Advanced Cognitive Processes
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Lecture - 35
Cognition and Emotion – V

Hello and welcome to the course introduction to advanced cognitive processes I am Ark Verma from IIT Kanpur and we are in on the last lecture of the 7th week of this course. In this week we have been talking about various aspects of cognition and emotion by now we have talked about the effects of emotion on attention, effects of emotion on memory, you also talked about the effects of various kinds of emotions, anger, sadness, positive emotion, anxiety on different kinds of decision making processes on you know on the kinds of judgments people would make on their attitude towards risk taking and etcetera.

In today's lecture I will talked to you about a very interesting aspect of emotional decision making, let us we will talk about personal moral dilemmas, we will talk about how judgment and decision making can actually be affected in course of you know such moral dilemmas I will talk to you about what moral dilemmas are in a bit.

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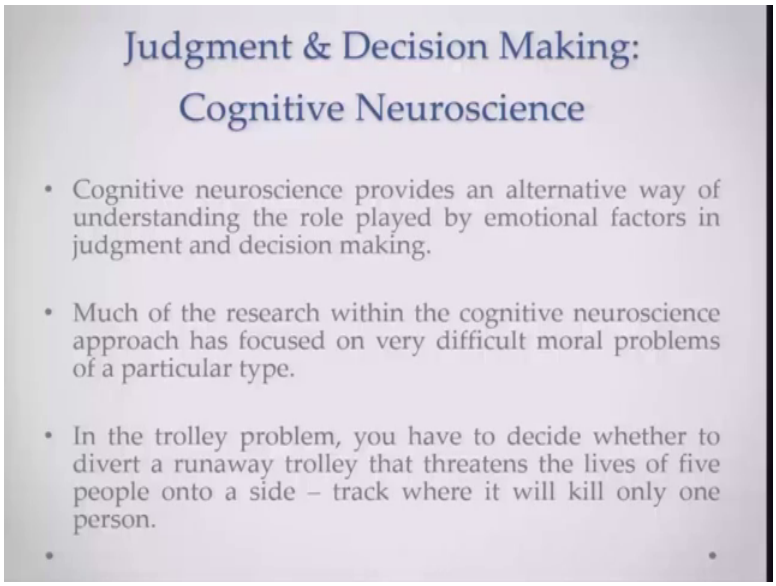

So, let us kind of let us take the cognitive neuroscience approach to this problem now cognitive neuroscience provides an alternative way of understanding the role played by

the emotional factors in judgment and decision making, what kind of areas of the brain are actually involved when you are making such kind of a decision being affected by such kind of a emotion. So, when you are kind of looking at the brain and how the brain is actually helping you or influencing your thing, much of the research within the cognitive neurosciences approach has focused on very difficult model problems of a particular kind these problems are I will referred to as personal moral dilemmas.

Let me give you a couple of examples so, there is a trolley problem suppose you are riding a particular trolley you are the driver of that trolley and you have to you reach a particular point that you have to divert the trolley to alternative path and if you do not divert the trolley to an alternative path all 5 6 of the people riding the trolley will die , but if you divert the trolley on the alternative path the totally will run over one of the person who is working on that alternative path and he will die. So, the idea is if you divert the trolley one person will die if you do not divert the trolley all 5 people will die, this is one problem.

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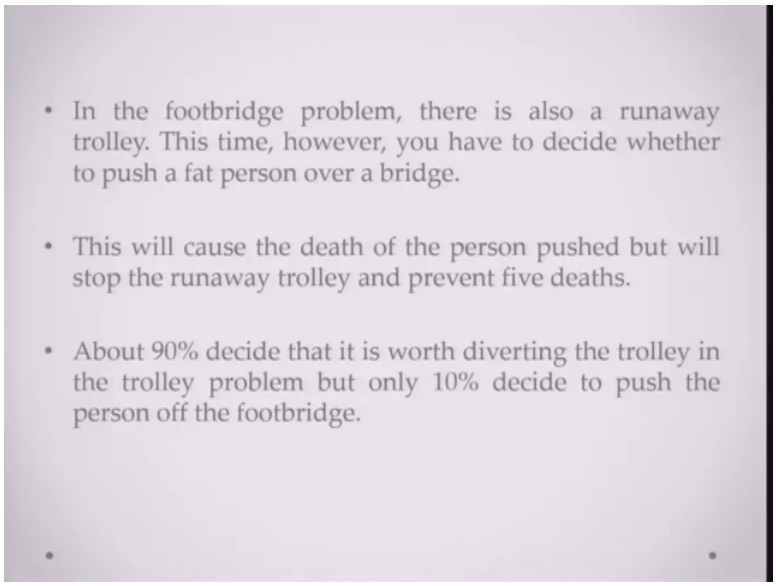

The other problem is called the footbridge problem the footbridge problem is fact that there is again also a runaway trolley this time you have to decide whether to push a fat person over the bridge. So, there is a fat person in your trolley maybe 5 6 of you are riding the trolley one of these fat persons has to be thrown out of the trolley in order to save the life of 5 people. Now, the death will cause the person of this thing the pushing

will certainly cause the death of the person that you will push away, but you will stop the runaway trolley and it will prevent 5 deaths.

