Advanced Cognitive Processes
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Lecture – 33
Cognition and Emotion – III

Hello and welcome to the course introduction to advanced cognitive processes I am doctor Ark Verma from IIT Kanpur and we are in the 7 th week of the course. We have been talking about cognition and emotion in this week and this is a third lecture in the series. Let us continue our discussion about various effects on cognition various effects of emotions and mood states on different aspects of cognition we have talked in this week already about effects on attention and memory.

We have also talked in this week about say for example, how can different kind of emotional states affect encoding and how well or how much you recall this information. In the last lecture we also talked a little bit about the amygdala and how the amygdala is important in a processing emotions and how does the amygdala actually get involved in both at the time of learning and at the time of recall of emotionally relevant information..

So, let us continue this in the today's lecture I will start talking a little bit about the effects of a mood or emotional state on the factors of judgment and decision making.

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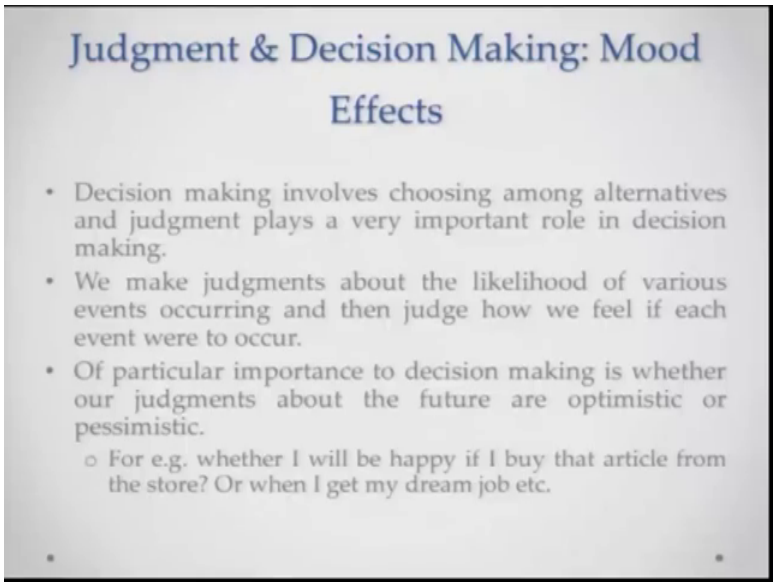

Now, decision making and we have done this chapter on decision making weeks ago and so, decision making as you all know involves choosing among different alternatives. So, you presented with so many different alternatives and you have to choose which one of the you know alternatives is most correct for you know the maximum utility or say for example, what makes sense at that point in time and there are different and you know possible reasons that you would make these choices..

So, one of the things one of the reasons we make choices because of is a one of the because we are kind of judging the likelihood of these various kinds of events that might occur and then we judge how will we feel if you are given a choice between you know buying 2 sets of clothes or say for example, there are 2 bikes that you want to choose from or say for example, there are a couple of people you are kind of you know you want to choose from that whom who will make me feel happier if I were married to this person or something like that.

So, the ideas we are constantly making these judgments you are constantly trying to predict the future we constantly trying to not only predict future events, but more importantly we are constantly trying to predict how will we feel if those events were to occur, that is the that is basically the core of the discussion today we will try and see what happens if people predict that if this happens and I will be happy should I make this choice or on the other hand if this happens I will think I will be sad I do not want to lose money I do not want to make this bad guess so, probably let us not do it.

So, the idea is the this calculation that people make about what is going to happen if such an event were to occur basically you know influences and plays a major role and the kinds of decision they would make and the way they would make these decisions. So, let us talk a little bit more about these things, now of particular importance to decision making is the fact that whether our judgments about the future are pessimistic or optimistic whether we are looking at future in a more positive favorable picture or we are kind of a thinking that you know the future is bleak it is dark I do not think something good is going to happen I mean I have been suffering and this and I do not think really I am going to come out of it.

Now, if these kind of a judgments are there how will this really happen. So, people kind of are making these judgments all the time you know whether I will be happy, if this

happens whether I will be sad if this happens, how happy will I be, how sad will I be, all of these kind of judgments all of these kind of calculations are happening. Now here comes in the mood state things. So, the mood states the mood that you are in certainly influences your attitudes towards risk taking and your attitudes towards predicting the future. So, and this kind of this will certainly affects the kind of decision that you will end up making.

