Indian Institute of Technology Kanpur

National Programme on Technology Enhanced Learning (NPTEL)

Course Title
Basic Cognitive Processes

Lecture - 04
Foundational Assumptions of Cognitive Psychology

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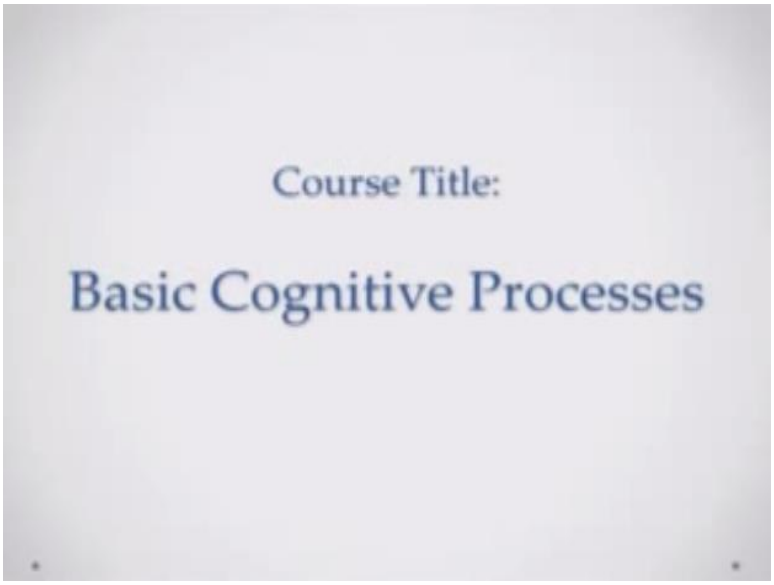

Hello and welcome to the fourth lecturer of the series called basic cognitive processes. I am doctor Varma from IIT Kanpur.

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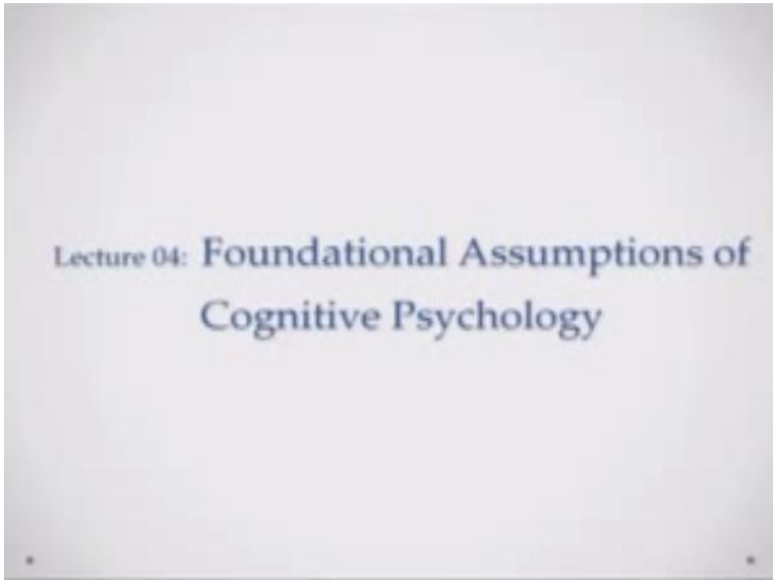

The title of today's lecturer is foundation assumptions of cognitive psychology. Today I will be talking to you about the foundational assumptions in cognitive physiology to explain you the principles on which scientific enquiry is based cognitive physiology. It is pretty much like playing a game and knowing the rules of the game before you actually engage in the game, you know early childhood days sometime you move to a new area, find know friends, you are actually getting into a new game.

It always better to know what the rules or the integrity of the game are before you start playing it, it is pretty much this to the same effect, that I will talk about what are the foundational assumption of cognitive physiology and why are they so.

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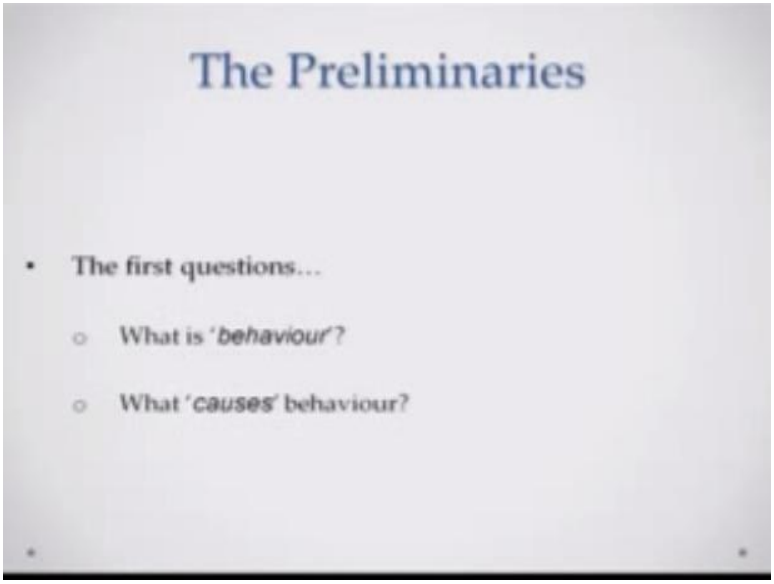

Let us start with the most basic question again so what is behavior, if you remember the lecturer on introduction to cognition you would remember that I told that behavior could be very simply just stimulus and a response association so there is a stimulators and there is a response to it. For example somebody pricks you, which the pin and you take your hand back or you for example you move away from the needle that Is pretty much what the simplest definition of the behavior could be.