So, how would you solve this problem you can probably you know take a moment pause the lecture end and decide what you want to do, but I will tell you what a lot of people do about ninety percent of the people decide that it is worth diverting the trolley in the trolley problem and only about 10 percent of people actually decide that it is worth diverting a trolley in the footbridge problem, both cases one person would have died 5 lives would have been saved, but the fact is that only 10 person decide to actually there were the trolley in the footbridge problem while 90 percent of people decided that it is to divert the trolley in the runaway trolley problem.

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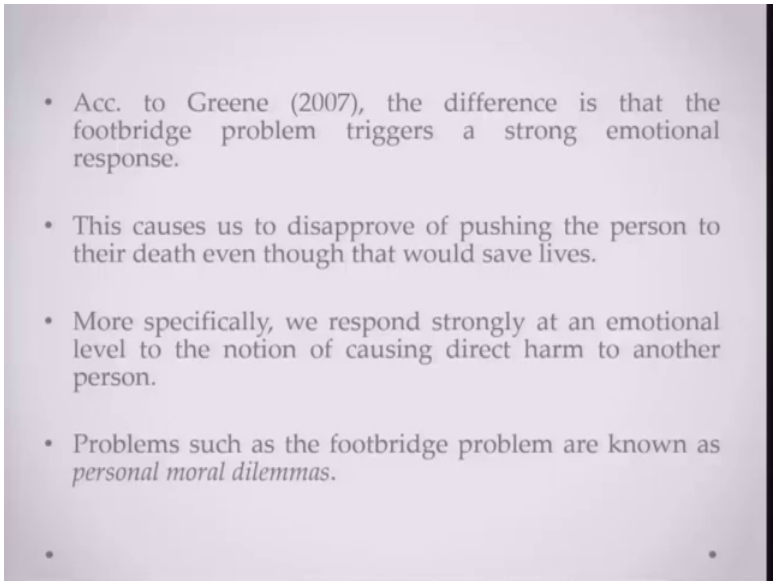

Why is this happening, according to Greene the difference between the 2 problems is that the footbridge problem triggers a strong emotional response and the strong emotional response is to disapprove the pushing of a person and causing the death you know even though that would save lives, more specifically what we are doing is we are responding very strongly at an emotional level to the notion of causing direct harm to an individual.

That is something which people would not want to do if something kind of happens you know there is I kind of always think that there is a general apathy among people, but the fact is how many of them are actually going to you know directly cause harm to the other person that is that is a very interesting question to talk about.

Now, problems such as the foot over bridge problem are known as personal moral dilemmas and a lot of cognitive science cognitive neuroscience research actually looks at the brain of people when they are actually making this kind of decision, what is going on in their head when they have to decide on these kind of things.

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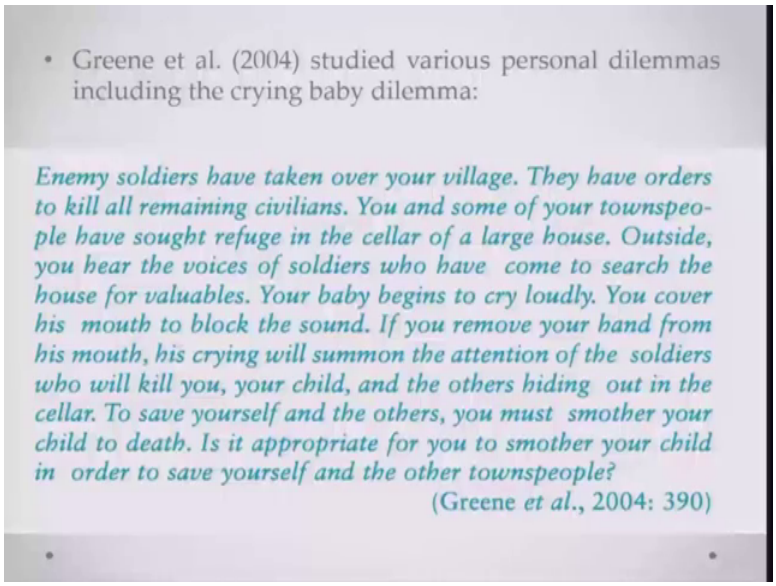

Greene and colleagues also have a they have conducted a lot of research dealing with these personal moral dilemmas are very another interesting moral dilemma is suppose you are living in a village and your village has been attacked by enemy soldiers. Now they these enemy soldiers have orders to kill all the civilians you know you and some of your own towns people have sorted a refuge in a cellar of a large house outside you hearing the you know voices the soldiers who are approaching and the fact is you suddenly your baby your child you know starts crying your babies beginning to cry.

