you have okay.

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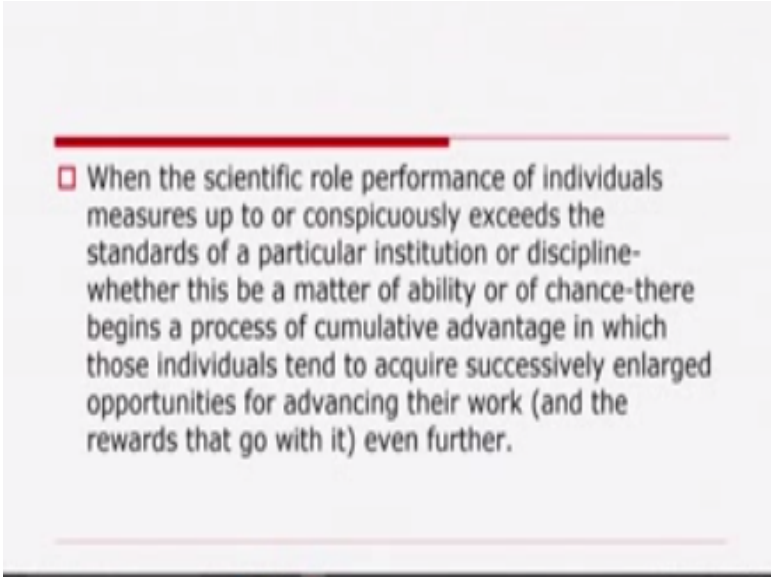

That is on a different note let me put it this way once in one Marx said you know men make their own history but they do not make it under self-selected circumstances okay mean but the most important part which must be noted here that the tradition of all dead generations weighs like nightmare on the brain of the living that's what Mark said I mean whatever accent that individual undertakes okay

It is guided by some institutional framework in guided by some structure is guided by some framework which is historically conditioned but and they will to be at his is there is no second opinion about it okay or there is any hardly second look then we have discouraged accumulation of advantage and disadvantage ending scientific institutions I mean the kind of queue

distributions of resources and productivity that resemble those who we have noted among individual scientists are found among scientific institutions okay.

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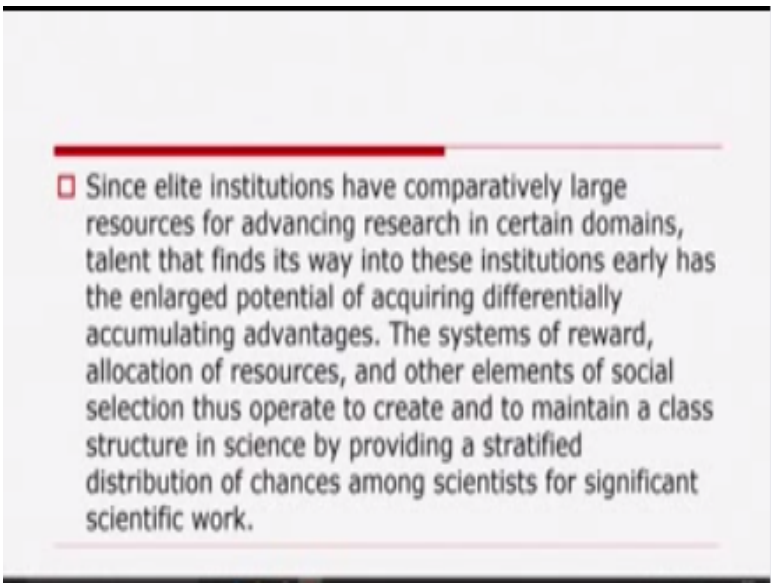

I mean what we have been doing we have the already discussed accumulation of advantage and disadvantage among scientists then accumulation of advantage and disadvantage among young scientists research scholars graduate students junior scientists and so on and now we are discussing in accumulation of advantage and disadvantage among scientific systems infinity to be some Silica's organizations and so on and the kind of cube distribution of resources and productivity.

