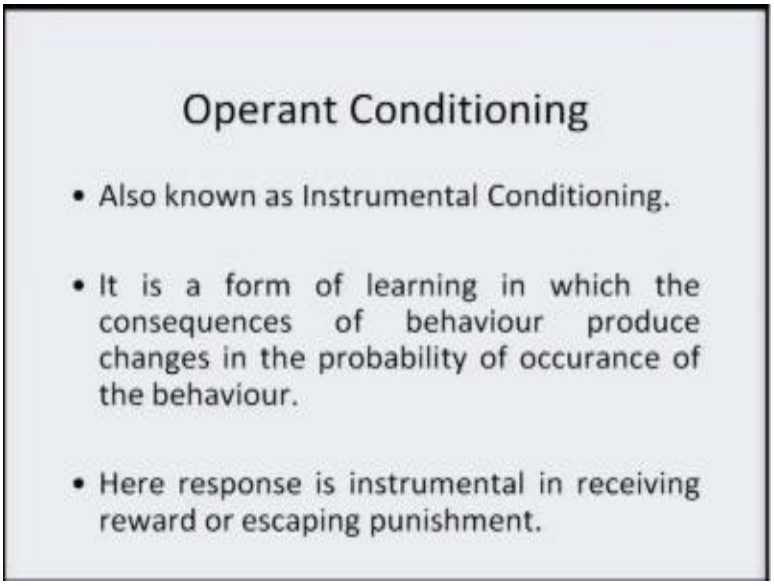
Indian Institute of Technology Kanpur
National Programme on Technology Enhanced Learning (NPTEL)
Course Title
A Brief Introduction of Psychology

Lecture – 10
Learning

by
Prof. Braj Bhushan
Humanities & Social Sciences
IIT Kanpur

Today we are going to talk about the second important theory learning, what is called as operant conditioning.

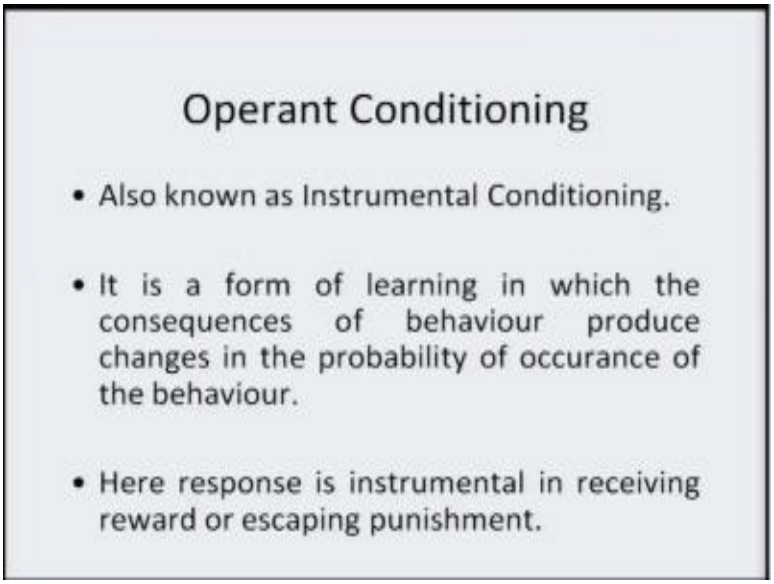
(Refer Slide Time: 00:22)



Operant conditioning is also known as instrumental conditioning, the reason being that – and you will concern or you say the person concerned, his or her behavior or its behavior basically has something to do with the anticipation of the probability of the occurrence okay. So unlike a classical conditioning where you saw Pavlov's dog being passively getting conditioned to salivate on the sound of the bell.

Instrumental conditioning is different, it is basically a form of learning in which the consequence of the behavior produces the changes in the probability of occurrence of that behavior.

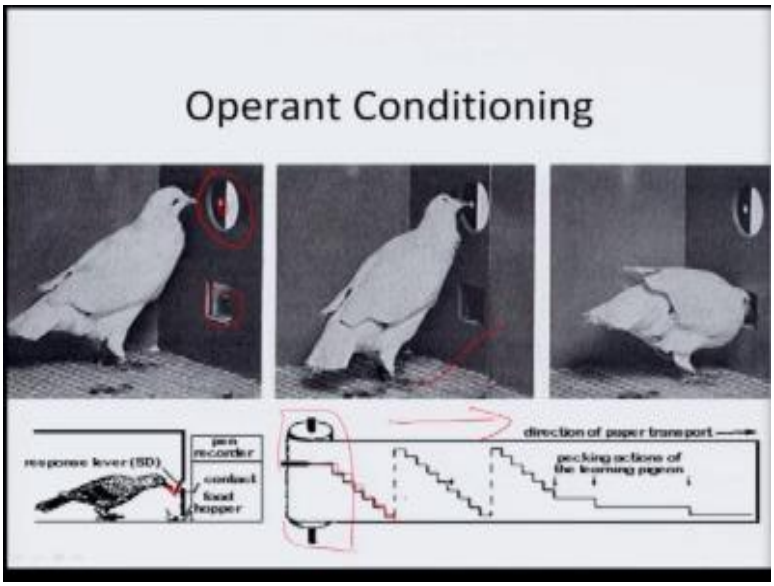
(Refer Slide Time: 01:16)



So the responses they are instrumental in receiving rewards or skipping punishment. So reward or punishment that is something which becomes important. So either you want to receive the reward or you want to skip the punishment and this in turns keeps shaping your behavior and you get instrumentally conditioned. B. F. Skinner was the man who gave this very concept and you saw in the beginning the pigeons at Mumbai. Skinner's operant conditioning experiment was based on the study of pigeons in the lab.

(Refer Slide Time: 01:52)

(Refer Slide Time: 02:17)



So now this was what the experimental protocol was, the pigeon was put in a cage okay. And as you can see here a colored space and exactly in the center here the pigeon was supposed to pick here, and once the pigeon would pick at that very specific location as you can see in second image, this very image okay. Then you realize that the food pallet used to come out. So every time you pick at the right point the food pallet will come, this was the location no, this is the location where the food pallet used to appear.

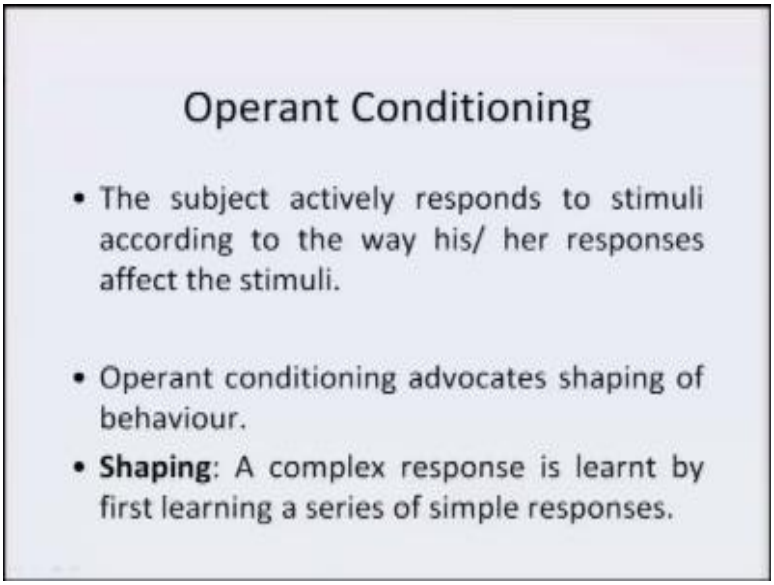
So repeatedly the pigeon was getting trained to pick at a specific location in order to get food. And as you can see here the box was basically designed specifically for this very purpose, and if you see this very image the response lever is put here okay. And then the beak of the pigeon, this very point had basically a metallic surface attached to it which in turn used to help the pen recorder okay.