Now the fact is if you cover his mouth to block his crying the baby will be smothered to death. So, the idea is if you kind of put your hand on the mouth of the baby will certainly die. But the fact is if you do not stop the baby from crying if you do not cover his mouth if you do not smother him to death, the fact is the soldiers will get to know of all the 5 6 people maybe 20 people, 100 people who are hiding with you and they will die. So, there are 2 approaches to this either you decide to save yourself and others and you must smother your baby death or you decide to save the baby, but that; obviously, has a risk of you know getting anyone killed anyways getting everyone killed anyways.

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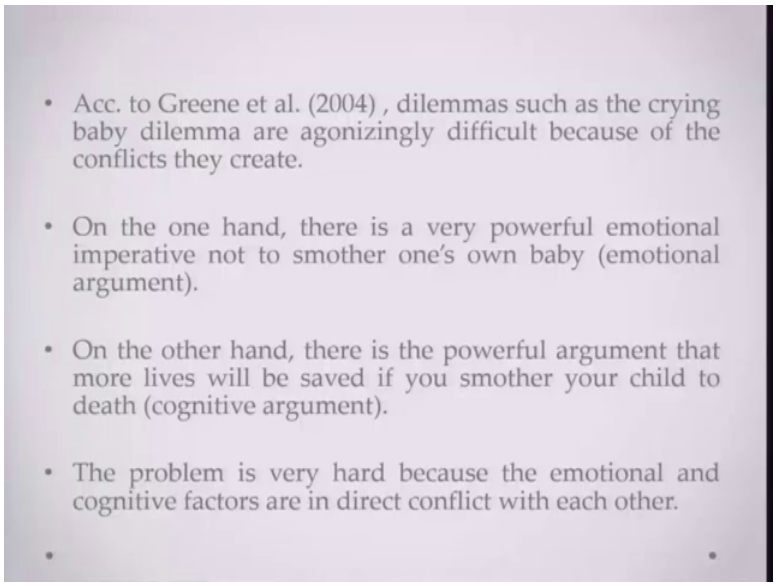

So, these kind of problems very hard because crying babies rather for that matter is agonizingly difficult problem because of the conflict it is creating. On the one hand there is a very powerful emotional imperative that you know you do not want to kill your own child and you are that is the emotional argument on the other hand there is a very powerful argument at you more lives can be saved if you just you know smother your baby to death. So, would you want to kill your own baby to save everybody else's life or would you want to save your own baby at the risk of you know everybody else's life

So, that is the there is a cognitive arguments the there is a emotional argument that you must kill your baby because everybody you know you should not kill your baby and the cognitive argument you should kill your baby because everybody else life will be saved. So, this is a kind of a very complicated thing and this problem is very hard because emotional and cognitive factors are directly in conflict with each other I mean in common parlance we say whether the heart is making the decision or the mind is making the decision so, this is such kind of a problem.

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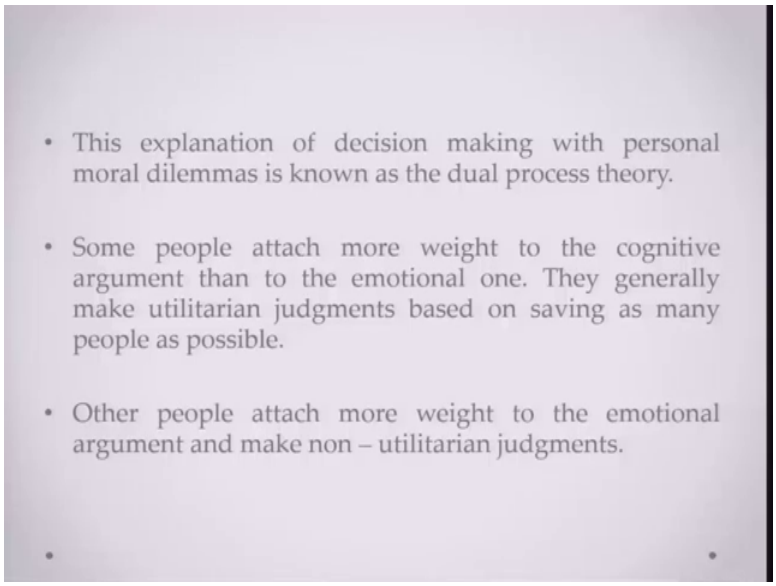

Now, this explanation of decision making with personal moral dilemmas is basically known as the dual process theory. So, if the argument that I was saying the emotional argument contrasted with the cognitive argument it is basically referred to as the dual process theory of decision making. Some people you would find it they would attach more weight to the cognitive argument than do the emotional one they would generally make utilitarian judgments.