That will find among scientific institutions that resemble those who we have noted among individual scientists are found among scientific in statistics and these inequalities also appear to result from self of making process clearly the centers of historically demonstrated accomplishment in science attract far larger resources of every kind human and material resources then research organizations that have not yet met them okay.

Now the central question where we stopped in the last lecture that if the processes of accumulating advantage and disadvantages to rear tweak why are there not even greater inequality that has been found to obtain okay from here we are going to discuss two important components in this in today lecture the about countervailing processes as well edge now the symbolism of intellectual property okay.

What are these countervailing okay put it let me let me put this more generally why do the posited processes of accumulating advantage and disadvantage not continue without assignable unit when two systems grow at different exponential rate okay the gap between them safely and greatly widening it we sometimes forget that as such a gap approaches or limit other forces come into play two constraint still further considerations and inequalities of whatever matters are in question okay such counter values processes.

That close off the envious accumulation of advantage has not yet been systematically investigated for the case of science more particularly for the distribution of human and material resources in research universities and all scientific productivity meaning let us discuss this in detail okay then as Martin tried to refer to Derrick DJ Salaries who is fond of saying in this connection with the exponential rate of growth in the number of scientists during the past you in the in the in the first half of the 20th century we were simply extrapolated.

Then every man woman and child to say nothing of their cats and dogs would have to end up scientist yet we have an intuitive sense that somehow their way not in much the same way every school going child knows that when two systems grow at differing exponential rates that's what the gap between the between them swiftly and greatly widen yet we sometimes forget that that as such a gap approaches a limit other forces come into play to constraint still further concentrations and inequalities of whatever matters are in question.

And such countervailing processes such countervailing processes that close off the endless accumulation of advantage and voltage has not yet been systematically investigated for the case of science more particularly for the distribution of two types of resources both human ecology material resources in research university the end of scientific productivity we didn't okay any university to grow you need both human and material resources okay.

Still martin tried to speculate briefly about the forms of countervailing processes which might take okay Martin suggested that let us consider for example the notion of an excessive density of that it is not a frivolous question to ask how much concentrated talent can a single academic department or research unit actually extend how many prime movers in a particular research area can work effectively in a single place.

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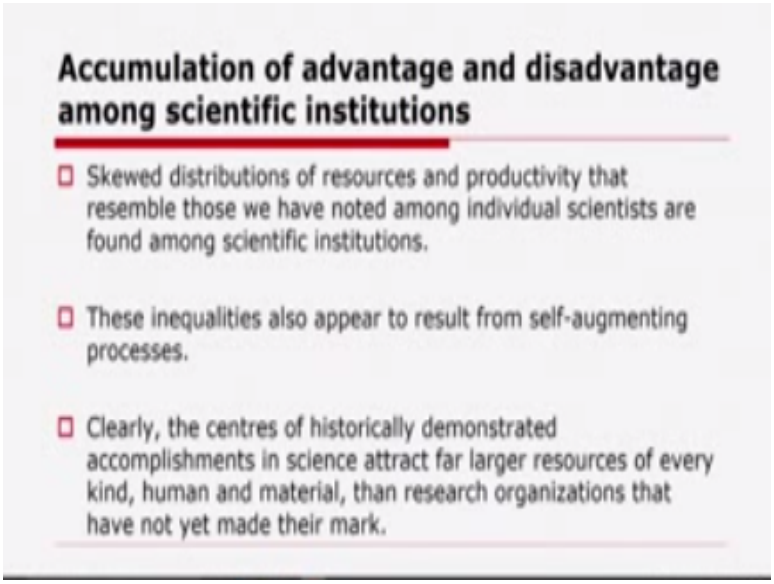

But there really can be too much often a strictly good thing okay think about think about think a bit about the factors motivations of uncommon talent as they confront the high density of talented masters in the same Department of the student okay the more autonomous among them might not intently enjoy the prospect of remaining in the facility and with the metal effect at work in the shadow of their masters especially if they felt as you understandably the often comes to fill sometimes with ample grounds that those masters have seen their best age correlative Lee some of the formally established masters in a in pattern of master.

