Cultural Studies

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Module No. # 01

Introduction

Lecture No. # 05

The Modern Mind: Its Origins

Hello and welcome back to NPTEL, the national program on technology enhanced learning. We are in now in the fourth lecture, sorry in lecture 5 of module 1. Module 1 as you know is introductory in nature and these lectures are being brought to you by joint venture by the Indian Institutes of Technology and the Indian Institute of Science. These lectures are for the students of you know in different engineering colleges in IITS and where humanities and social sciences courses are offered as elective courses and our course is as you know entitled cultural studies. And in these three or four lecture, we are looking at the contribution of science and what science has, what light science has to show or to through on culture. And in the lecture before this, we looked at evolutionary psychology and we saw that evolutionary psychology through its five principles as given to us by leda cosmides and to be and john tooby, can tell us a lot about why we have to kind of minds that we have and what are minds are actually fall and how our minds have to developed.

We had looked at you know how evolutionary psychology is a reverse engineering has a verse engineering methodology and we saw in the main, that our minds are actually made to solve adaptive problems in the past, right. However, in today's lecture, we are looking at the origins of the modern mind, we are not looking at the pre historic mind, at the mind as it evolved, but a looking at, really our targets here is the modern mind. And we are going to look through you know through it to a at the modern mind and its origins to three transitional phases as given to us by this call them (( )), but as always we are going to, before that look at some of the points we discussed in the last lecture.

So, as we go through the recap, you will recall that evolutionary psychology is really not a branch of psychology, but it is an approach to psychology, where knowledge and

principles from evolutionary biology, I used to do research on the structure of the human mind.

Next, we also saw that our minds are information processing our mind are it is comprised of information processing, sets of information processing units or circuits and the job is to solve certain kinds of problems, these problems we call adaptive information processing problems. And there are many problems alright, but there are four core problems that we may zoom in to and we can see that these problems are those that were there in our evolutionary history and interestly they interestingly, they are also with asked today. So, those problems we saw in the last lecture, were those a face recognition, threat interpretation, language and navigation.

Then a quick recap of the five principles of evolutionary psychology as where given to us by leda cosmides and john tooby, to be in their primer on evolutionary psychology. The first went like this, the brain is a physical system, it functions as a computer and its circuits are designed to generate behavior that is appropriate to your environmental circumstances.

We also saw the second principle as given to us by tooby and cosmides, as I quote our neural circuits were designed by natural selection to solve problems that our ancestors faced during our species evolutionary history, which is to acknowledge the fact that our circuits were designed by a principle by a force, if you will which is the one that was so elegantly formulated by charles darwin in the nineteenth century, which is a force of natural selection, and these circuits were designed to solve not current day problems, but problems they faced by our ancestors in our evolutionary history.

Next, the third principle of evolutionary psychology, we saw had to do with consciousness, and we saw consciousness, as you know both awareness also has a subjective experience, we also saw that consciousness, may be considered as a wakefulness, ok.

Anyhow, no matter what you know definition we adopt of consciousness, the point that was made by evolutionary psychology was this, that consciousness is just the tip of the iceberg, most of what goes on in your mind is hidden from you, I am so sorry, is hidden from you, as a result your conscious experience can mislead you, into thinking that your circuit is very simple for instance, ok.

So, we saw be the example of how, you know what goes you know that we saw that they are a number of processes that go into the very simple seemingly simple process or act of recognizing once own mother. They are inputs from definitely the video systems from memory, from various other systems and the point was to to you know to argue that all these you know the, all these process is that go into that act of recognizing ones mother or anyone for that matter are thousands in number or hundreds in number. And these are the points these are hidden from us, and I had said that we can very well speculate that the reason why these are hidden from us is because we do not really need to know them in order to survive and there would have been an information overload, if we were to really be aware or conscious of all the processes that give us the final results what to be an cosmides had called the high level conclusions or perceptions.

