

Indian Institute of Technology Kanpur

National Programme on Technology Enhanced Learning (NPTEL)

Course Title

Cognition, Transformation & Lives

Lecture-12

Change and its Context

by

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So let us pick up from the same slide where we were looking at interactions and let me give an example if you talk of people they will always say lot of corruption and how does the corruption buildup? Maybe you have gone to office and we want to your work done, just for some reason not happening and may be you heard that by giving some extra money to the person things we will get done. Now what you do we haven't done it any time before but your mind your dopamine is pushing because you want to get your work done getting that work done will be your that immediate gratification or pleasure or whatever.

And then what you is not is getting abstracted mind is always in a hurry. It cannot delayed gratification it has to jump and get everything done very fast and then you get an idea of giving some bribe. So, your mind pushes you may gather correct to give to brain if that person takes a brave and finishes your work immediately you learn a new way of doing it and your behavior get change society. We will call it as corruption but most people get their work done and do not see anything wrong because most people are doing it.

Again that issue of normal and abnormal comes in, if most people are doing it by one definition that is normal. So, most people are giving bribe and most people are taking its normal, so but the societal larger rule is that this is corruption but you have already reshaped your behavior voluntarily or involuntarily, voluntarily obviously nobody is forcing you to do that. But this behavior and the feedback is reward but, suppose you have given a bribe in the officer just throws you out he said I am not a person who will take a bribe.

And that would be a punishment. your work may still get done, but with certain amount of insult being delivered to you, in that case you are not going to do it and this whole idea of the new cognitive frame work which was giving you immediate gratification of getting your job done delinks, so next time if you have to do it you will as you remember that insult and you will not do it. This is the normal thing and then your mind will tell you whatever people are doing I am not going to take my take insult.

This is the seed of change but may be you are not able to apply your cognitive frame work and your whole part process to this bigger idea and then, you say fine, fine it is alright once insulted never mind. So, at that time your cognition rules appear your emotion and your basic instinct, the basic instinct is that if you fail do not try it again and you know your mind will tell you, but in other circumstances like if you have to give an exam and clear and in competition once you prepare which is your cognitive thing which is pushing in, your emotion is also included you want to get selected as an civil services officer.

You give an exam after one year of preparation and you won't succeed, so this will be entirely different of that corrupt practice. people will tell you do not give bribe even once you got insulted do not do it although lot of people will be doing it, but here people will tell you that even if you fail you should try it again because that is the right way of doing it. So, that brings in other concept with if you remember we were talking about the normal see and abnormal see of context.

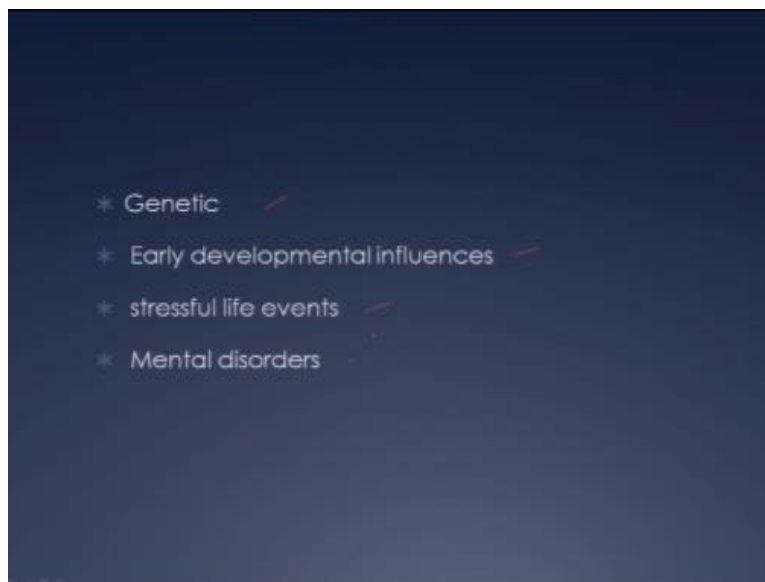
The same repetitiveness but I that these are all upper layers of behavioral manifestation the base line is still remains the same and the base line is that your behavior was a result of your thought and emotion which is coming from the brain, your experiences, your circumstances, your value system which are again at a higher level of cognitive processes. you have acted on an environment, environment has responded in different context depending on the context and the brain process again is shaped by this.

