

Indian Institute of Technology Kanpur

National Programme on Technology Enhanced Learning (NPTEL)

**Course Title
Cognition, Transformation & Lives**

**Lecture-07
Stories from the Brain**

**by
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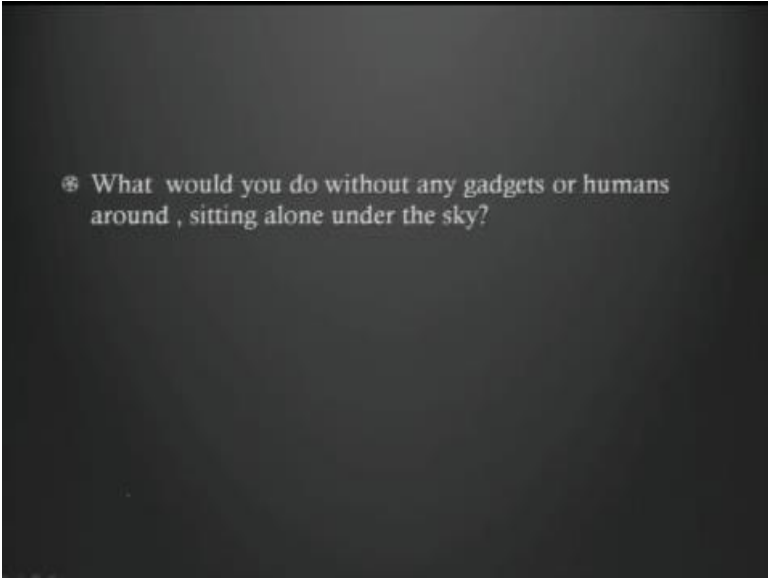
So in the last lecture if you remember we left at this expression of RASA and the difference between actually being emotional and acting emotionally because both situations required the cognition and emotional interplay, when you are getting really emotional they autonomic changes in your heart and involuntary systems happen whereas while you acting you may still control them, so there is a possibility that both cognition and emotion create another dimensions one can control another.

But and that is how will you that is what life is all about why does it happen on the surface all this may be happening to make you achieve move forward and do lot of things in the world, but at the base line in the brain does not bother about it too much actually if you look at it because obviously it is not the same somebody living in village or in a primitive African society and somebody living in doing some artificial intelligence research and say Stanford or MIT or even in the IITs and IISC that highly complex.

Cosmology or Quantum physics or genetics obviously the level of complexity of thought is different but the basic process which the brain knows and why does it have to play every time every minute in fact is possibly the need to survive and that is the basic need so if you survive and that is why your basic networks all or about survival your food and your security and we will talk about Maslow's need, it has some biological end depending also the basic push of the brain is survival and it has managed through these

3 4 tools as we talked about it but if you look at it the whole thing from a different angle what is the purpose of all this once you survived you got a food and your basic needs are taking care of what is the brain actually doing, just imagine if you are sitting under a open sky all your basic needs are been taking care of and you are alone you are not socializing you are not you do not gazettes obviously your mobiles and your eye pads and your computers what would you be doing.

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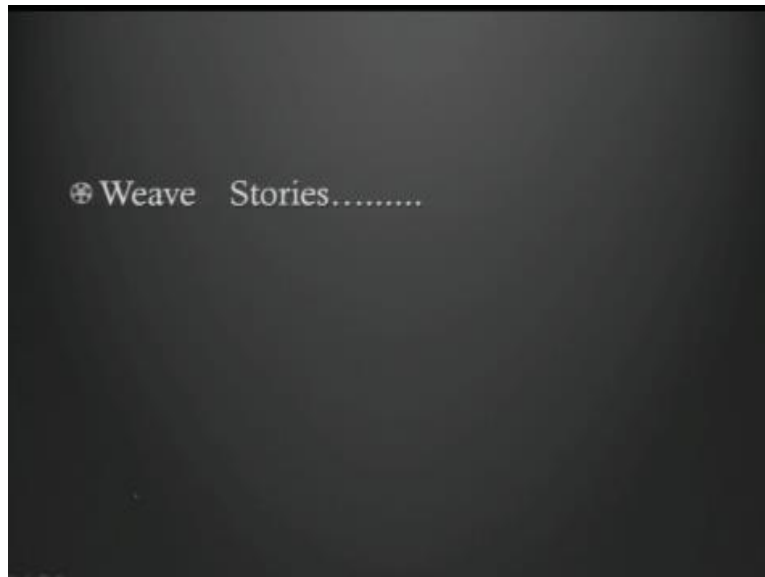
⊗ What would you do without any gadgets or humans around , sitting alone under the sky?

