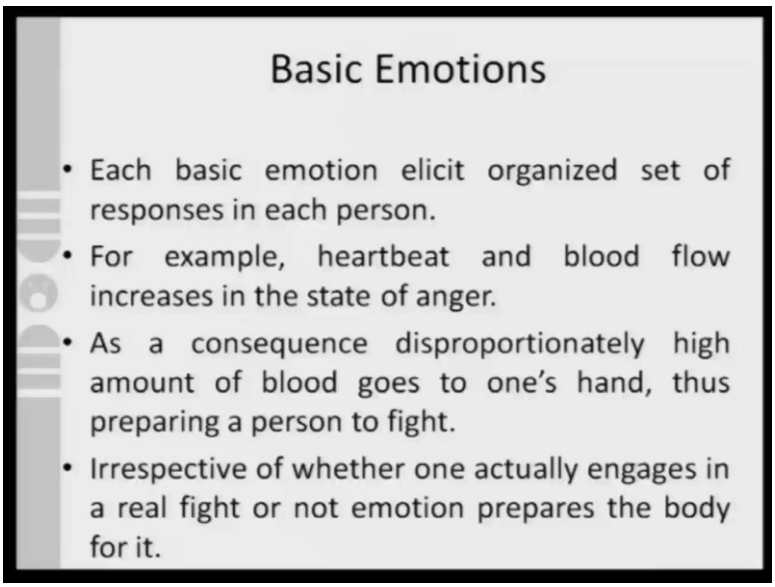
Introduction to Psychology
Prof. Braj Bhushan
Department of Humanities and Social Sciences
Indian Institute of Technology, Kanpur

Lecture – 28
Emotion - Biological Basis of Emotions

We have till now looked at the phase. We have till now looked at the behavior, the culture we have not still entered into the brain. So, right now in this very lecture we would be doing two things we would be looking at the biological aspect of emotional response one and two and most importantly, we would try to understand why is it that human emotions is given. So, much of importance what is it is significance.

(Refer Slide Time: 00:54).



Now each basic emotion that we come forward with is associated with certain degree of bodily activities say for instance heart beat blood flow will increase in the state of anger. For instance, but what happens in the case of anger as a consequence of increase in the heart beat and increase in the blood flow there is a disproportionately high amount of blood that goes into one's hand.

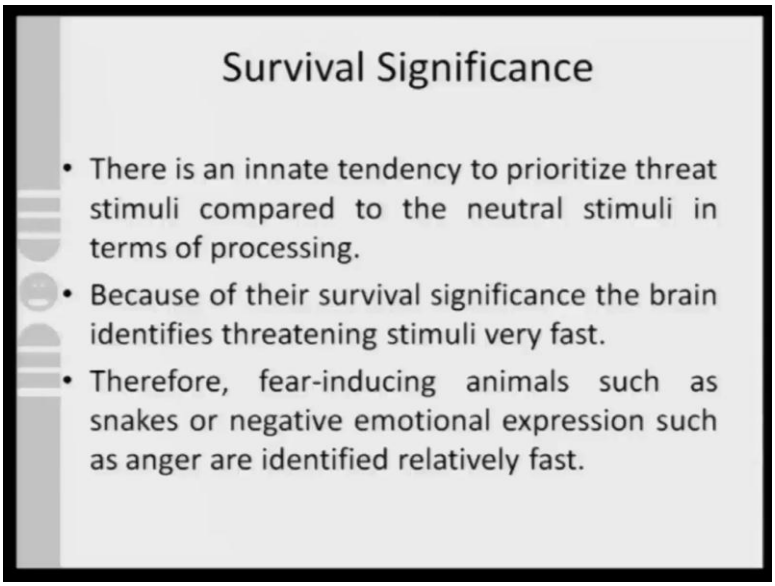
So, if I am extremely angry my heart beat increases the blood flow increases and then you realize that in the hands there is no disproportionately high blood flow which basically has again biological significances survival significance because it prepares you to fight your increased blood flow in the hand prepares you to fight against the external

threat you are angry your anger will make you move towards the source of anger and you will try to know over power the source of anger and there, for you have to be biologically ready else you would be compromising with your survival in order to make you ready for know that engagement in the state of anger, you know the blood flow and the heart beat both increases.