And here you see the drum here, this paper roll will keep moving okay, in this very direction. So paper will move in this very direction, and then based on the pecking behavior of the pigeon the pen will keep recording it on the paper okay. So here – now what you see here this is basically

the pecking behavior. So this is how in our very beautiful manner, much more objective, scientific manner, BF. Skinner conducted his research on pigeons.

And this gave him precise information as to how reward works in the case of these very pigeons, and this relate to omega theory in learning what is called as operant conditioning.

(Refer Slide Time: 04:17)



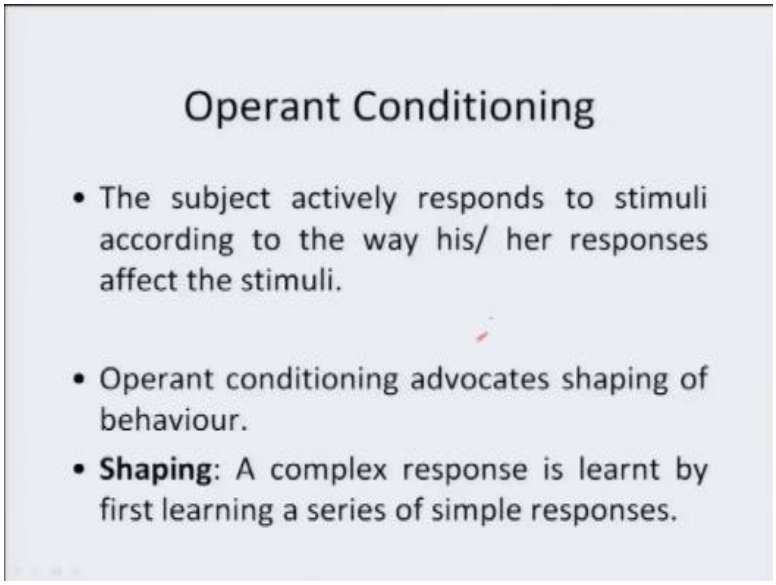
Now in the case of operant conditioning the participants they actively respond to the stimuli okay. According to the way his or her responses affect the stimuli. Therefore it will always know, look at how either the organism is trying to skip the punishment, if it in case it happens to be an obnoxious type of a stimulus, or the tendency of the respondent of the subject, the participant to get rewarded for the behavior that one is coming forward way okay.

That is the reason why operant conditioning basically is considered to advocate shaping of behavior. So how your behavior gets shaped okay and this shaping is dependent on basically the receiving of the reward or skip of the punishment and shaping basically in psychology is considered as a complex response which is learned by first learning a series of simple responses,

so you must have seen toddlers how they learn how to walk okay so you learn small steps first and then gradually you combine them to learn biggest thing.

You learn simple set of responses and then you combine them together, this creates a learning of a complex concept okay. Whole behavior gets now shaped and therefore later on when the organism responds in that very given situation and primarily.

(Refer Slide Time: 05:49)

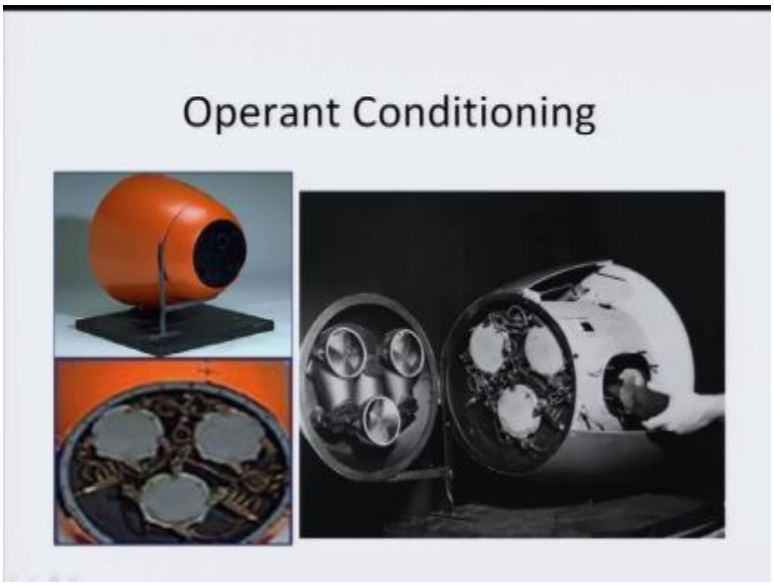


You look at the fact that the entire behavior finally becomes a complex response against a given stimuli.

(Refer Slide Time: 05:58)

One very interesting aspect before we go into the details of operant conditioning was the fact that Skinner also came forward with the idea of pigeon guided missile, remember that was the time when World War two was in progress, what he had done is that once again he had gold electrode that covered the tip of a pigeons break and you see the war head of the missile.

(Refer Slide Time: 06:26)

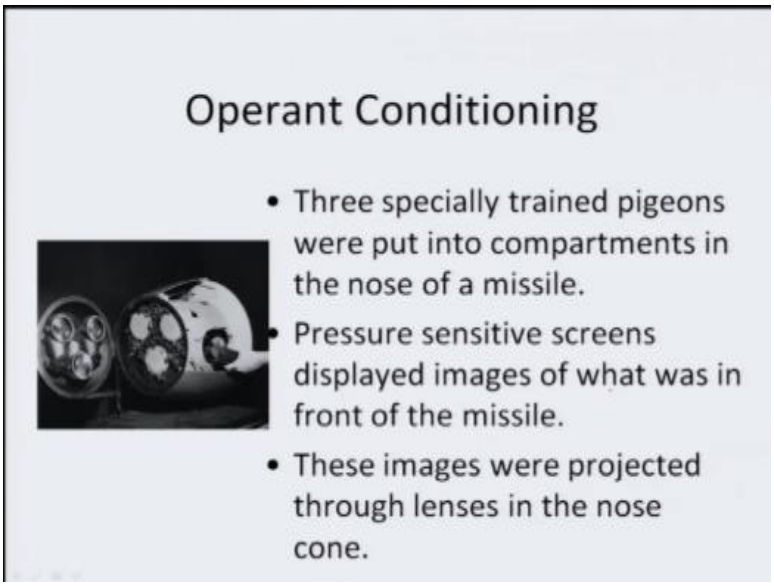


What he had done was as you can see in the figure here okay this is just.

(Refer Slide Time: 06:32)

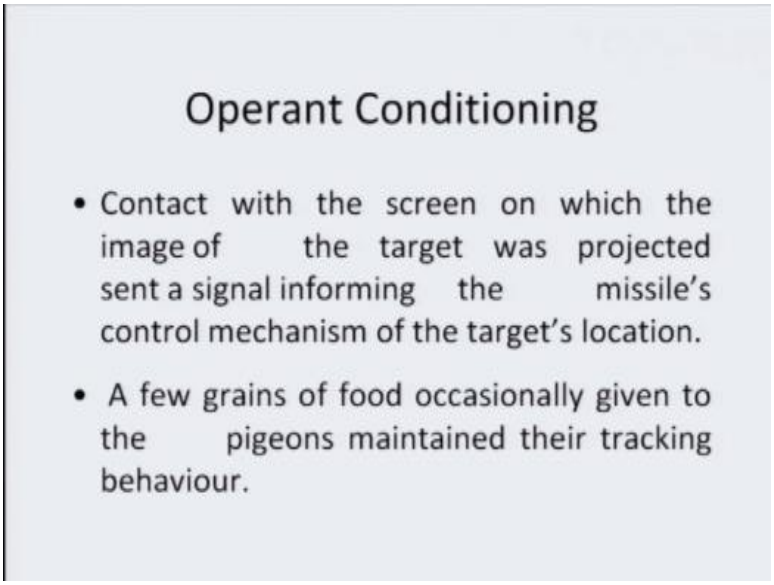
One of the holes where, one of the trained pigeon was being kept here.