So, in utilitarian judgment is ; obviously, you want to save more lives and the experience of you know 1 life or 2 lives, other people attach more weight to the emotional argument and they tend to make what I refer to as non utilitarian judgment just because you are emotionally attached to the to your child you would not want to kill your child and so, but you are risking the lives of everybody else.

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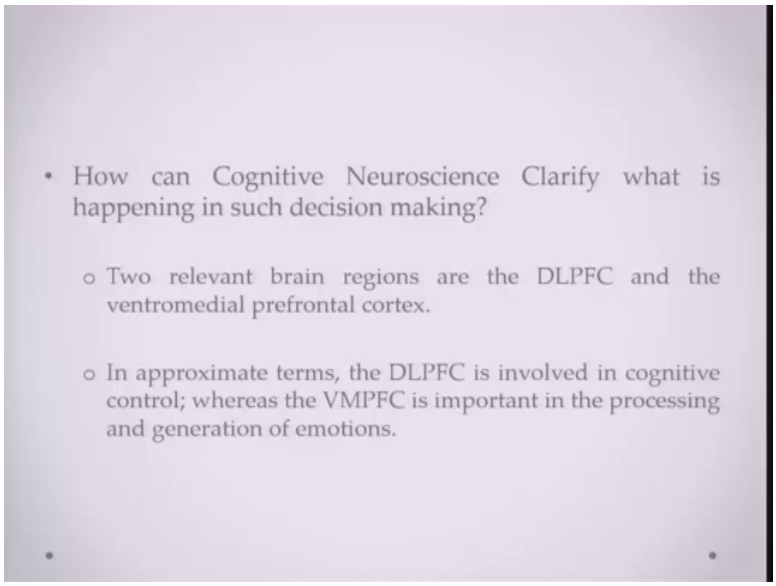

Now, how can cognitive neuroscience which in how can cognitive neuroscience clarify what is happening in such kind of decision making. Now there are 2 relevant areas of the brain 2 relevant regions of the brain that can kind of help us contrast these 2 decision making processes. One of them is the dorsal lateral prefrontal cortex in the frontal lobe of the brain which is involved in cognitive control.

So, if you are doing cognitive evaluations you will probably expect this region to get to get lighten up the other region is that the ventromedial prefrontal cortex is the region of the brain that is important from processing and the generation of emotion. So, if somebody is going by the emotional argument you would expect this region of the brain to lighten up.

So, let us look at how these 2 areas of the brain get activated when people are you know evaluating the cognitive or the emotional argument and this should tell us a little bit about what the contribution of these 2 areas with respect to you know decision making are.

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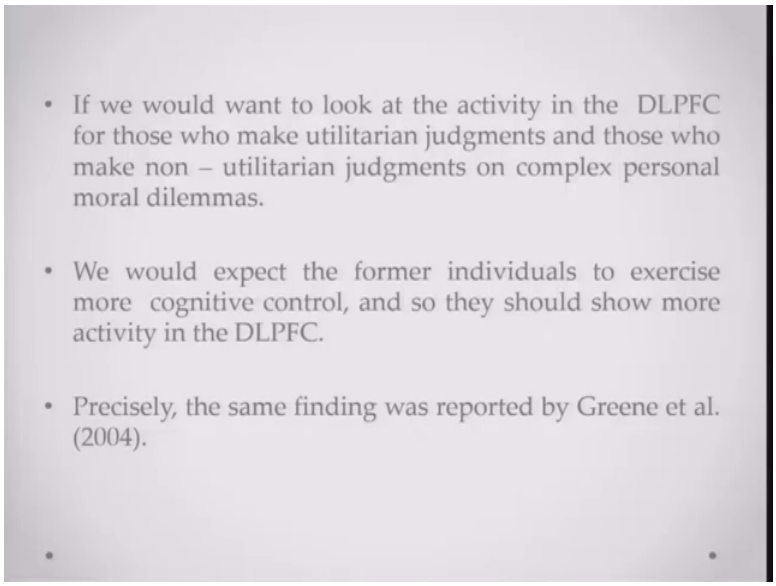

Now, if you would want to look at the activity of the DLPFC and you wanted to compare the activity of the DLPFC in people who made utilitarian judgments versus people who made non - utilitarian judgments, you would probably expect that former individuals those who are making the utilitarian judgments, you will probably expect that there DLPFC would show more activity.