Once, you failed and then you try for giving a bribe again is like going against that small inner voice in Gandhi's words I am slowly introducing Gandhi to you, your mind is saying that do not

do this but the pressing urgency of getting your job done pushes you to do the same act again, on the contrary you may really not want to go and do and prepare again for your IAS exams because you think that once is enough I will change the course of my carrier, so the context varies.

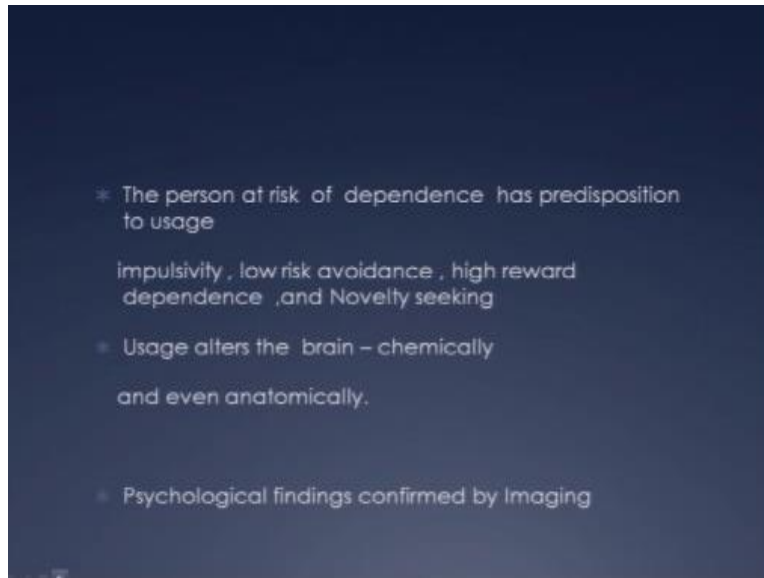
The impression of context in your mind varies, template is the same but these are the new ways of snap shots of stories. So, this is how it is happening now you can relate this thing to whatever we have talked in the previous lectures so as we have talked about.

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Is genetic we have a temporary mind early developmental influences, stressful life events, mental disorders.

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If you apply all this to this whole issue of vices and dependence addiction. A few facts which are very clear which are the biological and physiological facts, and this is what I said that whole drama of socio culture impression of addiction and the moral responsibility of transformation posed on the person is the way the biological pressure the person at risk of dependence as predisposition to usage, these already a tendency within a person probably its genetic like lot of other things have come of genes from millions of years.

You all have shared genes this risk of addiction has already a predisposition to usage certain personality factors have been associated with the risk of addiction which are largely I am telling you, impulsivity and impulsivity means this tendency to get things are immediately. The gratification the sense of fulfillment cannot be postponed it has to be then and there. Low risk avoidance when you are going for addiction you already Trans gracing the normal boundaries and normally people would avoid the race.

But these people have the brain processing and the brain firing does not tell them much about avoiding risk probably it is a function of the prefrontal cortex and the frontal lobes which evolved at around 1920 but by that time probably the addictive behavior is already set in, the addictive behavior may be its starts early and the brain matures lately and it, so the whole brain maturity of so the person is doing certain thing and the society is telling but the brain part of the

brain which is already not develop to control it also developed in conjunction, so it will never tell them that this is wrong. Because has somebody, say, somebody starts something a 25 and already has been brought up in the proper manner of knowing right or wrong.

And whatever I am not saying it is absolute right and wrong but that all society has told him and then at that point he may still have more guilt and shame, but if he is doing certain thing from 16 when the brain the part of the brain which stops is already not fully developed so when he grows up to 20 his mind has not learn what is right from right from a wrong, and that is the probably the education system and the training and religion and everything says that you start teaching kids and that is the.