Next, the fourth principle of evolutionary psychology we saw was this, different neural circuits are specialized for solving different adaptive problems and we had discussed this (( )) that like as an engineering, where you know an all purpose machine is no good for instance, hammer cannot do the job of saw like in the human body. For instance, there are various organs devoted to different kinds of specialization, for instance believe us devoted to detoxification, then the lungs for respiration, the heart for pumping blood etcetera. Following evolutionary biology we also in evolutionary psychology, we argue that and our neuro circuits are specialized for solving different problems, the there maybe overlaps scientist, may have found overlaps, but the point is there definitely our circuits that are specialized for doing different jobs.

Then, we saw the last principle was very again elegantly put as our modern skulls house a stone age mind, and we saw that that it may it needs this, that even in our modern forms, even as we have a modern form or we live in modem times, the mind that we have is one that was sculpted as a metaphor use by toobuy and cosmides. Sculpt throughs like wind you know, sculpting a piece of rock for instance for thousands of years and well, why not, because it seems that ninety nine percent of our species evolutionary history right was spent in hunter – societies right. And the you know, all the rest of it, you know, the you know the the beginning of agriculture for instance, the computer age, the industrial revolution before it, right, all these are as to as the author say simply like the you know our like the blink of an eye, then compare to the enormous amount of time spent.

They say it is the thousand times more than than any time spent in any stage of evolution. So, ninety nine percent of our specious evolutionary history was spent in the hunter stage and we have minds that are essentially, even if they do or produce or performance sophisticated task like mathematics for instance, like high literature, very good literature, for instance like music, for instance and very complicated complex tasks, it still is fact that you know, many in fact argue the these are byproducts of the original, you know of the original tasks right that our brains work sort of sculpted for, right.

So, our modern skulls house a stone age mind and the fact is that you know the the close call adaptive problems like face recognition, like navigation, remember alike threat interpretation and also things like the raising of children, gathering of food, etcetera. All these are things that have not and perhaps, we may speculate are not going to leave us, it is they are going to be with us in as far as survival and reproduction in the darwinian paradigm are accepted as the goals so to speak towards, which our brains were designed.

Fine, so the topic of discussion now is as we saw the modern mind, and It I think it is fitting that the this is the next lecture in our series, the modern mind and its origin. And the key source text in this lecture is by merlin Donald, Origins is work, the origins of the modern mind. Let me as the (( )) here see, Iit is not it is not that this is the only narrative so to speak of the development or the and the origin and the development of the modern mind, they may be different, they may be different findings as work goes on or they may have been others who who delineate or describe different set of transitional faces, ok

One reason why I brought this text here right is called an accepted text now, and if he have to see, because it is a linear narrator, if we have, if has three faces, if we had to see all look at the origin of the modern mind as a narrator, then we cannot have too many overlapping and contradictory text. So, I begin with the caveat that perhaps some of the findings will change, but it is enough for us to know, because we are not exactly focusing on you know on on prehistory and anthropology here, we are trying to look at the text that is going to give us some knowledge about how cultural most formed, right.

So, let us see how this narrative had been woven together by merlin Donald. The central argument in donal's text is this and that is why we need essence doing cultures studies, we need this text. Human beings have evolved a completely novel cognitive strategy

compare to other animals and this cognitive strategy is our brain culture symbiosis, this is also known as co evolution, right, we have a whole theory of co evolution.

And these strategy is one that was developed, pick you know singularly by the humans you know why homo sapiens by the human specious. So, we have a brain culture symbiosis, meaning we have you know the physical feeding into the cultural, the culture feeding into the physical, and (( )) and that is why we need to know this narrative.

Then dimension as a consequence, the human brain cannot realize its designed potential unless it is immersed in a distributed communication network, that is a culture during its development, this is very, this is this is immensely important. Looking look at this, he calls culture a distributed communication network, now because I will unpack unpack his word and I am going to speak speak about the point that he wants to make here. It is that because the evolution was a symbiotic, once the evolution was not simply even to do with the brain and only physical pressures, for under or (( )) pressures, the topographical pressures.