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You would be doing what the caveman did, you know these are painting some cave 40,000 year old if you found in southwest France if you in near Bhopal and Bheem patrika actually what they were doing may be they did not have language and that time we not sure, but they know the language of painting.

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So they were weaving stories look at this painting and try to just there is a 40, 00 year old painting what does it tell you there are human beings their children who are playing their animals there is a person who is trying to shoot maybe hunting food and then there are other rituals, they wanted to leave this story behind so your brain since ages still doing the same we are generally mugging around making stories or some of this stories died some of this stories survived some of them were turned to religion.

Some of them to science some of them all that is a human drama the religion the god the all stories which have come up from your brain and why does it do it, we look into the why and how of it and that is how imagination developed that is how a part of cognition developed emotions were already there, so this was a balance between emotion, emotional expression and the meaning given to it as I said for Freud rationalizing totally ill directed emotion without a meaning to it how long can brain sustain.

How long people will understand so there was always a need for the brain to create meaning and in fact we will talk about it and so what is the universal thing behind it where does it come from if you go back to whatever time and life originated and they at some point of time at somewhere

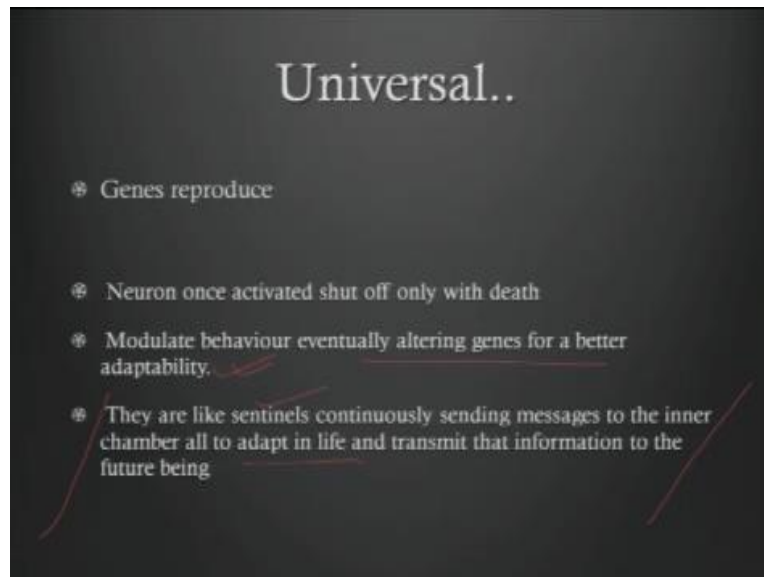
may be deep down to see the first gene would have appeared and that gene would have been very intelligent enough what is the need of the gene then what is the need of gene to keep producing reproducing human beings.

And other spaces they just wanted to propagate a species whatever spaces it is the first gene probably learned that to survive another small thing, emerging tsunami and lightening and waves and mechanical forces the first gene would have realized that the best way to survive is to multiply you multiply you become many and then nothing is going to destroy thus we are nothing is going to destroy total humanity yet although we do not know because some people do predicted to say that there is a very limited time which we have even hocking,

Stiffen hocking recently said that we have 100 years unless we find home somewhere else so that was a first gene and then as genes multiplied and created bodies the complexity grew the complexity is not necessarily being complicated but complexity is about the new dimension which come in and then came in neurons the nerve cells, that fiber like structures which connected to each other, through electricity and chemistry we all know about neuron transmitters I will not going into to it some of you if you want to really going to the bit of neuroscience can refer to the NPTEL lectures.

