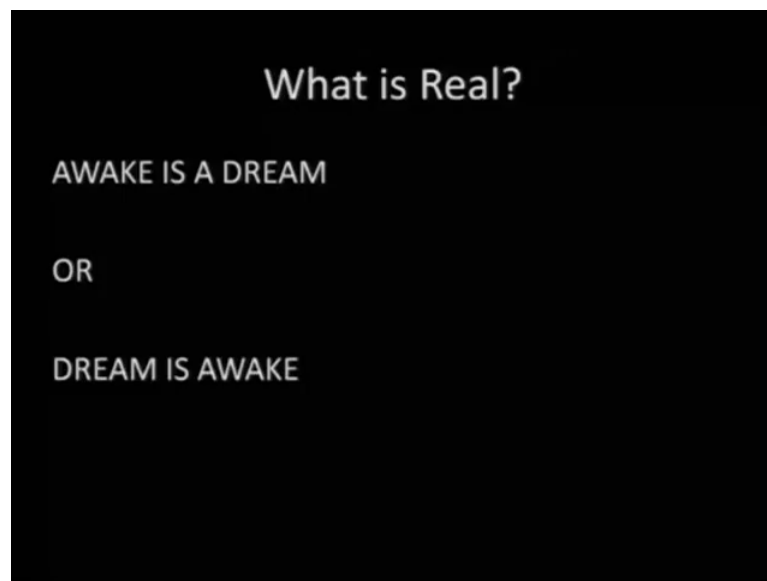


**How The Brain Creates Mind**  
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**Lecture -16**  
**Sleep-1**

Welcome to the last week of this course. You remember first thing itself I asked whether we are different from ape, and what differentiate us from primate, other animals. They are also aware, and they are also experiencing nature in their own way. They have feeling, primate they have emotions. So, what is that the human beings are so proud of? Is it conation?

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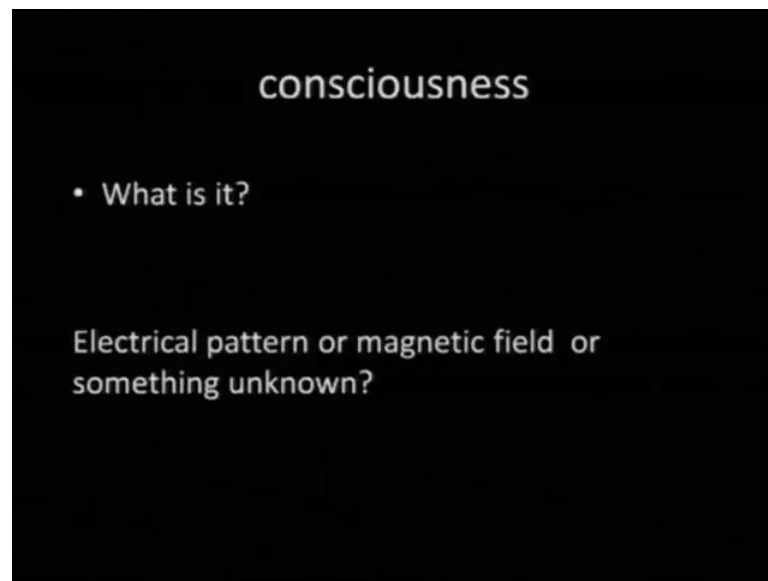
Conation is about intentionality and will. Is it cognition? The ability to think, to handle symbols, to handle metaphor which is called abstract thing; is it the ability of human beings to be able to make judgments, or is it will? Lot of debate in philosophy and neuroscience about, there is the whole group people of who think there is nothing, is not a will, there is no will. Some people there is a will, but if there is a will it is a free will, to its neuroscience will say its not a free will, because after all the brain processes which are creating everything so they will create will also

Is it the quality of human beings, to be aware about being aware? Animals may aware, but are they aware that they are aware. Now, when I am speaking, there is something in me which is looking at what I am speaking. If you observe it closely you will always find it. Maybe Gandhi called in a sense of inner voice, but is the inner voice that anterior cingulate gyrus which is always tell you about reward and punishment, what is right and wrong. But where does it right and wrong come from, is it a natural right law right and wrong, or is it a conditioning or the society which has developed right and wrong over years, and it has taught you, and your mind, your cingulate gyrus itself thinks right and wrong, because it has been told so, maybe I been learning again.