The point being made is the human brain today, right it cannot realize, that is even it cannot sort of maniphase and achieve its true potential without been immersed in culture, it is only because we have so developed with culture and brain with relationship of brain and culture with the physical and cultural, right. We cannot achieve you know full potential unless we are in the culture, I am that is why it important for us. You know before we go on in other modest look at more moderns forms of culture to look at modern culture practices, to we will look at the key concepts, the (( )) of culture studies, right, it is important for us to ask this question, we have a mind that has developed culture.

How was this mind, how was culture developed through a mind and how that this very mind developed in? Another things that we saw was of course in evolutionary psychology and how really our essential propensities are for, are core, you know core evolutionary problems like face recognition, etcetera. Here (( )) cases and other point and that is key points to the fact that the that brain that the brain developed with culture and culture developed along with brain development, that is where we needs to see the origin of the modern mind.

Then, he says the human brain is quite literally, specifically this is important, specifically adapted for functioning in a complex symbolic culture, this is very important. We something call symbolic thought, what is symbolic thought and even c n, when we discuss (( )) end of this module, when you talk about structuralism as a school of for a a theory, we will see that capacity for symbolic thought that is the capacity for you know cognizing the word retaining, things about the word in on memory using symbols, is a major breakthrough, right, is a, is not only a, not only a breakthrough in our evolutionary history, is it also one that eventually allowed us to have mathematics, eventually allowed us to have language, later on you will come to know how, you know language is based on the fact that words are arbitrary.

Like words, there is no one one one to one correspondence between a word and the object that it refers to. For example, this pen that I am holding here, there is nothing, there is no relation between the word pen and these object that I am holding, is a something pens, so pen like about this, you know this object that cause out to ask to call it a pen. It is it is the different words in different languages for a pen and that is proof of the fact that the relation between the pen and the word pen, the object pen and the word pen is won, that is arbitrary. This kind of arbitrariness would not have been possible had be not developed symbolic form, so symbolings not is immensely important, again symbols and science and signify practices as web, shall see you the who the next you lectures i've any the foundation (( )) topics in cultures that is

So, let us read again the human brain is quite literally, specifically adapted for functioning in a complex symbolic culture. So, that set symbolic thought is one that is if not thoroughly completely peculiar to us as species, it is still something that has allowed ask to us very a very complex culture, very complex forms of knowledge, the beginning with the alphabet and the number system. 19 20

So, this work by by merlin donald about the story of the origin of the model mind, and it being in at culture being a very important part of it, (( )) itself on three major transformations right, and he declares this in the beginning really, and he says that this is entire development through a brain culture symbiosis has to be seen or (( )) under three major transformations throughout, you know prehistory and history, the first transition an I shall explain all of these through his work.

First transition is called, is something that entailed a kind of skill known as mimetic skill and autocuieng; theses are the two features of the first face, mimetic skill and autocuieng.

The second transition involved in the main, its major feature was lexical invention and the third transition was the externalization of memory. So, what are the first is that what are the three transition, a, that the first transition in involved two important feature mimetic skill and autocueing, second transition lexical invention and third here memory is externalized and this entire say will be devoted to these three transformation.

And then the effects of the transformations which are again point to towards the end, the effects were these, there are three new sorry, the new uniquely human systems of memory representation, this is important compare to other species. We had we developed a unique a new (( )) unique system of how you know a memory was going to be represented. And another effect was there are three interwoven layers, right of these are three interwoven layers of human culture, each supported by its corresponding set of representation. Look at this, there was a different way, different systems are developed through brain culture symbiosis of memory representation and there were interwoven layers of human culture, where we find each of these stages had their own representative systems or systems of representation, right, so let see how this happens.

