Advanced Cognitive Processes
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Lecture – 25
Reasoning & Decision Making – III

Hello and welcome to the course Introduction to Advanced Cognitive Processes, I am Ark Verma from IIT Kanpur and we are talking about reasoning and decision making. In the last lecture I talked to you about inductive reasoning and some of the pitfalls that basically occur in inductive reasoning because of various biases that affect our making of decisions.

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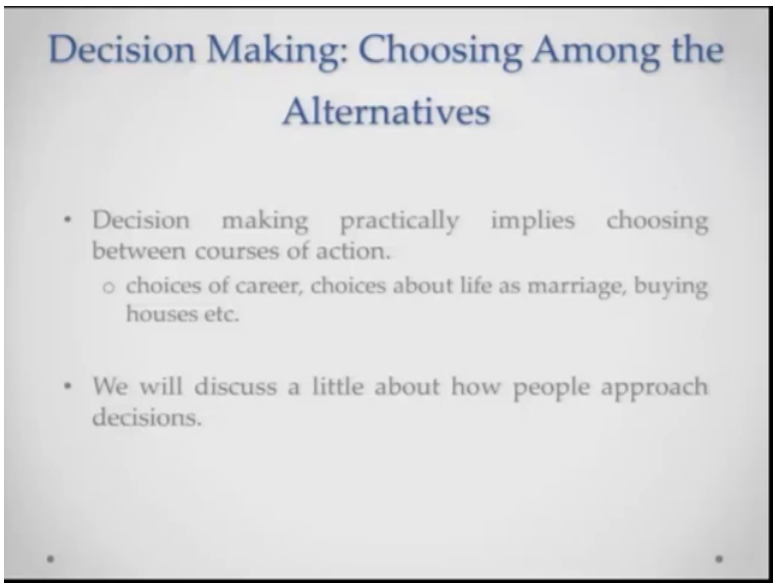

So, I will talk about decision making in this lecture as well, but I will kind of trail evaluate the kind of the ways in which we approach making decisions. So, making of decisions practically implies choosing off between courses of action. What do you want to do? Should I go for this or should I go for that, you know things about choices of career choice about marriage buying a particular kind of a car buying a particular kind of house or not, and the idea is that we are kind of evaluating these choices and we try and actually pick up the ones that are more useful for us, that have the more utility for us that is at least what initial assumption is.

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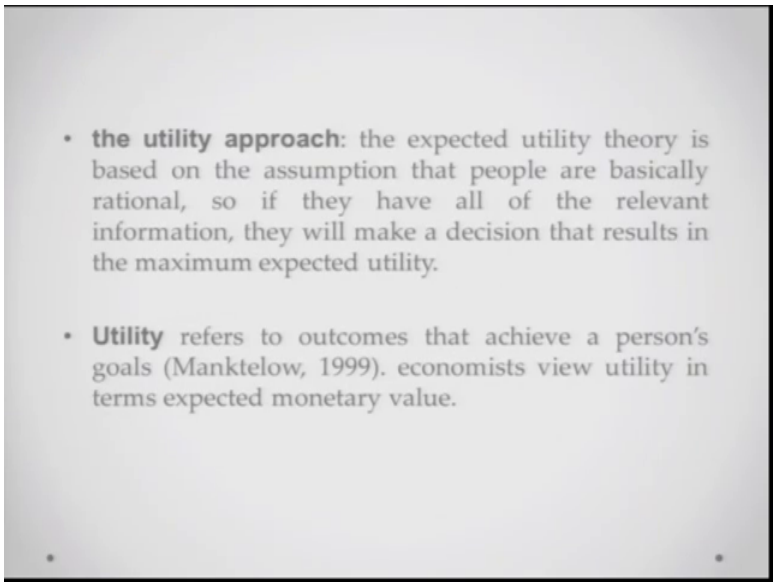

So, let us discuss a little bit about how people approach decisions, where the most common approaches is called the utility approach.

So, the expected utility approach or the expected utility theory is based on the assumption that people are basically rational beings. So, if they have all of the relevant information that is required to make a decision, they will end up making decisions that will maximize the utility ok. In economics utility is referred to as monetary value. So, the idea is that if there is money sort of a decision involved, people will make such a decision that will kind of magnify the monetary output as compared to you know losing money or something like that.

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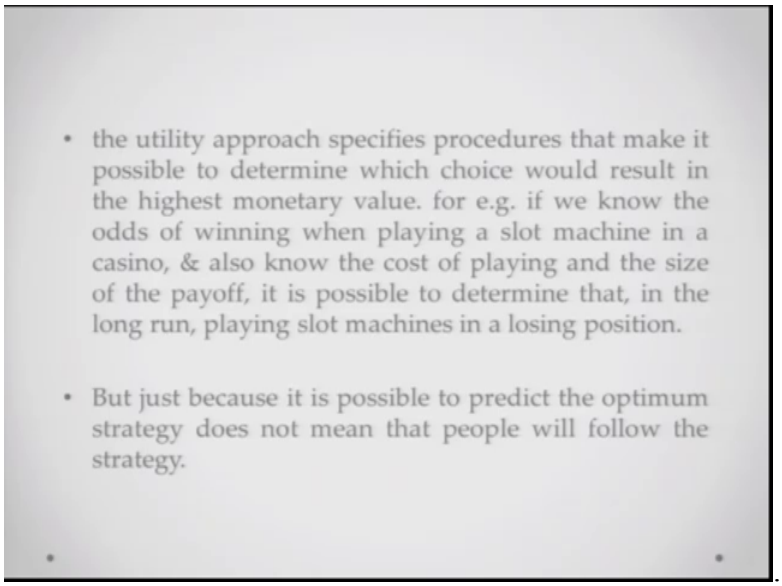

The utility approach specifies procedures that make it possible to determine which choice would result in the highest monetary value. For example, if we know the odds of winning when playing in a in a slot machine, and we know about the cost of playing how much you are going to put, each time you play and the size of the payoff that you know what is the payoff like it is it will be possible to determine the fact that, in the long run playing in a casino or playing against a slot machine would always result in a losing position.

In the in the long run you will lose money instead of gaining money for; however, time you play. But the fact is just because it is possible to predict the optimum strategy does not really mean that people really follow the optimal strategy you know it is just that mathematically this is correct and I know it, but I still do something which is not optimum.

And in today's lecture we will try and see why you know why and what kind of processes intervene in us making decisions which are not optimal.

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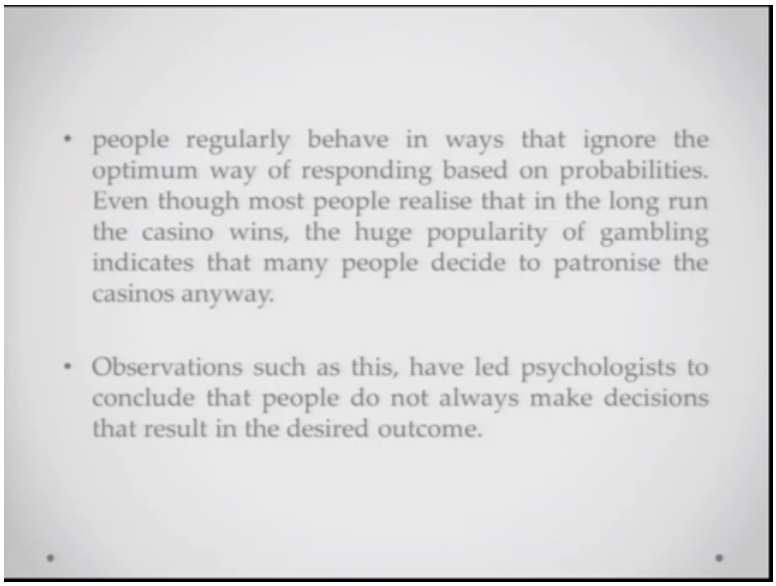

So, people regularly behave in ways that ignore the optimum way of responding to probabilities. Even though people realize most people realize that in the long run the casino is actually the winner, the you know the huge popularity of gambling indicates that people decide to patronize casinos anyway. You know people in the long run know that you know a high consumption of alcohol would lead to diseases and stuff like that, high consumption of you know junk food would lead to disease just like it, but these things are anyways popular and people are using it and they are you know popular getting popular by the day.

So, observations such as the ones I was talking about, have basically led psychologists to assume to conclude that people do not always make decisions that result in the desired outcome. What people do not always make decisions that optimize or maximize the utility or monetary value; let us look at some of the other aspects.