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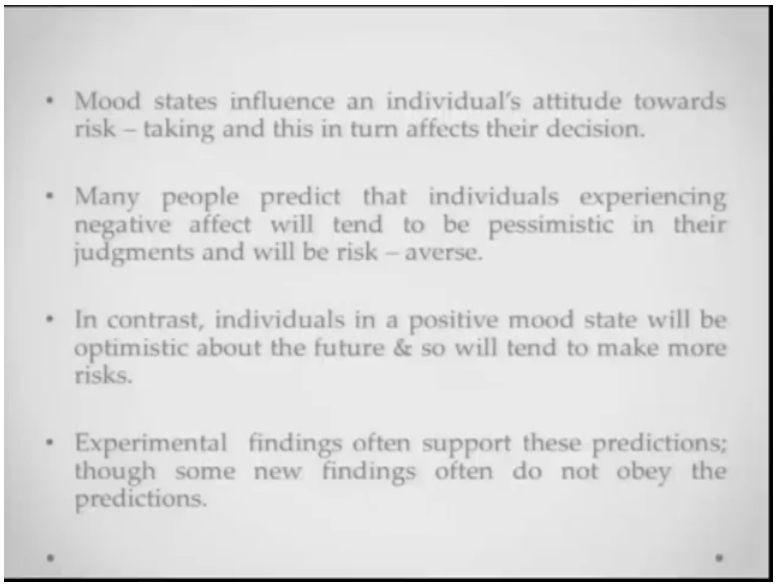

So, this is very important for many people predict that individuals experiencing many researchers a lot of a evidence is there that individuals expressing negative effect will tend to be slightly more pessimistic in their adjustments and they will be a risk averse. So, if you are kind of you know in a very sad state if you are kind of in a very dejected sort of a thing you not really feel good and somebody ask you what is going to happen it is kind of likely that you will come up with you know I think things are not going to turn better from here.

So, they will also be in that sense because the kind of a thinking that the future is bleak and it is dark and I do not know what is going to happen, they will also be very averse to taking risky decisions they will not make decisions that could be risky and this is very interesting because this is kind of in some sense that the idea is that if you kind of are in a sad state and you are looking at the future that is going to be sad it is kind of is possible

that the future is sad because you are not really looking up at other positive possibilities are not really opening up.

And that is just aside from this course because a lot of things that you learn in this course is very important to really apply them in your thought processes and use that knowledge I mean the kind of research that I am discussing try and kind of a link yourself to it or you know link your lives to it. Coming back so, people have predicted research has predicted that individuals experiencing negative effect will tend to be more pessimistic in their judgments about the future and they will be risk our self in contrast individuals in a positive mood state will be very optimistic about the future.

They will be update upbeat, they will be you know having that kind of confidence to make that leap of faith, they will be having that kind of confident to take risk and those kind of things I will come to that positive emotion is taking in a lecture later, but the experimental findings have also shown.

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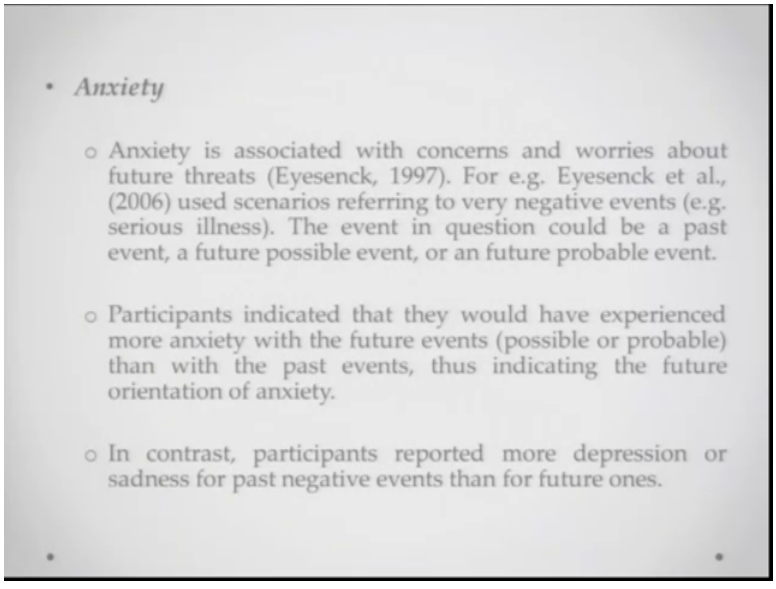

They found support for these kind of predictions; obviously, there are in a research a lot of times you will come up across with those findings as well which do not fit your hypothesis, but more on that later.

Now, let us talk a little bit about the effect of a anxiety as one of the emotions on judgment and decision making. Now anxiety I think everybody must have experienced

different degrees of anxiety at different points in their lives. So, anxiety is associated with concerns and worries about future threats people who are anxious are generally kind of fidgety they are not very really very confident and sure about what is going to turn out they are kind of constantly worried constantly wondering about what is going to happen next.