Then selection pressures as (( )) says and have meeting for mistakes, selection pressure at the stage of human evolution, were ultimately express and tested on the socio cultural level, this is why we need to look at the story that I have talked about, the story of the origin of the modern.

Because in evolution, the changes were physical alight, but as he said, you know where is a manifestation of this, a manifestation, where is evidence from it, how do it glean their evidence. The evidence gleaned from the sociocultural level and they were tested the deselection pressures and evolutionary adaptations, that they are ah established at they are there to stay and that they are beneficial for this species, were finally as he said, tested on the level of the sociocultural, then he says the evolution, this is important, ok.

The evolutionary scenario can be described as a series of cultural adaptations, now this is really a new way of you know of describing things, right. The new way of formulating things, for a since rewolaze, whenever we talked about evolution, whenever we talked

about Darwinian theory, we think that these are to do with only evolution or changes at the physical level.

Now, we have a scholar who is who is who telling us that these are also at the same time cultural adaption. So, the evolution is scenario can be described as a series of cultural adaptations, even though individual cognition was really where the main event was taking place, so that is why we we are going to look at these changes also as culture changes. Even if there happening in the brain and in the body, these are not simply to be read only as, considered only as biological physical changes.

Then, the essay says the most important evolutionary steps were concentrated into a few transition periods, and the changes greatly accelerated. And they are to begin with, they are to begin with one very important point here, which is the increase in the size of the brain and now little spent some time talking about this here, ok.

There is something called the east side story, as you have heard about. The east side story as you know wholes that we the human species, the human race originated in Africa, after you know geological catastrophe, which we call the great wift valley, which separated you know the eastern part of africa from the western part as they was the formation of a valley, and through up a you know, through up you know a set of maintains, which separated the eastern side of africa from the western side and the our origins are go back to the eastern side, which was let, which was dry and when we came down from trees, and when we developed bipedalism by walking on two feet and eventually we took to meat eating. We took to meat eating, which led to a protein rich diet, which had a enormous implications as far as a development of the brain was concerned.

Right, meat eating let to a protein rich diet, and it led to an increase in the size of the brain, right. So, it is not that they were day (( )) one increasing in the size of the brain, scientist tell us that the (( )) several perhaps increases in the size of the brain, but one major breakthrough came about, we know with bipedalism, with hunting for food, we can increase in the size of the human brain following a protein rich diet.

A second very important physical anatomical change, sorry anatomical change was the descent of the ladings. The ladings you will find in the aips, in our in our cosines, are certainly higher up, right where was our (( )) of homo sapiens are down here, right.

So, if you look at this here, slide, so if this, so there was the descent of the ladings, which created as linguistic and you know stud the people who study anatomy and linguistics would say the day was a peculiar geometry being formed here. Right, which we called the inverted l, this is on here, the inverted l.

The inverted l gave a peculiar geometry to you know to us and it enabled you know enabled (( )) of vowel sounds right, which enables the descent of the ladings, they forwards immensely important for what for the beginning of language, right, this rapid why of sounds is more and then that available to are aip cousins, right. So, what are the two points here big to begin with? Increase in the size of the brain and descent of the ladings, both he have to understand according to (( )) and others scholars both had you know immense implication for the development of culture, language is a part of culture our hunting skills, our you know our communication skills, a part you know a symbolic fort or part, apart I want go into the building of culture, right. These are trace to the increase on the size in the size of the brain and the descent of the ladings, and you have to remember that this you know this happened together what we saw while are go couple of slide are ago, merlin donald consist a brain culture symbiosis, right.

So, rapid increase in brain size happened in the first case, the in the first case, in the initial stage, they increase was not everywhere, the increase was concentrated in three areas. Now, let us look at these according to Donald, these three areas are the association cortex, the hippocampus and the cerebellum. It is so interesting if you look at this, you know the association cortex as it is increase in size, it enabled, it is something that it is responsible for complex perception. So, increase in the association complex in is speculated gave us the possibility or it it creative the possibility for complex perception.