Moving ahead we can also talk about what causes behavior, now cause of behavior is something which slightly more complex to understand. For example, the cause of behavior could be simply just a reaction, to the as you can say in the apprehend the needle example, or it could be motivated, by some internal desires, for example you want to have a ice cream, or for example you need to drink water because you are thirsty.

So behavior on that sense, can have causes multiple levels we will see how does this actually pan out while you are actually talking about cognitive physiology.

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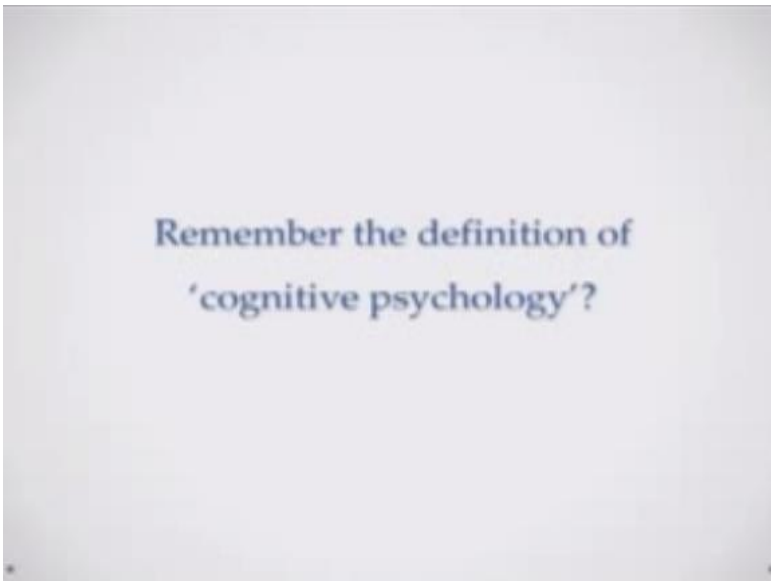

If you remember the definition of cognitive physiology, we would talking about cognitive physiology as the scientific study of the mind. Now again this term mind comes in, and this idea in itself is slightly counter or has been slightly counter lot of people, because when we say mind, we are talking about something which is actually non physical.

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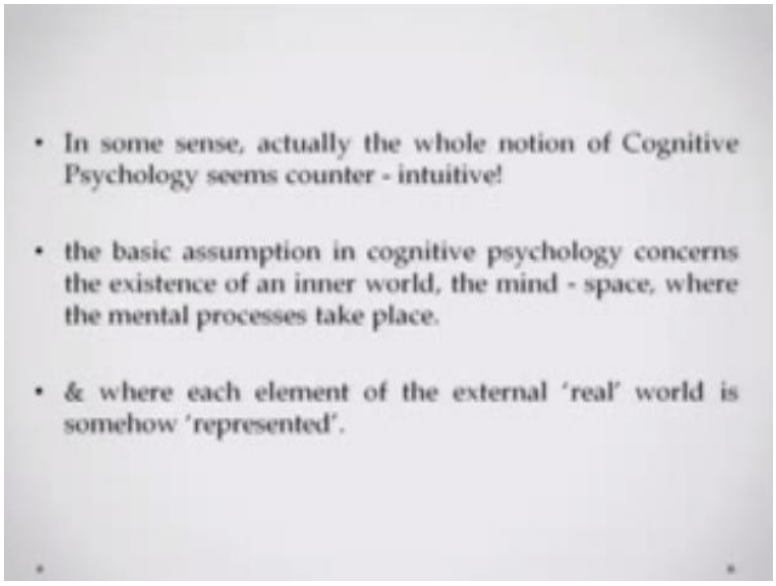

Something which is rather abstract, so the whole point of cognitive physiology is that we assuming or that we building our discipline on bases on this assumption that there is inner world there is this world called mind and there is where is you know mental process take place, where the mental activity really goes on. Also this is the space where in each and every element of the outer world is actually represented so you might have represented of your dog, your sibling, your parents, or say simply for the example a representation of where do you live, what are the objects that you use, and those kind of things.

Unless you have mental representation of those things you will not be able to talk about those things in any meaningful manner. So in that sense the cognitive psychology is actually resting on this distinction between the inner and the outer world. We will try and see how we can actually approach this how we can actually talk about this internal world, in more scientific ways.