There is a part of Indian philosophy which believes, we are living in the dream of God, Bhrams Swapna, Bhramas Dream, and we are living. So, look at it, and if you really if you follow quantum physics, there is whole multiple verse theory going on right now they (Refer Time: 03:11) this is wonderful theory, and it says if you look at the quantum that electron is a particle, but it also give wave interference, it is also a wave, and it will exist into multiple probability states till it is observed, when it is observed there will be a decorance, and it will assume one state. So, probability of finding a with (Refer Time: 03:47) equations, the probability of finding electron and sort of a cloud, which is the probability density, viz David Bomb Theory, that if you know the way function, you can project the position of the electron.

So, ever say that if there is multiple possibilities and electron assume on probability state, where do the rest of the probability go? They are existing in multiple universes. So, in one the typical experiment of electron going through two slates, if electron pass through one slit, multiple, in some other universe it will be passing to some other slate, you have multiple copies of yourself existing somewhere, whether it is happening in microscopic or a or a mesoscopic scale, or a microscopic if you put one theory. Do you believe in multiple versus theory? We still do not know, in that case are we leaving in a dream, we dream of somebody else, some other species which really gone and advance much more than where we are. In your own life in every day you go into your dream state in your sleep, and you are a different world all together. Is that real, or this real? This are the big questions of the most complex topic called consciousness.

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Is there a consciousness in first place, are we conscious, conscious of what, is consciousness is a unitary, think, or even when I talk about myself I, is this I a unitary self, is this with this. I will have lot of I, there will be I, which will be working as a husband, I as a student, I as doctor, I as a driver, which I is this or this is only one I which as multiple expressions I will be different with my friends, I may be different with my family, or when I am teaching I may behave differently, which I you are talking about is this multiple I's part of what multiple versus and all over multi universe are actually here. If we have a consciousness, and that separates us why I am talking about consciousness, it may sound as a philosophical topic, but that is the real big challenge and when we will talk towards the end about what where does the brain research stand.

This is the important question, which lot of people have talk about, because when we look at the, like Francis Kirk and Christopher Cock with that they brought, talk about consciousness is nural correlates. In last seven and half hours we are talking about neural correlates, we are not talking about consciousness, networks, and areas, and chemicals these are the neural correlates, but do they really define consciousness; that is what we have to discover, because that will determine the which way your mind start thinking.

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the power of the brain would not be to generate consciousness *ex nihilo*, but only to bind, focus, accumulate, and bring to self-reflection the all-pervasively *given* experience within a coherent situated knowledge. *These* latter functions are in principle accessible to science ; they are part of the so-called “easy problems”. In particular, one may adduce very interesting evolutionary arguments in order to explain the emergence of crucial features of our human consciousness, such as *self-reflection*

**Bitbol, M.; Luisi, P. L. Science and the self-referentiality of consciousness. Journal of Cosmology 2011, 14, 438-454.**

So we know what is electrical pattern, we know about the concogent magnetic field. Is it electrical pattern, or a magnetic field, or is it something else. There is a very interesting articles, the difference is given, just go through it. the power of the brain would not be generate consciousness *ex nihilo*, not out of anything else, because they lot of spiritual tradition Buddhist tradition, which believe that brain may be brain, this brings title of all thing what I was trying to indicate, how does the brain create mind, or does the brain create mind, or mind is different, because if mind is there consciousness is there. What type of mind you are talking about; conscious mind, unconscious mind. Buddhist believe there is consciousness which is all pervading, it is separate from the mind, and it is actually alter the brain functioning.

So, mind is primary, brain is secondary, or they might exist simultaneously. Neuro science tens to believes that the brain which is creating mind and there is nothing beyond brain, if that creates mind that creates consciousness the power of the brain would not to be generate consciousness *ex nihilo*, but only to bind focus, accumulate and bring to self-reflection. The self-reflection is very important. So, the self I talked about the binding oscillation. what in your brain gives you the sense of unitary self, because I may have hundreds of parts of me, but when I stand here, I stand as one Doctor Alok Bajpai, and I not only stand, but I represent myself with this unitary self.