That is what you can now relate that why are kids told so many things? kids are told so many things and they not left to their own to decide what from what is wrong because that is coming from ages because society and the parents think that what we know that our structure is the right structure and that is how we should bring up kid to keep a structure in the society. Society nobody running the society and so that is running itself, by this rules like universe is running through rules.

This is also rule that you study, you learn good thing, good manners, pray respect elder do or whatever have your opinion, work, develop a skill, marry, produce children so that once you produce children we have sense of responsibility and fall into the, that rail and so society remains but some of biology is but biology is not listening, genes are not listening to this rules, they are doing their experiment they are pushing for sexuality.

They are pushing for this real addiction in the head and it is important because genes have to propagate species, so if they kill sexuality how will people reproduce so genes are not listening to your rules they will keep pushing and keep trying sexuality in each brain all the time and that is how works whether do you like it or you don't like it with your cognition and with your training all the package of your conditioning.

You can balance that expression of that thing be side with this, some people cannot, and they are genetically so genies do their experiment. They will allow most people to falling in line with moderate amount of impulsivity in some of them they just try a experiment probably look at your this way.

All this people who are out of a frame their experiments good or bad is another matter so somebody who is takes three pegs of whisky and dances widely may be an embracement to the family but he may be the star in a club. So, again context so impulsivity low risk avoidance is because of brain a structure high reward of dependence that is the immediate click that they get it.

All of us are looking for some other kick so these people look for kick of different sort and novelty seeking their mind is never at rest they just can't go into say 9 to 5 job they may doing at 9 to 5 job because of financial compulsions but it this sense of a incompleteness, their sense of sensitivity, simmering, seek new things, keep doing something all of us actually have these things in different measures.

So no human mind and genetics is tell you no human mind has does not has what the other has. that some amount some measure will be there and that again go back to your when you talking of whether these are illness is a continuum if everybody has a same gene and same tit bits here and there everybody knows has filter repetitive thought process like an obsession. They know what obsessive compulsive disorder.

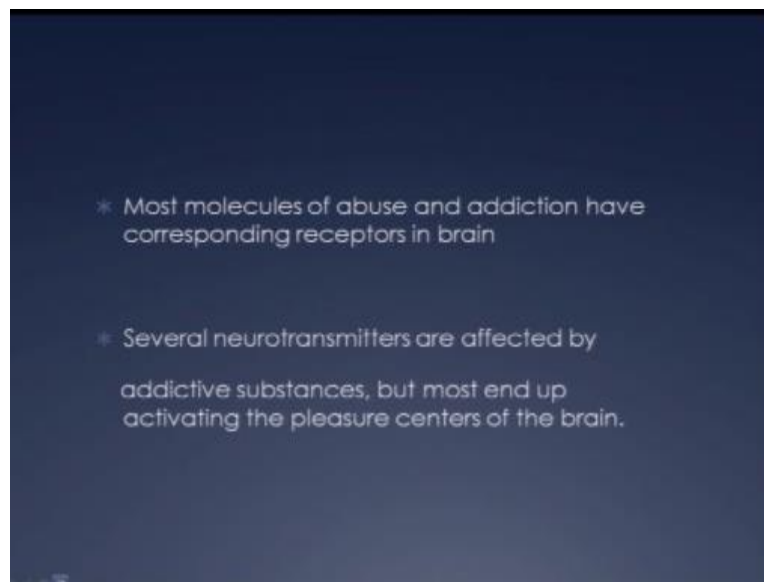
They may at zero the obsessive compulsion disorder person may be at 100 is just that we all know hypnagogic and hypnopompic hallucinations while you getting of from getting up from sleep or going to sleep sometime you feel that somebody is calling your voice your name there is nobody, they are very well known hallucinations but they are consider to psychological hallucinations.

But will the brain have ten path ways of different hallucinations unlikely nature works on economy actually so it has same common path way. What becomes an illness what is not is again

matter of context or may be crossing the threshold. So, usage we all know what is impulsivity, we all know what is risk avoidance, usage of certain substances alters the brain chemically even anatomically.