So, Eyesenck says that anxiety is associated with concerns and worries about future threats and they basically in a recent study in 2006, Eyesenck and colleagues they use scenarios referring to very negative events you know serious illnesses deaths and breakups those kind of things and the event in question they asked them to basically you know they come in a encounter scenarios about these events and the events in question could be either a past event that has already happened think about that, a future possible event that this might happen to you or a future probable event that may be this will happen as a future possible event and a future probable event.

Now, participants indicated that they would have experienced more anxiety with the future events occurring both possible and probable than with the past events, thus indicating in some sense the future orientation of anxiety people are generally a very anxious about the future what is there in store for me and those kind of things in contrast people reported more depression or sadness when they were talking about events that had negative events that had passed on. So, the past negative events kind of provoked some kind of anxiety as some kind of sadness as opposed to anxiety. So, this is a interesting contrast between anxiety being more future oriented and sadness in some sense let us say slightly being past oriented.

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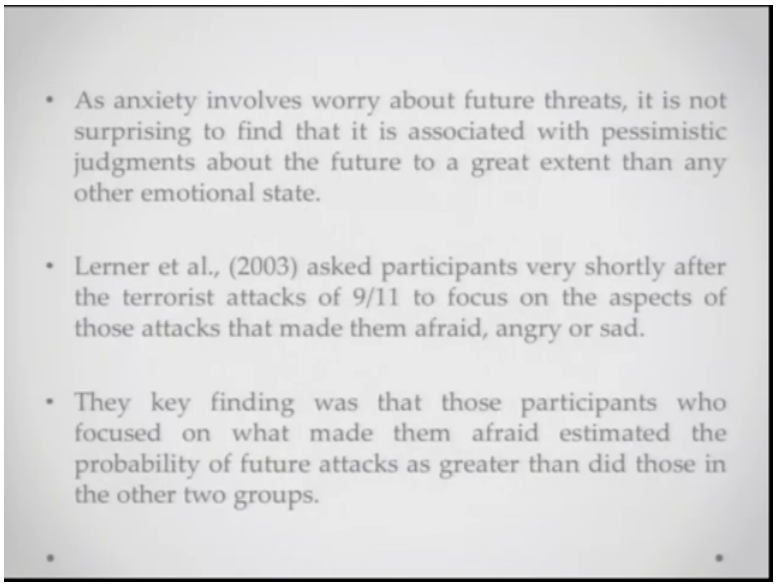

Let us say this is a good you know a piece of result that you could you know remember and stick on to, now as anxiety involves worrying about future threats it is not really surprising to find out that it is associated with pessimistic judgments or the future to great extent than any other negative emotion or any other emotional state for that matter.

Now, Lerner and colleagues in 2003 they asked participants very shortly after the terrorist attacks of 9 11 to focus on aspects of those attacks that made them afraid angry or sad, what happens is, what anxiety is, that the key finding is that those participants who focus on what made them afraid anxious estimated the probability of the future attacks to be much greater than those participants who focused on the you know that were in the other 2 groups that focused on the other 2 kinds of things angry or sad emotions .

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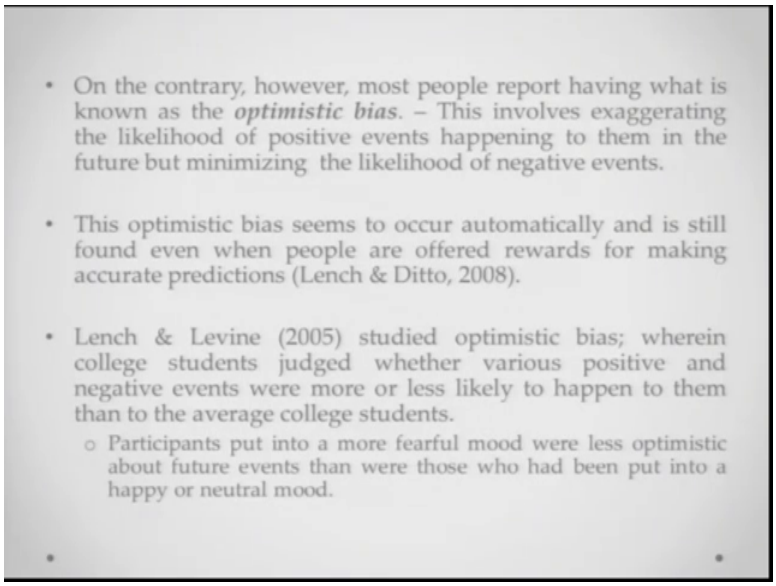

Now, on the contrary and as that is also a bit interesting if you look at people around you most people report at having what is a referred to as the optimistic bias you know with accidents whether you know thefts with the that you know this could happen, people do a reflect what is referred to as the optimistic bias you know this involves an exaggerated likelihood of positive events happening to them in the near future and minimizing the possibility or a likelihood of these a negative events.