Not only represent I feel unitary self in myself, that all the component which go in make me. the part of this component are general I share with animals, I share with all other humans, but there is something unique in me, the part of me is you and; obviously, as I said that all your neuron had networks has grown in context and in relationship with external thing. So, what I say me is not only me, it is you also. Not exactly you may I may not have interacted with you, but other human beings.

So, all other human beings have affected the growth of my brain, and that is why it is so difficult to detach myself, because when I detach from whom and I detach from what, but even if I detach and I say and it is finally, me my me carries lot of other people also; my parents, my religion, my people who have affected the way my neurons have really formed the network. So, it brings to self-reflection, the given experience, within coherent situation knowledge. So, you have a knowledge template, experience come that all integrated to that.

These functions are in principle accessible to science. They are part of the easy problem that is the physicality I have been talking about. Experience comes you already have existing memory banks, and ways are going on this experience comes, it compare with previous memory. It is all integrated and given you, but self reflection is something which probably only human beings do, thinking about it. Animals more or less respond with connection with the nature and the nature stimuli.

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Consciousness as a 'light' (Thomson)	
Access consciousness	Experience consciousness
<ul style="list-style-type: none"><li>• Sensory/reflexive</li></ul>	<ul style="list-style-type: none"><li>• Experiential</li></ul>
<ul style="list-style-type: none"><li>• Soft</li></ul>	<ul style="list-style-type: none"><li>• Hard problems</li></ul>
<ul style="list-style-type: none"><li>• Emergent</li></ul>	<ul style="list-style-type: none"><li>• primary</li></ul>
<ul style="list-style-type: none"><li>• NCC</li></ul>	<ul style="list-style-type: none"><li>• Self</li></ul>

So, consciousness I will just compare it, there is access consciousness, and there is a experience consciousness. Thomson (Refer Time: 11:04) is the light. So, what is the access consciousness, this are the sensory reflexive thing, the motor thing, something come you are track you are aware of it, but what did you feel about this retraceing, is the experience consciousness, which is yourself. The soft problem is this, which is more or less we are circuiting through it, that is the whole interface of artificial intelligence and brain compute interfaces. hard problem is Coliya what David Chamar said, Coliya, Coliya is when we see red color, me and you are seeing red color, are we seeing the same thing. Physically we are saying the same thing, but red mean to you, maybe different what mean to me. When we say we are happy, is happiness in your head the same the happiness in my head. It is no way describing in words.

So, general term happy, but you really go into it and see what happy is, then you may really find it bit difficult. So, hard problem we still not cracked and what we are moving on in the periphery of it, the physicality of it. Neuro science says it emergent properties of brain. We know the theoretical background of brain, although we may not be able to give one comprehensive theory. We do not have the comprehensive theory how the of brain functions, but even in the titbits and blocks which we know, we are able to view something which is called emergent properties, viz believe especially in the spiritual

philosophical domain, that consciousness is primary. it is separate from the emergent properties, and that is the debate Einstein has to have with lot of people. Einstein was one person who always believes in objectivity, coming from traditional school, although he threw away Newtonian world, but he still from that world.

So, he said even if I and you do not exist, moon will still exist. he had a huge debate of about it with Tagore, you should read you can find on Tagore and Einstein dialogue, about observable, he said that even, but Tagore said he there is no mind, than there is no moon and he said it is not mind of only one person, they have the universal mind, everybody mind shuts off, whether moon is there or not there does not make a difference, but that was more (Refer Time: 13:52) philosophy. So, neural correlates of consciousness viz a viz self. Is this self-primary, is this consciousness primary, or it is neural correlates. we know that the brain damage to certain area this identity of self goes off, specially in the parietal lobe, on the right parietal deeper parietal, it formulates yourself; that is the place where all and where is integrated.

So, your sense goes off, or if you get the damage to cortex or. So, what happen to consciousness, you not aware of things, you still keep on doing things. or you play something reticulated integrate system, people get injury and they go into comma, are you there when you are in comma. There are situation in psychiatry were we know the person is conscious, but he is not responding, in some catatonic (Refer Time: 14:49) which is called locked in syndrome, you do not know whether person is conscious or not. So, this are the debates; that is why I pointed out in the last weeks, last lecture, is that in spite of knowing all this things this are the question we still do not have answer. You can take a stance and fight for it and try to prove it, but at the end of it other people can also proves.