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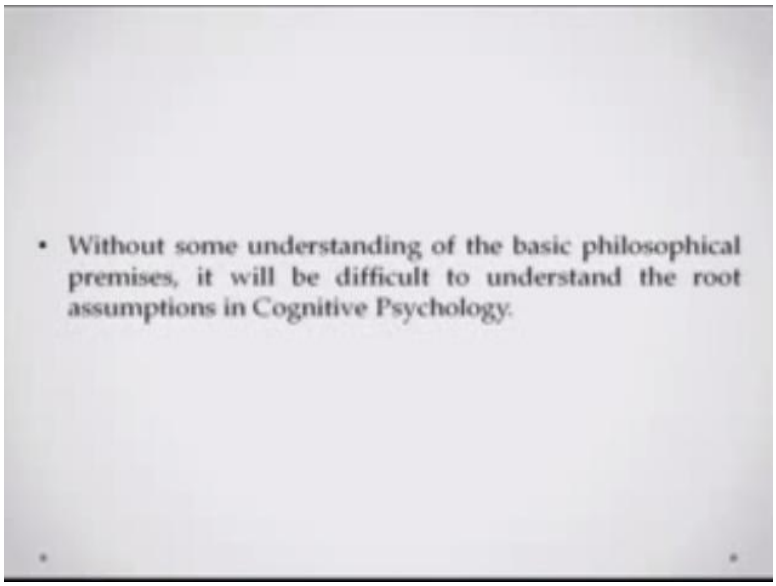

So without this actually to really you know, achieve that feet it will be important for us to actually get some kind of the philosophical understanding of what basically this inner world, and what this material world really means.

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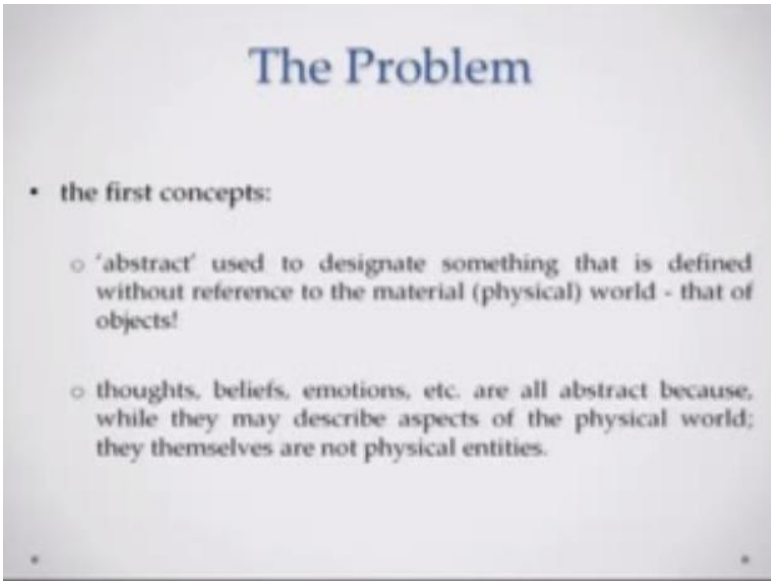

The first concept that you like to understand is that concept of abstractness, what is abstractness, abstractness basically is when you actually define something without a reference to the material world, without reference to the physical object that are the there in the material world, thought believes, emotions, etc are all abstracts, because while they sometimes describe people sometimes describe aspects of this material world, they do not need those material aspects to exists okay.

So for example, you might have feeling of love, you might have feeling of guilt, or shame about something or for someone, but this does not need that material entity to actually feel that or understand that the feeling of love, or feeling of pain okay. So that is something which you will need to keep in mind.

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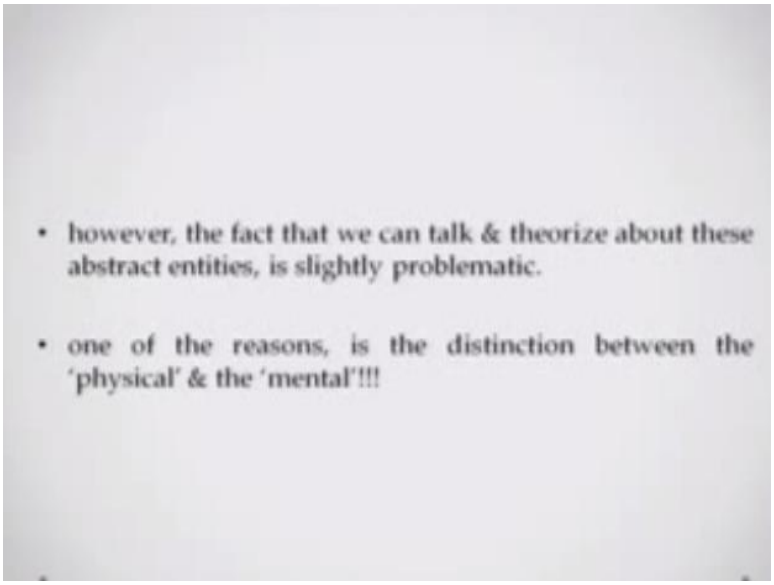

However, you see that it is very easily that we can talk about and theorize about these abstract entities. This is something we always do, we always talk about our feelings, we always talk about how our feeling at any point in time, how something looks, those kind of discussions we always having, why should be so easy to do that? Probably because we understand that distinction between the physical and the mental, we understand what is the physical world we understand what is the mental world. And that is why we can actually talk very easily about these two things.