So now when you use certain substance or even if you go doing certain things beyond what is required, beyond its utility in space and time and keep going on and on and on it alters the brain anatomically also the memories which are form in brain are the network between neurons the synopsis as and they are in certain pattern with that pattern will correspond to one object or experience or face or something in the environment.

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But if you keep using the certain way of doing it the synopsis will alter. Say, psychological findings have been confirmed more or less by new techniques of imaging most molecules of abuse and addiction have corresponding receptors in brain now whether this receptors have developed because of the usage or they were originally there is a chicken and egg question.

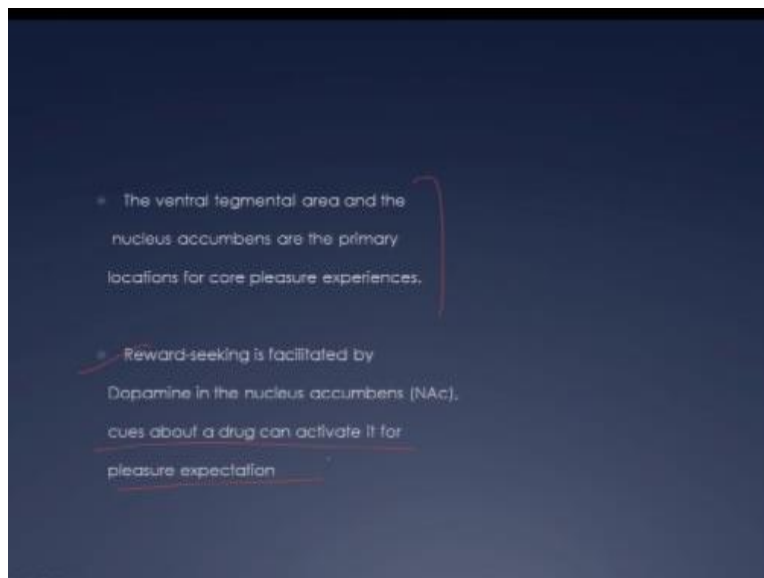
They are cannabis receptors some of these drugs have been culturally accepted like cannabis. cannabis sativa is a plants out of which lot of bang comes out of it, cheras Mari they come up

processed from different parts. Similarly, opium, heroin, brown sugar. Opium when you heard of opium war the opium has been culturally used in china, in parts of India. Cannabis is most common form is bhang and ganja in India which is you are those of few however the hard rules may be but we know the truth it's of level people may use it.

Not everybody but some people use it, some people just tried it once. similarly alcohol see, the amount of alcohol use is gone up in society in last 15, 20 years and so we don't alcohol doesn't have receptors C_2H_5OH does not have a receptors in the brain but alcohol interacts with the existing neuron transmitters to create some other chemicals and destabilizing the membrane.

And so cannabis has a receptor, opioid receptors we very well know actually in fact if dopamine pushes you to act and explore the endorphins which work on the opioid receptor if they go high they give you sense of bliss and that is why different chemicals go in the way create different effects, like LSD creates hallucinations and cannabis can creates hallucinations and perceptual disturbances in time, opioid gives a sense of bliss.

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But at the end of the day these neurotransmitters are affected by addictive substances but most end up activating the pleasure centers of the brain. You know this I showed you in the first the dopamine surge affect the areas which are the reward center so reward seeking is facilitated by dopamine in the nucleus accumbens (NAC), but even if there is a cues about the drug it can activate for expectation.

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But sometime who takes the certain drug and you know the drug is not there even the thought of it even the image of it can do an obsessive activity. So, these are the other brain areas you remember I showed you the brain structure this corpus callosum which connects to the orbitofrontal cortex outside of this brain.