Apprentice ambivalence may not release the thought of having exceedingly talented younger associate in their own or completing research terrain who they perceive might subject them to premature replacement atleast in local peer esteem when as anyone can see they the Masters are

still in there undoubtedly not every one of us elders has the same powers as critical self appraisals and the same largeness of split okay.

Further what Martin tried to mean that at least during the years of seemingly limitless academic influence and expansion a person like her I mean mathematician like I guess Barrow okay would have stayed on and Newton would have been given a new chair but again as you have ample cause to so know continue the expansion of that kind in any one institution also has its limits apart from forces generated within universities that make for dispersion of human capital in science and learning.

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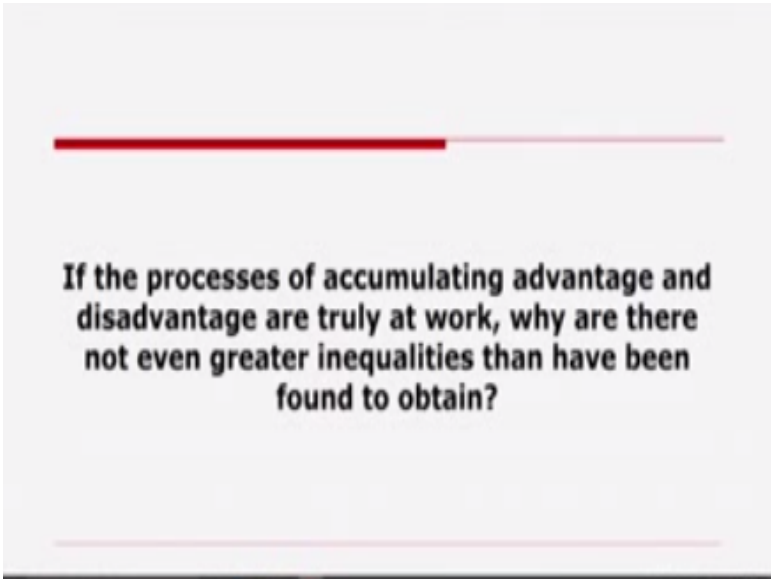

There is also the system process systemic process of social and cognitive computation among universities entering into that external computation is the fact that the total resources available to a universe with your Research Institute must be allocated somehow amongst its constituent units some departments work for even enriching varsity and in elitist reasons this provides opportunities to institutions of considerably smaller resources and repetitive.

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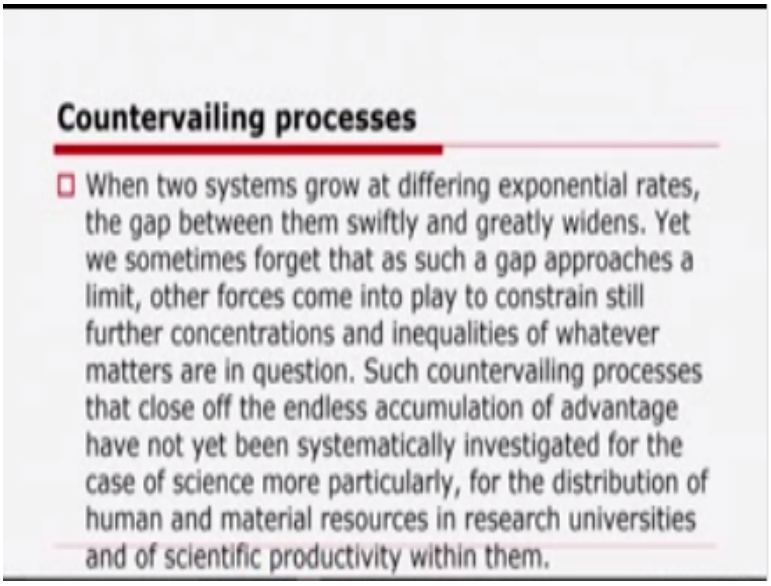

What I what model may not here that offered from forces which are generated within universities what are those forces I mean human and material resources okay there is apart from these human and material resources there is within university there is also the fish term systemic process of social and cognitive competition among the university okay and such external competition in the fact that the total resources available to a university or Research Institute must be allocated somehow amongst its constituent units you may find that some Department foursome.