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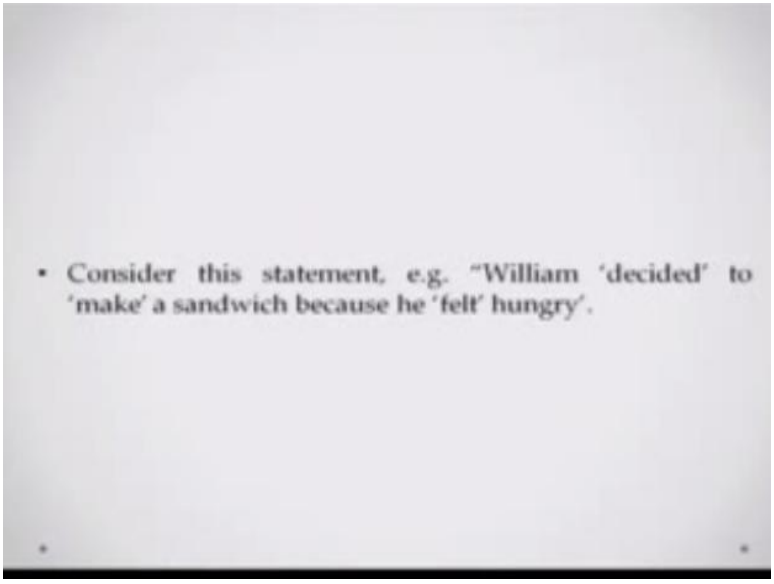

Consider this statement for example William decided to make a sandwich because he felt, hungry. Now if you note, there are two important factors here the aspect that the Williams is feeling something and which is hunger and aspect that William is decided something that he will make a sandwich.

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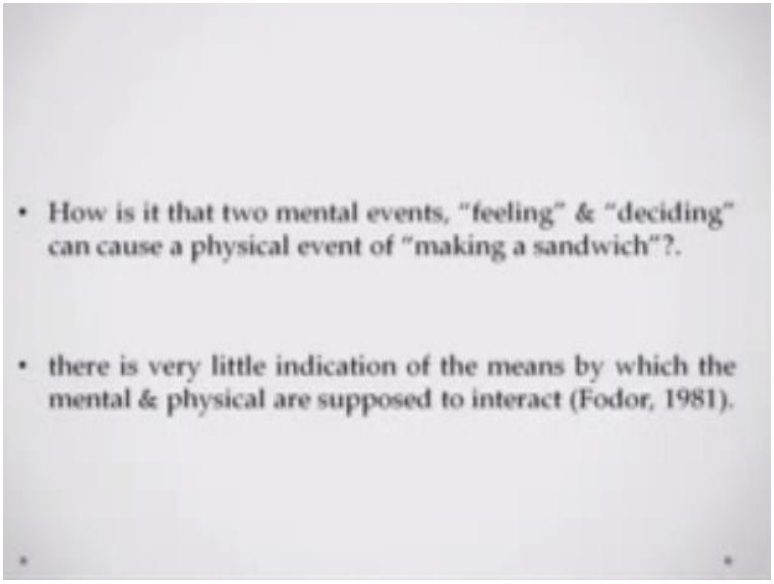

So how is it happing the two mental events feeling and deciding a leading to the physical event that is making of a sandwich, this is something we are actually going to talk about in cognitive physiology in more detail.

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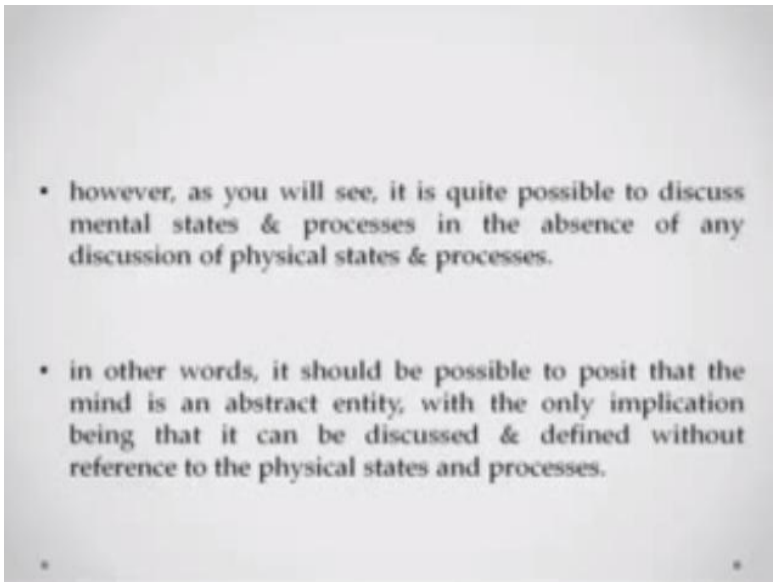

However, as you will see it is quite possible, so it is quite possible to talk about the these mental state and processes, in the absence of any discussion of any physical station process. We do not really talk about that in the brain something happen and somebody decided, felt something or say for example that area of the brain decided, something so we not really taking about this, physical substrates which might underline behavior, or those kind of thing. We will actually talk about how this interaction can be approached, as we move a head in this particular chapter.