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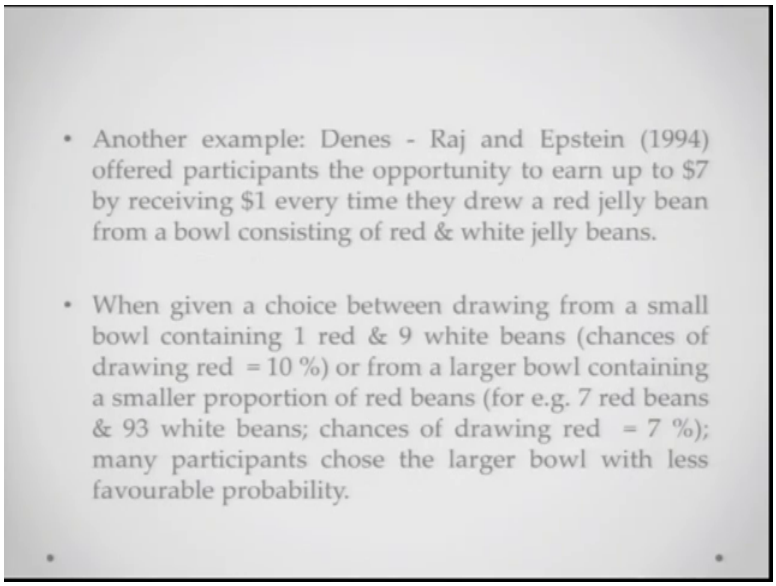

For example: Denes Raj and Epstein. Epstein basically in 1994, they offered participants the opportunity to earn up to dollar 7 by receiving one dollar every time they drew a red jelly bean from a bowel consisting of red and white jellybeans. And there were two balls one had one red and 9 white jellybeans and the other had seven red and 93 white jelly beans.

It was shown that a lot of people actually chose the longer bowl the larger bowl even though the probability of selecting, you know a red bean in the larger bowl was around 7 percent well as in the smaller bowl it was around 10 percent.

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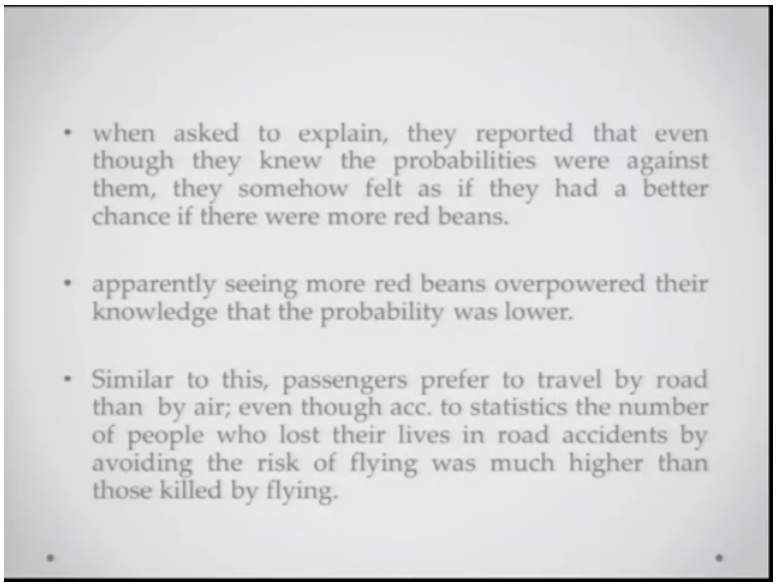

So, a lot of participants you know when they were asked to explain they reported that even though they knew that the probabilities were against them when they take the larger bowl, they have somehow felt as if they had you know a better chance if there were more red beans. You know something is there which kind of is overpowering you know their basic rational judgment.

So, this is interesting, similar to this also I mean you can take another example that passengers preferring to travel by a road instead by air, sort of thing they you know there is there is a better chance of surviving without an accident if I am travelling by road as compared to by air, but the actual data says that more people die in road accidents as compared to people dying in air accidents.

So, again this is also something that people are following while they are ignoring things like base rate and things like you know what is a more probable or not.

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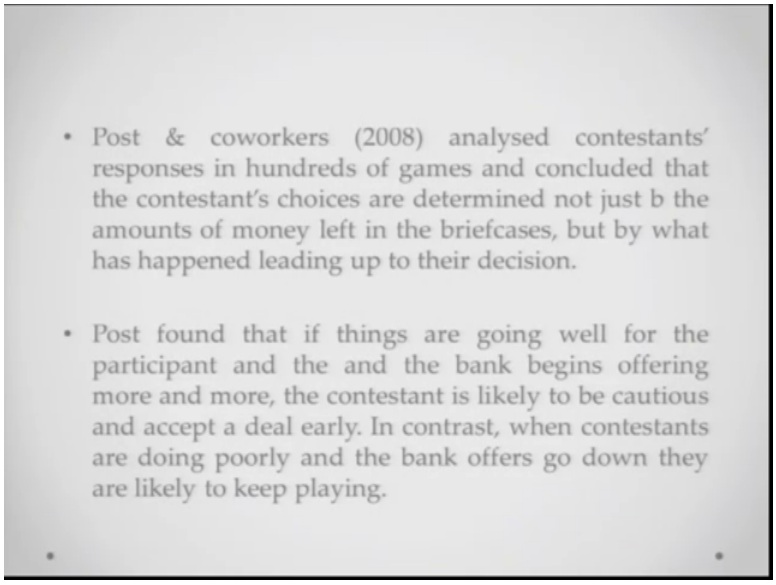

Post and coworkers they analyze the contestants responses and they analyze their responses, across 100s of games and they concluded that the contestants choices are determined not just by the amounts of money that is left in the suitcases or in the beds, but where also what has happened leading to their decision. Till a point I am coming to make decision what some whatever has happened in the past also in some sense will influence whether I will make this better or not. Whose found that if things have been going well for the participant and the at the end the bank you know begins offering more and more, the contestant kind of gets more and more conscious and you know they would accept a deal early.

In contrast when contestants are doing poorly and the bank offers go down, they are more likely to keep on playing. Suppose in a gambling game, if you have been meaning more more and more and you know they there is more and more higher bets on the thing, you would at some point get a bit more cautious you know you are kind of afraid of losing this much. On contrast if you have been losing more and more and you kind of almost have nothing left you would be tempted to play more because in some sense you are hoping that maybe at some point I will win which will kind of overpower all my losses.

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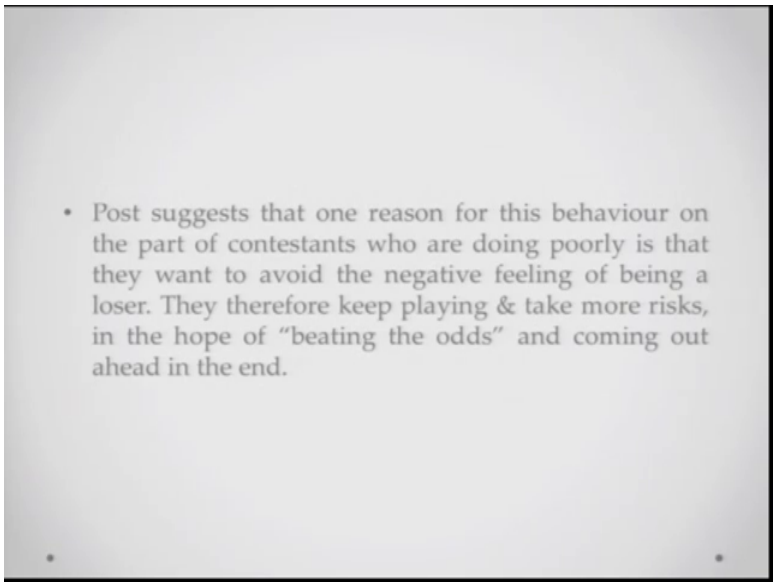

This is again simple way how decision making sometimes operates. So, post suggests that one of the reasons for this behavior in the participants you know who are doing poorly, and they are continuing to play is the fact that they want to avoid the negative feeling of ending up as a loser.

So, the gambler kind of goes on, gambling because at the close of play he does not want to be termed as a loser, he wants to kind of you know end the balance sheet not in red, but you know in green. So, therefore, they keep playing they keep taking more and more risks in the hope of beating the odds and coming out ahead in the end.

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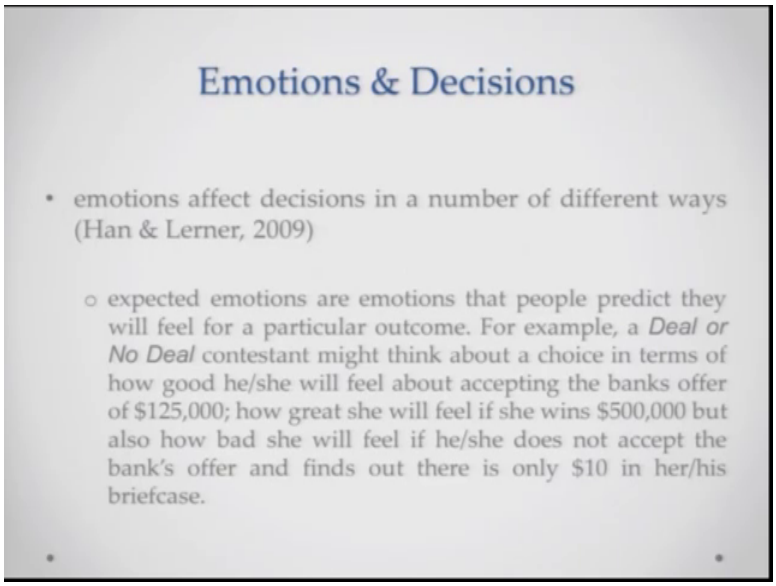

And this is very interesting this is kind of counterintuitive in some sense, but it is rather interesting. What might be playing its role in this; I think emotions play a very big role. So, emotions and there is a lot of research which has shown that emotions do affect taking of decisions in a variety of this, we will talk a little bit about emotions now.