Now, hippocampus, in increase in the design, the brain in the side of the hippocampus, which is responsible for memory enabled us to also, so it increase the capacity for memory and finally cerebellum increase in in this side, also gave us balance and posture.

Now, if you look at the story are very carefully, balance and posture are required for skilling balancing and posture are require for bipedalism or outstanding, on standing on two feet. Before this, you know we were not standing on two feet, right, because development in in evolution in evolutionary history, before this what we had was we

were walking on the on (()) and like is as you see in chimpajee etcetera, they do something called walking (()), right. So, they walk on their (())

Now, as there was pressure given, given you know I have situation in the (( )) part of Africa, given a situation, where they had to be, they are to hung for food to meat eating as part of the diet, right. Given such a future, it was necessary that there should be bipedalism, and bipedalism what happened was they was a they was a freeing of the hands, because you no longer [fl] waking there was freeing of the hands and if the freeing of the hands as scholars tell us, they was what we call the beginning of the the gradual, you know beginning of the opposable some. That is the thumb is opposable as compare to you know I cousins is opposable to a great degree from the other four fingers.

Now, let me (()), because it has immense implication of culture, right, what happens when slowly the thumb is oppose to the four fingers, is that you get two kinds of grip right, extremely important for a first tool, for a first technology, this grip is a the power grip, to be able to hold an implement right. The other grip is the perception gripm to be able to these things, to make things, to make implement with a certain degree of preoccupation. Now, if you notice carefully without an opposable thumb, it is not possible to have either of power grip or all a perception grip, so this is opposable thumb is gave as the first culture.

So, you see the relationship between physical change and cultural change, right, and then we began to hunted groups, we began to communicate more among (( )), we developed language, with language we developed word, with words you need more memory to store, in also to store other kinds of hunting strategy, right. Where you did hunt yesterday for instance, and for complex perceptions, then one needed to survive, that one had to change, and for that we need a brain that have to accommodate all these changes, and increase in brain size came about as call as say with you know with the eating also, this eating of meat. So, this. So, many forces really, so interesting this (( )) is, so beautiful, so many changes that came about together, right in a brain, what donald calls a brain culture symbiosis.

So, the cultural evidence are, if you if you ask me, you know ask this college how do you know, how do know that this happened, right. So, the cultural evidence for is that we do find sophisticated tool, stone tools, in places where you know archaeologists or

paleontologists study of paleontologist study of fossils ah have been to their word and make these evidence of long distance hunting strategies and of course, of migration out of Africa.

So, this is the cultural evidence that we have. Remember was donald said, that eventually merlin donald says that eventually all these changes a happened in adaptation to the body, these changes were ultimately (( )) realize or manifested or become evident at the cultural level, and that is I remember he call this is a series of evolution, series of cultural adaptation, this certainly is another way, a novel way of looking at the story of evolution.

So, the second major transition as we saw a led a was by another large brain expansion and at the same time the descent of the larynx, this is something we have already discuss. The descent of the larynx is important why because it led to two things. One is it led to high speed vocal communication system and a large lexicon. Remember, lexicon invention is an important part in stage two and so there was, what is the lexicon? Is involve lexicon is a dictionary, is the collection of words, right. So, there was there were new invention, and they were you know additions to the lexicon or to the set of set of words and terms in symbols that where there in our ancestors, ah minds stored in ancestor's brains. And also concurrently, there was a high speed vocal communication system that group along you know along with this, right.

Now, we will look at what happens to you know to apes, why they did not you know why isn't at apes did not achieve this level. A very important point theory is apes our cousins alright in a in the evolutionary story, but apes have something, a memory system which Donald's Donald called an episodic memory system, this is lead as to an important change in in the first transformation. Apes have a system memory system which is episodic in nature, that is they do not have easy recall without environmental cues, right. As is Donald says here there are brilliant event perceivers, but their episodic memory are poor, very poor episodic recall as the cannot self trigger their memories, this is very important, they cannot, they need environmental cues. So, in case, wondering why if it is did not developed as we do and they have a different evolutionary trajectory, after we split from our permanent sister.