So in other words for cognitive psychologist or cognitive psychology it should be possible to proceed at mind is in abstract entity with the only implication that it can be discussed and defined without reference to physical states and process. So we have to begin, and this is the most foundation assumption of the cognitive psychology that you need to understand that mind is the metaphysical, mind is a mental entity, it is not really a physical entity.

Brain is the physical entity we will come to the relationship between the mind and the brain but cognitive physiology actually rest on this distinction between the mind and the brain okay. So this is one which you need to keep in mind before we move further. Now if you understand this if you except this that minis the mental entity on we are going to talk about that we are going to

trail and investigate that, then as cognitive physiology was you should do is cognitive you could actually just you know develop theoretical models and develop explanation of human behavior on the basis of that physical entity.

You do not really need to talk about what are the physical processes that are going on between your years, you do not really talk about how the neurons are hiring, how are, the neuron transmitters acting, you cannot just talk about completely, theoretically about what the particular mental function is. Say for example, what memory is for example what learning is okay.

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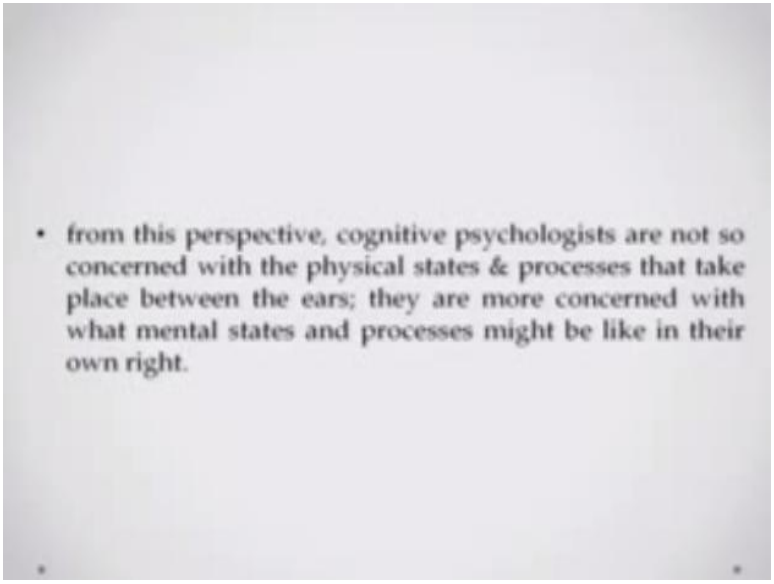

It is not to say that cognitive psychologist are not concern with the neural structure at all or the material explanation at all, it is that they can exist without them as well. Obviously, you will see as we go head in this course, that there is always a attempt to locate or to you know base that physical that metaphysical or mental explanation to the physical structures that are there in the brain.

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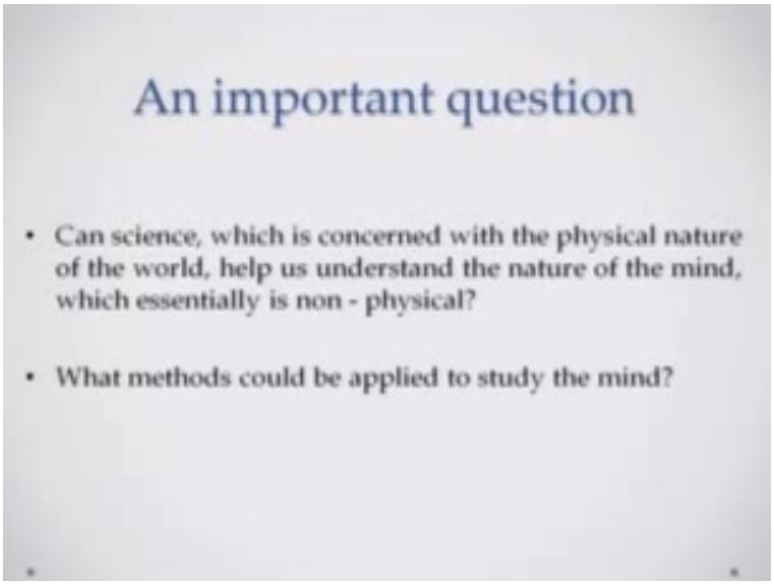

Now moving slightly on a different plane an important question could be that science basically is a field, which is really concerned about the physical world, it is really concerned about the measuring and it is really concerned about the explaining, explaining things that happens in the physical world. So how can you science to talk about the mental world, how can you use science to talk about something that is entirely metaphysical.