(Refer Slide Time: 06:37)



So in the nose of the missile which had three compartments okay three specially trained pigeons they were put there, and the pressure sensitive screens displayed the image of what was in front of the missile okay, these images were projected through the lens in the nose cone okay and because these pigeons were.

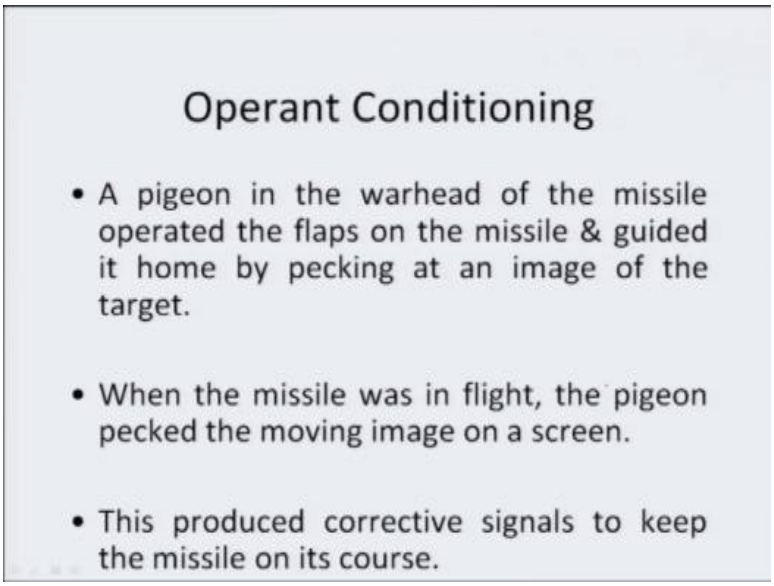
(Refer Slide Time: 06:59)



Specially trained, so what used to happen is that the contact with the screen on the image of the targets was always projected okay and a signal informing the missiles control mechanism to the target location okay and the few grains of the food will occasionally it was given to the pigeons in order to maintain their tracking behavior because the pigeons were trained to pick at a particular location in order to receive food okay.

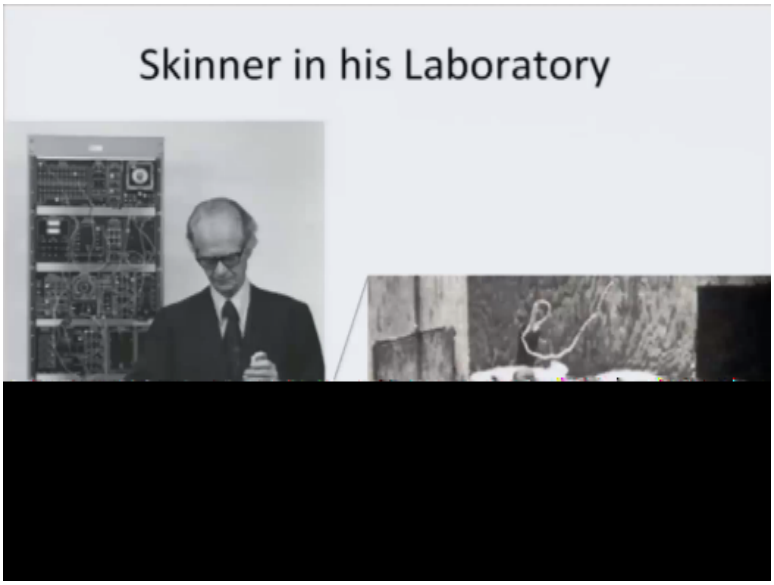
So they kept on now maintaining the trajectory of the missile because their correct picking lead to a positive result, basically they were getting a few food grains.

(Refer Slide Time: 07:41)



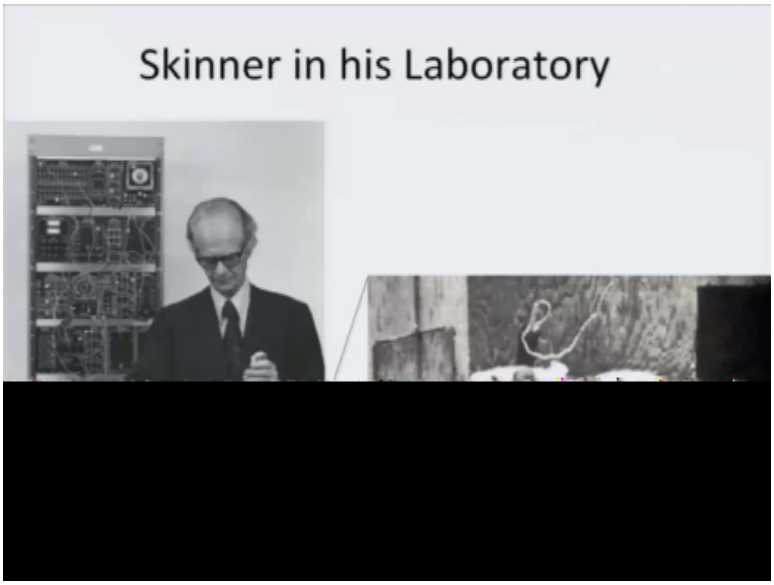
Now the pigeons in the warrior head of the missile operated the flaps on the missile and guided it home by picking at an image of the pecking target and when the missile was in flight the pigeon picked the moving image on screen, so this produced corrective singles to keep the missile on its correct course, you can see on the your screen right now.

(Refer Slide Time: 08:03)



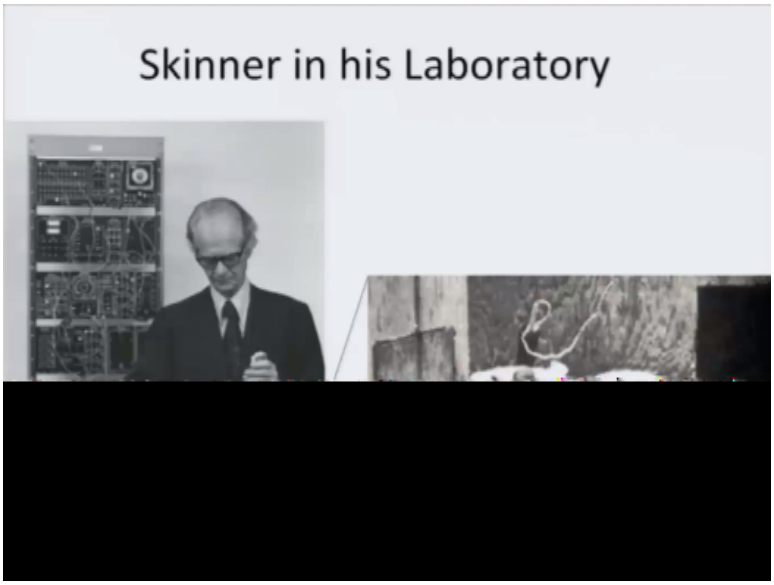
Skinner busy with his instrument, as you can see here he okay he subjected those animals in a particular box which now after his name is nowadays called Skinner box. In the earlier experiment he had the pigeons and you also saw the pigeon guided missiles, now you see white rats being used for experimental purposes okay.