Say for example, you know people who are not you know wearing helmet. So, people who are smoking or drinking too much if you ask them you know I mean there are a hazards associate to do these things and you would most likely tell you that you know this is not going to happen to me I drive very well I am not really prone to falling down or you know meeting an accident so on and so forth.

And even say for example, you can take it to any kind of addictive addiction that people have now this optimistic bias you know seems to occur almost automatically and still found in people when they are you know offered rewards for making accurate predictions even when you ask them that you know the you know just cut down all this optimism from your judgment and just basically you know you we are going to give you some reward if you make the most accurate prediction even when they are actually consciously trying to make accurate predictions they would sometimes you know reflect this kind of optimistic bias.

Now, Lench and Levine in 2005 they wanted to study the optimistic bias. So, they basically asked college students you know whether various positive and negative events or more likely to happen to them than another average college student and they basically also induced particular kinds of mood states in the in these people while they were to make these judgments, participants that were put into a more fearful mood were found to be much less optimistic about future events then those were put in a positive mood.

So, positive mood people basically or happy or neutral mood people basically did not did show that you know optimism thing, but those people who are put in a more fearful mood anxious mood they basically they were very less optimistic about the kind of future events that might occur to them again you know converging evidence is the one that we were talking.

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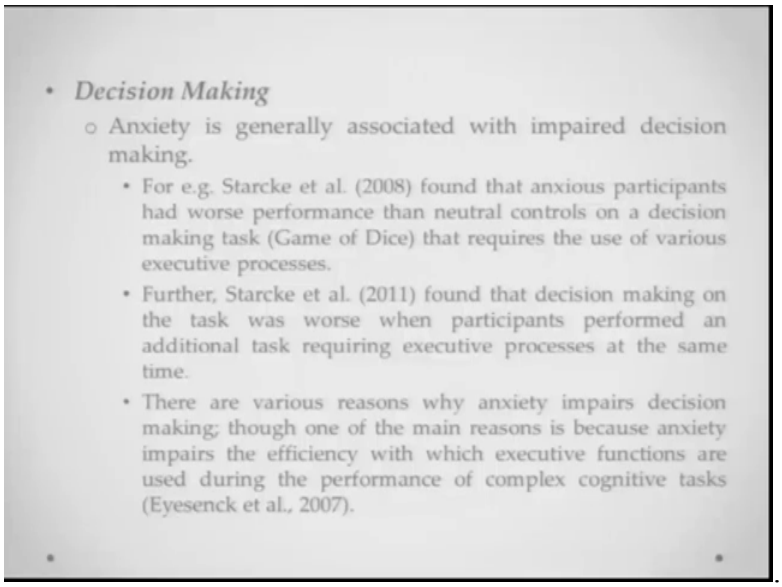

Now, let us talk about the relationship between anxiety and decision making, anxiety is generally associated with impaired decision making I mean you would have heard it. So, many times that you know you should not really be anxious do not worry about it. So, much just cool yourself relax yourself and then make this decision you know people keep saying all sorts of things around you and a lot of times those things are commonsensically. So, clear that even experimental evidence would support that kind of things.

Now, a Starcke and colleagues in 2008 they found that anxious participants had worse performance than neutral controls on a decision making task that required the use of various executive processes. So, we have referred very briefly to executive process I think in the bilingualism thing things like response inhibition things like shifting of responses weighing particular responses controlling things in you know inhibiting particular trains of thought. So, on those tasks the game of dice where basically you know required the use of these executive processes anxious participants performed much worse.

And they actually continued this study they took this further in 2011 and they actually found that decision making on the task was worse when participants performed an additional task that are also more taxing on their executive processes. So, it kind of seems that anxiety is in some way linked to the executive processes as well there are various reasons, why anxiety could impair decision making though one of the main reasons is that anxiety impairs the efficiency with which these executive functioning executive functions are used during the calm you know during the performance of complex cognitive tasks.