So, one of the kind of emotions I could talk about is expected emotions. Expected emotions is what people predict they will feel after a particular outcome. For example, a deal or no deal contestant might think about a choice in terms of how good he or she will feel when they win dollar 100 25000 you know in accepting the banks offer and they also compare it how great he or she will feel if she wins dollar 5000, but also how bad he or she will feel if she does not accept the banks offer and ends up losing.

So, if the bank is offering a lot of money they will compare that what happened what will I feel if I accept this offer and I bring it they also compare what happens if I reject this offer and I lose the money. So, the idea is what will I you know look like if I have lost what will I feel like if I have lost rather.

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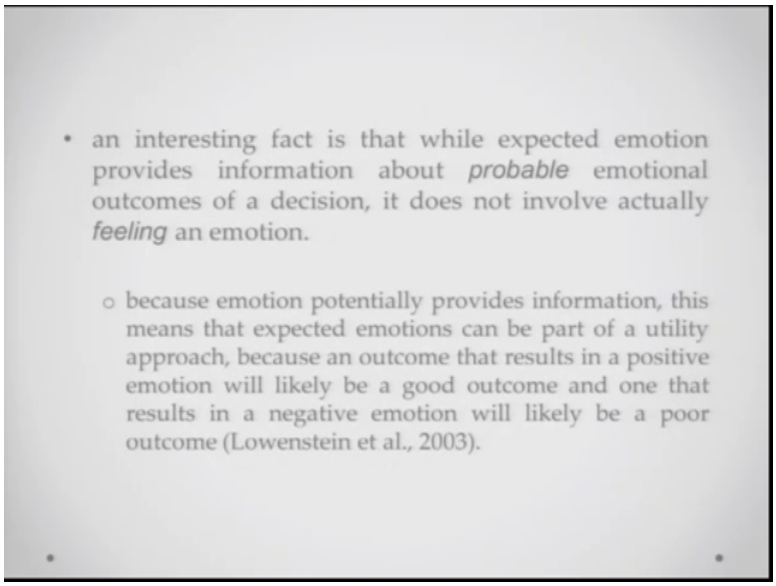

An interesting fact here is that while expected emotion does provide some information about probable emotional outcomes you know, it does not really involve actually feeling you are just hoping that I will feel. So, I feel very happy or I will feel very bad if I am lost. Once that point you know, once that bridge actually comes it is very different to really imagine what you are going to feel and you know these two things might not really have a close correspondence because expected emotion is expected emotion you are not feeling that emotion at that point in time.

So, because emotion also potentially provides information, this means that expected information expect a part of the utility approach you know they can tell you something they can be a factor in making the utility decision. Because an outcome that results in a positive emotion will likely be considered a good outcome and one that results in a negative emotion will likely to be you know treated as a poor outcome. So, you kind of you can factor this in your utility decisions.

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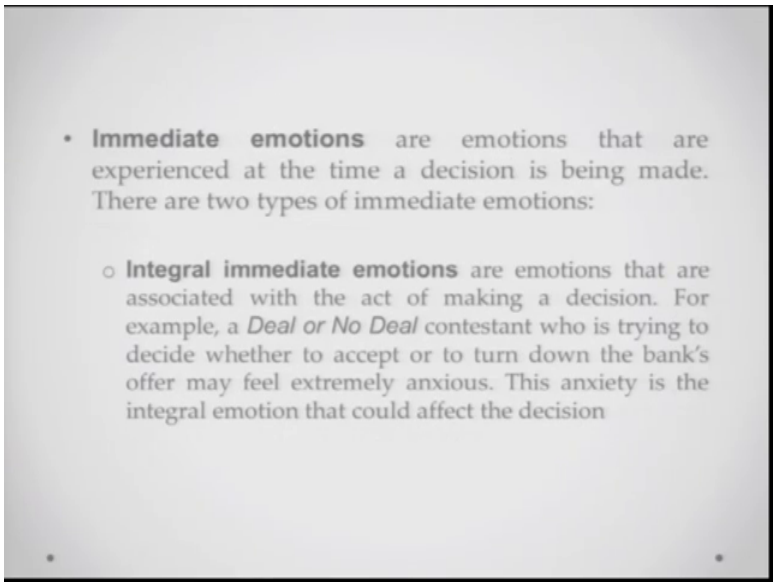

On the other hand you can talk about immediate emotions. Now immediate emotions are emotions that are experienced at a time the decision is being made you know when you are actually going to press the button.

Now, there are two kinds of immediate emotions that we can talk about. The integral immediate emotion is the emotion that is associated with making this decision, whether I am making the correct decision, whether I am making the incorrect decision, how anxious I am feeling because this is such a heavy choice to make how happy that I am feeling is this is a relatively benign choice to make.

So, for example, deal or no deal contestant again I am taking the example of this game, you know who is deciding whether to accept or return the banks offer, might be feeling extremely anxious because this is such a lot of money involved. This anxiety is referred to as the integral anxiety or integral emotion and can play a very important part in affecting the decision.

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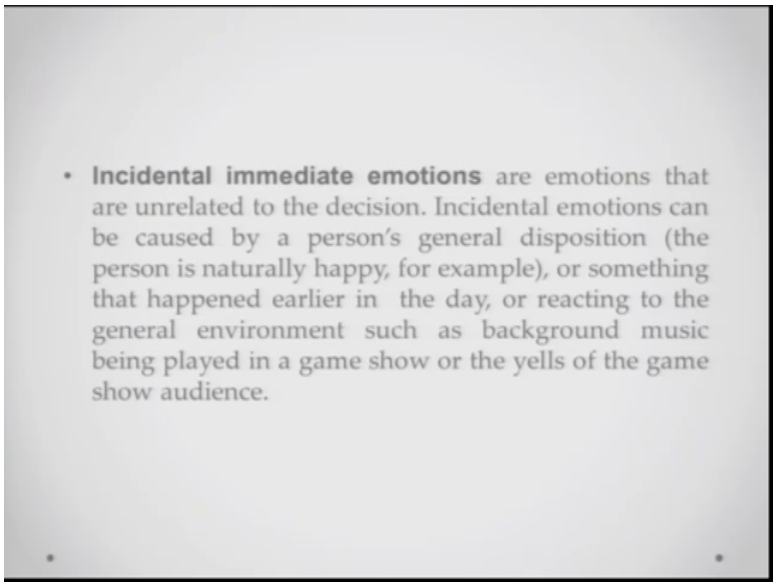

The other immediate emotion that we can talk about is the incidental immediate emotion. Now incidental immediate emotion is not really associated with the task of making the judgment, it is basically how the person has been feeling throughout the day you know how is the person generally. If I am generally a risk loving happy go lucky kind of a person or I am generally a very cautious person, and I am generally very you know conservative in making these choices.

So, incidental emotions again can be caused by a person's general disposition as I was saying or they would also be you know because of the fact that something good happened earlier in the days I am thinking that my day is good I am going to make a heavy decision or something bad has happened earlier in the day, I am thinking and maybe the day is already going bad I will take a more conscious cautious decision here.

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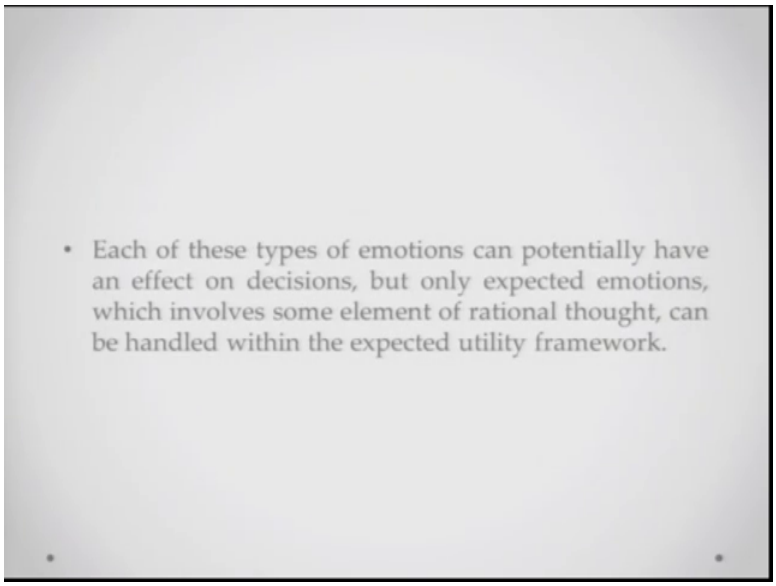

So, this is also something that will play a part. Now each of these type of emotions. Expected emotions, integral emotions and incidental emotions can potentially have an effect on how or what kind of decisions I am going to make. But only expected emotions which involves some element of rational thought can be handled within the expected utility frame because others other two things there is no logic of how you will arrive at those things.