(Refer Slide Time: 08:32)



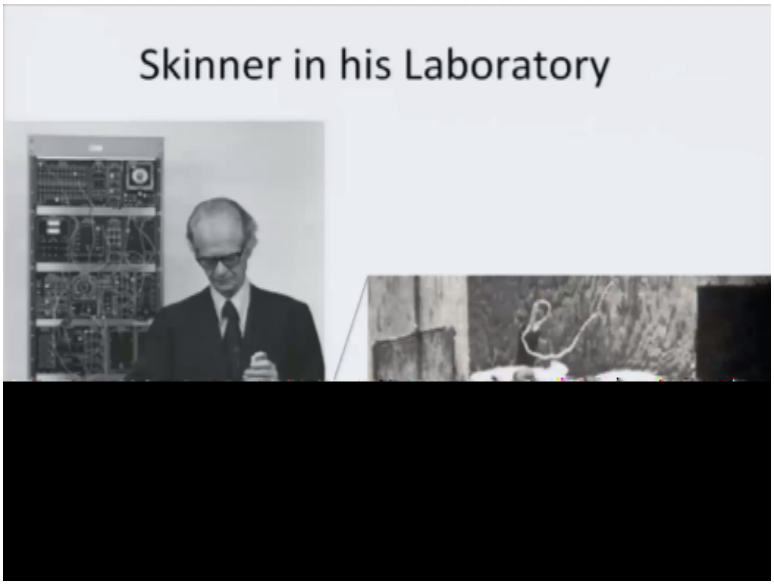
And pigeon was a case where no other word was taken into account the pigeon was supposed to pick at a right location and this led to repeatedly rewarding the pigeon while giving few food grains. In this case as you can see in the Skinner box.

(Refer Slide Time: 08:40)



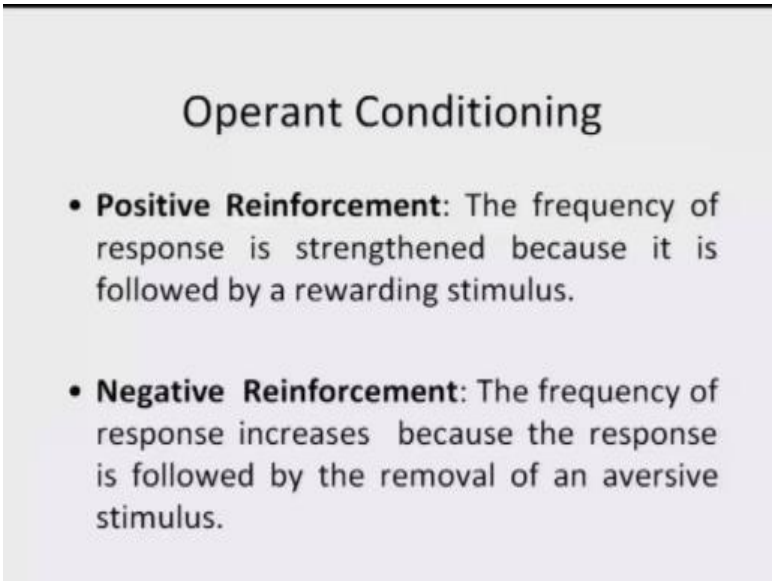
A rat was keep there and this was the experimental demonstration of what we call as the tendency to escape punishment, this rat was.

(Refer Slide Time: 08:58)



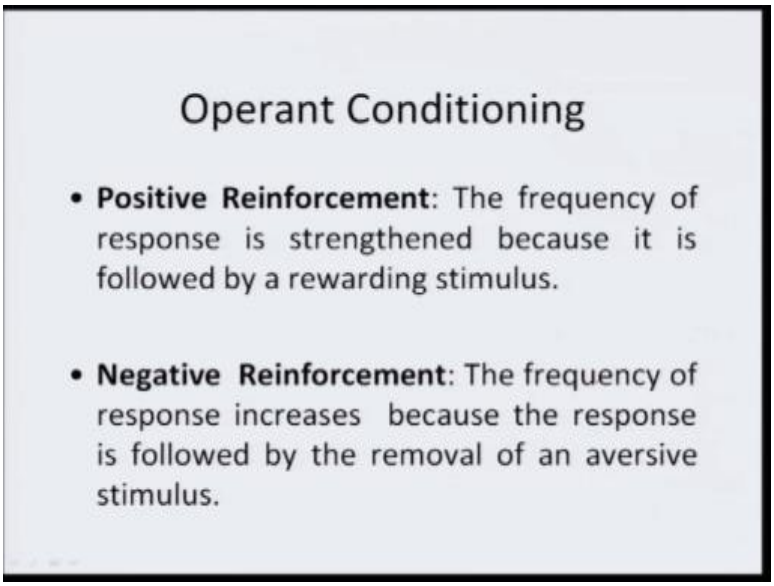
Subjected to electric shocks which used to come in the metallic grid that you see at the bottom of the cage, the floor of the cage and in order to escape the mild electric shock the rat had to okay make certain desired movement okay, and that desired movement would basically help the rat escape electric shock, so this was basically again making the rat learn how to respond okay and but this response was not in order to receive a reward but this response was basically in order to escape the punishment okay, so basically what operant conditioning.

(Refer Slide Time: 09:38)



Said was that we have two types of situations okay, you can have positive reinforcement that would shape the behavior or it could be negative reinforcements that shapes the behavior. Positive reinforcement basically the frequency of response gets strengthened because it is followed by a rewarding stimulus so you do a behavior a desired behavior and the desired response in turn gives you a reward whereas in the case of negative reinforcement the frequency of the response increase.

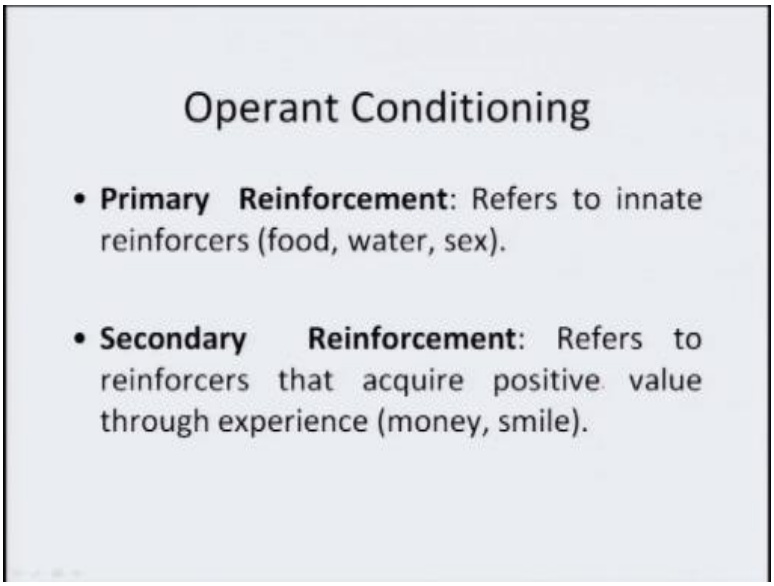
(Refer Slide Time: 10:10)



Because the response was followed by removal of the aversive stimulus. So you saw the first case positive reinforcement was the case of the pigeon okay because the response of the pigeon got strengthened because every time it would correct, come forward with the correct response a reward would be given. In the case of the white rat basically it was removal of the aversive stimulus so electric, mild electric shock was given to the rat okay, and the response increased because the rat realized that by giving this type of response, by giving a particular type of response.