Now if you evaluate this argument with your real life experience many times you get angry, but you do not revert back to the source of anger every time you get angry you do not fight. So, is it that the heart beat of the blood pressure it suggest know what you call gets modified if you plan to fight the blood the blood flow will increase heart beat will increase and, if you do not intend to fight it will not increase that does not happen the biochemical regulation of emotion suggest that whether you fight or not heart beat will by default increase blood flow will by default increase this increase in turn will now get extended to the two arms and you will be ready for fight.

This is an interesting mechanism towards the end we will again look at this very slide trying to say and understand that we are social human beings we are social creatures. So, irrespective of whether you actually engage in the real fight or not the state of emotion prepares your body for it. So, heart beat by default will increase blood flow will by default will increase, but then the social moderator works and that social moderator tells you whether to fight or not; that means, that even though you are biological ready for an act socially your brain confuse you.

(Refer Slide Time: 03:58)

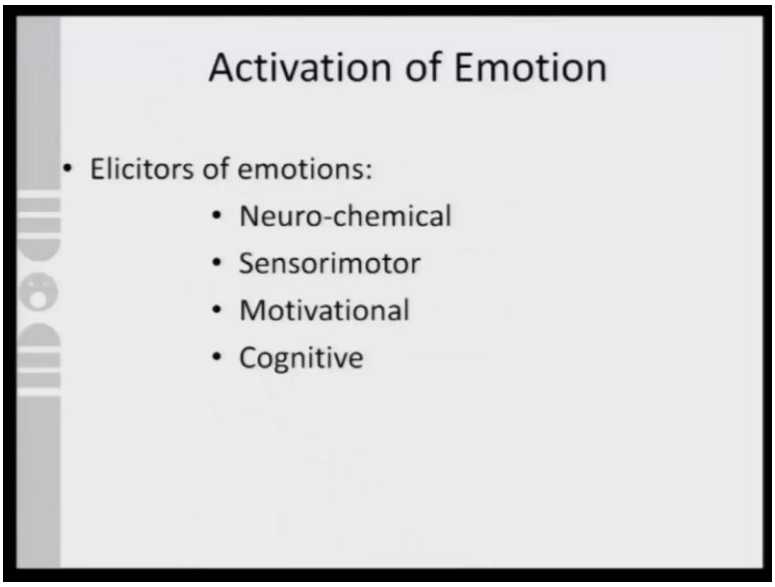


Now there is an innate tendency has to prioritize the threat stimuli compared to the neutral stimuli or any other stimuli. now why is threat given. So, much of importance if I look at an angry creature in front of me I develop great degree of fear and this threat actually has to do with survival significance, I consider that the anger that the object in front of me has towards me and is reflecting at me could know prevent me from my healthy survival and in order to what to call help myself survive this figure induction very fast. it propagates to the brain and on the priority bases the brain processes it and therefore, you would realize that all threats are always processed in priority compared to any other emotion you are say for instance now sitting with your friends you are cutting jokes at each other you are enjoying the evening and suddenly you see a snake in the lawn now the fear inducing animal has made you focus at itself rather than anything else in the environment you will not look at the joke now your processing of the joke freezes at that time when you process the fear at the snake as induced in you ok.

So, this is now an interesting mechanism in terms of emotional expressions. Now emotional expression and survival significance it suggests that there is an attentional preference for such a stimuli and therefore, reptile such as snakes angry human beings all such things will always get priority in terms of processing by the brain now understanding the biological significance of processing certain type of emotion let us look at the activation pattern what Elicit's emotions remember we are exclusively interested right now looking at it from the bio chemical regulation point of view number