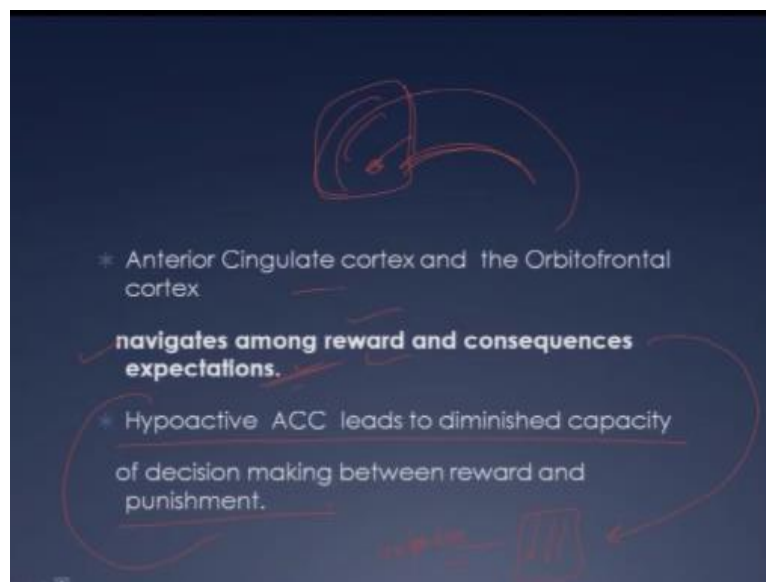
Then this type of areas these are thinking brain the conscious whether consciousness probably the meaningfulness of a stimulus or the image or the experience comes from the deep unconscious. It has to navigate among the reward and consequences expectations now this area like whatever saying the orbitofrontal cortex so, dorsolateral prefrontal cortex is this area.

Inside of it is the orbitofrontal cortex and anterior cingulate gyrus which is in between somewhere here so both the inside and outside they have to look at a emotional aspect of this

thing calculate while other part has to decide calculate among the reward and consequences of expectations and if they know at the consequences of it is but it will inhibit the impulse coming inhibit the impulse which is coming from the need for taking something.

And need for doing something is coming to the brain has we talked about those 500millisecond even before it coming conscious even before that 200 300 milliseconds were you were aware of your going to decide act on it the brain has this and all were decided within whether it is going to do it or not. If not, from past experience it will suppress the need when this area fails now this will answer your question.

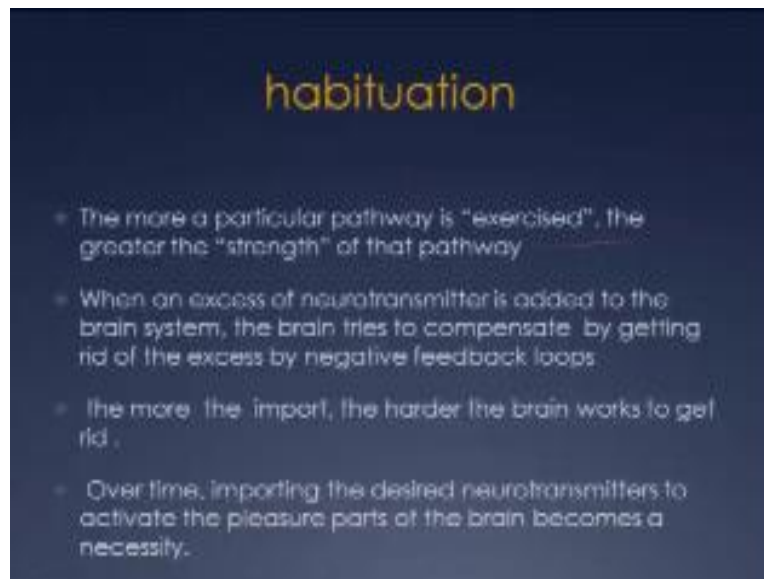
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We ask this question why people will do certain things which we know that they are damaging. Actually their whole suppression the inhibitory part of the brain is already working at a diminished capacity. So, the consequences of certain behavior if it is a punishment or reward that whole thing blurs up and they will act and then whole drama of consequences will take care. So, some that rewards of the centers have been reward by the gratification.

And pleasurable activity after a certain act or a drug or something it pushes you the dopamine pushes you again and again to do it when you do it if the consequences are your thinking brain will suppress it. when the thinking brain is actually working in a diminish capacity this whole blurring of the reward and punishment happens and people keep repeating the whole things and that brings the questions why cannot they decided why cannot they stop.