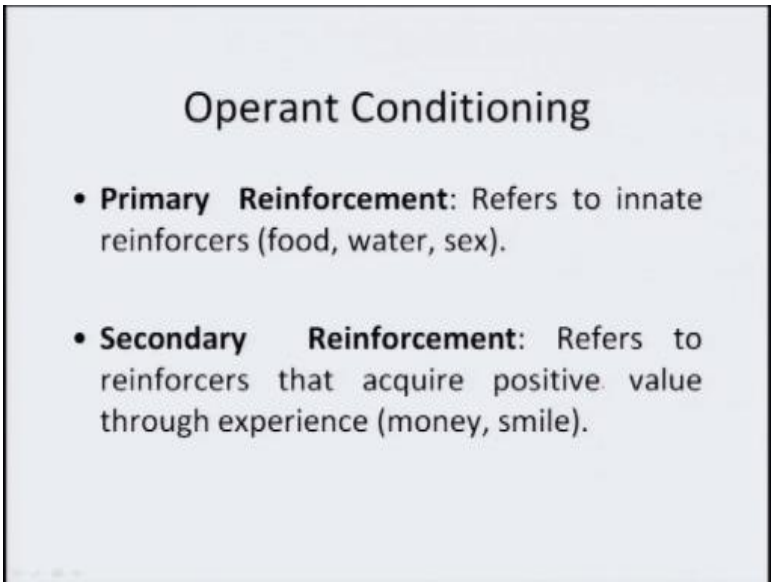
It could basically make itself escape the punishment that it was experiencing, the aversive thing, the electric shock that got removed.

(Refer Slide Time: 10:56)



Now besides now considering the reinforcement as positive and negative reinforcements in terms of especially human beings, you can also now think of primary and secondary reinforcement. Now remember one thing in human beings also positive and negative reinforcements will work okay, but the way various factors that motivates us to perform certain type of act, some of these you would realize are biologically driven, hunger, thirst, sex, and sleep okay, they are biologically driven whereas many other things okay, such as appreciation such as a token of smile, such as so giving some money okay, or now recognizing you by conferring a, an award to you, these could be secondary reinforces.

(Refer Slide Time: 11:49)

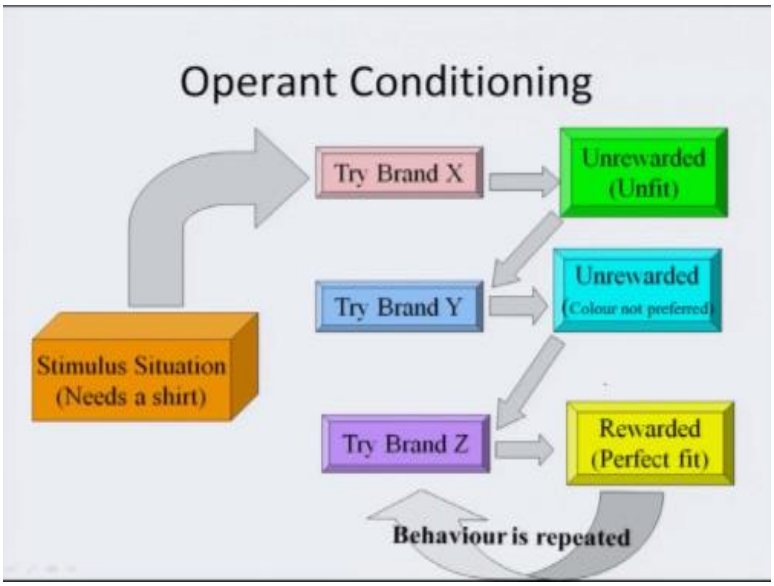


So in the case of human beings we realized mostly that we could have a condition behavior that comes out of either primary reinforces or secondary reinforces. Primary reinforcement it basically works in the case of innate behavior so if you are given food for behaving in a particular way, if you were given water if you behave in the desired way, if you are allowed to have sex because you give the desired behavioral outcome okay, so provision of providing food, water, sex, would be considered as an example of primary reinforcement whereas cases where you consider the reinforcements as positive.

But it is not basically dependent on your innate biological tendencies but they give you things which are otherwise socially acceptable okay, you have learnt to value those things through your experience. Now say for instance you come forward with the desired response and then you are given a reward of say 5 lakhs, that is the prize amount, it is the value of you know the award that becomes reinforcement for you or simply the fact that everybody gives you a standing ovation okay, people stand up and clapped for you or even situation when your near and dear ones those who know basically have value in your eyes they just give you a smile which would work as a positive reinforcement for you okay, now these are secondary reinforcements.

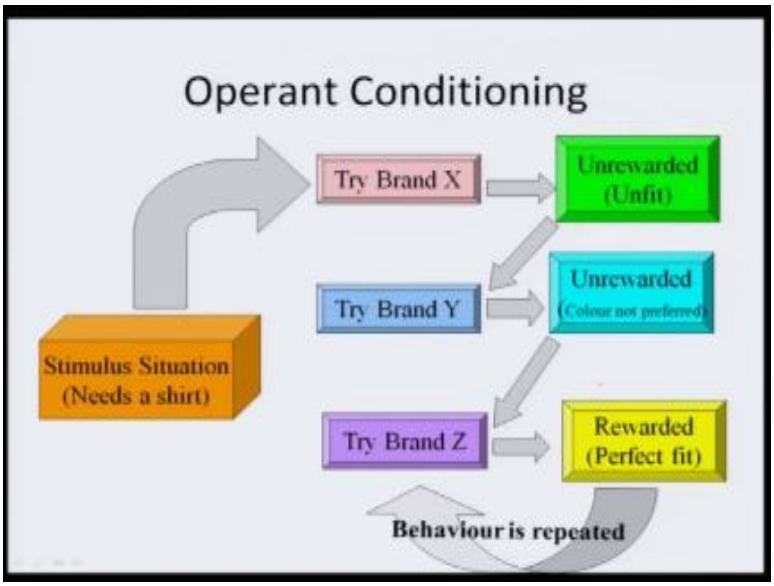
So human beings would realize that they are not only guided by primary reinforcement but they are also guided by secondary reinforcement, consider this very situation.

(Refer Slide Time: 13:45)



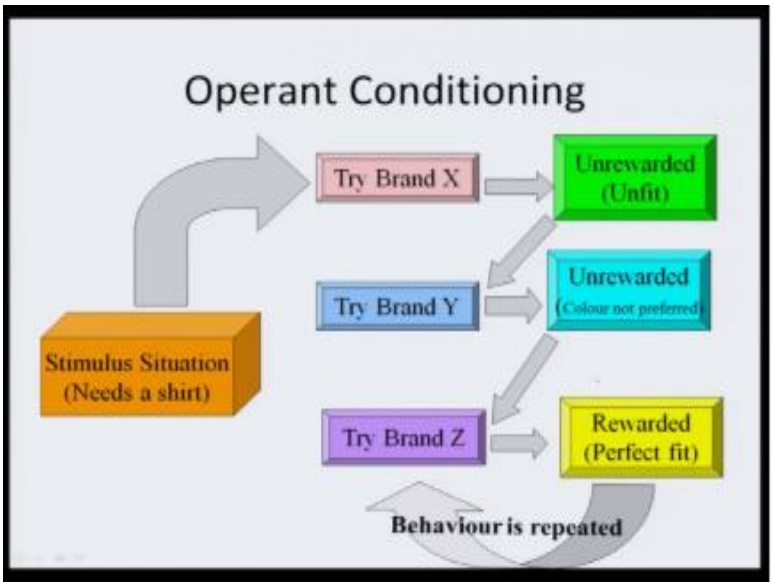
You are in a shopping mall and you are trying to buy a new shirt, you need a new shirt so what do you do, you interim along, go to an appropriate shop and then say for example you have tried brand X okay, this very behavior does not lead to a rewarding type of an outcome you realize that the shirt is not fitting you, okay. It is an unfit, you drop that, you go to brand Y, okay.