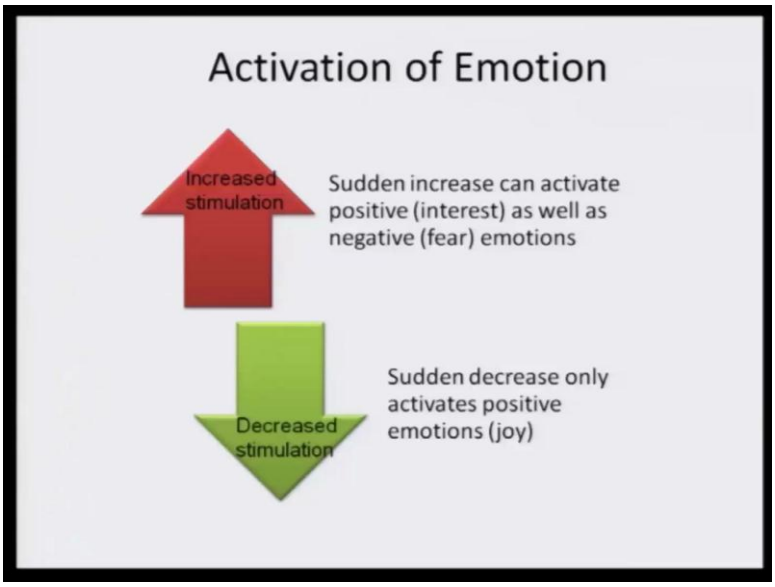
one the Neuro Chemical Bench mark.

(Refer Slide Time: 06:25)



The change in the Neuro-Chemistry, Sensorimotor changes and of course, two behavioral factors the Motivational and Cognitive factors.

(Refer Slide Time: 06:45)

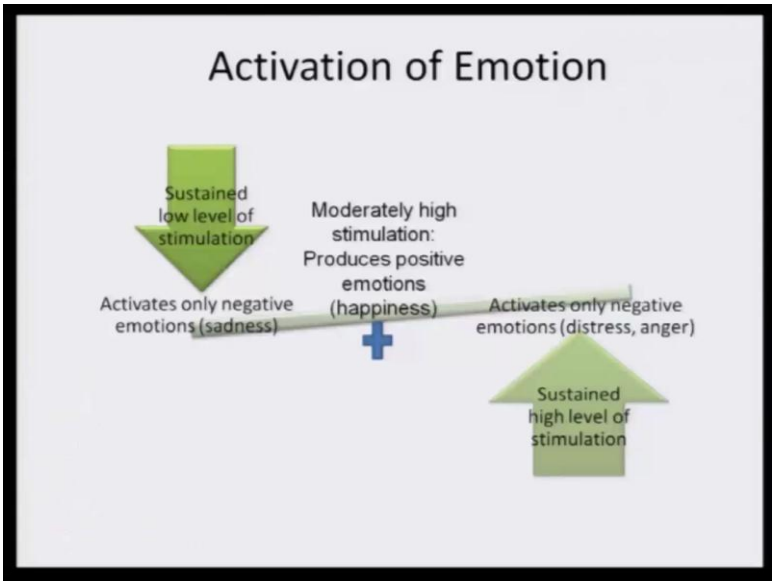


Now, look at the activation pattern and compare it in terms of the increase versus of decrease situation if the stimulation has increased what would happen and if the stimulation level decreases then, what type of emotion they will lead to if there is a sudden increase in the stimulation then it can activate positive as well as negative

emotion say for instance interest happiness these are positive emotion fear for instance are negative emotion, but then sudden increase in the stimulation can lead to either of them know your interest happiness fear all of them are dependent on sudden increase in the stimulation level therefore, increase stimulation sudden increase in the stimulation is going to be either positive or negative emotion it can lead to, but if there is a sudden decrease in the stimulation level then it is by default going to lead to positive emotions.

So, there is an interesting things sudden increase it could be positive it could be negative if it is sudden decrease then it has to be positive emotions only what if the stimulation level is sustained in the previous case what we discussed was either sudden increase or sudden decrease now we are talking about sustained level.