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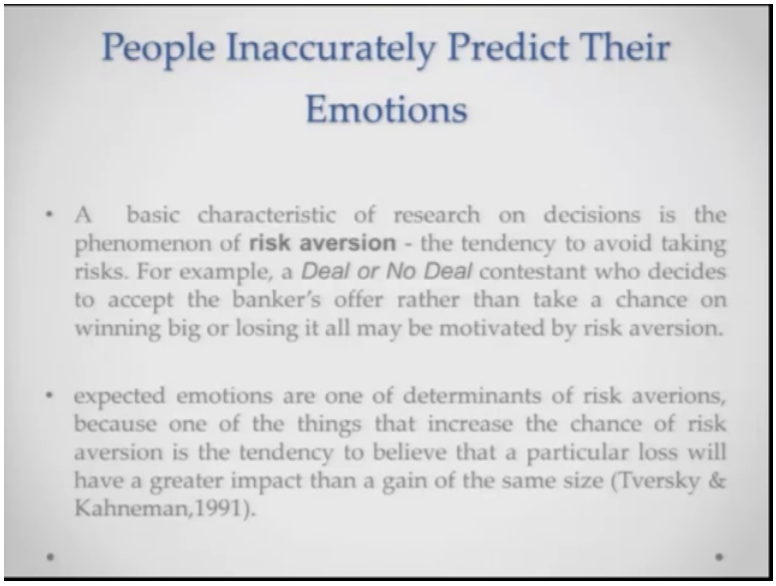

So, let us you know go further with how emotions are going to affect decision. So, one of the factors is that people sometimes in accurately predict their emotions. A basic characteristic of research on decisions basically shows that there is a phenomenon called risk aversion. And there is aversion phenomena is the tendency to avoid taking risks for example, a deal or a no deal contestant who decides to accept the bankers offer rather than take a chance on winning big or losing, it all may be motivated by risk aversion.

You know you do not want to lose everything that you have. So, you want to avoid the risk and you just accept the banks offer and close the play. Expected emotions are one of the major determinants of risk aversions because one of the things that increase the chance of risk aversion is the tendency that a particularly be rated as highly negative you know you will assume that if I lose this I will feel so bad, that I should not lose this and I should take the more cautious choice I should be the more you know conservative choice maker.

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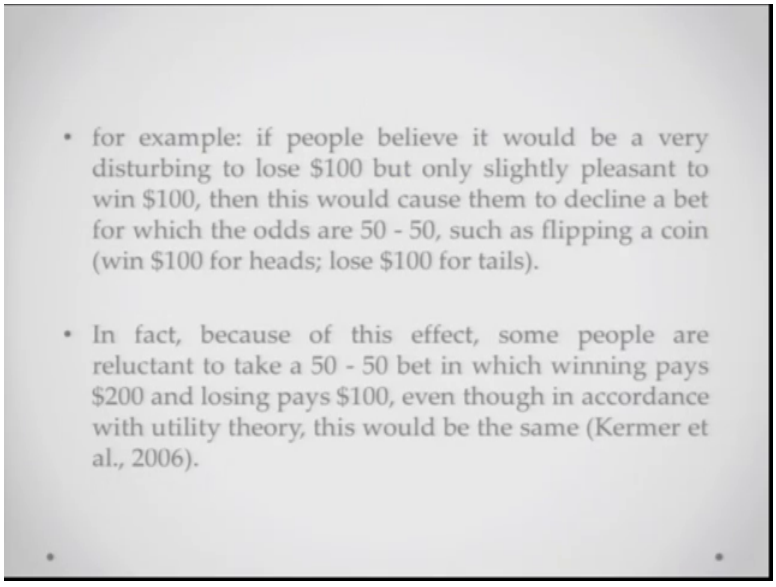

For example lets take a real example (Refer Time: 12:30) if people you know if people believe it would be very disturbing to lose dollar 100, but only slightly pleasant to win dollar 100 and this would cause them to decline a bet for which the odds are fifty- fifty suppose there is a coin toss and dollar 100 for you know heads dollar 100 for tails, I have to give you dollar 100 if you win you have to give a dollar 100 if you lose its fifty-fifty,

but because people think that you know losing dollar 100 is much more bad somewhere to winning dollar 100 they will not take such kind of a bet.

In fact, because of this effect some people are reluctant to take a fifty-fifty bet in which winning pays dollar 200 and losing pays dollar of 100 even though in a accordance with the utility theory.

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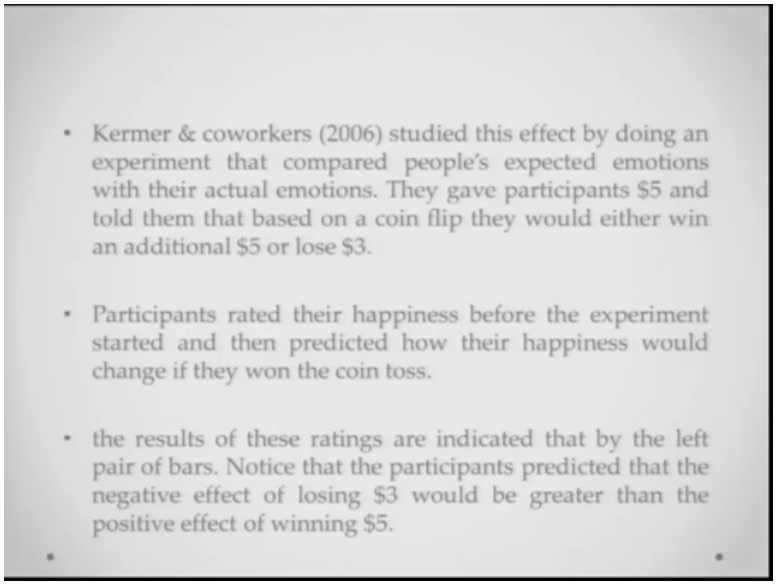

This basically should be the same Kermer and coworkers in 2006 they wanted to study this effect by doing an experiment and come they basically wanted to compare peoples expected emotions with their actual emotions what they expected and what they actually felt they gave my participants dollar 5 and then they told them that based on a coin flip, they would either win another dollar 5 or they would rule loose dollar 3 out of what they have this dollar 5. Participants were asked to rate their happiness before the experiment started and they predicted how their happiness would change if they win the coin toss the results of these ending.

So, I will show you the results in a way, you will see that participants basically rate that they would you know they negative on dueling on losing dollar 3 as compared to they feel much less positive if they win another dollar 5.

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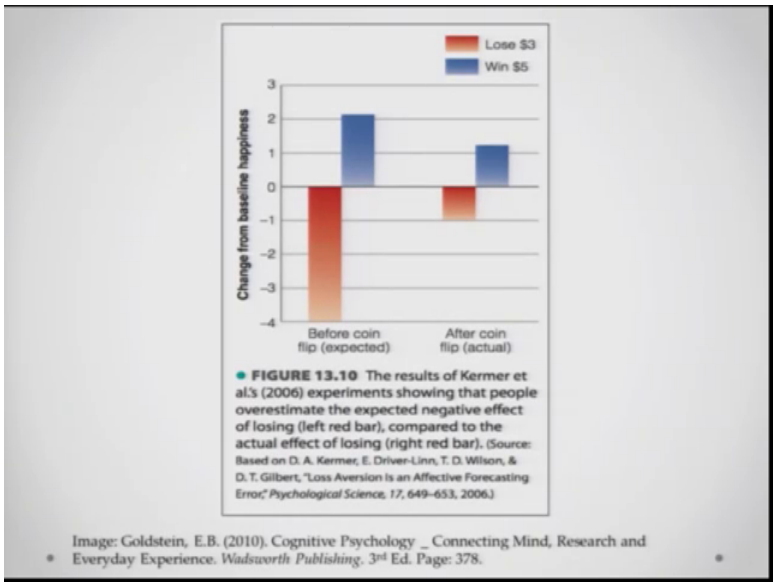

Here you can see, you see that you know participant they rate losing dollar 3 has much more negative as compared to winning dollar 5.