(Refer Slide Time: 14:15)



The shirt fits now but then you realize that fine the color is not that attractive those who are all along with you your friend or your family members they tell you that no even though it is a fit but then you know the color is not so attractive, it is dull. You drop brand Y also, you try brand Z.

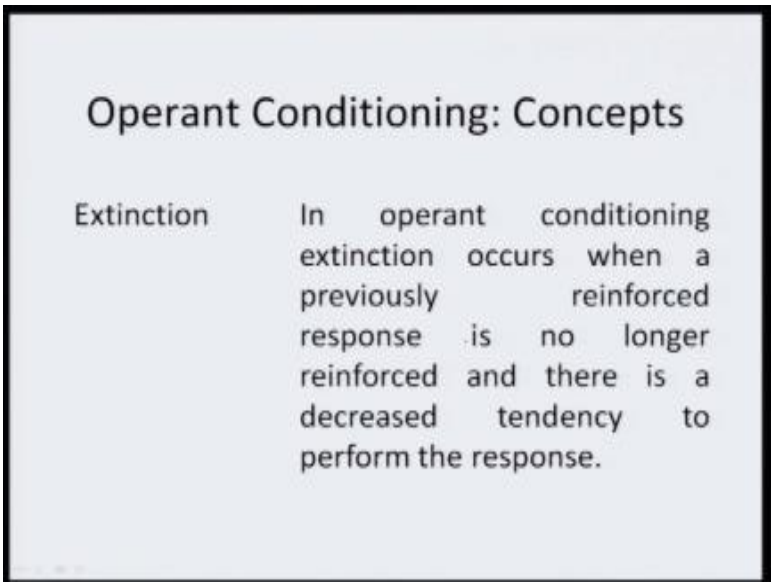
(Refer Slide Time: 14:36)



And then you realize that it is not only a perfect fit but even the color you know the print is very attractive, what you do now? This very reward does not only allow you to buy that very shirt at that moment but later on when you will go for shopping the next time instead of trying branch A and Y you will jump to brand Z because now you know that it is brand Z which might give you the colors of your choice.

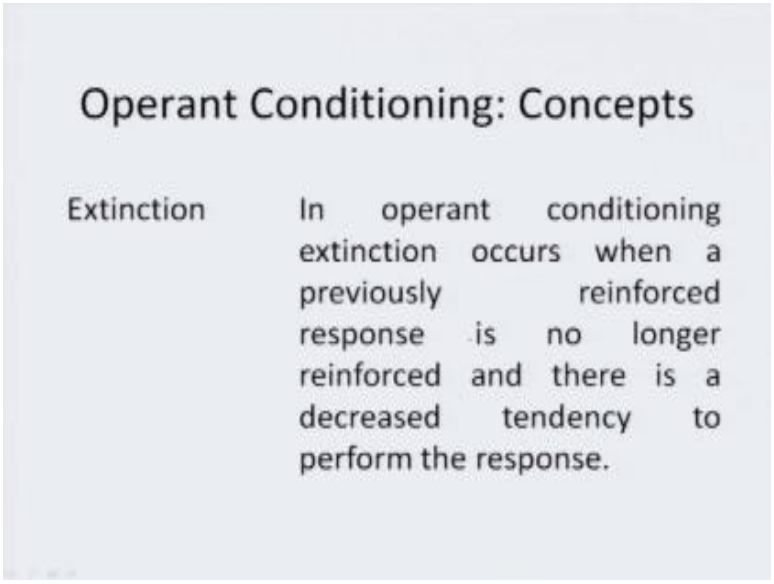
And it also tells you that fine brand Z will largely also have those shapes of the shirt which fits your body, okay. Now the entire purchase behavior is controlled by operant conditioning and the reward that you get out of a given situation. The way we discussed important concepts in classical conditioning, let us now talk about important concepts associated with operant conditioning.

(Refer Slide Time: 15:35)



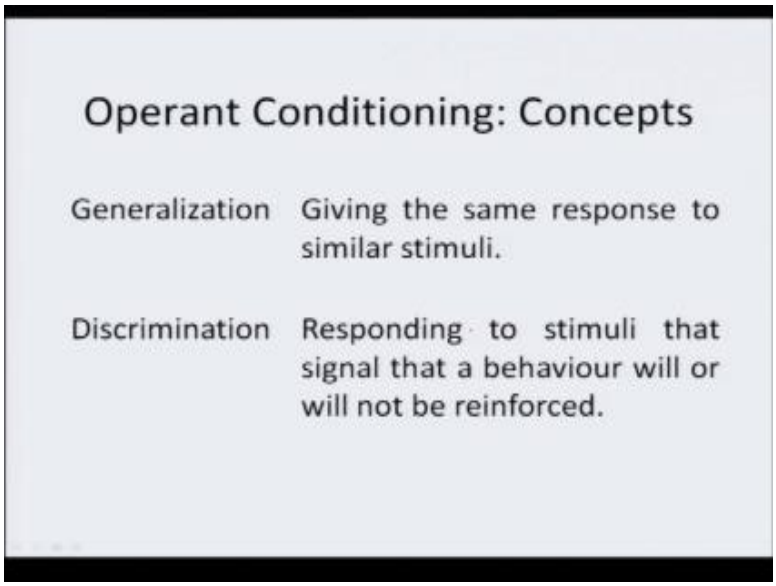
Similar type of things now, one the process of extinction, what we had discussed earlier? The way we had defined extinction it is exactly the same that we were going to talk about here. In operant conditioning extinction basically occurs when you realize that the previously reinforced response is no longer reinforced, okay. So something that was appreciated that was being given our enforcement.

(Refer Slide Time: 15:59)



You realize that their reinforcement is not being given and once the reinforcement is not being given that specific response starts diminishing, okay. So that tendency of the individual to give that very response now goes down, it is no longer there simply because the reinforcement has also not been given in that very situation. So removal of reinforcement that leads to complete fading out of the desired response it is called extinction.

(Refer Slide Time: 16:33)

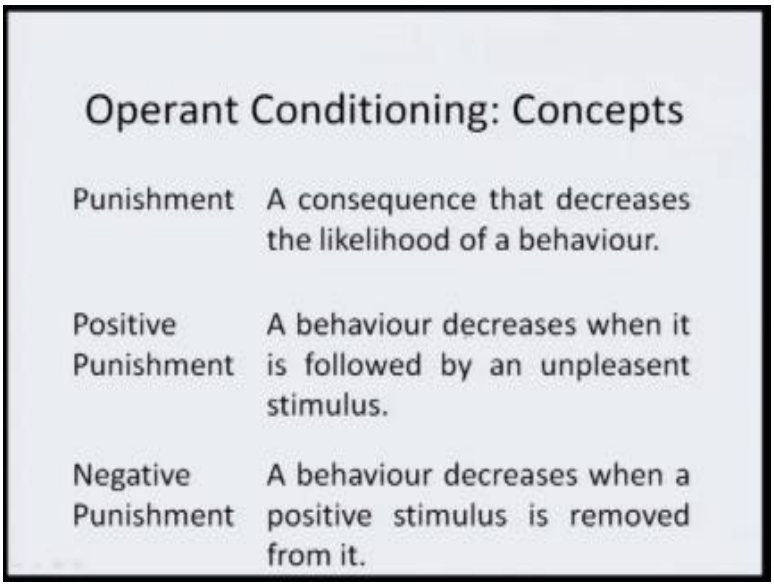


Again generalization and discrimination are two important considerations here, generalization would mean that you give the same response if you realize that the stimulus is the same, okay. In the case of the example of pigeons near Gateway of India in Mumbai you realized that whether you throw the grain, okay on the ground or no you hold the grain in your own palm the pigeons come and they take, they eat the grain, okay.