Which are there one of them was given by me it is call a beautiful mind and there were a series of how the brain creates mind MOOC course the two semesters back, may be you can find some of them on the internet You tube, so neurons are fibers which are connected at both ends to at least 2 or 3 of them and make a 10^{11} neurons measure make a huge complexity so neurons once they came in and they got activated with birth electrochemically they only shut off with death, they keep active all the life.

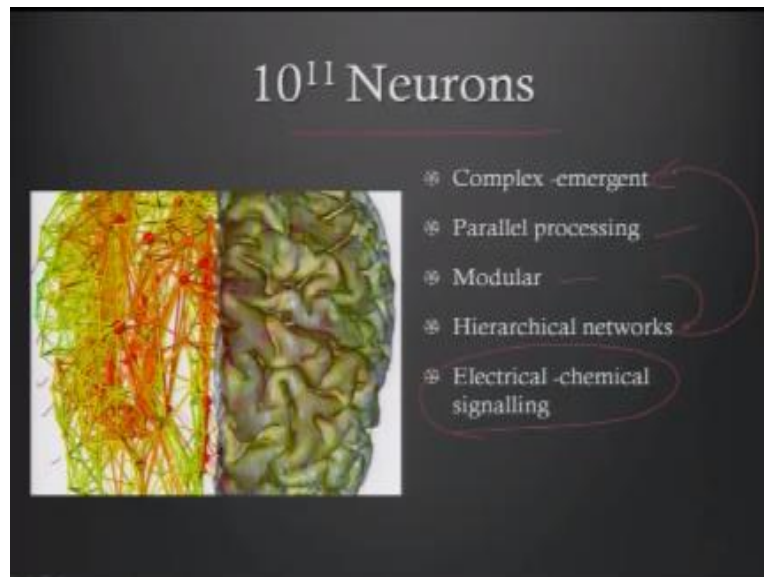
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Whether they are firing to create emotions whether they are firing together to create a thought or action or anything they but they are always in the state of a readiness to fire, so the first neuron what they learnt like gene learnt to multiply the neuron learnt to talk and neuron which is an isolation is not communicating is not a neuron, so there whole need was to communicated and that communication grew in complexity with species after species and till within our head what do they do by communicating they are like sentinels they are continuously sending messages to the inner chamber all to adapt in life and transmit that information what they are doing is taking information through the five senses.

Sending it to the brain presenting it to the higher thinking brain and essentially for adaptation to life in the process they alter genes for a better adaptability so whatever if you go to the Darwin's theory survival of the fittest adaptation and mutation and gene genetic whatever has gone in is actually the behavior the behavior does not get transmit, but with the behavior if you survive and you adapt better to the environment then that you keep practicing that and your neurons ultimately transmit that to the genes, I hope you got it keep talking to each other taking information through your sensors modulating it presenting some meaning to the brain and that is what brain does, just.

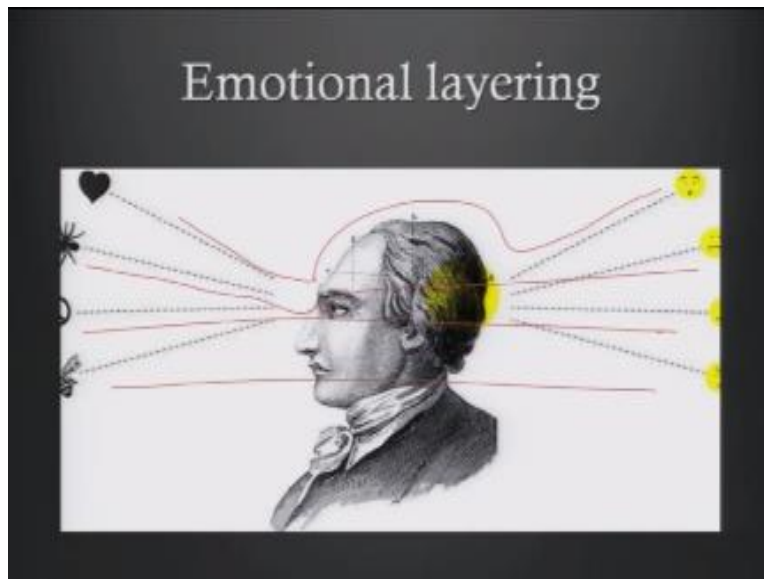
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So these are like you can see this is from the top of the brain and this is how the whole bunch of neurons 10^{11} they are responding they are complex so what is the understanding they are parallel processing as I said that there are at a given instance each area of brain is doing its specialized job in modules, but right from modules as they go up there are hierarchical networks, through all through the electro chemical signaling.