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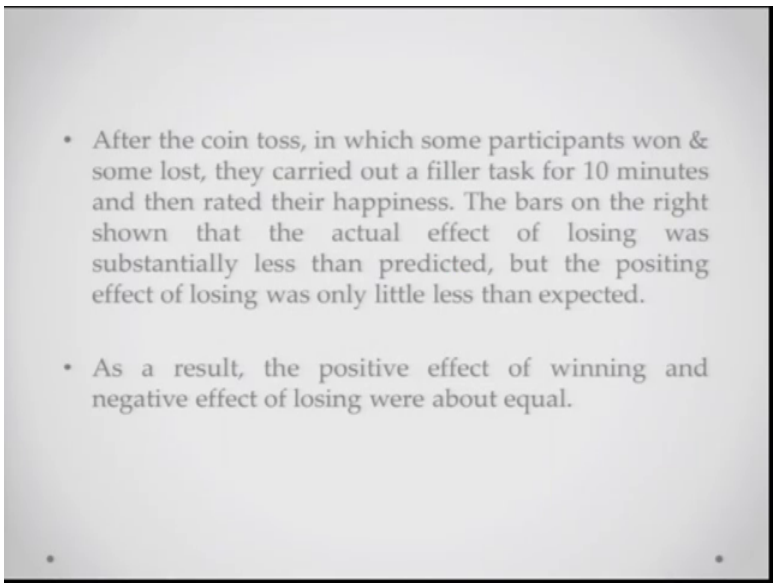

After the coin toss has happened in which some parts one and some loss, they carried out a filler task for 10 minutes and then they were asked to rate their happiness once again.

The bars on the right side here actually show that they actually did feel more positive on winning dollar 5 and they felt much less negative as compared to what they had estimated before the coin toss. They felt much less negative about losing dollar 3 now.

So, you see there is a gap between expected emotions and actual emotions that are being felt, and one wonders you know how this kind of things operate and you know affect our decision making. Certainly we somehow overestimate the you know the we over estimate the cost of losing something the cost of the negative outcome we over estimate that how bad we are going to feel.

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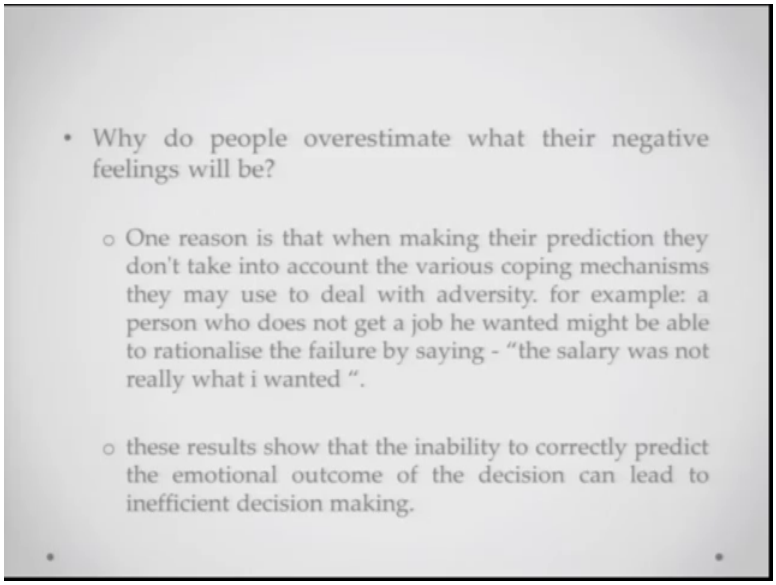

So, why do people overestimate their negative feelings what could be the reason? One of the reason is that when making their predictions, they do not really take into account the various coping mechanisms that they have you know, even if you use that you have family, you have this, you have that and this should help you to deal with adversity. Sometimes people do not take these things into account for example, a person who does not get a job he wanted might be able to rationalize the failure by saying the salary was not really what I wanted.

These results show that you know there is this inability to correctly predict the actual emotional outcome of the decision and that is what is leading people to make so many of the wrong decisions, because they are overestimating negative outcomes.

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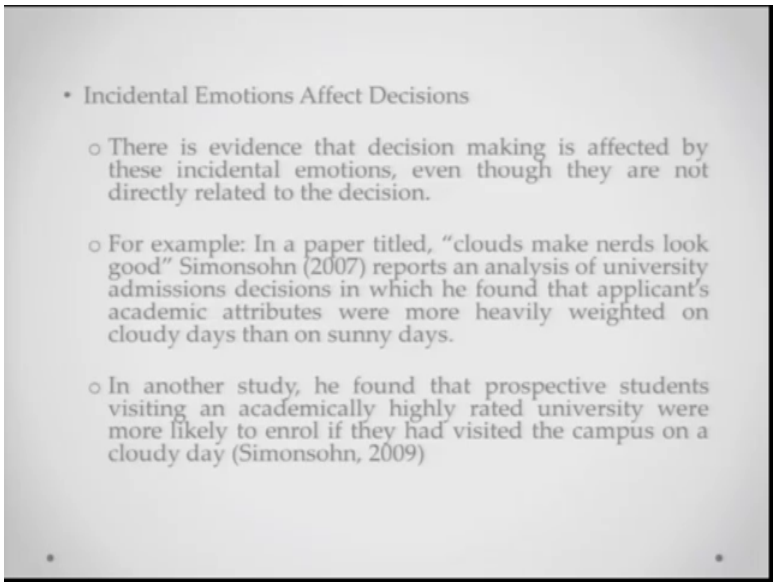

Let us talk a little bit about how incidental emotions might affect decisions. So, what happens is, there is a lot of evidence that that shows that decision making is also affected by incidental emotions even though they are not really directly related to the decision. A very good example is say that there was a paper titled clouds make nerds look good.

Simonsohn in 2007, he reported an analysis of university admission decisions, in which he found that applicant's academic attributes were more heavily weighted on cloudy days than on sunny days. So, in cloudy days basically you know nerds by this paper, their academic attribute attributes were given much more weight as compared to their other attributes you know personality and so on and so forth.

In another study he found that prospective students visiting an academically highly rated university were more likely to enroll if they had visited a campus on a cloudy day. There again there this I mean their rating of the university is also kind of influenced by these things.

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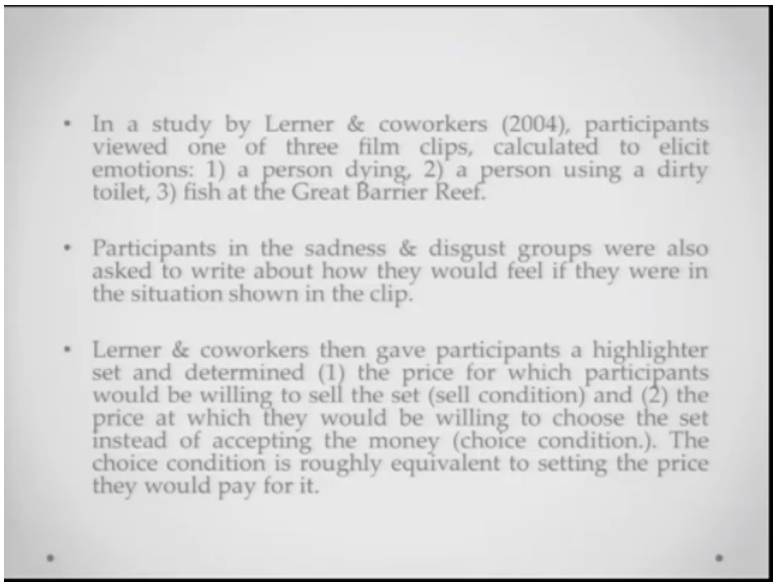

In a different study by learner and colleagues in 2004, participants viewed one of 3 film clips calculated to elicit emotions, they saw a person dying and they saw a person using a dirty toilet, and they saw a fish at the great barrier. If 3 kind of cliffs they were seeing participants in the sadness and disgust groups were also asked to write about how they would feel if they were you know they were in the same situation, how would they feel that you know if they were involved you know in the dying thing or they were involved in using the dirty clip or they were actually seeing a seeing fish at their reef.

Learn learner and coworkers found and they basically then gave participants highlighter set, and they determine the price for which. So, again this is not related we are talking about manipulation of incidental emotion the task is something else. So, learner and coworkers then the participants a highlighter set and they determined the price for which the participants would be willing to sell the set.

So, they were given this and there are that how much you will sell this for and the price that they would be willing to choose the set instead of accepting money. So, you know well they will not, choose not part with the set and refused the money. The choice condition is roughly equivalent to setting the price they would pay for it you know, it is just like as like how much would you pay for it.