So where the grain is, is not important. So even though the situation has changed you realize that the stimuli is by and large the same no? It is the food grain which was in one case lying on the ground, in the other case it is, somebody is holding it and therefore the response is extended there that is generalization, okay. Same response if there is no similarity in terms of the stimuli that is being given.

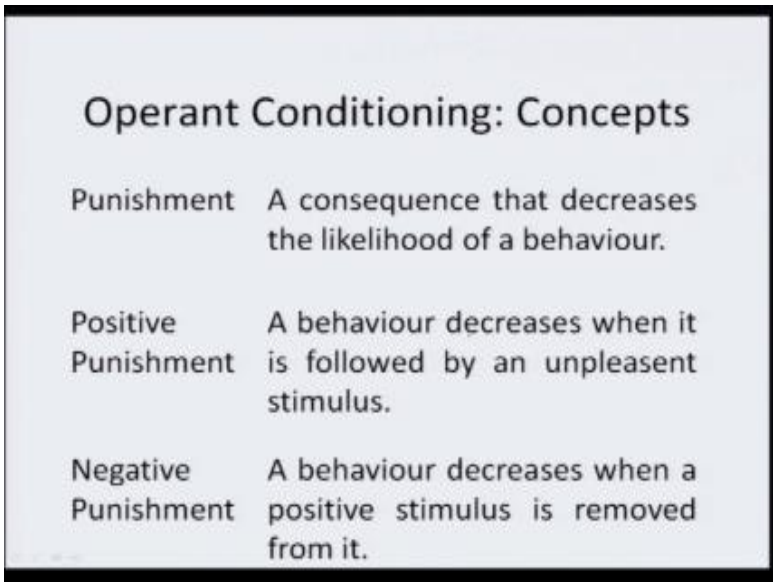
Discrimination would be the reverse of generalization okay. A responding to a stimuli where you realize that the signal, okay somehow is not the same. So if you realize that it will be reinforced in one condition you realize that it will not be reinforced in the other condition because you know that this will not be reinforced in the other condition you do not do that, okay.

(Refer Slide Time: 17:58)



Important concept also in operant conditioning is of punishment, okay. Punishment basically no is a consequence, which decreases the likelihood of the behavior because if that behavior is no again and again repeated every time the individual would be punished for that very act and if you realize that the likelihood of punishment is increasing because of repetition of the behavior you finally decide that this is a non durable type of an act, you do not perform that. Now punishment can also be positive and negative in nature, okay.

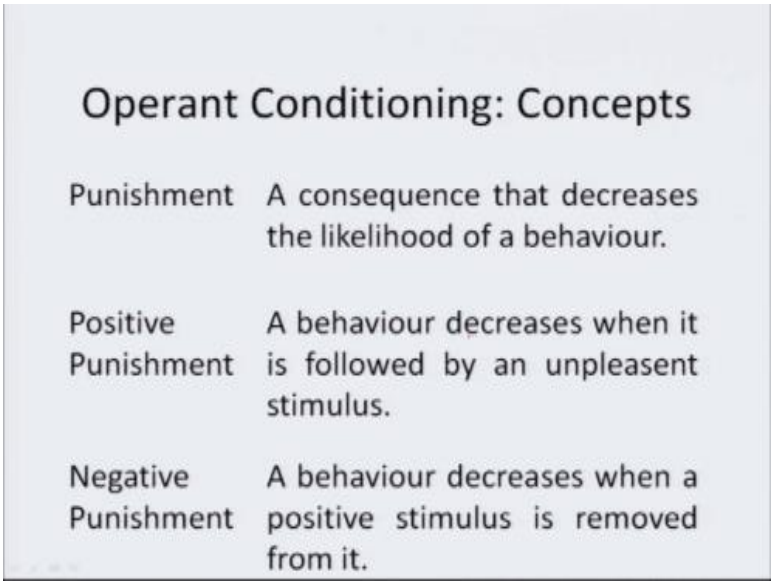
(Refer Slide Time: 18:34)



This is something very interesting to understand in psychology, by and large we understand that punishment is punishment and therefore the common sense understanding of punishment is that it is negative, primarily technically speaking punishment could be positive, it could be negative. Now a behavior decreases when it is followed by an unpleasant stimuli, okay.

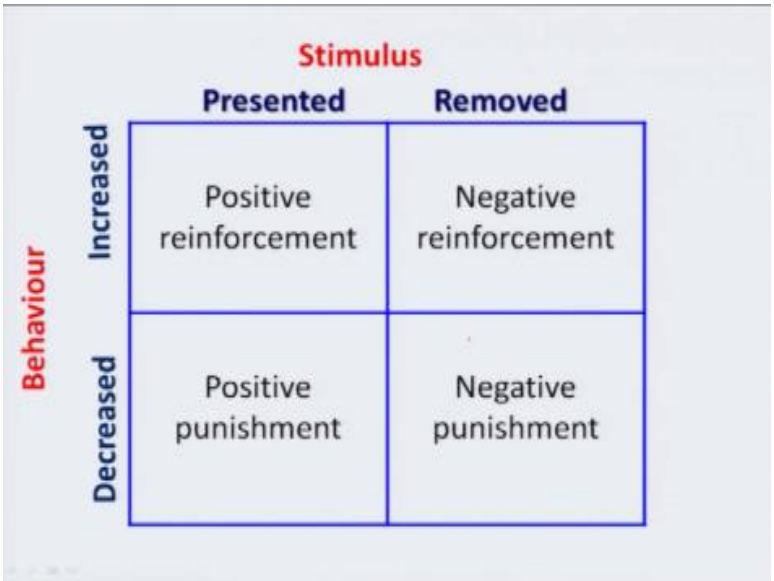
So decrease in the behavior when it is followed by unpleasant stimulus that is positive reinforcement. But if the behavior decreases when a positive stimulus is removed so in one case it is followed by an unpleasant stimulus, in the other case the, you realize that the positive stimulus is removed. In one case it is given in the case of positive punishment it is withdrawn it is removed in the case of negative punishment okay.

(Refer Slide Time: 19:22)



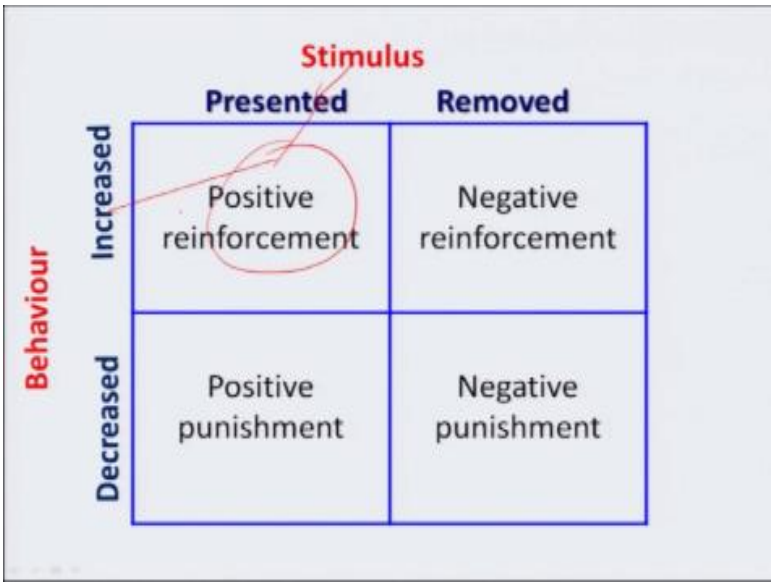
So understand one thing, reinforcement could be positive, negative and similarly punishment can also be positive as well as negative. Let us now understand positive, negative, reinforcement and.