(Refer Slide Time: 08:09)

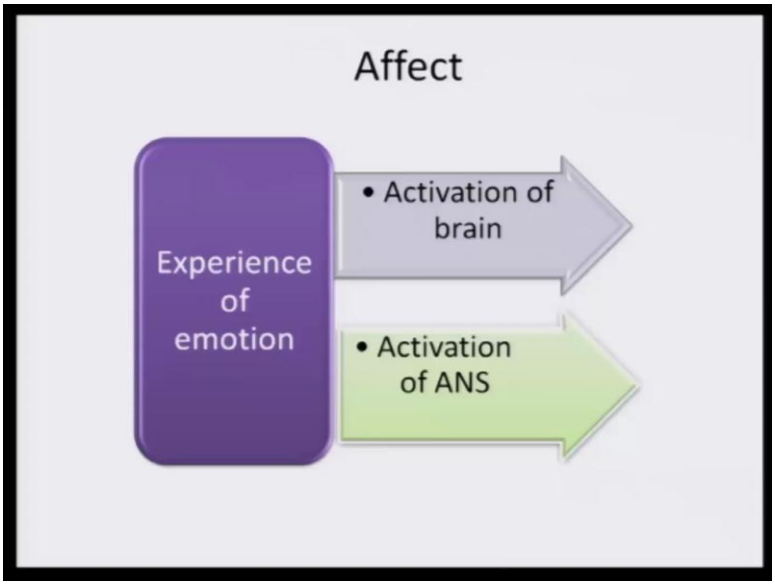


Now if there is sustained low level of stimulation then it can now lead to negative emotions, if there is a sustained high level of a stimulation then it will activate only negative emotions interesting thing you see here sustained low level of stimulation and sustained high level of stimulation and in both the cases it is negative emotions for instance sustained low level of stimulation might say activate sadness. If you take negative emotions like distress and anger it has high degree of stimulation, but it is negative in nature.

So, sustained low and high level of stimulation both by default will have negative emotions, but if you have moderately higher stimulations then it is bound to produce

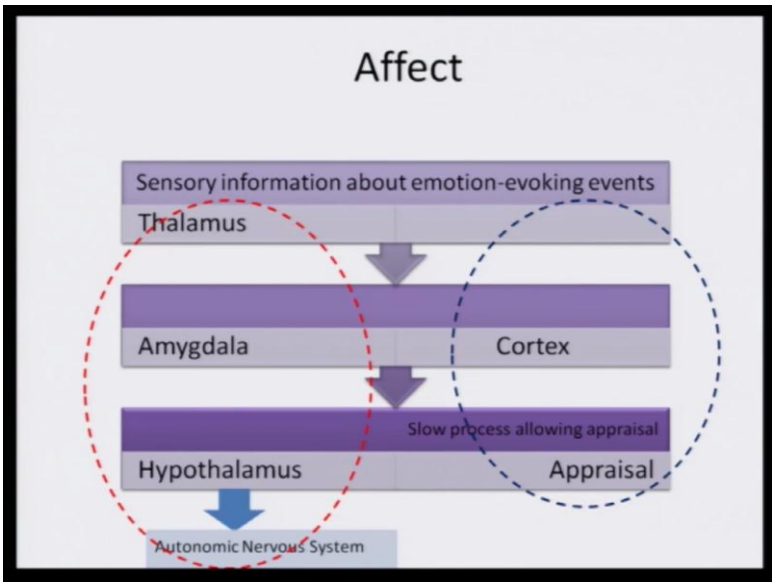
positive emotion happiness for instance now happiness is basically a moderately highest stimulation. So, this is an interesting pattern know, what we saw in the previous line was that if there is a sudden decrease in the stimulation then you can think of a positive emotion and in second case what we are seeing is that, if we do not have sustained low or high level if the level of a stimulation is moderate then you experience positive emotion you do not experience negative emotion, but if high or low degree of a stimulation is sustained then it is only negative emotion.