They are basically looking at the problem from the cognitive perspective they are looking at the problem from you know response inhibition response selection, evaluation of responses, kind of perspective which is basically the tasks that the DLPFC does.

So, people making more utilitarian judgment should show more activation in their dorsal lateral prefrontal cortex precisely this is what was reported by Greene and colleagues in a study they published in 2004 so; obviously, DLPFC is linked with cognitive argument evaluation of the cognitive argument and making utilitarian judgments.

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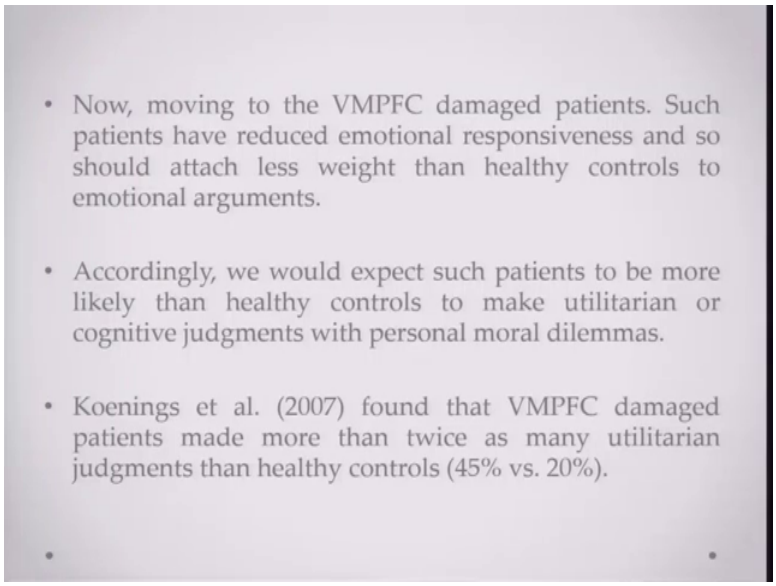

Now, let us move on to the ventromedial prefrontal cortex, now if you are talking about patients who have a damage to the ventromedial prefrontal cortex that is the VMPFC you would assume that because they cannot generate because they cannot process emotions these people would lack the emotional responsiveness and because these people lack the emotional responsiveness they would you know they will attach less weight to the emotional argument.

They will also make more utilitarian judgments and less nonutility in non - utilitarian judgments. Accordingly, we would expect such patients to be more likely than healthy controls to make as I was saying utilitarian judgment putting more weight to the cognitive argument.

Now, Koenigs and colleague and they did this experiment in 2007 and they actually found that the ventromedial prefrontal cortex damaged patients made twice as more utilitarian judgments as compared to the healthy controls which is 45 percent and 20 percent in the healthy control that is a massive number that is something that is showing that you know the lack of emotional responsiveness because of brain damage is not allowing them to really attend to the emotional side of the argument at all.

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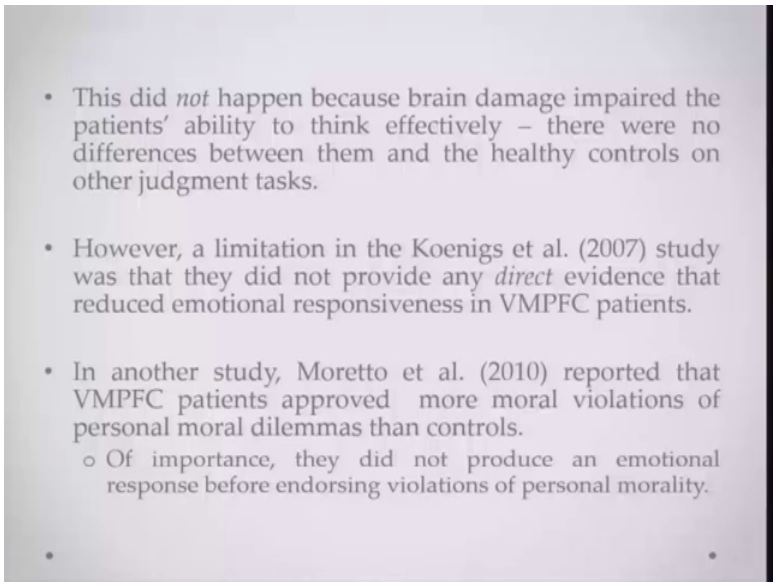

Now, this is interesting, but and this is not only happening because the brain is damaged and they are not being able to think properly because these people who are administered. So, many different tests as well and they performed fairly well across all the tests. So, it is just about the emotional decisions that they are not really being we will make.