(Refer Slide Time: 19:36)



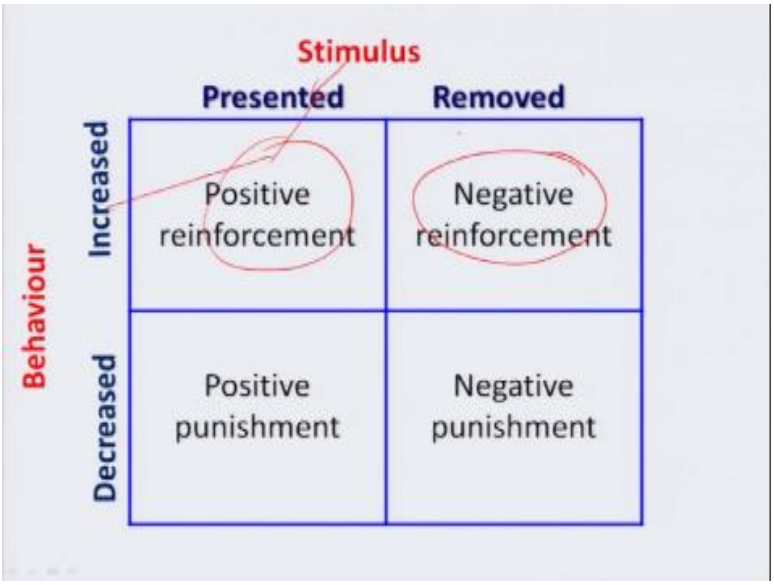
Positive, negative punishment, once again using this very grid. So in this case you have the stimulus so you think of two conditions are two by two table now exactly the way we had talked about, the signal detection theory in the case of perception okay, where the signal was present, signal was absent the response was either yes or no. Here, either the behavior increases or the behavior decreases okay. Second case where the stimulus is present or the stimulus is removed, it is not present. Now what happens?

(Refer Slide Time: 20:14)



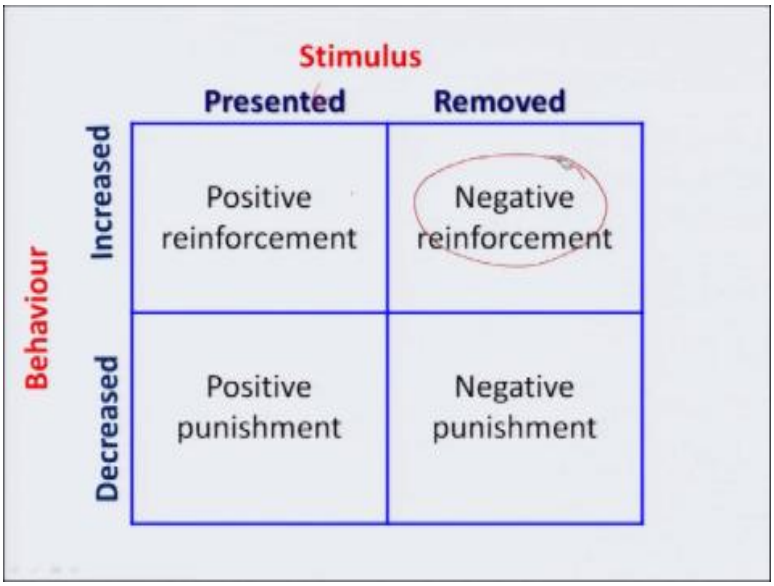
If the stimulus is present remember this, if the stimulus is present and the behavior also increases okay, this would be a case of positive reinforcement, why? You gave the stimulus and the behavior increased, so this is positive reinforcement.

(Refer Slide Time: 20:32)



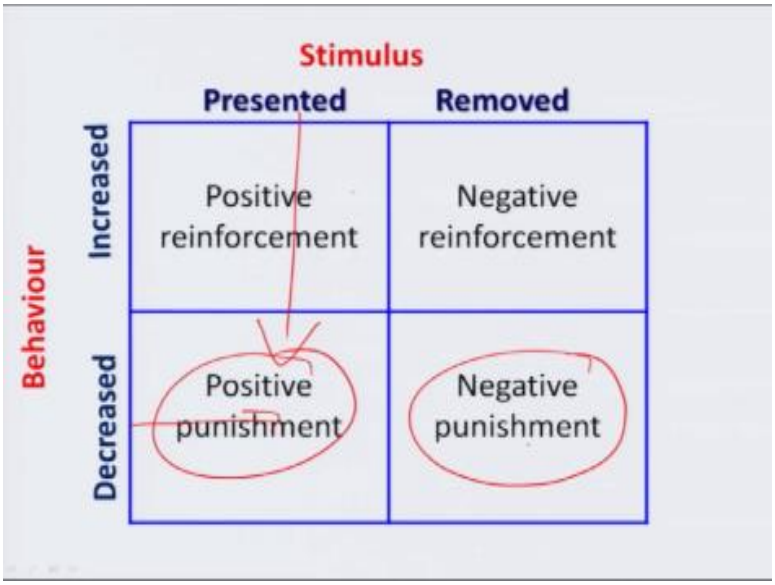
You remove the stimulus okay, and removal leads to now increase in the behavior that is negative reinforcement okay. Now increasing the behavior has been taken care of, now we are not talking of increase in the behavior, rather now we are talking about decrease in the behavior okay, so now think of.

(Refer Slide Time: 20:53)



The situation, so we now come to the second situation where we are not talking about increase in the behavior. Remember, earlier we were talking with respect to increase in the behavior we are now talking about decrease in the behavior. So the result finally is going to be decrease in the behavior and again stimulus you think in terms of presenting the stimulus or you think in terms of withdrawing the stimulus, removing the stimulus. Now if the stimulus is presented.

(Refer Slide Time: 21:24)



Okay, so now you have presented the stimulus, behavior decreases okay and this leads to positive punishment okay. So you present the stimulus leading to a decrease in the behavior positive punishment okay, removal of the stimulus and this leads to decrease in the behavior this way is considered as negative punishment, so having understood the whole concept of a classical and operant conditioning let us now try to make a distinction between the two, this we will do in our next, next lecture.

Acknowledgement

Ministry of Human Resource & Development

Prof. Satyaki Roy
Co-ordinator, NPTEL IIT Kanpur

NPTEL Team
Sanjay Pal
Ashish Singh
Badal Pradhan
Tapobrata Das
Ram Chandra
Dilip Tripathi
Manoj Shrivastava
Padam Shukla
Sanjay Mishra
Shubham Rawat
Shikha Gupta
K. K. Mishra
Aradhana Singh
Sweta
Ashutosh Gairola
Dilip Katiyar
Sharwan
Hari Ram
Bhadra Rao
Puneet Kumar Bajpai
Lalty Dutta
Ajay Kanaujia
Shivendra Kumar Tiwari

an IIT Kanpur Production