(Refer Slide Time: 09:40)



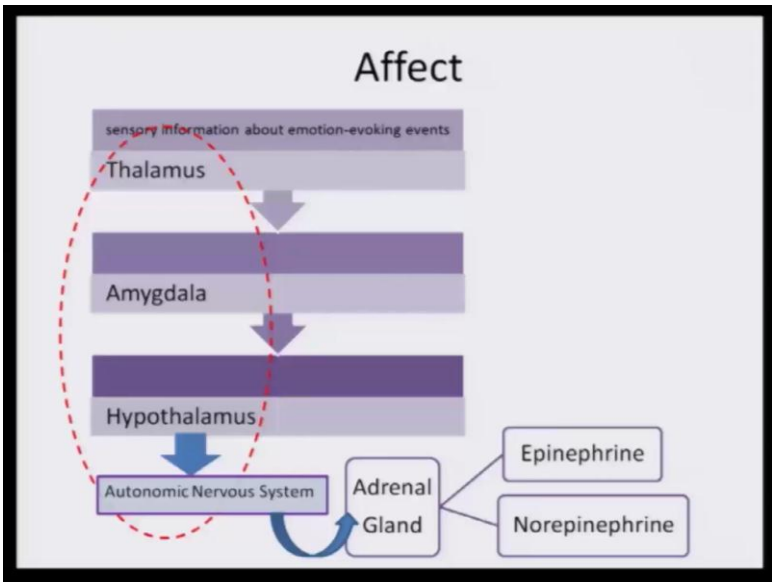
Now, experience of emotion in terms of biochemical regulation will depend on the activation of the brain and the activation of the autonomic nervous system in the beginning itself know we said that the heart beat increases the blood flow increase. So, these are level of changes in the activation of the autonomic nervous system now usually what happens in our day to day experience we have the sensory formation which now invokes emotion in us you remember we had talked about no how sensation is carried in the brain in the first lecture when we started on perception.

(Refer Slide Time: 10:32)



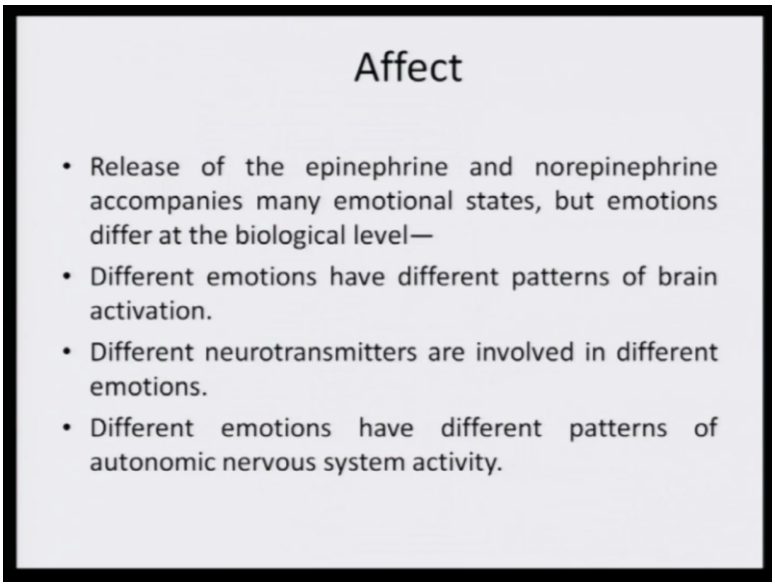
Now sensory information which will invoke emotion has two path ways that it takes in the brain one where you the thalamus the amygdale the hypothalamus which finally, goes to the activation of the autonomic nervous system the second where the sensory information goes to the higher cortical areas and this is a very slow process, but what it does is that it allows you to go for appraisal of the emotion; that means, the two systems are working one which basically moves very fast something that is knows circled here red and you realize that thalamus amygdala hypothalamus the a n s systems get activated this is a very fast system, the slow system which actually now allows you to go for appraisal of your emotion little later we talk about the about the appraisal mechanism also and then you realize that the higher cortical areas are involved it is a slow process, but then once the appraisal is done again it will affect the behavioral outcome.

(Refer Slide Time: 11:44)



So, the first channel that we were talking about once the autonomic nervous system is put in to action adrenal gland comes in to picture and then you have the secretion of epinephrine norepinephrine.