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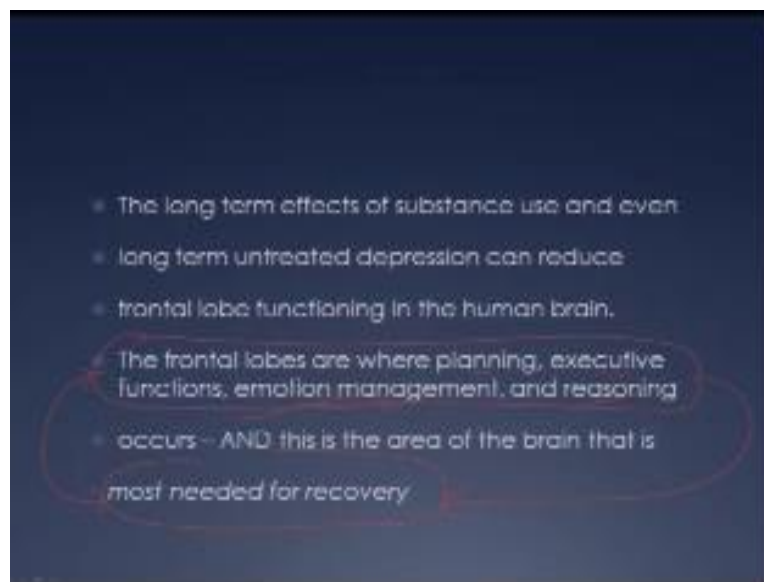
The more of a particular pathway exercise the greater is the strength of that pathway. Now you may think why am I talking about this habituation thing and this addiction thing because this when you pose it against whatever we have talked that frame of societal expectation your cognitive emotional frame work, the way your developmental thing gone, the way your brain processes and how the brain gives you reward and punishment and all that this is the final example of this.

We will move on to the real exercise part of it, so when an excess of neurotransmitter is added to the brain system. The brain tries to compensate by getting rid of the excess by negative feedback loops. The more the import, the harder the brain works to get rid, overtime importing the desired neurotransmitter to activate the pleasure part becomes a necessity. So if a certain quantum of

neuron transmitter is required to give you a certain pleasure, you after a period of time this excess on neuro transmitter.

The brain tries to get a rid of it in the process the activation of the pleasure part of the brain becomes a necessity. So, the brain gets in to activity in your habit of so, every time a chemical goes in it interacts with neurotransmitter it excites again it goes it excite. So brain almost get in to that habit of that neuro transmitters, so if you does not get it has to produce more and more and that is habituation. The long term effects of substance use and even long terms untreated depression

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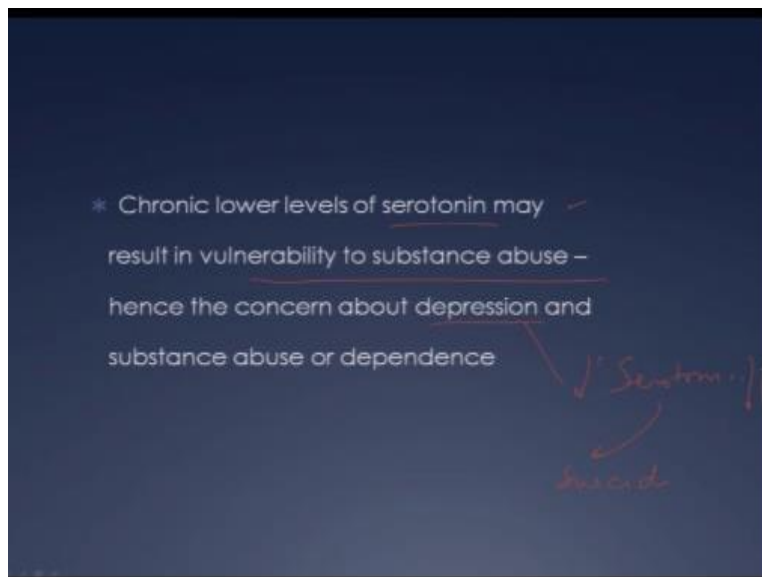


Can reduce frontal lobe functioning. so the when you look people who have taken drugs or alcohol for very long time and you absorb them close in the very few would be in the perfect cognitive capacity the judgment gets impair then start thinking in a very, very concrete way and the whole personally deteriorates. This is partly because the frontal lobes which we are talking about the orbitofrontal cortex and all, is already there capacity to decide to abstract to problem solve everything deteriorates. This is the area emotional management lot of these people who are

in to addictions become very very impulsive say when moody and all anything which they do in excess.