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So, and complicated further, multiple universe bring in. if multiple universe are there and multiple possibilities, they say is, are we living in a giant brain. if you look into this concept of pilot wave in quantum physics, which bomb brought in pilot waves are the base line waves which are over a which quantum probability is right, it is a simplest thing which is not so simple, and they bring something called, you must heard of E P R experiment Einstein Podolsky Rosen, which wheeler proved on much later, something called quantum entanglement, which Einstein called it poky distance.

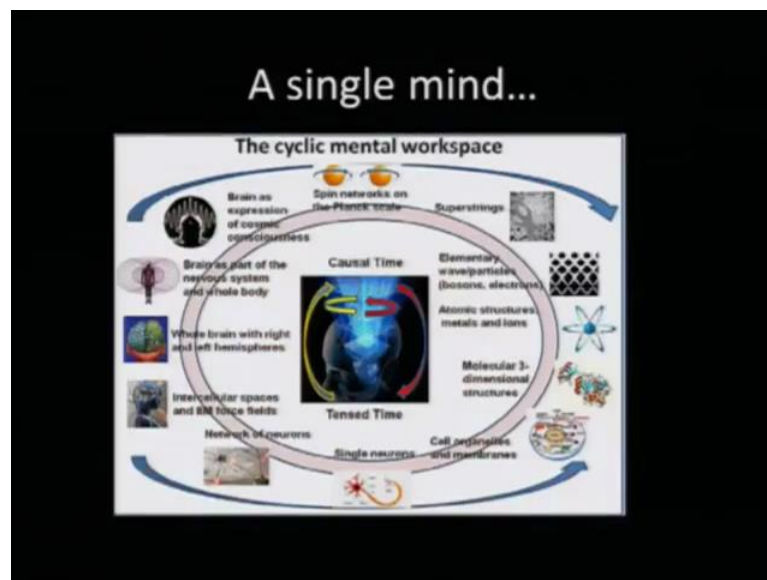
This poky extended distance, over he was not very happy with this unpredictability. So, he said he still has believe there is correlation, but you take out two subatomic particles, filled with one there will be change in other also, because they are sharing the spine and Einstein said how it is possible, because nothing can travel faster than the speed of light, but this communication between two particles, is faster than light.

So, one can exist here and one some other part of the universe, but still, both will the correlated, and they communicate faster than light. So, if it is possible some atomic particle, is it happen that the one brain. So, we still do not know the communication with the one brain and the other brain, even with the minor neuron we may boil it down in the reductionest approach, to facial expression in the light reflecting from face to other, but



there are lot of phenomena which we do not know, telepathy we do not know, or sometime clairvoyance we do not know. Now we may brush of all this. So, sometime in over arrogance of our reductionism, and under or need and pressure to, but everything on equation on physical theory, we brush of all this, but over brushing off does not make much difference, because of the simple reason, because this things exists. This are abbreviations, this are like black (Refer Time: 17:45) says which may bring new theory, because this may be the points where something new physic may actually emerge, we have to still see.

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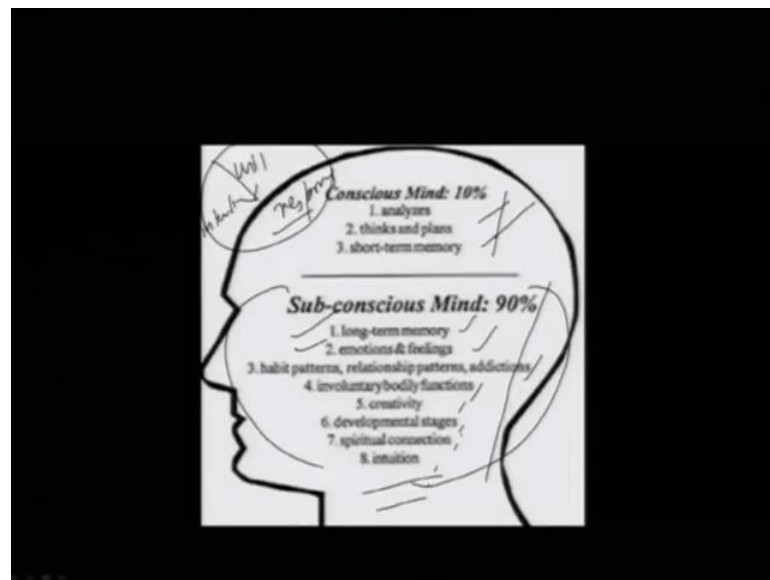