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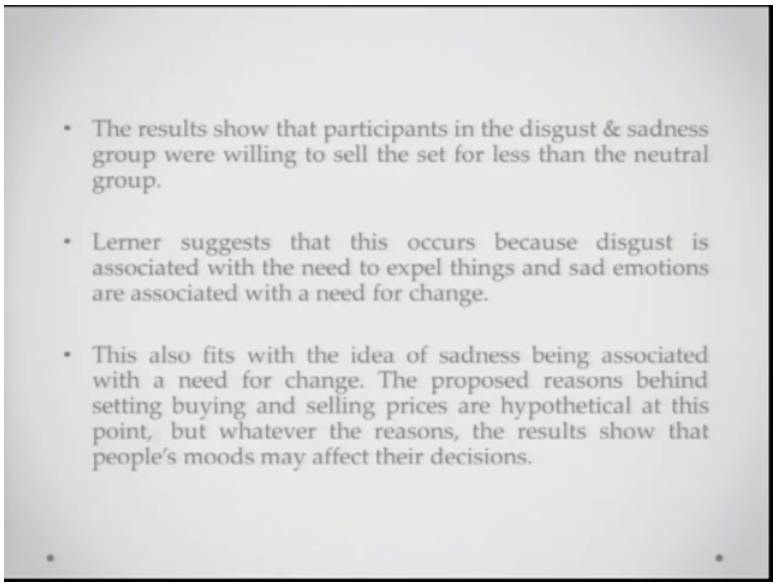

The results show that participants in the disgust and sadness conditions were willing to sell this set for much less than the neutral group. So, there were 3 groups one was the neutral group, one were the sad group and the disgust group, they were because their incidental emotions were generally on the negative side they just wanted to part with the set and the kind of were agreeing to sell the set for much less as compared to the neutral set neutral group.

Then I suggest that this is occurring because disgust is associated with the need to expel things, and sad emotions are associated with the need for change. So, both of these emotions even though they are not really you know directly involved in the pen or highlighter selling tasks, they are in some sense affecting how people are making these decisions. It is also kind of fits with the idea that sadness is being associated with the need of change the proposed reasons behind this setting and setting of buying and selling prices are kind of hypothetical at a hypothetical at this point, but whatever the reasons be the results kind of show that you know peoples moods may really affect their decisions at least that much you can take away from this.

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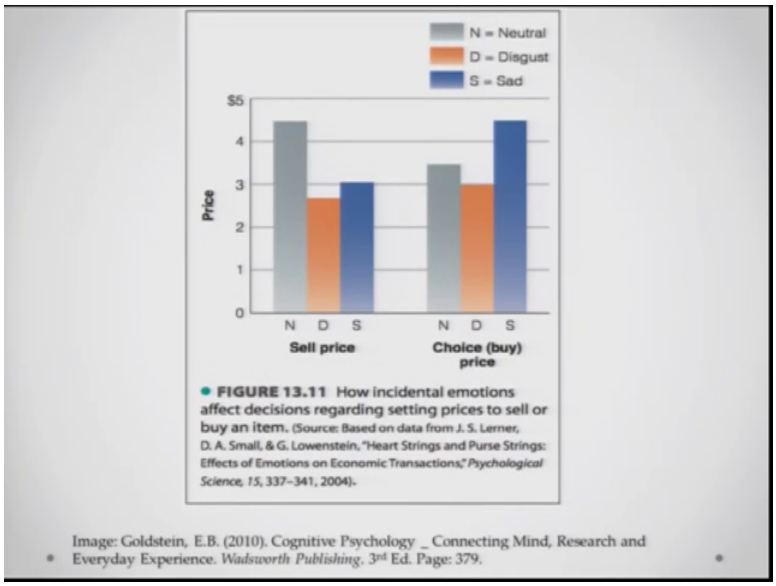

And here is the 3 groups neutral disgusted inside and you will see you know the kind of differences in price you will see that the neutral group is selling for much higher price than the disgusted entire groups, and similarly in the other case.

The choice to buy the sad group is willing to pay more in that sense.

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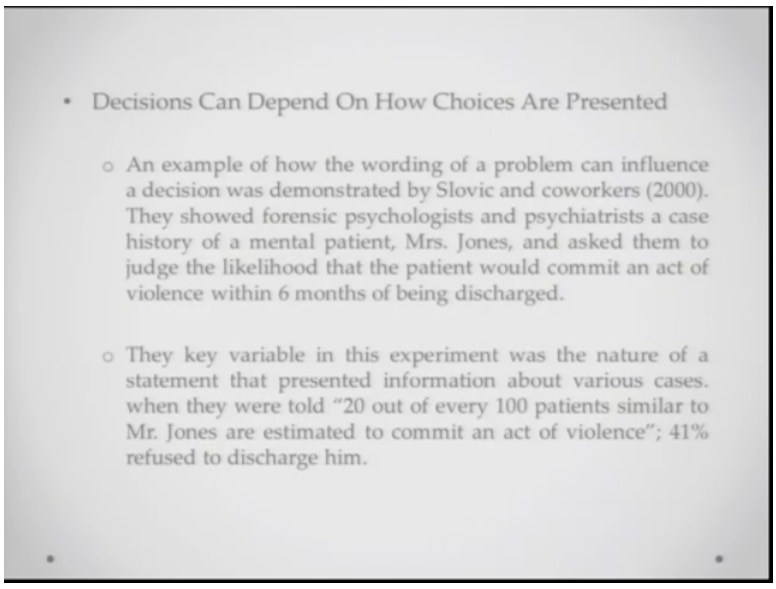

Now, we talked about expected emotions, we talked about incidental emotions, decisions other than emotions can also be affected by how the choices are presented. You know what kind of way you present the choices to people that could also affect. So, for

example, how the wording of the problem can influence a decision and this was demonstrated by a slovic and coworkers in 2000. They showed forensic psychologists and psychiatrists a case history of a mental patient, and this mental patient was named misses Jones and they asking to judge the likelihood that the patient would admit would commit an act of violence within 6 months of being discharged.

The key variable in the experiment was the nature of a statement that presented the information about various cases. When they were told 20 out of every 100 patients similar to misses Jones estimate are estimated to commit an act of violence, 41 percent refused to discharge message shows on.

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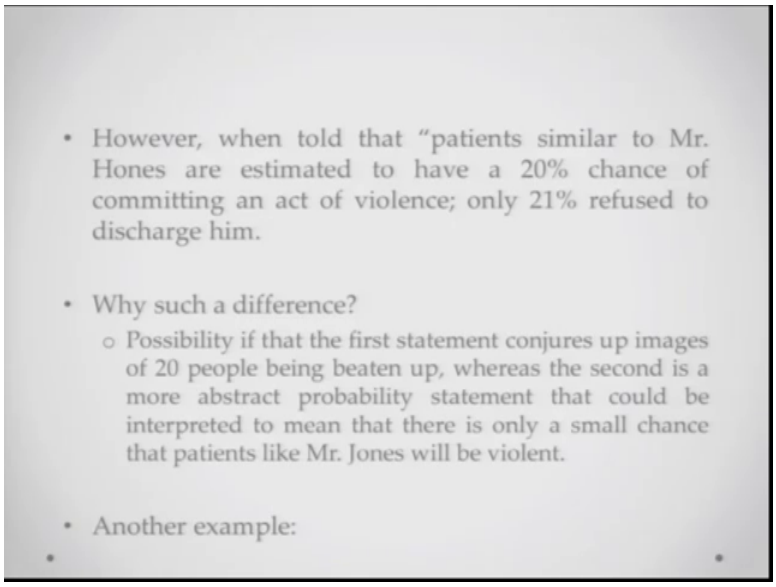

The second case what is happening is when they were told that patients similar to misses Jones are estimated to have a 20 percent chance of committing an act of violence, only 21 percent refused to discharge. So, the idea is because you are framing it differently, it seems that you know if you are presenting they are likely the larger likelihood that this person will commit an act of violence, then people are not revealing to this charge if you are committing if you are presenting in such a way that you know there is less likelihood that this person will commit violence, then more people are willing to discharge.

Why is there such a difference, why is this really happening? It is possible there the first statement conjures up images of 20 people being beaten up, where the second is a more

abstract probability statement that could be interpreted to mean that there is only a small chance that where people like misses Jones will be violent.

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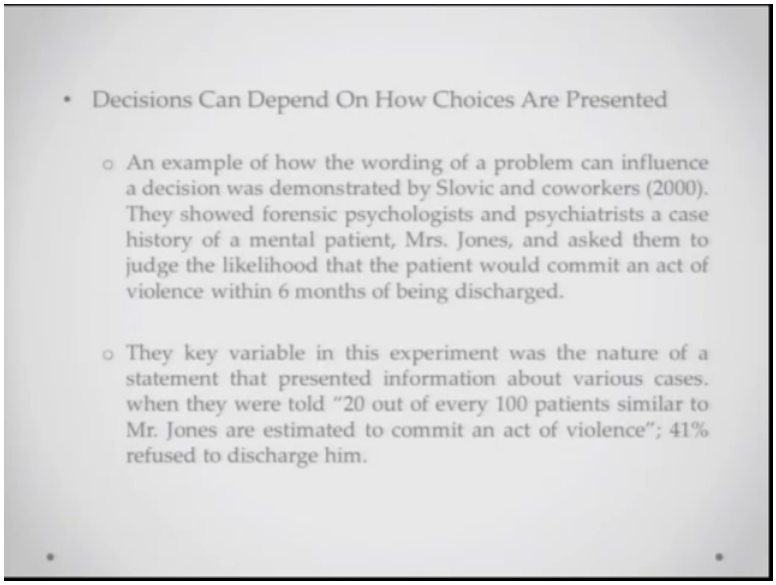

So, you can actually just look at this again, the first statement is 20 out of every 100 patients similar to misses Jones are estimated to commit an act of violence.