Remember, we did not evolves from apes, this is very important for us to remember, we evolved you know into a common ancestor, and then you know they was a (()) and

therefore, it is cannot you know they cannot express knowledge even gestures or mimes to communicate, even the simplest of intention they needs several rehearsals, of you know there is a hundreds of rehearsals, it seems for it to be able you know to be able to do something without a cue.

So, the first transition therefore involved two things mimesis and voluntary retrievability, voluntary retrievability sorry is something is saw that apes an not have. So, you would developed something call auto cuing, that is cuing without the need for any any cues that is auto self, right. So, we developed voluntary retrievability because of selection pressure and also mimesis. Mimesis you know is a greek word, the mimetic skill comes from mimesis, a greek word meaning imitation.

So, these are the two things that we have, and lets read from what what Donald has to say, Donald according to Donald to fundamentally new cognitive features develop a supramodal motor modeling capacity called mimesis, which created representations that had the critical property of voluntary retrievability, in the this is the story first taken the story of the development.

Now, before we see that the first main logic for the first transition is based on several premises, that is revolution in the modeling system, right, they use hominids, were were able to use the whole body as a representational device, to mind, auto imitate things in using the entire body. We do not have language at that stage, right, so the entire body was used to represent things and there was a self triggered rehearsal loop, meaning there was an auto cueing system, which was said that is self trigger, which is not need any cues. So, that you know if you are in if you want to if you want to remember an even that had happened else way, you do not need to again go to that place to trigger the memories, you can trigger your memories at will.

Tell homo at this stage, homo erectus had we did not have language and not yet in the second stage, right, homo erectus are species had something called proto language. Now proto language is what it cause download, cause a limited degree of linguistic capacity is not full fledged language. Proto language with mean you know two row sentences for instance and we compared it to the accurances of you know child, two year old for instance, depending on the child's development, how how how the child tries to communicate with his parents or others using just two words, right, there is no sense of

syntax, really no sense of grammar, right. So, this the linguistic capacity, this very limited linguistic capacity was something that was developed by the time, the first second stage would begin and this was important and it helped in tool making and social coordination.

Now, there is one thing, the descent of the navings which did, what if you remember, it give you know great (( )) to phonological system, system are producing sounds, to what what donald calls the high speed phonological system, and second they was lexical invention, the addition of more and more words into the (( )).

So, therefore, autocueing as we saw, required no environmental cueing and something that you know distinguishes us as a species, so the sociocultural implications of mimetic action that is memo, mimetic action is the using of the entire body as the representation device. What happened was, there there was a dramatic increase, right, a donalds calls it a dramatic increase in the variability of facial vocal and whole body expressions, as well as in the range of potential scenarios between individuals, second there was a quasi symbolic communication to create a very simple shared semantic environment (( )) words.

Now, the second face as the two more features and we have seen this capacity for lexical invention and high speed phonological apparatus, this is you know why this is important for culture, particularly it is important for you know it is a (( )) of you know rudimentary system, which goes into the a the creation of myths and b to the creation of you know ultimately to the creation of literature points. The story right it is important for us from the cultural studies point of view, because it gave us inheritors fought, right.

So, as donald says a the natural collective product of language was narrative thought, essentially storytelling, which evolved for specific social purposes and essentially similar purposes in modern society, right, to be in a simple narrative, to be able to, two kind of articular things in a linear sort of (( )). This happened and then that happened and then the following happened to at causality, to it this happened, then that happened and because of this, because of that, a third thing happened, do follow, ok.