So, this is what is there a single cyclic mental works pace, everything is connected. lot of philosophers and lot of mystics actually, believes that its all, at the end of its all one, whether it is god or laws or we do not know, but still one see, supertic theory you are talking about understanding space, boson, electron at the molecular three dimensional structure, cell organals, single neurons, network of neurons is a lot of neuron and technology, electron magnetic forces and intra server spaces in the brain, which again correspond to spine networks, whole brain. Brain is part of nervous system expression of cosmic consciousness. So, there is causal time, there is the tense time, tense time in past tense, present tense. So, time as an arrow and that is the fact we are existing, our whole existence in time and spaces.

Our brain pressit time as passing, past, present, future; time if you study as a also as a arrow something like. So, when we study time, we study like this the cone of light, is not it. So, light coming this is present, this is past, and this is future. brain always perceive it, is it possible that there is no time, and the time is the conditioning which our mind has gone into it, but all our measurement are in time, whether it is E G or synaptic transmission or whatever. So, we live in time, but whether time is existing all at the same time in the simultaneous operation.

So, that brings us to, what is conscious, if there is a conscious thing, fraud, doctor fraud would have been very happy because all his life he said this unconscious mind which were you repress things and he did not know neurobiology at that time, there was not much investigation facility also, but he had a great leave of thought, and he said all your conscious mind is the product of your unconscious mind. We are almost taking in fraudel language.

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And these are fact, conscious mind analyses, thinks, plans, short term memory. Unconscious mind has a long term memory, otherwise emotions, feelings, habit, and voluntary creativity developmental spiritual connection intuition. this is the possibility, but it a huge possibility, if you examine yourself your own life, you will find some truth,

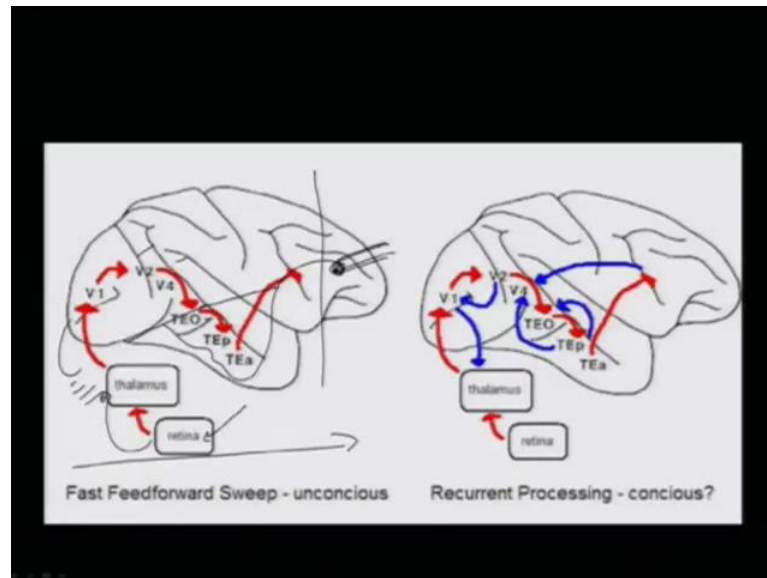
what you are aware right now is what you are putting attention to it, your will to it, but why is that will doing it, the cause may lie in the unconscious mind, because sometime you suddenly come with something creativity, where does creativity come from. Is it the deeper hidden network operations which are going on in the brain, which every moment creating in a sort of non-linear chaotic dynamics, new dimension? That dimension as it crosses the surface it comes into your awareness, and you suddenly realize that, oh this is creativity. Where does the sudden emotion come from? You do not have a plan of getting angry and suddenly getting angry, where it is coming from.

You suddenly doing something, and suddenly remember the childhood friend, where it is coming from you. So, conscious brain has a will intention response, but how much of it we must really do. If you really monitor every act in the day, will you be able to really say that I did everything with plan, you have a planning, but what would you really do, depends on long term memory, your emotions, we saw emotions where are they are coming from emotions; why has the brain done this? So, there is a myth when people say that you are not using your brain, we hardly use 5 percent of brain. If we use 100 percent what will happen, you are not supposed to use 100 percent of your brain, because 90 percent of the operation of the brain, are in the realm of sub conscious mind, and that is used to run your body, and your life and survival. Imagine if everything is under your conscious control, and somebody throwing a stone at you, and you will think, by the time you think you already hit, brain automatically sees vision you duck, in reflex, in reflex.