And this hierarchical networks create a complex emergent meaning, you call at consciousness or you called a story or meaning that is the matter of preference and the way you look at it. So what is simply mean to say?

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Let me explain it to it, just look at it and so whatever goes into the brain suppose you see a structure it goes from the vision and you are also hearing at the same time so two path ways will take off that information turn it into that energy of whatever photon and here a mechanical pressure from the ear they go into the pathways the data goes into a center coordination, center call thalamus from thalamus they are send to their specialized area of hearing and vision.

But the same time the whole data is being compared within the brain in the deeper structure in the limbic system with thalamus with the existing memory comparing whatever is going on in your head right now with that making a composite image trajectory or visual send it to the higher brain where the higher centers give meaning to it and then decide whether to act on it or to just keep it at a thought level or allow it to pass off.

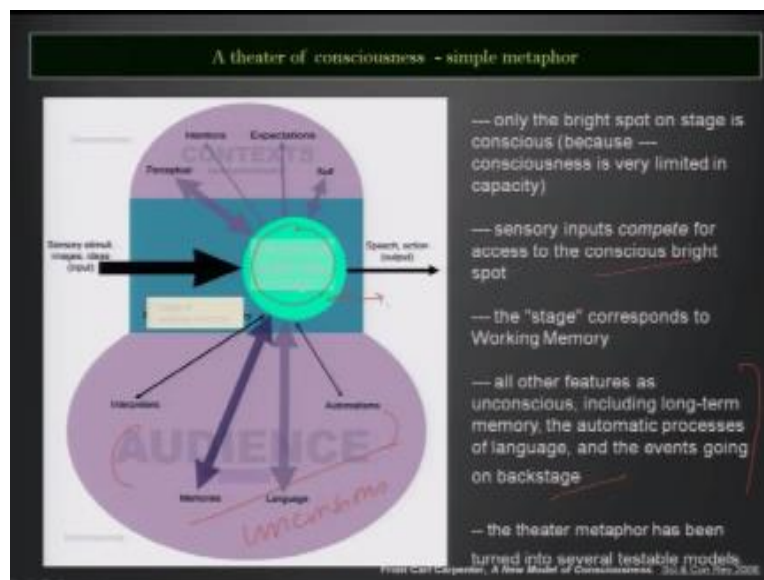
But from that basic unit which goes into through your sensors that basic information which goes to the electrochemical as it the images reformed as it is pushed to the center the deeper part and as it goes to the higher the complexity increases so there maybe 10 points which are brining information they coalesce into I am just hypnotically think do not get it into total literal meaning

I am just trying to explain the 10 points of information are coming to form a image, image is formed that image is compared with the existing image.

Another complex image is formed and that complex image is so as it goes to the hierarchical network the complexity increases and it expands from bits of data points they coalesce to make one image and then another image and the higher brain is just giving it a meaning. But in the process of giving meaning in the limbic system in the deeper thing there is always a emotional layer which comes from memory, memory of what if there is suppose this you see it goes and it is displayed like this, this induces fear it goes like this.

You see all this you can connect it, now the question is that whatever data is going is actually going into the brain is getting emotional layering even before it reaches the higher center where it can be put into cognitive process of thinking of abstraction of judgment of problem solving. But the emotional layering your rational thought is always liaised with the emotion and that is the union of true, they do not exist separately and that is what exactly we were talking about.

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This liaising of emotion, so this is the simple metaphor is taken from bars so there is a conscious brain knows only the bright spot on the stage is conscious so that means Freud is almost coming back to life because initially the cognitive psychology in everybody thought that unconscious nonsense and it is not happening, but now when we look at it neuroscience in the models which are explaining it we are finding that most of the brain is actually acting unconsciously.