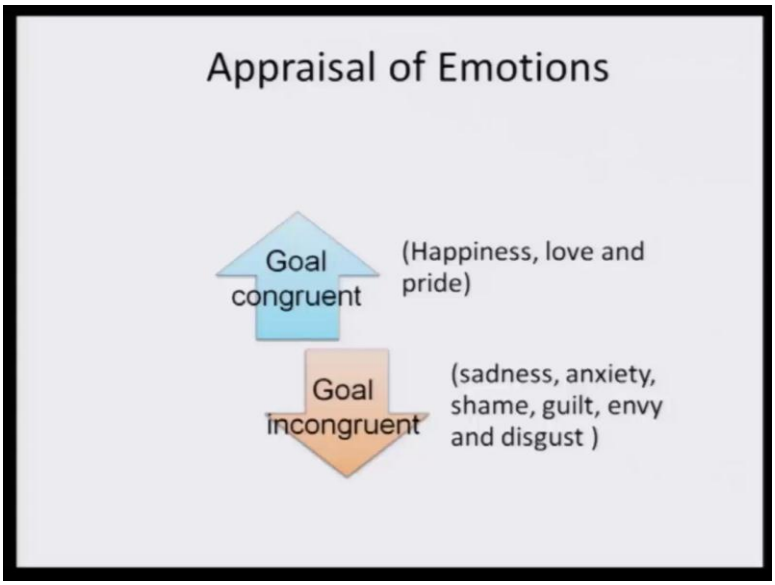
(Refer Slide Time: 11:53)



Now release of epinephrine or norepinephrine it accompanies many emotional states for instance you have different emotions which have different patterns in the brain activation level there is difference even at the level of neurotransmitter you have difference at the level of a n s activity also. But remember one thing the slow process the second channel

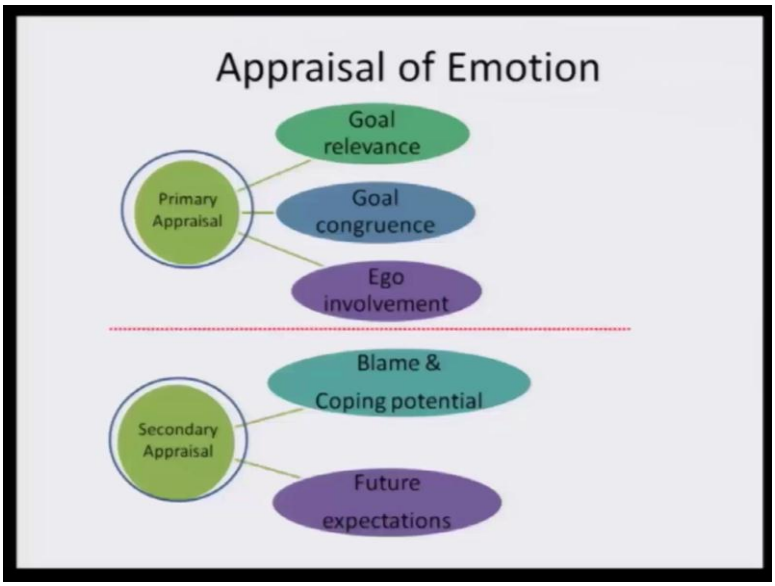
that we were talking about which had to do with appraisal of the system. Now this you know the emotion invoking sensation that had been received by the brain when the high cortical area processes it looks at emotions largely from two perspectives how congruent or incongruent it is to the goal.

(Refer Slide Time: 12:52)



So, you can clearly divide emotions in terms of goal congruent emotions and goal incongruent emotions the goal the goal congruent emotions will involve happiness love and pride emotions like sadness anxiety shame guilt envy and disgust they all become the part of the goal incongruent emotions. Now what happens? The goal congruent and the goal incongruent emotion they are primary know looked upon from two points of view the primary appraisal mechanism.

(Refer Slide Time: 13:10)



And the secondary appraisal mechanism the first filter is the primary appraisal primary appraisal looks at the goal relevance goal congruence and ego involvement these are the only three criteria's secondary appraisal mechanism looks only at two things the blame part who has to be blamed or who has to be given credit. If you think of the opposite of it and the coping potential and then the second filter get the secondary appraisal mechanism uses this that of the future expectation.