If all the data tend to the power eighteen operation which are going on in your head all the data which is going in, and see how much data is going in, eye, hearing, touch, I am feeling cold, the touch of this, the signal which are coming from my feet, my body, my back, everything comes to your conscious mind. I do not think any computer in this world can handle that. The amount of data follows in every second of your life, forget minute and hours. No computer can handle it. So, you will crash, your brain will shut off, and your brain is not there to shutoff; that is why smartly what is done, the things which you do not require to decide which are basic for your survival, had been kept under wraps, under unconscious mind, and it keeps doing.

So, why do we have to bother that fine I got this, should I keep it in memory or should I not keep it in memory, brain will decide. So, large part of mind is subconscious, or unconscious whatever you want to call it. How does it work? This are type of, this are just example.

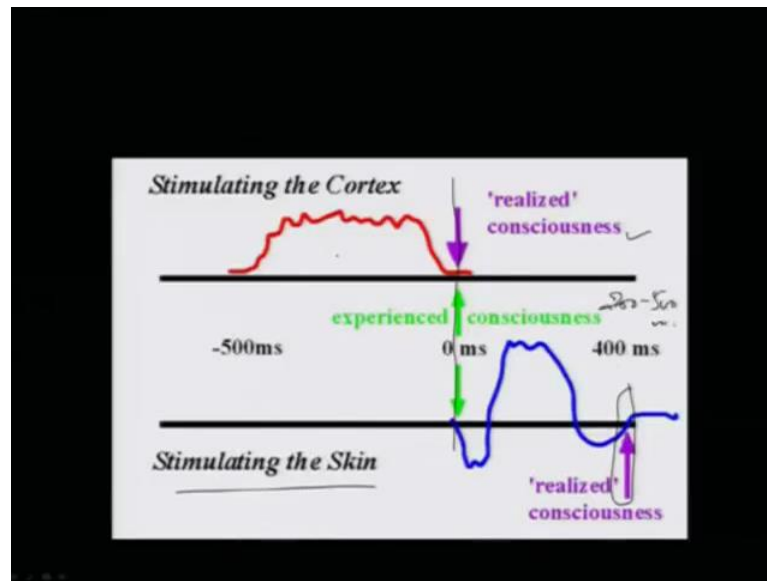
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Something come under retina, here ,vision, goes to thalamus, topographic representation goes to this v one v two three four future extraction on movement with is that, goes to the temporal lobe what and where, and finally, presented to conscious brain. This is a feed forward loop. This is unconscious. By the time it reaches here, you become conscious only when it reaches here. you really do not know how this getting process, unless you really want to become, I am, try thinking it, try closing your eyes and think everything which is going on your head, oh man your mind will get baffled, how electromagnetic thing proton go changes the electron goes to draws and cons.

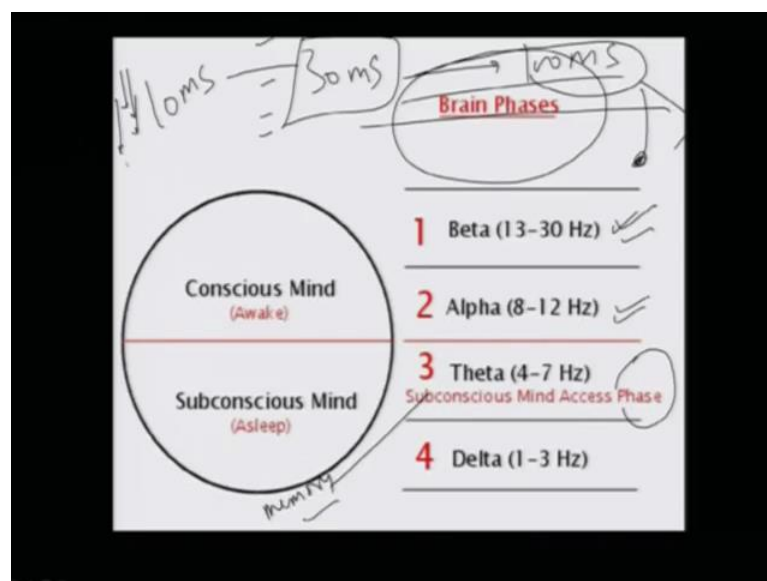
So, many neurons firing, going to lateral geniculate, forming the topographic presentation, you mind be blow off, but once it happen there, then they can be a feedback loop, this can be a conscious thing, that you give a signal to maybe you thing about what I am looking at. So, there is possible recurrent processing.