Now, there is one limitation in Koeings and you know Koeings and colleagues a study of 2007 that this is still the evidence they are providing is not really a direct evidence of the fact that the ventromedial prefrontal cortex damaged patients are lacking emotional responsiveness. So, what is happening here, you have to get to more direct evidence. So, Moretto and colleagues in 2007 and in 2010 they reported that ventromedial prefrontal cortex damaged patients they approved more personal violations of moral dilemmas than controls.

So, you know personal so, the if the emotional code is broken these people are kind of fine with that it is of importance to note that they did not really produce an emotional response even before or while endorsing the emotional violations of the persons you know morality. So, again this is supporting evidence for the fact that they ventromedial prefrontal cortex might be linked you know with the absence of emotional responsiveness and with making more emotionally neutral decisions.

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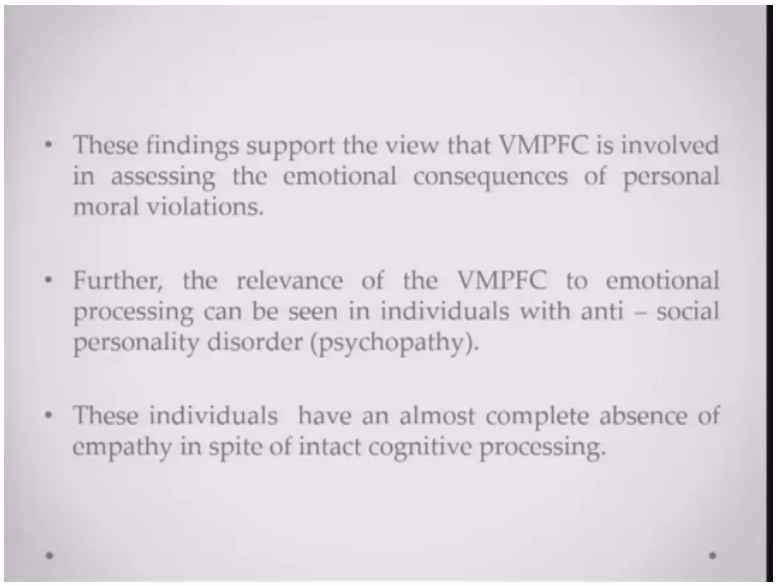

Now, these findings kind of link the VMPFC and kind of establish that the VMPFC is involved in assessing the emotional consequences of personal moral violations. Further the relevance of VMPFC to emotional processing can be seen in individuals who have antisocial personality disorder.

If you kind of look at the brains of psychopaths, murderers, killers those kind of people and if you look at their brain and if you want to look at the ventromedial prefrontal cortex activations what is happening there, these individuals also have a complete absence of empathy during you know when they are intact cognitive processing is there. So, they just lack any kind of empathy and any kind of you know emotional care for the other persons.

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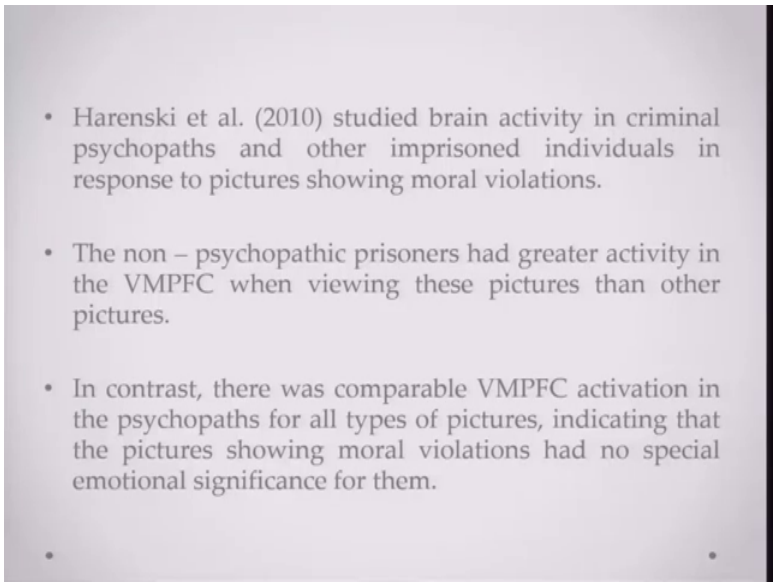

So, Harenski and colleague they wanted to study the brain activity in these criminal psychopaths in a study they did in 2010 and other imprisoned individuals in response to you know pictures showing moral violation. So, they showed them scenes of crime gruesome scenes and stuff and they wanted to look at what kind of moral responses these people will give.