So, this kind of linking things into narrative thought, because you had (( )) extension of what he calls the lexical skills and to the labeling of relationship, the obituary labeling of relationship between in words. And this collective product of you know language you

know language global, language of words of you know phonological systems was a very important capacity we had apart from the symbolic capacity and this symbolic thought and this capacity is narrative thought, which give us give us for smith.

Then the sociocultural ramifications now, of this you know the second face, was that it increase in the number and complexity of available words and grammars, obviously there's going be an the syntax. Now, if you need ah linear and causal a system of representing events, then you would obviously need a grammar right, you need a syntax and which to to arrange those thoughts and there has to be an increase in the number right, in the number of words, and as donald says, and altered human culture by introducing a new level of shared representation.

Remember, the level of share representation in the first face was a level that was that played out in the body in you know played out in the body, right, it was it was where the body was used as a representational device. Remember mimetic skill, but now what happened was we have an an entirely new level of shared representation, which had enormous implications for the development of culture, it was not bodily right, but it was spoken, it was language based, so this is why we called it a new stage. And I think donald rightly cause and there is no deriving the fact that the descent of the ladings and an along with another you know a increase in the size of the brain was an important second transformational face.

Next, we come to transition number three, the third important transition in the development of culture along with selection pressure, and this is very interesting, this is external memory storage and retrieval. And new working memory architecture, what is meant by external memory? Right, in this scheme, external memory it is called obvious, it is what I have in front of me, I am not giving this lecture or I am not you know I am not talking to you simply from my own memory, right, I do not need this if I am going to talk to you base my recollection from my internal memory, the memory that is there inside my brain, right.

So, the third stage is important in this relatively new stage, it is that our we no longer rely only on an internal memory system to to store our knowledge, to store the procedure of how things may be done, right.

Ah we are external storage in the sense we have books, right, so if I go out shopping, i have I carry on list with me, that list is not you know in my internal memory, it is one of piece of paper, which is the external memory, right. So, external memory storage and retrieval, thus you know the c ds were we you know, the hard disk were, we you know the external disk of the computer disk were, we keep our things anywhere were we store our knowledge and you know and not in you know this was there is no no knowledge grove. So, fast that our internal memory cannot cannot definitely, obviously cannot store, the normal human brain cannot store so much material in its internal memory.

So, in the third face as Donald says, in the development of the origin of the human modern human mind and and the developmental change in culture, is that we began to store things you know outside of our internal memory into what we call as external memory system. And therefore there is a new memory architecture, why because they said there are two (( )), now one is your internal memory and one is the external memory, which is an extended field for your memory, working architecture of the memory. I am not going to this a lot, because the second thing is new working memory structure, something (( )) of psychology would be able to explain to you better.

Never then the important point is in the third transition, other the third transition is marked by the the development and growth of various kinds of devices for storing for external storage of memory. So, now Donald says that is what happens with this external storage of memory is that set of wide range of new possibilities, right possibilities to do with not simply storage of data right, but also the way data is now process. Remember, they, he said the days new working on, there is a new working memory working memory architecture right, and the hence they are new possibilities of ways of processing not only a processing with also varies retrieve things. Since we have not retrieve directly from our own internal memory, we are retrieving things data from external memory and yet our brains are also working along with these external memory devices, here are there is definitely a different way of only new system with new possibilities of of looking looking of storing knowledge or even these things add to the way new knowledge is produced, right.

So, I will end by looking at this slide for instance, before was there, before the coming in of external memory, thought here was dependent on biologically working memory, but

after external memory, the situation has changed with the increased use of the external symbolic storage, all these points are given to us by Donald.

The long terms store were accessible by means of limited associated strategies in the storage before the external memory, available to biological memory, but after the external memory systems, there was a, as we said, the larger architecture, within which the individual mind works this has changed, right. And the structure of internal memory is now is now reflected in the external environment, so there is a larger feel as it were to work with and before the external memory, finally there was a need for oral minemonics, and there was a need for you know for us to adopt different strategies, right, different shortcuts, because we are retaining things in our own memory, right. So, there was also the need for specialized people (( )) for instance, who who are use you know who had the for preserving memory material, not everyone (( )) divided in such a way, because some people were engaged in the task of it, of you know task of storing memory.