And the other is patients similar to misses Jones are estimated to have a 20 percent chance of committing an act of violence. So, the percentage is kind of similar, but it is basically in terms of here also we are talking about 20 there also we are talking about 20, but there we are talking about 20 of 100 which is a more tangible thing. Here in the second signal we are just talking about an abstract probability, which kind of probably makes it less likely that this will happen you know 20 percent out of 100 percent is much lesser as compared to 20 percent 20 people getting better.

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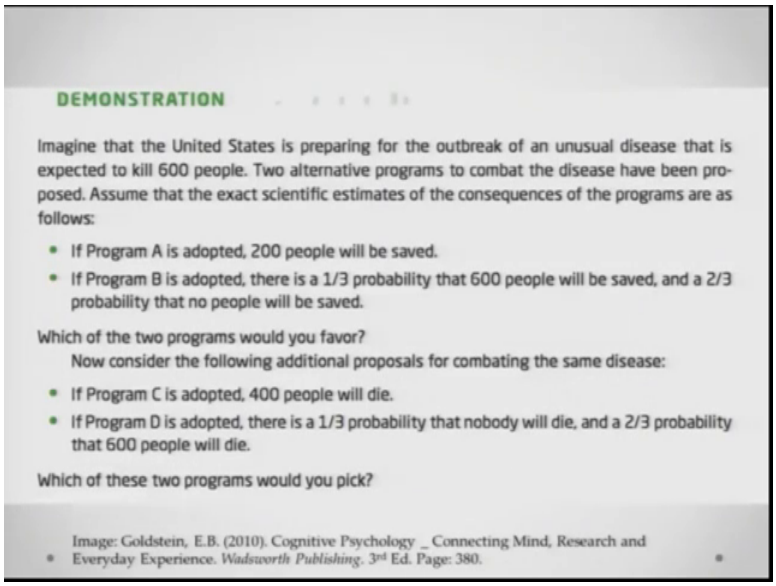

Another example: So, imagine that you know and this is an example from Goldstein's book, imagine that United States is preparing for an outbreak of an unusual disease that is expected to take 600 people. Two alternative programs to combat these diseases have been proposed, assume that the scientific estimates of the consequences are as follows. If program A is adopted 200 people will be saved; if program B is adopted there is a 1 by 3 possibility that 600 people will be saved at a 2 by 3 possibility that nobody will be saved, which of the two programs would you favor?

Now, in a different setting consider the following additional proposals for the same disease, if program C is adopted 400 people will die, if program B is adopted there is a 1 by 3 possibility that nobody will die and 2 by 3 possible 2 by 3 possibility that 600 people will die.

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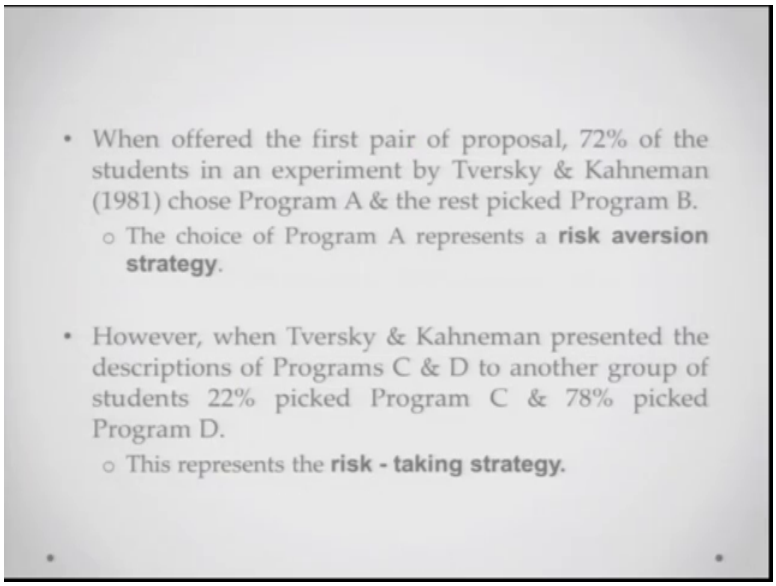

Now, you see that A and B statements and C and D programs are kind of very similar to each other, but when participants are offered the first pair of the proposal seventy two percent of the participants in an experiment Tversky and Kahneman chose program A and the rest chose program B.

The choice of program A basically reflects the risk aversion strategy. In the second one when the when Tversky and Kahneman presented programs C and D to a different group of participants 22 percent picked program C and 78 percent picked program D.

Now, this is basically the risk taking strategy, if you again look at this. if program d is adopted there is a 1 by 3 probability that nobody will die and 2 by 3 probability that 600 people will die. 1 by 3 probability that nobody will die is a risk kind of a scenario even though the odds are kind of similar, but the risk taking strategy is in invoked because the program d is framed in a particular way.

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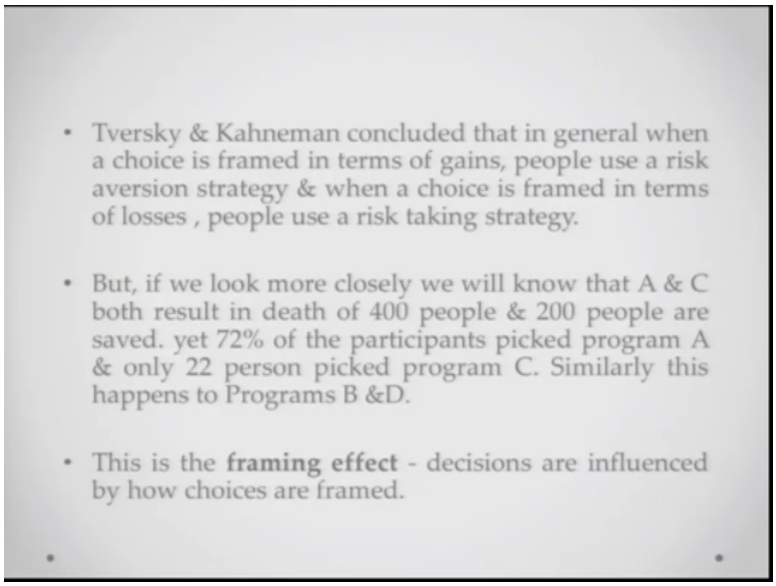

Now, Tversky and Kahneman concluded that in general when a choice is framed in terms of gains, people use a risk aversion strategy and when a choice is framed in terms of losses people use a risk straight taking strategy then we can liken this to the gambler example that I was talking about. But if we look at more closely we will know that a and c both resulted in the death of yeah, that is what I was saying A and C both result in the death of 400 people and 200 people are saved yet 72 percent of people are picking up A over B.

Similarly, C and D are exactly the same, but you know you see 70 percent people take D and you know some of them a lot of them we leave out A. So, this is referred to as the framing effect, the framing effect basically says that decisions and how you are going to make a decision is influenced by the wording or by the framing of the problem.

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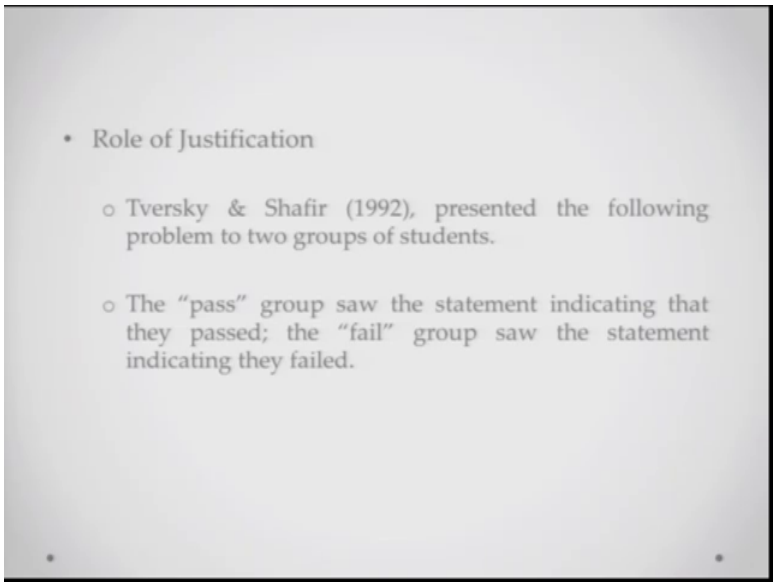

Now, another aspect other than framing effect is the role of justification; To Tversky and Shafir in 1992 presented the following problem to a groups of students. They pass group. So, there are two groups in the past group who are going to pass and the failed group the pass group saw the statement indicating that they passed the failed group saw the statement indicating that they had failed.