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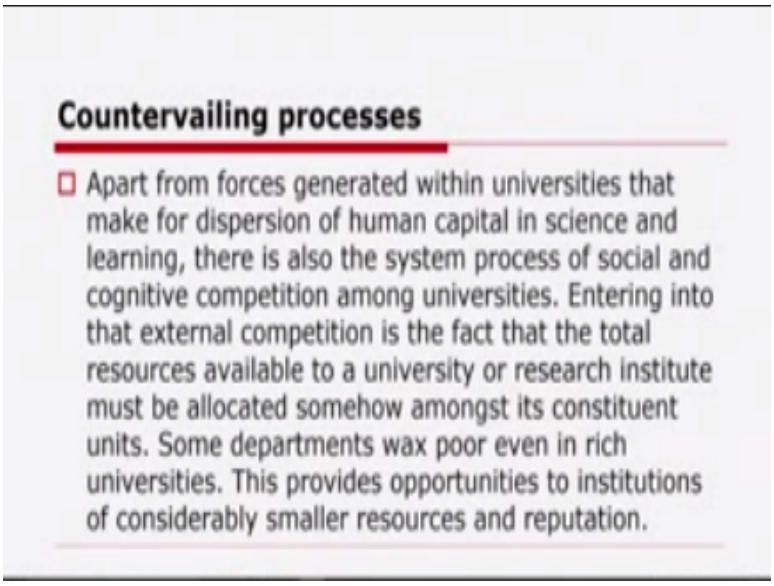

Who even in Greece University and some departments still poor University in which universities you will also find I mean some Department perform very well even in which you would and when some in reverse some departments or from poor even in which universities such situation provide opportunities to institutions of considerably smaller resources of repetition and these may elect to concentrate their limited resources in particularly in particular in specific fields and Department.

So to provide competitively attractive micro environments to talents of their first class of the first class in those fields as another and another countervailing process okay populist and democratic values may be called into play in the wider society in the wider social arena external to academia is to dismiss and design and leave governmental lodgings to bemire widely spread in a in a calculated effort to counteract cumulative advantage in the great centers of learning and research okay but such but apart from such speculations what Martin did Martin tried not to defer the examination.

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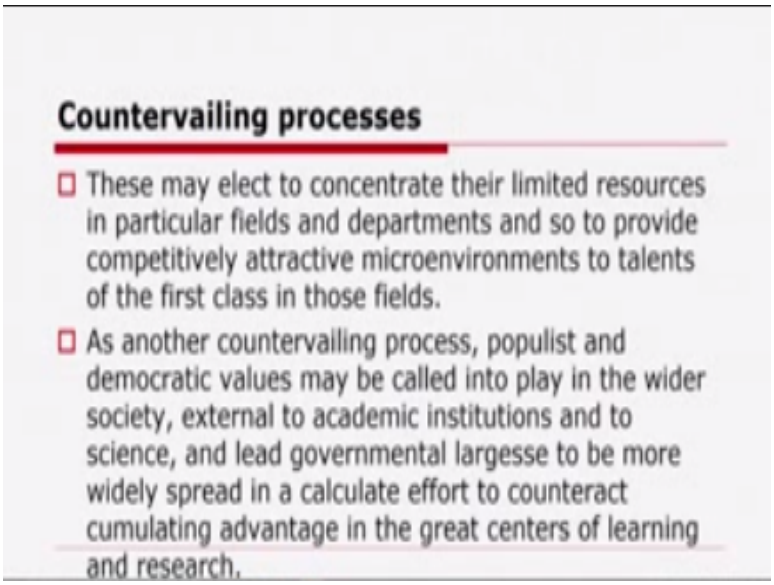

The of the symbolism of intellectual property in science by continuing with observations on countervailing forces countervailing processes ok that emerge to curve the accumulation of advantage that might otherwise lead to a permanent institutional monopoly or sustained oligopoly in the fields of times and the sustained domination of a few individuals in those fields just as there is reason to know that the preeminence of individual scientists will energy that variability come to an end.