Well, and who knows this may have in the first kind of you know division of labour of mental labour and physical labour right, some were some assigned the task you know of of retaining things in their memory. But after external memory, what happened was an external memory field developed, an external memory field, which serve as a real working memory for many mental operations and is also an external long term store.

The long term store is not just in now in (( )) or more longer, only inside our brain says also a huge external long term stories, you can also look at this from the point of view of the internet (( )). So, not just storage devices like the hard disk for instance, the entire in the world of date, a world of data is available to you through the internet, it is just as as I said you know the click of a mouse, you can access, you know you know it is because knowledge is going so fast and there is going so much to be retained, that it is impossible, it is impossible for us to store everything in a limited memory system, right.

That is why we needed, we needed the written word, we needed you know new storage devices and this has also changed even physically, right, the ways are minds work. Why, as donalds said, it is because we have a new environment here, which where there is a symbiosis of the external and the internal memory systems.

Therefore, external memory systems a amplified the number and variety of representations available to us and increased the degree to which our minds share

representations and rely in external devices for the process of thought itself, look at this. So, it is so important for us to understand that, even you know for the process of thought or the processing of thought perhaps has changed because of the availability of these external storage devices.

Fine, so quickly let us look at the few points here. If you get a question like what is like what is the human brain specifically adapted for, according to Donald? It is that the brain is adapted for the functioning in a complex symbolic culture, is important, complex symbolic culture.

Then, how did the evolutionary scenario proceed as far as humans are concerned? Now, we the answer is this; we have to look at the evolutionary scenario as the scene is not simply a physical adaptations or changes, but is cultural adaptations. Why because, the selection pressures that were there are even for you know even for the (( )) physiology of the species, were ultimately expressed and they are also tested and I might add here and also the evidence comes from the socio cultural level, right, then, what where the three major transformations in the story of the origin of the modern mind? Three major transformations, this is immensely important. Three major transformations, we have to be very careful when we say, do not mix these first transition had mimetic skill, which will the body was the body was used for representation and it also had auto curing, which we know was self had a self trigger rehearsal loop, you do not need any you do not need an environmental cues unlike apes, the memory is not episodic, they we sort of developed system called auto crane where we could recall memories as well.

The second stage, we find that most important thing was lexical invention, following among other things the decent of the (( )), anatomically speaking, which gave us (( )) right in the shape of an inverted l, which allowed, which gave us a, give us more (( )) or largest all a larger (( )) of (( )) through which we could create new words and develop or lexical, it also included the the you know high speed phonological system.

Third is, as we saw just a while ago, the externalization of memory, which is availitive lineo evelopment, it is the last stage in the transition of you know of last transitional phase in the development of the modern human mind as compared to the evolutionary mind, ok.

So, what we saw in our last lecture, the last the the argument in the last lecture for the point of view of culture was that, all that we do no matter what cultural arrangements we have, the the fact remains that you know ultimately our mind is supportive. You know our mind are geared to solve all problems, problems faced in our evolutionary pass, which is ninety nine percent (( )) society when you look at the time scale, right.

But this Donald's essay, Donald's work, Donald's book tells us that there is a difference, you know particularly when you come to lexical invention and you come to the externalization of memory, we feel that the all these new things that we are able to do is because these changes have taken place. There was there is a narrative developmental story, if you will (()) do this, and but at the same time, the beauty is it does not do away what evolutionary psychologists have claimed, right. In the ultimate analysis, yes, we have these what we may call the deep structures, the deep structures in our deep propensities for face recognition for raising children and you know for finding mates etcetera, right. Thank you so much and we shall meet in the next lecture, thank you.