The non - psychopathic prisoners had did show greater activity in the ventromedial prefrontal cortex and you know while they were viewing these pictures as compared to the other pictures. In contrast there was a comparable ventromedial prefrontal cortex in the psychopaths for all types of pictures, indicating that the picture showing moral violations had no special emotional significance of them. So, their thing is that then they are treating everything equal the emotional pictures are not really having any important status in their cognitive processing.

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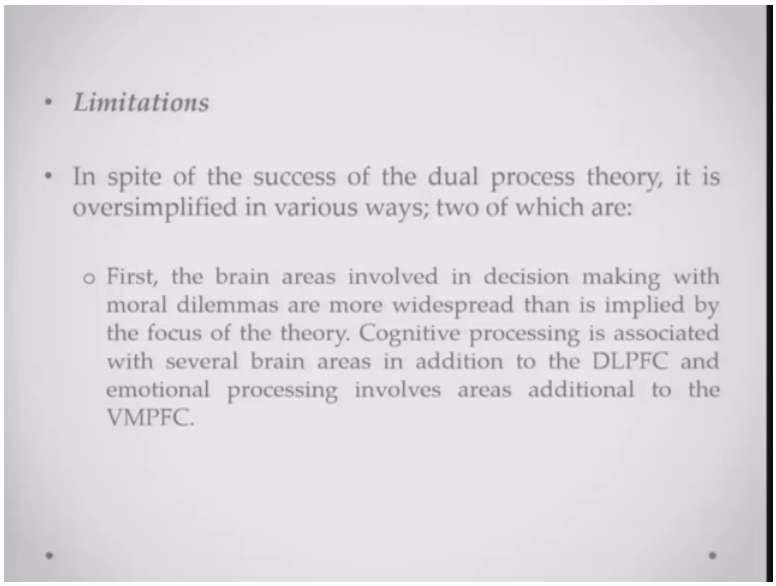

So, again this is also in some sense in indirect proof that the ventromedial prefrontal cortex might be involved in evaluating the emotional arguments in emotionality responding to such kind of a conflict scenario. So, the DLPFC and the VMPFC and now you can see that if somebody is going by the cognitive argument the DLPFC activation should be there is what is going by the emotional arguments or emotional side of arguments then the VMPFC activations must be there.

Now, there are sorts of limitations to these kind of studies as well, see for example, in spite of this success of the dual process theory it is a little bit oversimplified you know it kind of just says that there are 2 boxes in which processing and happen it is almost like a binary and; obviously, I mean binary is not a great way to classify complex processes as decision making.

Complex ways of processing as emotions and cognition and those kind of things and it is partly because you know the brain areas involved in decision making and moral dilemmas are much more widespread than just the DLPFC or the VMPFC cognitive processing is associated with several brain areas in addition to these 2 areas and you know just pinning the grail of making such kind of decision. So, these 2 areas just vocalizing them is probably not a very useful strategy.

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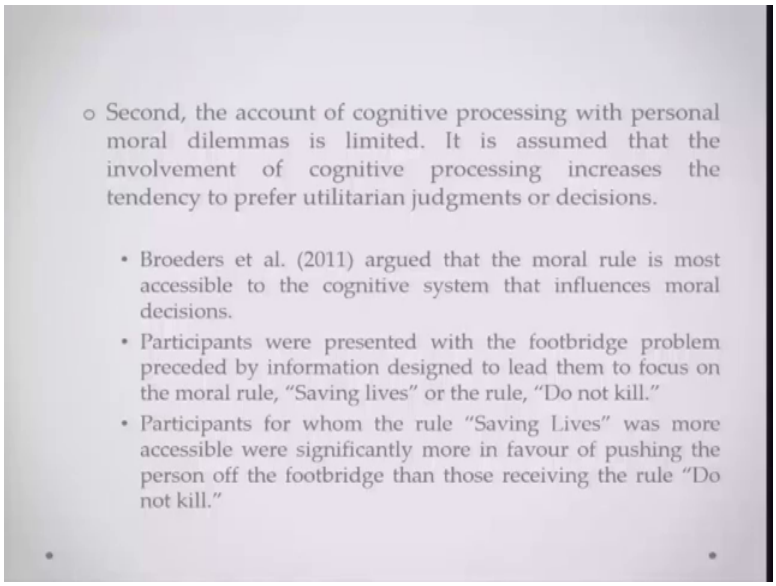

And the second point the account of cognitive processing with personal moral dilemmas is limited, it is not it does not really cover all the aspects of decision making, it is assumed that the involvement of cognitive processing increases the tendency do prefer utilitarian judgments or decisions. So, if people are making doing more cognitive processing they are going to take more utilitarian judgments.