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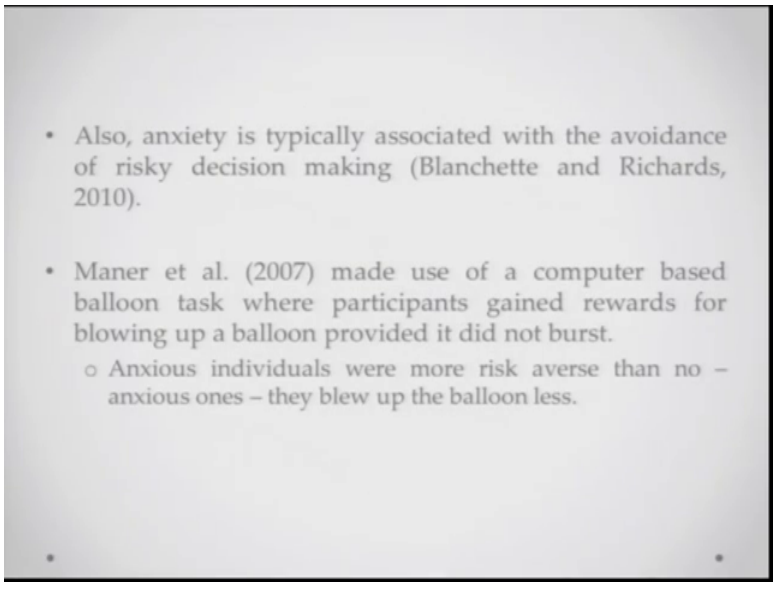

So, again more evidence about the fact that anxiety is linked to these various executive processes. So, this is this is again one of the evidences that says that anxious people will probably be slightly poor or slightly worse in making a particular kind of complex

decisions. Also on the other hand anxiety has typically associated with avoidance of risky decision making anxious people as I was saying earlier are slightly pessimistic in their view about the future and in that sense they are more conservative in making decisions..

They would avoid taking risky decisions, Maner and colleagues in 2007 they made use of a computer based a balloon task and what they were to do is they were to fill the balloon to an extent that it does not break, but then only the I mean those people will be rewarded whose balloons were most filled up. Anxious individuals in this task were the most risk averse they did not take a chance and then the non anxious ones and the view of they generally view of the balloon much lesser to avoid the balloon breaking up.

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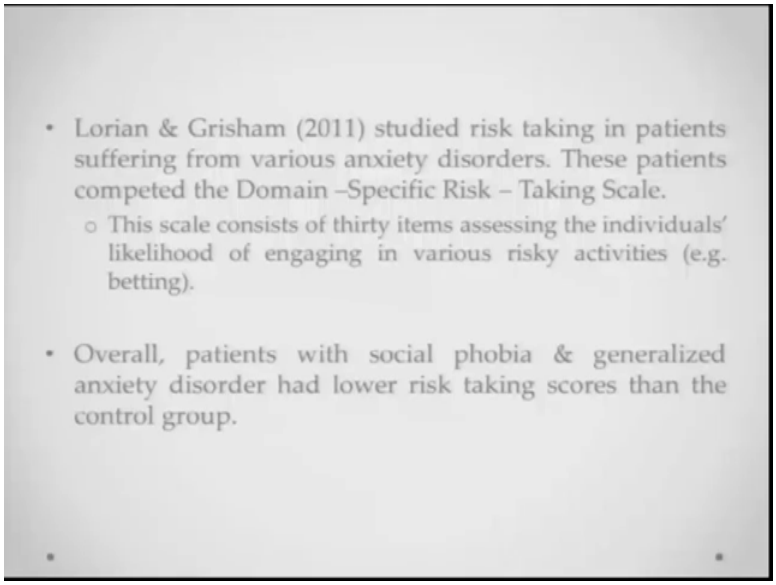

So, again you see another example of them avoiding the research the risky scenarios Lorian and Grisham in 2011 they also wanted to study risk taking in patients suffering from various anxiety disorders. So, they basically these patients were made to complete a domain specific risk taking scale and the scale basically consists of around thirty items which assesses the individuals' likelihood of engaging in various risky activities.

Suppose for example, what is the likelihood that you would you know bet your entire salary in a casino or what is the possibility that say for example, you will go and commit this thing or you will go and do that or all the risk taking scenarios in some sense overall what they found was patients with social phobia and generalized anxiety, disorder had

much lower risk taking scores than the control group or the group which was not suffering from any particularly emotional disorder.

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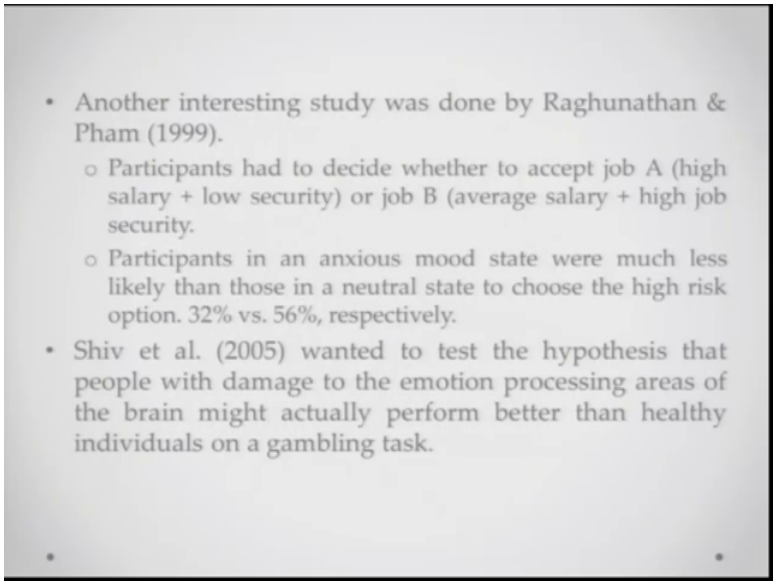