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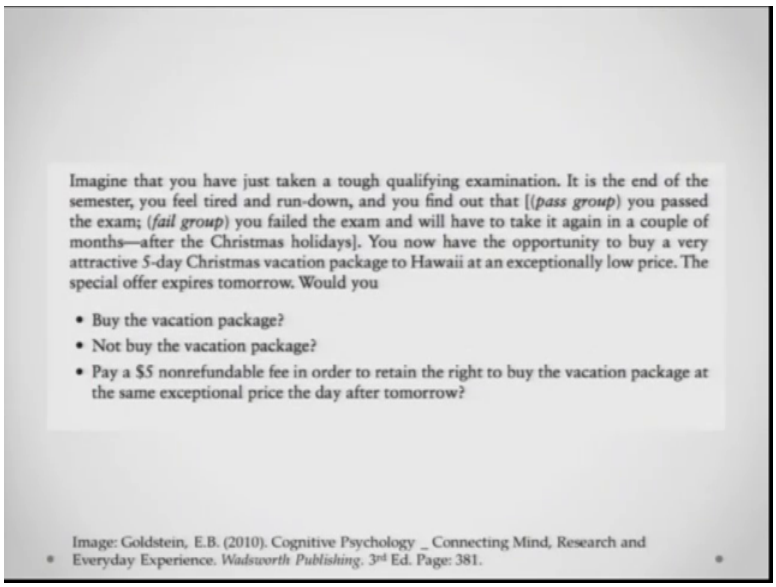

So, just look at this example again borrowed from Goldstein, imagine that you have taken a tough qualifying examination, it is the end of the semester you feel tired and

rundown and you find out that you pass the exam or it is the end of the semester you feel tired and rundown and you find out that you feel the exam, and you will have to take it again in a couple of months after the Christmas party.

You now have the opportunity to buy a very attractive 5 day Christmas vacation package to Hawaii at an exceptionally low price. The special offer expires tomorrow. Now the options are would you buy the package not buy the package pay a dollar 5 non refundable fee in order to retain the right to buy the vacation package or the same exceptional price the day after tomorrow.

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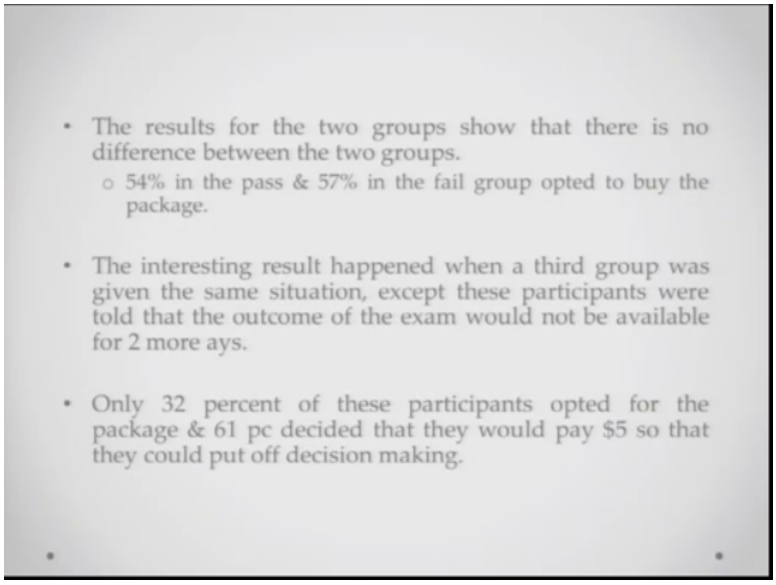

The results for these two groups showed that there is no difference between the two groups, 54 percent in the past group and 57 percent in the fail group opted to buy the package. Now the interesting result must have happened when a third group was given the situation, except these participants were told that the outcome of the exam will not be available for two more days.

So, what happens here? Only 32 percent of the participants opted for the package and 61 percent decided that they would pay dollar 5. So, that they could put off the decision making they are kind of linking the decision to whether they will pass or not you can see this here.

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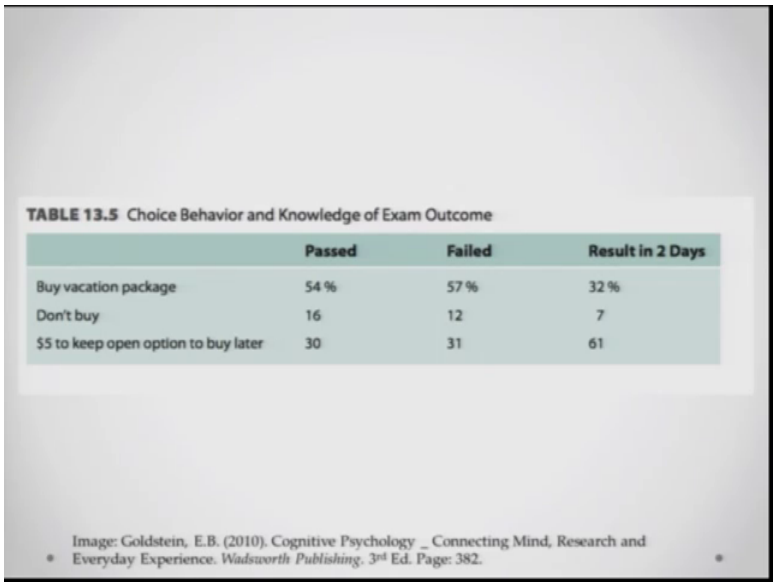

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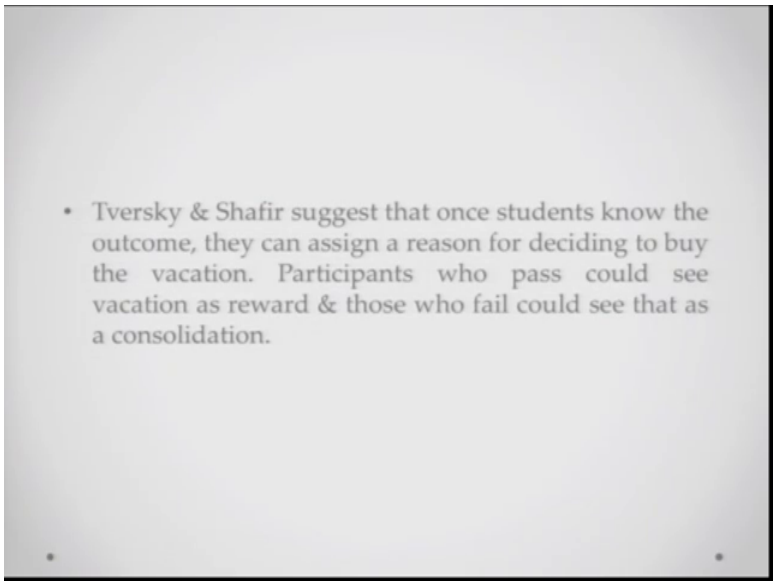

Now, this is basically you know Tversky and Shafir suggest that, once students know the outcome they can assign a justification for buying or not buying. Failed students would say that I failed I just need to go to the vacation come back and I will try harder for the next semester; the passed students will anyways use it as a option for rejoicing that I have succeeded I have passed and I should go away. The third group basically do not have that justification yet and. So, they kind of want to put this off.

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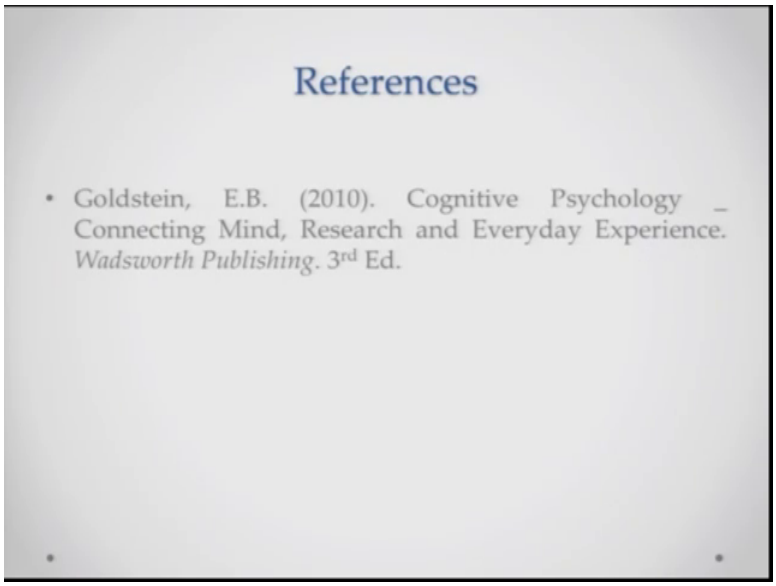

So, I think this was all from me about this the various aspects of decision making, about the various approaches that people make towards decision making, the emotions and utility approaches and so on and so forth. We have concluded our section on reasoning and decision making next week we will begin with a new cognitive function.

Thank you.