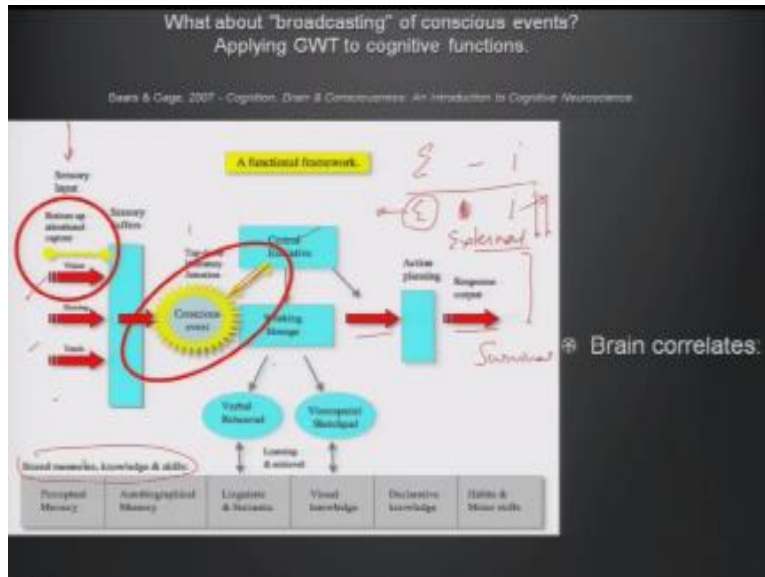
And the conscious brain sees only what the unconscious brain is sending to it, because when the information comes it in the process of comparing it with memory and emotional layering some of it may be rejected and the image maybe liaised with some other inputs so what you see corresponds to reality but not exactly. Sensory input compete for access to conscious like hearing, like touch, like vision and this is a working memory.

All other features including long term memory the automatic process of language and events going around the back stage this is the back stage which is the unconscious, so when you when I am talking eye is a part of may be which may be looking at what I am talking. But that may be consciousness, but the language the words I may have decided to speak in English but the words are forming automatically.

Otherwise if I think and I stop I mean it will take 100 lectures to complete it, so the brain is already trained with this knowledge which I have my brain has composed a story which will last still 10 lectures aiming towards whatever I wanted to tell you, and in the process it is creating itself and the conscious mind sees the frame which is presented to it, a frame of reality presented to it by the unconscious mind.

So it knows only that frame whether it can go back in a feedback loop and really alter that is later part of this series, so this is again from bars.

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If you look at it there is a sensory input here, what is the point where this whole process is controlled and that point is like a camera which is the attentional mechanism that is the bottle neck, attention mechanism can hold certain things at a certain point of time. Now imagine there are external inputs which are coming all the time which you should respond to otherwise you will not survive, suppose there is lion here and you are lost in your own poetry you will not be there in the next moment to have any poetry at all.

So the brain has to actually respond to that external reality but the internal reality is also going on you may suddenly see a lion and remember a story from childhood, so what does the brain do the conscious brain has to suppress the need of this internal push, if the external and the internal are the same. If external imaginary and internal imaginary has the same wonderful. But if internal imaginary is going in some other direction and external is going in some other direction the emotional center will have to decide the threat value of this.

If there is no threat you are free you can your mind can think about everything, but if there is a threat the brain will always respond to this external thing for as I said survival in that case the conscious brain will suppress this internal imaginary. So this whole dynamics of external,


internal is going on all the time even when, while you are sleeping you are doing this, do not you see dreams so that is what I am saying that the brain all the time is taking from vision, hearing, touch then there is a central executive which is the conscious event.

Then there is, on the back ground of this stored memory and knowledge and skill which is all compared with this and then there is a top down voluntary action, action planning, response output, which is the behavior? So it goes in gets processed compared with the internal stored memory liaised with emotion accessed on hierarchical value thrown to the conscious brain, the conscious brain evaluates it gives it a meaning through the meaning it decide whether it wants to act on it or it just wants to ignore the whole thing.