Now, there are studies which kind of talk a little bit about that Broeders and colleagues in 2011 they argue that the moral rule is the most accessible to the cognitive system that influences moral decisions. So, if there is a cognitive system that has to take these decisions it will probably make use of the moral rule and in that sense you know when participants and in their study when participants were presented with the foot over bridge problem preceded by the information designed to lead them to focus on the moral rule.

Say for example, "Saving lives" is the rule "Do not kill" is the rule participants for whom "Saving lives" was flash they found a mode this rule more accessible and you know it was significantly in favor of pushing the person off the footbridge then those who received the rule of "Do not kill." So, they will probably make use of the more accessible moral rule. So, that is kind of one way this processing is really happening.

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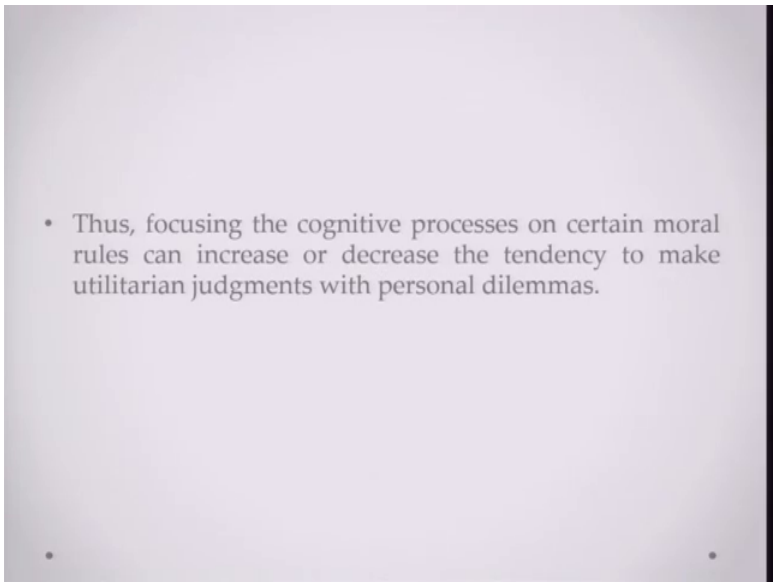

Now,. So, focusing the cognitive processes on certain moral rules sometimes can increase or decrease the tendency to make utilitarian versus non utilitarian judgments. So, it is not really about that somebody's looking at the cognitive side of the things or the emotional side of the things the person is just trying to access a particular rule. If you prime them with the main rule and the main rule is let us say saving lives, then either of the decisions will be easy or if the main rule is do not kill then you know one kind of decision slightly becomes more difficult.

So, this is something that you know you have to be fairly cautious that the dual process theory of making decisions might be slightly more complex you know might be slightly oversimplified and in a sense the explanations offered might not be really you know as effective.

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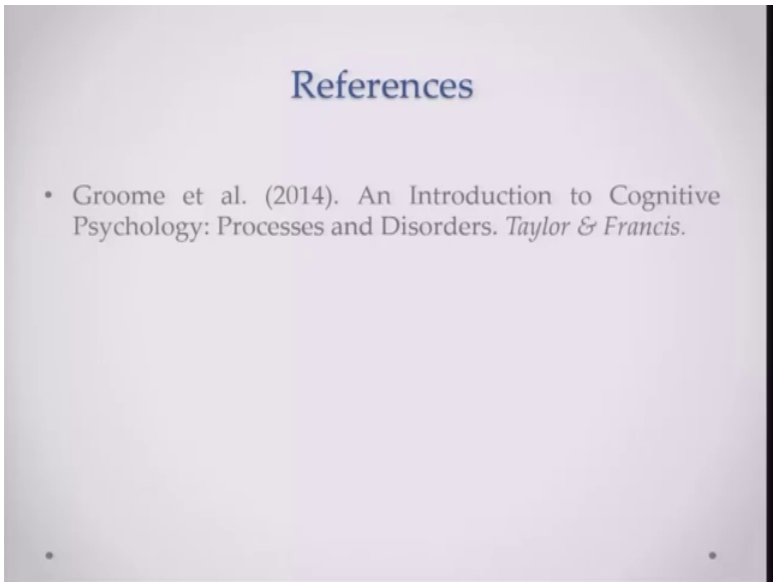

So, I think that is all from my side about judgmental decision making and I hope you like the section on cognition emotional various aspects of it, we will meet you in the next week which is the last week of the course.

Thank you.