So we will see, and if we can talk about it at all, what could be methods that we used to actually talk about this?

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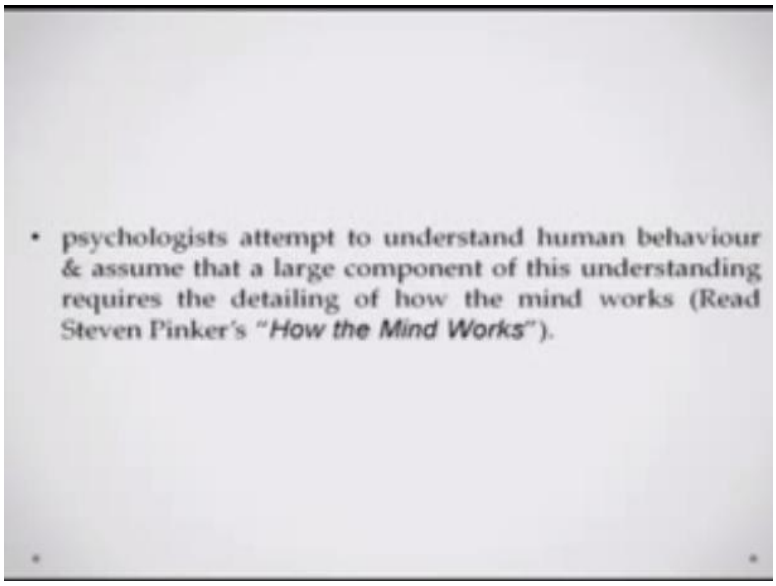

So we will go ahead with this we will see this physiologist do attempt to understand human behavior and assume that the large component of this understand requires the detailing of how this mental world really pans out okay. A very inserting suggestion could be do read how the mind works in which he actually really you know interesting way approach this topic. I will take you to alternative account.

Now as I said science is basically about measurements and it is about really measuring of the material and solid facts, there was this account of mental activities or human behavior which is known by the name of behaviorism.

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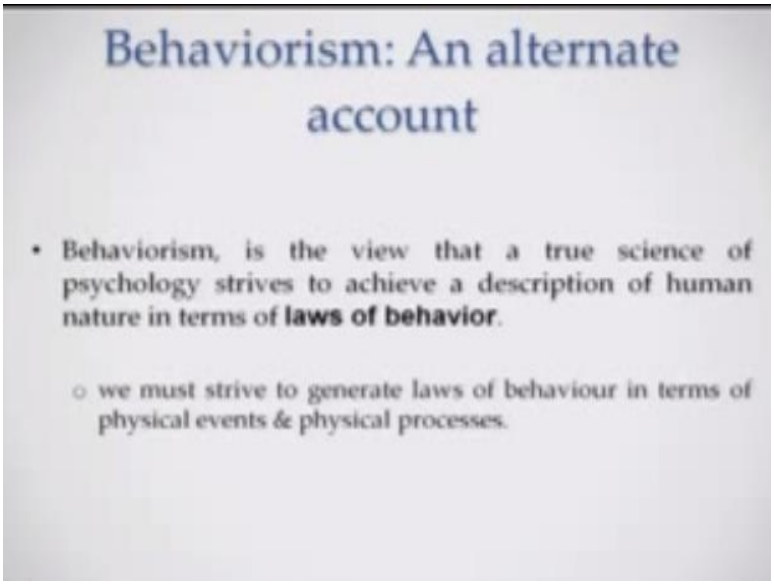

You saw in our history, lectures history of cognitive physiology lecturer that behaviorism is actually one of the things that really lead to the formation of cognition, it was in reaction to behaviorism that will not of cognitive physiology really comes up okay. So let us try and understand behaviorism is in a bit more detail today. Behaviorism is basically the view that is true science of psychology strives to achieve description of human nature in terms of loss of behavior.

You know, simply like for example loss of gravity, we have loss of action and those kinds of things. So the idea in behaviorism is that we must strive to generate loss of behavior in terms of physical events and physical processes okay.

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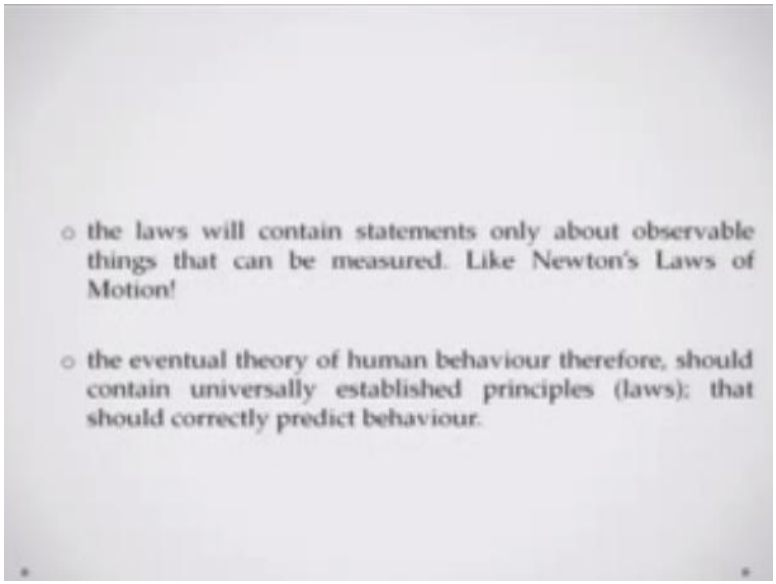