This is the interface between the socio cultural expectation from the person and the biology which thinks it is an illness. This is the area frontal lobes which is most required for recovery. With this is the area which can plan which can execute which can control emotions and reason out the difference between a reward and punishment, and unless you are reason out your really not going to alter it.

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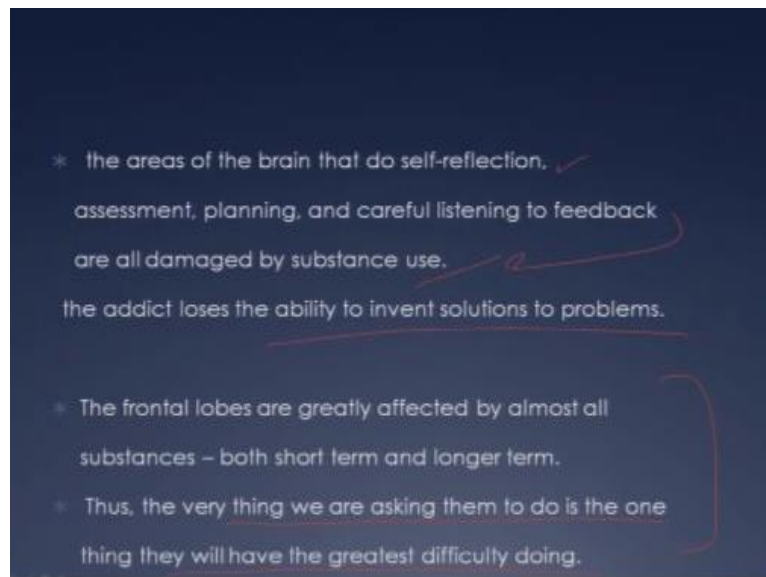
So for recovery of any change whether be it for addiction or without addiction frontal lobes are important, so chronic lower levels of serotonin. Serotonin is all the chemicals result in vulnerability or substance abuse, so depression also has low serotonin. These are very impulsive people who can even attempt in suicide, in suicide attempts Serotonin is very low in substance available serotonin is low.

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This is the chemical control this is the increasing evidence of brain recovery from certain kind of addiction, long term heavy alcohol use results in some permanent damage; this is perhaps the most harmful drug although people think obviously opioid and cannabis they are going just and acting on some receptors and when they are withdrawal when they are withdrawn. They after some withdrawal symptoms which is that brain receptors asking for more and more chemical with this it settles down with alcohol damages membrane permanently, it damages the nerve stability it alters the firing.

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But luckily all this can be corrected. obviously the first thing is we withdraw it so whatever we want to change in a life abuse drugs or anything which we will talk about transformation you have to really withdraw that import. This is possible drug abusers and addicts do not overtly seen crazy, it seems natural to expect them to wake up and quit. this is where society ask them to be will assert their will, assert will, lots of mother who bring their young ones who teenagers who are enter drugs and those have themselves please tell them to stop. I know unless he cannot puts his will he cannot, if he puts his will he can do it so will.

I asked your question where is me and where is the will so that will comes back but because they are not consider to be mentally ill even by the this standards of normal see and abnormal see but the diagnostic criteria may say they have illness so this is the confusion. We do not know whether to take a moral stand tell them that they are bad people or consider them is weak people over not able to assert their will or consider them a ill that there is a biology is along, I think its probably a mixture of everything.