Now, moving slightly further very interesting study was done by Raghunathan and Pham in 1999 and what they basically asked was they asked the participants to decide whether to accept a job A and now job A was characterized with a very high salary, but low job security or job B which is characterized by average salary kind of a salary, but very high job security. So, participants in an anxious mood state were a much less likely I mean they were much less likely than those in a neutrally mood state to choose the high risk job that was job A the numbers are like only 32 percent of anxious participants chose job a versus 56 persons of a neutral mood state participants chose job A.

Now, Shiv and colleagues in a in a different study around the same topic, Shiv and colleagues in 2005 they wanted to test the hypothesis that people were damage to emotional processing areas of the brain might actually perform better than healthy controls on these gambling tasks. So, they based the underlying idea is probably that because anxiety is linked with wandering about the future and wondering about the future is an emotional task maybe if there are individuals whose emotional processing is deficient in a particular manner because of brain injury or something. They might be able to actually do the gambling task slightly better I mean they will not be. So, much more a worried and stuff like that.

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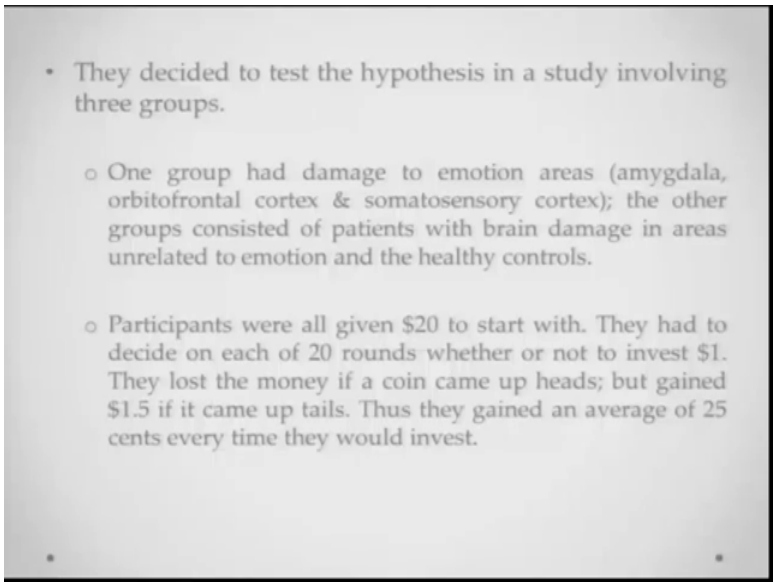

Now, these people decided to test the hypothesis in a study involving 3 groups. So, there was one group who had damage to the emotional processing areas of the brain amygdala the orbitofrontal cortex and the somatosensory cortex and the other group of patients were a one group of patients had brain damage in different areas, but not in the areas concerned with emotion and then there is this third group with healthy control participants you know the intact brain people.

Now, participants this is a very interesting task. So, participles are given around dollar 20 to begin with and they are told that you know you have to kind of on the basis of a coin flip decide whether or not to invest this dollar 1, the idea is that if it came ahead they would kind of use dollar 1, but if it came tails they would win dollar 1.5. So, the idea is if you assume a 50 50 percent chance if they are investing 20 out of 20 times they would still end up gaining 25 cents for each time they have invested which you can multiply that by 10 giving a 50 percent probability. So, technically the best strategy would for them to would be to basically just go on investing you know continuously.