Now these loss basically will contains statements only about observable things okay, you can make a law about only the things that you can see that you can measure only then you will able to reliably predict everything, or so is the believe okay. Say for example, loss of motion or gravity or something like that. Now the eventual theory of human behavior in behaviorism should therefore contain these universally established principles, and should able to correctly predict behavior.

So if you actually taking about the physical world, say for example much like physics, if you understand the behavior of two objects or two material you should able to really and confidently predict that when these two objects are brought close two each other how they will interact or how they you know interaction will pan out. Pretty much that was the idea about how psychology should actually exists as the science, as the field of enquiry.

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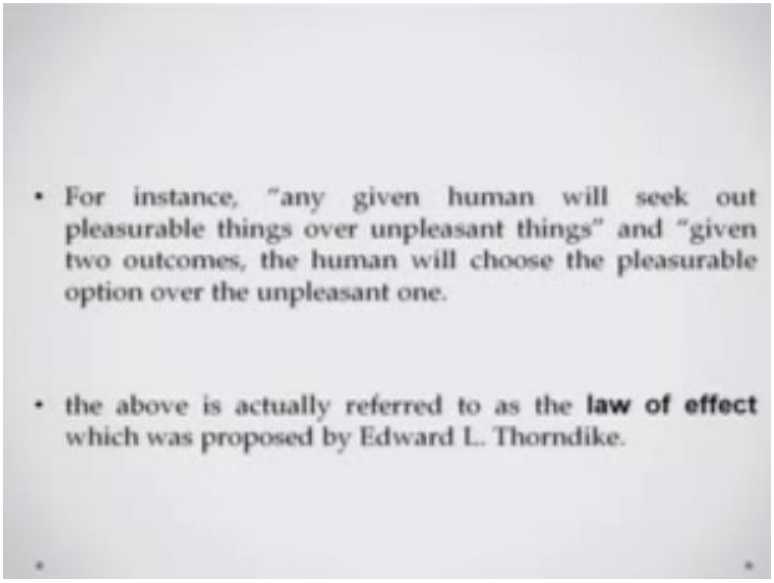

So for instance there was the law that any given humans / animal will seek pleasurable thing or un-pleasurable things, you know very simple assumption and given two outcomes the human will always choose the pleasurable outcome over the un-pleasurable outcome. This is basically what the law of effect is. We discuss these this was given by Edward Thorndike. In the last class. Edward Thorndike actually said that animals or humans will learn the responsive that lead to rewarding consequences and unlearn the responsive that will leave to punishing consequences.

You know pretty much other simple you know prediction of this, because this effect of making a particular response leads to learning you know this is as a if you do something and leads to positive, and you will do it again if it something that leads you to negative reflects you will not do that. Pretty much this was thought to be, you know micro of all human behavior. We do everything that leads to good consequences, and we do not do things that lead to bad consequences.

Now that should ring a bell, this statement should ring the bell, that is it really so does it always happen like that, you know in that feeling that you will get when you say this statement again, that is where this crux of cognitive physiology use, we will see this as we go ahead.

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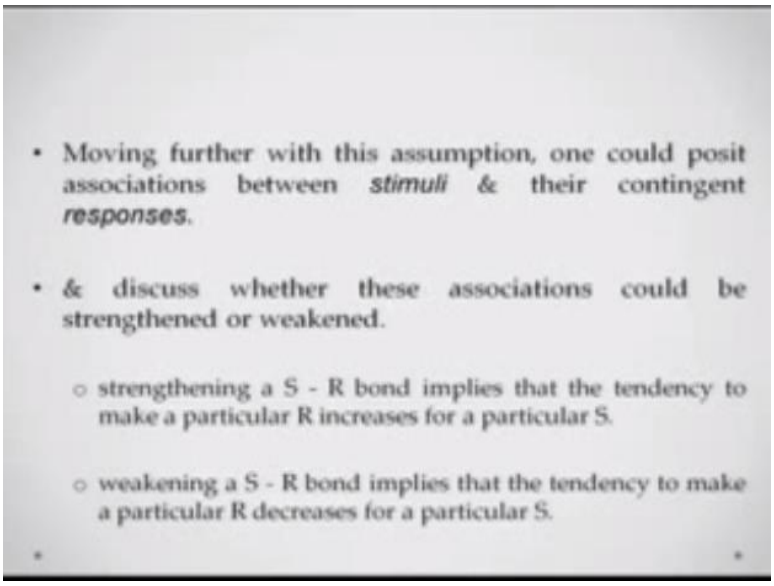

So if we further with the same theoretical model that behaviorism gives the whole idea is that behaviors is can be explain between the associations of stimuli and their cognitive responses, there is the stimulus and there is a responses, that is pretty much all worth is the there to explain behavior okay. So stimulus response bond basically in, that they tendency to make a particular response increase for the particular stimulus, if you trying to strengthen this bond.