And move on or give a feedback loop and suppress it the conscious brain also suppresses the internal push to express depending on the emotional state, if it is a happy time you can still have your internal poetry and you can meet somebody, you can say that your face look like a flower and there is a piece time, the brain has evaluated there is no problem, you can say all this but you cannot say, sit with a lion and say, oh king of jungle let us talk. Brain will know boss you have to run, so that is what brain is doing it is creating stories.

So if you look at it whether it is happening in animals also, they are also aware, they are also perceiving the thing, whether they are giving the meaning or weaving the story that we do not know because that is something which is, we have not been able to check. So actually the brain is aware of.

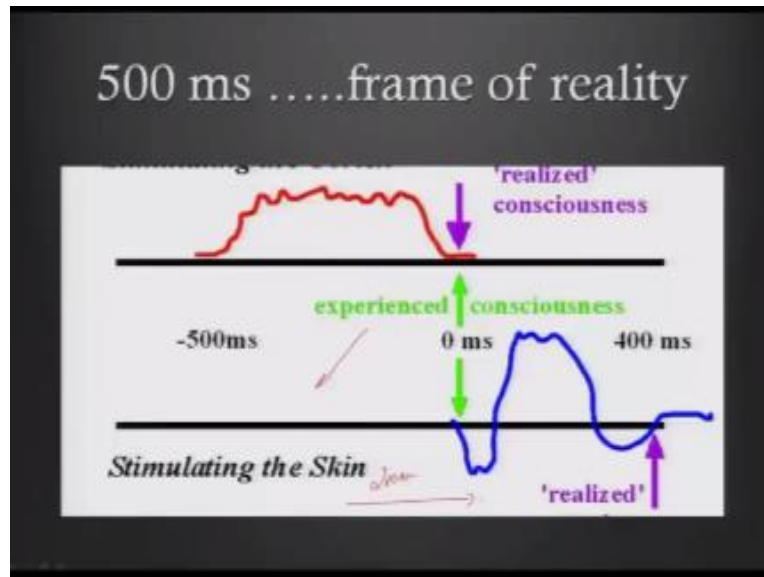
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⊗ brain is aware of a small fraction of what these faculties are doing. These contents change continually, depending upon demands of the current environment.

A small fraction of what these faculties are doing. Your brain is continuously active, while you are sleeping your brain is still making stories in the dream, dreams are just information processing, whatever has gone into head, what you have not been able to logically bring to a conclusive end, your brain keeps making stories out of that but all these changes are happening continually, responding to the demands made by the current environment. So what is the truth? The truth is that if something goes into your head.

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You will not become, this is famous experiment of Libet, where he said that even when you decide, and your decision has been taken in the unconscious mind at least 200ms before even you decide, so if I decide to move this hand 200ms before the brain would have already decided, but whatever is under going through the unconscious mind, all these reformation of image and emotional layering, comparing it with the memory, presenting the composite image. You become conscious only after, this is 400ms.

Let us say somewhere between 300ms to 500ms roughly, so the reality what you see is being presented to the conscious brain in frames of 500ms at max. Less than that, suppose you touch fire and even before you think you have removed that is reflex action. So the brain has in evolution very intelligently kept away few things under its control, it does not ask you whether you have to remove your hand from fire or not, it will first remove it.

It will first remove the whole thing, because that is for survival, then you can get into the 500ms, so what you are having, if you actually look at it, you are having snap shorts 500ms. Imagine if you are just living in this 500ms snap shot, what would life be? There is no meaning. So brain weaves a meaning and the story out of it, which it sends the feed back to the brain, to the deepest

structure through behavior through thought and probably modifies it, probably modifies the whole thing. But this is the reality in which you are living in short time and today in an hour, in a day and all, so it weaves a story fine.

What happens? You have so many stories, like I am doctor and I am teaching you, I am sharing this course with you, I will go in evening and meet my friends, so that story will be different from this story, my work as a doctor will defer in a different way. Somebody who is recording me here, has a different frame of reality, once he finishes his work, he will have so many stories, and so where is the link then? The link is in then, the link is in the self, because then there is not one story, there are two stories.