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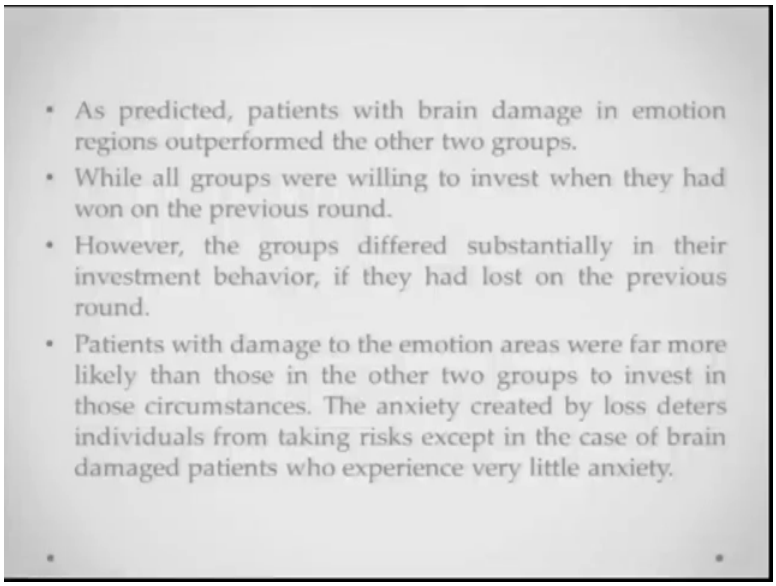

Now, as predicted patients with the brain damage and emotion region and a emotional regions of the brain outperform the 2 groups they were not really making any emotional things they are not really wondering about what is going to happen if I lose this money and stuff they probably did a very cognitive calculation a calculative thing and it is performed very well than both the other groups.

While all the groups were willing to invest when they had one on the previous hand. So, all the groups if you have won it kind of puts you in a temporary emotion you know positive emotional state. So, even patients with a less emotion with you know a damage to a non emotionally (Refer Time: 18:45) were willing to a bet neutral people were the intact people were willing to bet and anyway so other people were anyways willing to bet because they might have worked out those probabilities.

Now, however, the groups differed substantially in their investment behavior if they had lost on your previous. So, the difference kind of comes that if you have lost something right. Now how are you going to appraise the future patients with damage to the emotional areas of the brain were far more likely than those in the other 2 groups to invest in these circumstances as well so, even if I have lost this hand even if I lost 1 dollar right away, but in broad I probably will eventually end up winning. So, these people are not really doing any emotional calculates see winning and losing is not really only about money it is also about how you will feel.

And people who have this you know interact emotion processing areas these 2 groups would probably have engaged in this kind of thing how bad or good I will feel if I will use. So, these people in that sense in those calculations were slightly less likely to make the investment while these people who have damaged brain damage in the emotional areas of the brain are not really engaging in this kind of emotional counterfactual thinking and they are just like investing in even though circumstances on whether they have won or whether they have lost in the previous hand.

So, this is a very interesting result and it kind of is happening that the you know anxiety created by the loss is deterring the individuals from taking these risky decisions except in the case of a people with brain damage to the emotional areas of the brain. So, that is again very very interesting in you know in some sense reinforcing thing.

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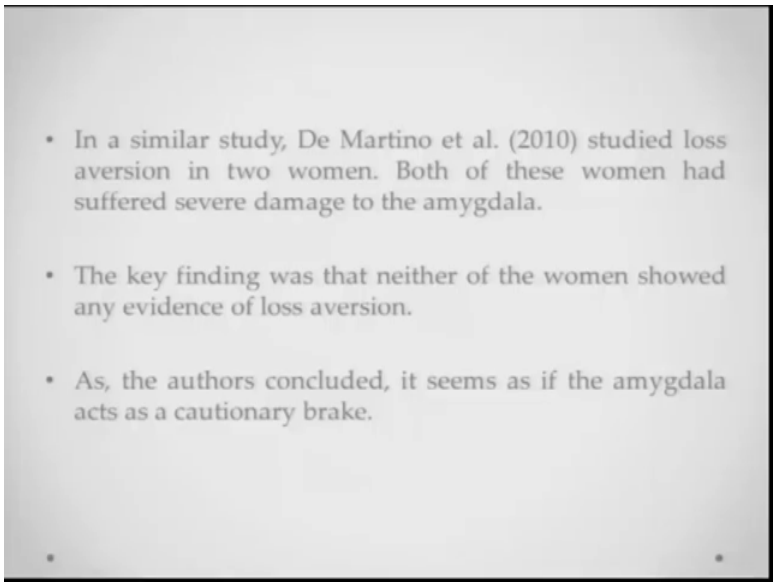

Now, De Martino and colleagues did a similar study and they were studying loss aversion into women and both of these women had a extensive damage to their amygdala. So, they are probably deficient add processing and comprehending emotions and the key finding was that neither of the 2 women showed any evidence of loss aversion their emotional processing areas are damaged, the there is no sense of loss aversion in them, even if they are losing or winning they are kind of continuing in the gambling task.

As the authors concluded it seems that amygdala probably acts as a cautionary break you know it kind of tells you that this is the permutation and combination this is how you will feel, if you win this is how you will feel, if you lose and you make the judgment. If the amygdala is damaged nobody is doing these calculations for you and you are probably you know just going on with your handshake maybe I will display again maybe I will play again.