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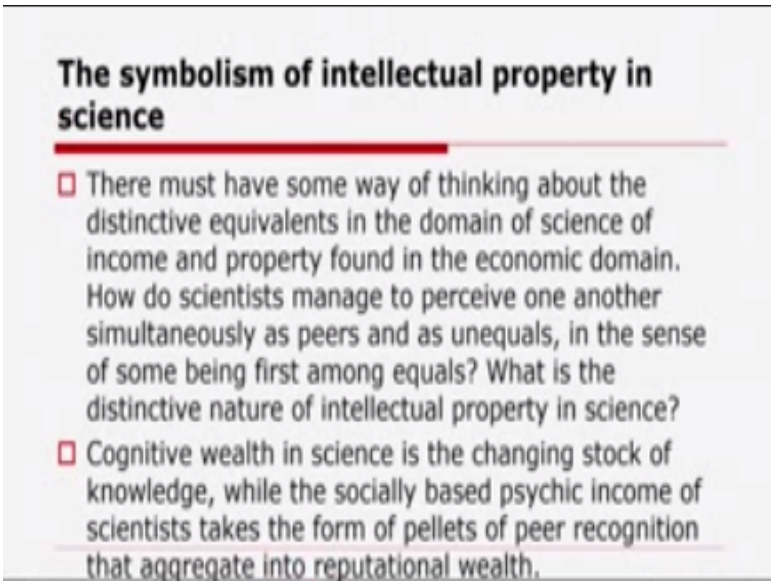

So there is reason toexpect that various preeminent departments of science will decline while others rise in the full length of time then such countervailing forces that we have discussed ok from here onward okay we move on to the symbolism of intellectual property in life ok the death must have some way of thinking about the distinctive equivalence in the domain of science of income and property found in the economic term how do scientists manage to perceive one another simultaneously as peers.

And as unequal in the sense of some big first among equals what is the distinctive nature ofintellectproperty in time to explore the forms of inequality in science okay registered by such concept as the material effect and the accumulation of advantage you must have some way of thinking about the distinctive equivalent okay in the domain of science of income okay and property and wealth found in the economic time okay.

That is why for Martin tried to pull such questions that that term how the scientists managed to persuade one another simultaneously years and add unequal in the sense of something first of all the equals what is the distinctive nature of intellectual property implants mean the tentative answer to the coinage question now which Martin proposed way back in 1957 seems to have gained force in the light of subsequent working within the sociology of things the system of coinage is taken to be based on the public record.

With the north one scientific contributions by qualified year that coin is comes in various denominations largest in scale and shortest in supply is the towering recognition symbolized by

if only for an entire reporting time ashen we speak Newtonian germanium Freudian Einsteinianor even sincerely Roger okay considerable plane below those still close to a summit recognition in our time if the is the Nobel Prize okay.

And other fault and it can be also economy the practice of affecting the names of scientists to all or part of what they have contributed comprise thousands of economic laws theories theorem hypotheses and constant and when we speak of theorem Planck's constant the Heisenberg the Heisenberg uncertainty principle operator distribution a given coefficient or a larger skeleton structure.

And other forms of other forms of peer recognition distributed to far larger numbers further graded for election to honor district scientific societies medals and hours of various kinds names chairs the institutions of learning and research and moving to what is surely the most widespread and altogether basic form of scholarly recognition.

I mean that which comes with having one or having ones work used in explicitly acknowledged by one year okay I mean the way Martin try to argue here the cognitive wealth in science is the changing stock of knowledge while the socially based psychic income of scientists takes the form of pellets so here's everything that aggregating to a reputational wealth okay this is very important okay.

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