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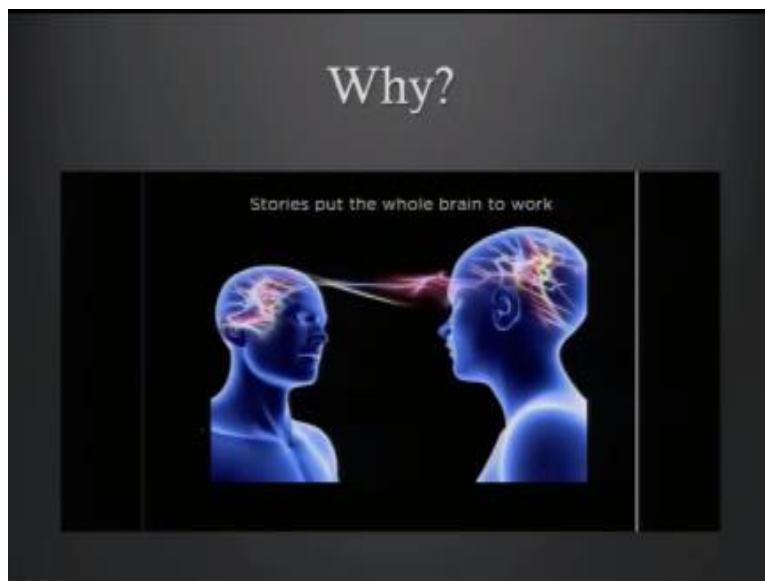


One story is the immediate story of survival in the situation, taking in whatever goes and actually adapting to the environment but this I guess is on the background of, so this is we have come from nearest cousin chimpanzee this is me. We both are same, we both are aware of our environment. What is there, there is some difference between he and me, he may better adjusted I am not saying that I am better adjusted. I may have my own share of anxiety, but the person will better adjusted may be my cousin chimpanzee.

We will look at it, he is also aware, what differentiate me from him? May be when I am saying I am representing the whole humanity; we have self-preferentiality we have unity in whatever roles we are playing.so even if I move into 10 situations within next two days, I will be still myself, that is the self, self reflective I may be thinking what I have done, I have spoken, that is what I am saying, even when I am talking to you, there is self in me. Remember this self, this consciousness self which is looking at me while I am talking to you and intent I think I have a control over my will.

I may decide to say this or not, even if it is coming from my unconsciousness brain and I do not have free will, we may not have a free will, but still I have to have that will. That will differentiate homosapians from others. So the brain is weaving two stories.

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One is the story of which self goes on in the background, right from my birth till my death it will keep weaving that self, and this self has been form on the initial one or two decades of my life, and myself does not contain only me, it contains my parents, my friends, my experiences, my religion, my mythology everything is gone into, may weaving a and then my thought process and

then my cognition knowledge I have gained, I have modified lot of things. The whole thing is like a one self, this one self has another short stories coming every now and then in the anecdotes in the interactions, the way I move in the world.

So actually, so there is a world in which the self is going and over the self, so these three stories are end pointed into one and that is the meaning of life. So, the consciousness brain with the poor consciousness brain may actually not be doing anything else but trying to give meaning to what you are doing. Now this whole meaning of self is not emerged in isolation, as I said a lot of inputs from the society and everything has really gone into it and brain over evolution has probably caught on to this process, because that is the best suited process.

We have to survive with people, man is the social being actually it may not sociological or politically statement, it may actually be a biological statement if you ask me, you have to move in this world, give meaning to it, you do not want sporadic things hinting to your brain, you want to relate to other people. So this meaning gives you exercise to it, whether the meaning itself can over time alter your unconsciousness, the process of it, is what we will look at towards the end of the series and when we talk of transformation.

So because without taking that it cannot happen that is the problem why, if you go to the basic question of why don't people seem to improve, may be this whole process itself have never been examined, we will try to examine this in next lecture in a fresh angle. So I will see you in the next lecture continue on the process of story making and see how it plays ourselves thank you.

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