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So, this is the type of stuff which happens, and brain has really evolved smartly. This is the stimulating the skin, this is a zero millisecond, this is a realized consciousness. Now you cannot realize conscious, before this is 400 millisecond, but the whole things say - 200 to 500 milliseconds.

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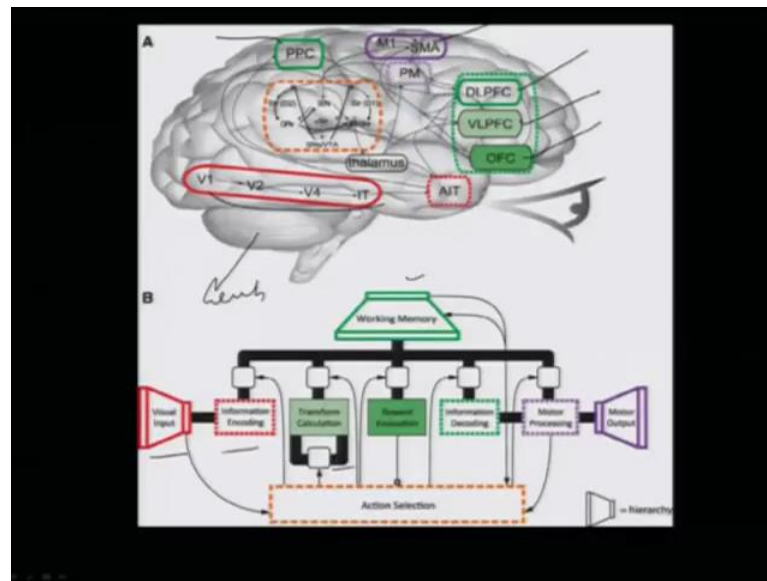


Now, listen to this, 10 milliseconds if something towards you. If say two stimulus are coming within 10 milliseconds to you, you cannot differentiate between the stimulus, so anything beyond 10 milliseconds, 30 milliseconds. this is the threshold of 30 milliseconds, when you start differentiating between the stimuli coming to you, and between 30 milliseconds to 100 milliseconds, reflex action happens; that means, if a lion is coming, that hardly any changes or lion coming to you, but suppose go to your childhood fantasy, and see if the lion is coming, within 10 milliseconds if too much of it comes, you will not be able to make out its a lion. It is only after 30 milliseconds you will see that differentiate your mind will differentiate this feature of lion. So, mind does not have to, if it have to ask you in 200 millisecond, whether I should run or not, you are run. What mind does immediately process the whole thing, and within 100 milliseconds you start running.

Once you start running, by that time one to 100 milliseconds start, by that time it reaches your conscious brain. So, nothing becomes conscious, unless those 200 to 500 milliseconds have passed; that is very interesting now, and you will only see, what the unconscious mind have already processed. So, you do not know lot, maybe what you are seeing what is the actuality, and what your mind is seeing may be two different things. So, somebody as they ask me is there any reality. The reality is just 500 milliseconds frame of reality which is coming to your mind, but the unconscious mind is throwing at you, that is reality, that is if that is conscious.

So, all your conscious is 500 milliseconds, and they did then frame by frame your mind makes a reality and story or whatever you mind keeps making. Remember about the oscillations, oscillations also respond. These are aware resting awake state alpha, action mental operation beta, subconscious mind access phase what is this. I told you theta is memory. So, even when you are trying to remember, you actually do not know how you trying to remember, theta and delta is of course, sleep and all.

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This is just a, to the type of stuff, it also lateral prefrontal cortex. Prefrontal cortex you have heard from my mouth many times, ulf supplementary motor area, Prostal paratel area. This is the occipital, this is cerebral fine tuning, cerebral keeps receiving it own firing where it has to find tune. So, this is the visual input, the information is encoded transform calculation. We will end at this, and maybe will carry forward to next lecture and began from this.

Thank you.