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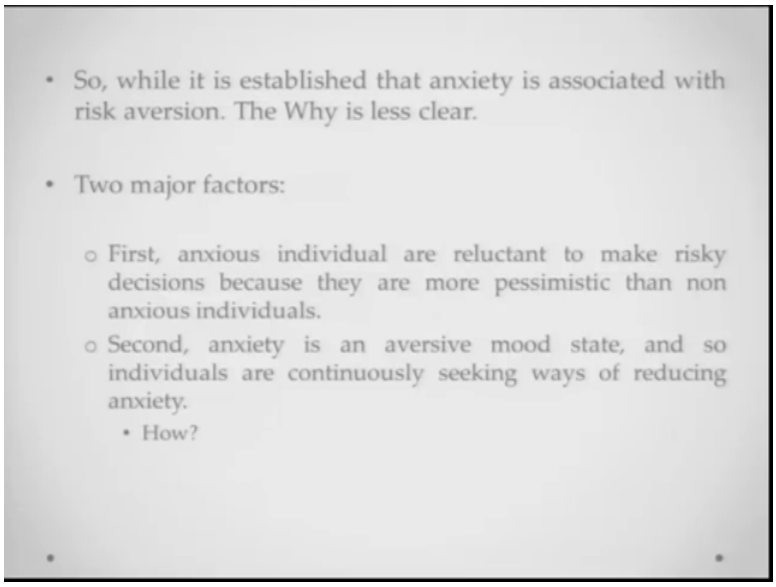

So, while it kind of establishes that anxiety is associated with this aversion the why part is not really very clear there is there is not a lot of results about, why anxiety should be doing this. So, there could be 2 possible factors, first is that yes an anxious individuals are reluctant to make risky decisions because anyways they are more pessimistic about the, you know future than the non anxious individuals. The other thing is that you know anxiety is an aversive of mood state and so, individuals are continuously seeking ways of reducing anxiety what could be these ways that people look at reducing anxiety the there is one clue that I will offer and then you can kind of a make these judgments.

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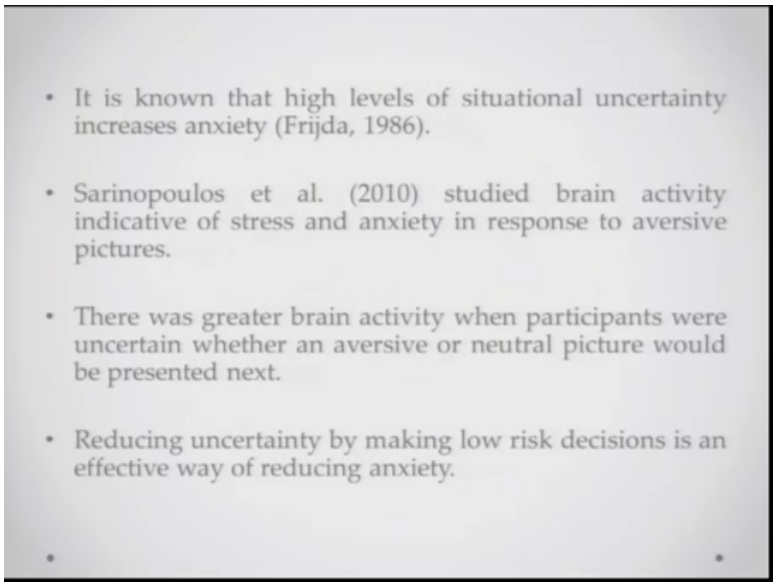

So, it is known that high levels of situational uncertainty increases anxiety, now the factors in betting scenarios on in gambling scenarios there is; obviously, this heavy degree of certainty. So, what people might be doing is they might be going with the safest bet when they can predict the outcome very well they will if I have not invested I am 100 percent sure that I am not going to lose.

If I am investing I am not really that sure. So, maybe and you know there is this so the notion is maybe these people are trying to make their environments more predictable, a very interesting study was done by Sarinopoulos and colleagues in 2010 they were studying the brain activity indicative of stress and anxiety in response to aversive pictures you know unpleasant pictures.

There was greater brain activity found when participants were uncertain about whether an aversive picture is going to come next or a neutral picture is going to come. So, this uncertainty is showing greater brain activity regions in like amygdala etcetera and this could be one of the reasons why these people are so risk averse why they do not want to take any risks in the first place. So, reducing uncertainty is; obviously, a way of you know is possible by making low risk decisions and is it is a really effective way of reducing anxiety and people who are anxious are constantly trying to come out of that anxiety.

So, this is a little bit about how anxiety might be you know affecting peoples decision making we have done 3 lectures in the week we will continue talking about cognition and emotion in the next lecture.

Thank you.