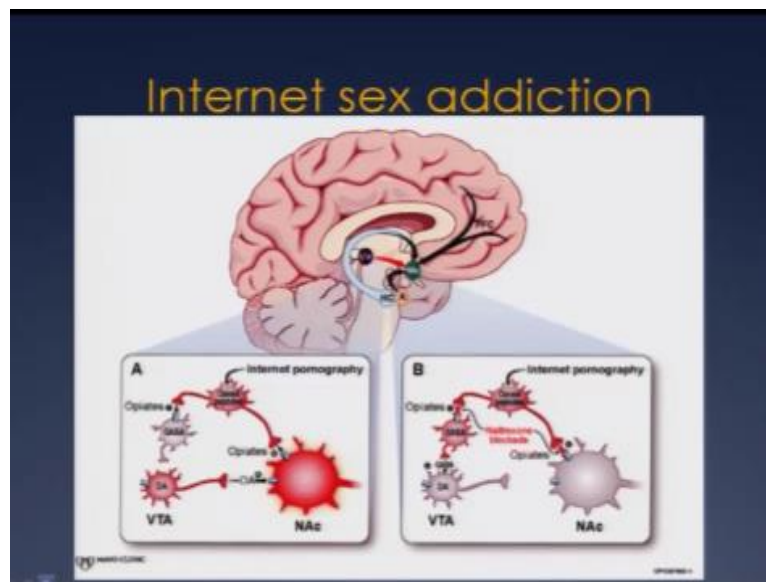
And because the area of the brain that do self reflection planning and careful listening to feed back are all damage by substances that the feedback you work on societies so that, the environment gives your feedback that feedback its loop itself is not working. Their mind just cannot, the addict loses the ability to invent solution to problems. The frontal lobes as I said a greatly affected thus the very thing we asking them to do is the one thing they will have the greatest difficulty we applying the reason.

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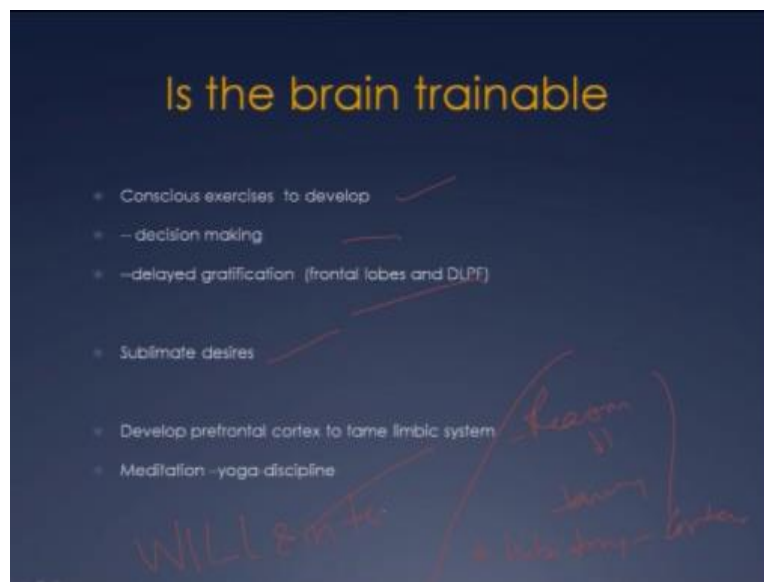
Neural circuitry of motivated behavior goal directed behavior to achieve that addiction subjugates.

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So is your motivation internet sex addiction we all know this is the new thing monographic.

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So, is the brain trainable? let me again brain back the I have shown the slide are they conscious exercise to develop decision making delayed gratification sublimate your desires develop prefrontal cortex to tame the emotion that the reason taming emotions, it is about the inhibitory firing of cortex, is it all biological? But can this biology can this electrical firing can this the natural process be altered by some external training?

Now that will to external training again comes from the brain itself so the big question comes back again at the will and intent when it comes to changing. So, this brings in to the basic few stories of our stories as in the building of our final story which we will be talking about and that is whether we can change over selves. Why do we wish we have talked while how we will talk about and so we will talk about it whether the mind is trainable? in the next lecture Thank you.

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