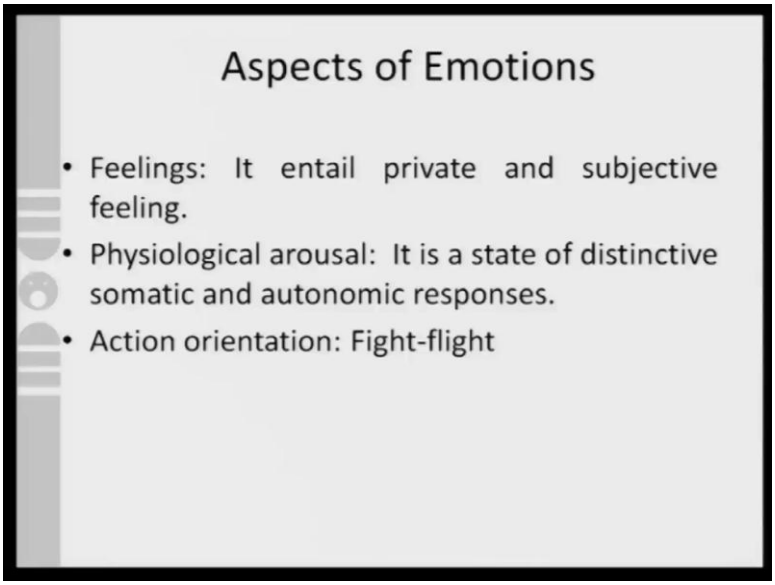
Let us come to primary appraisal first goal relevance means you have set a goal for yourself you remember in one of the lecture we said know that it is attainment of the goal or it is blockade in the process of attaining the goal know that helps you memorize things and this is how emotion and memory they merge together you have set a goal for yourself the emotion that you are experiencing how relevant it is to the goal that you have set for yourself. Whether it is congruent with the goal or incongruent with the goal second important thing and the third is the level of ego involvement whether you find your ego to be involved in that situation or not say for instance, if you find your ego to be involved in the process it is goal congruent it is goal relevant you can think of pride because your ego will get inflated in that process. If you do not consider this to be situation that can boost your ego why will you pride.

So, you understand these things know. So, just goal relevance goal congruence and the level of the degree of involvement of your ego only these three filters are used and this

leads to the primary appraisal mechanism most of our emotions, when they are undergoing the process of appraisal are easily identified easily experienced only on the basis of primary appraisal in certain cases secondary appraisal mechanism comes in to picture where you search for the individual who has to be blamed for it if there is say something that has gone missing then you search for potential person to be blamed who has to be held accountable who has to be held responsible for it and the reverse of it would be credit if there is something that has been achieved then you say yes. I have done it you take the credit you get pride out of it besides blame and pride the second thing is the coping potential if the damage has been caused if someone has been found to be blamed for it can I cope with it can I handle this loss and depending on whether the answer is yes or no. And how capable you find yourself coping with no this situation works as an important factor for secondary appraisal and second important filter for secondary appraisal mechanism is the future expectation.

If same situation I experience in the near future in the days to come would I will be able to handle it that is the future expectation if I find myself capable enough of handling the situation now if it comes on my way then fine I am comfortable with it I cannot have a negative emotions if I think that I lost in this situation and I find myself incompetent to handle this it is comes in the future also then fine I am bound to develop negative emotion in this situation I would be scared of it.

(Refer Slide Time: 17:14)



Therefore, the feeling the physiological arousal and the action orientation the fight flight responses all these three things comes in to picture. When we look at emotion at the end I would like to show you a video footage the reason I am showing you this video footage is that you see people in uniform, who are suppose to execute a command while you are on duty you are performing the profession responsibility emotion were and you have a congruent appraisal mechanism appraisal and then the emotional reaction look at this very episode.

(Refer Slide Time: 18:07)

Look at this man in sky blue shirt who is trying to save himself from this lathi charge or all he attempts turn in vain he is surrounded by police men and then comes this officer he saw this lonely target surrounded by so, many police men and came to stop others from hitting this young men you saw somebody who did not think who did not evaluate the decision of now continuing the lathi charge on a single individual you saw a set of people, who could not stop themselves know in the process and then you saw somebody who had better a control and thought that one single individual should not be made target this was a disproportionate reaction this is now congruent emotional regulation.