If you trying to weaken this bond, that tendency to you know give a response R to particular stimuli S will decrease, and you can actually change or manipulate this strength to actually go on in further predict human behavior that is what they wanted to do.

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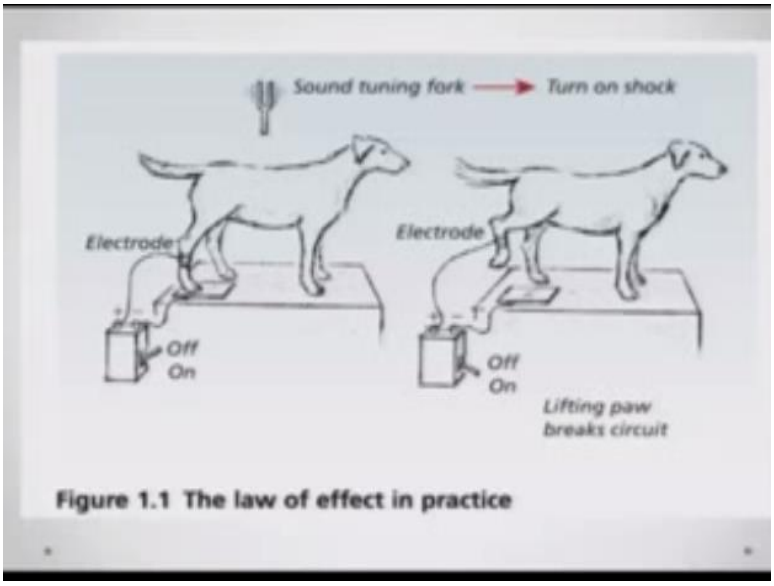

Figure 1.1 The law of effect in practice

Say for example take this example here you will see that dog basically connected to the set of electrons and wooden plane does also the metal seat, if the dog actually keeps it legs on that metal seat what can happen is that you can actually you know have a sound of the tuning fork. When the sound of the tuning fork goes a dog receives the shock, over a number of trials when you do this, whenever the dog hearing the sound of the tuning fork, it raises its leg, because that will break the circuit, and it will not receive any shock.

And the point is of teaching the dog to learn this association between the tuning fork and the shock okay. This is pretty much a very simple explanation of behavior, say for example, you can actually still you this behavior to explain the you know use this model to explain the behavior of vary small children, or animal or those kind of very simplest scenarios. Now this was one, moving ahead to something slightly different but within the same frame work.

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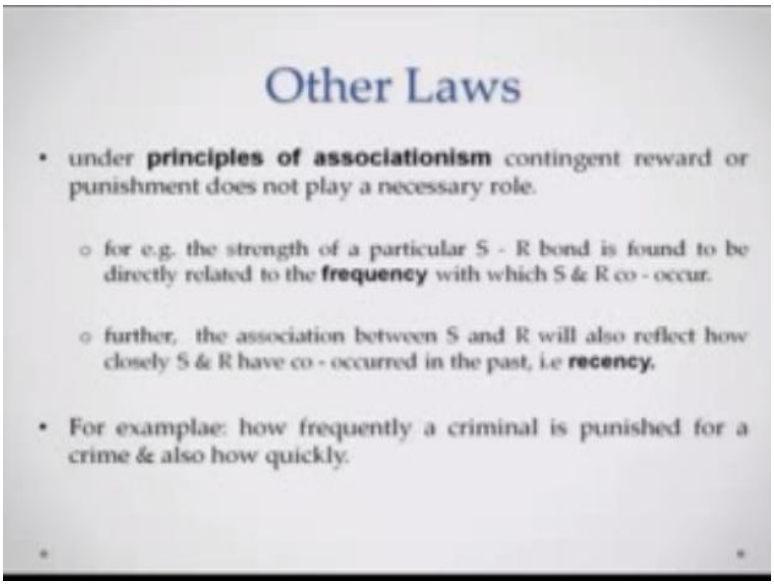

Principle of associationism, associationism basically talks about the feds of frequency and regency. If two are actually frequently occurring together you might link them, or if two things are occurring close in time together you might again link them okay. So for example, how frequently a criminal is punished after committing a crime can teach him not to do a crime okay, if it is 100% of the time that the criminal receives the punishment after doing a crime he might not want to do it, or also how quickly a criminal gets punish after he done a particular crime.

You know these kinds of associations can be made and that can lead to learning of a particular kind of behavior.

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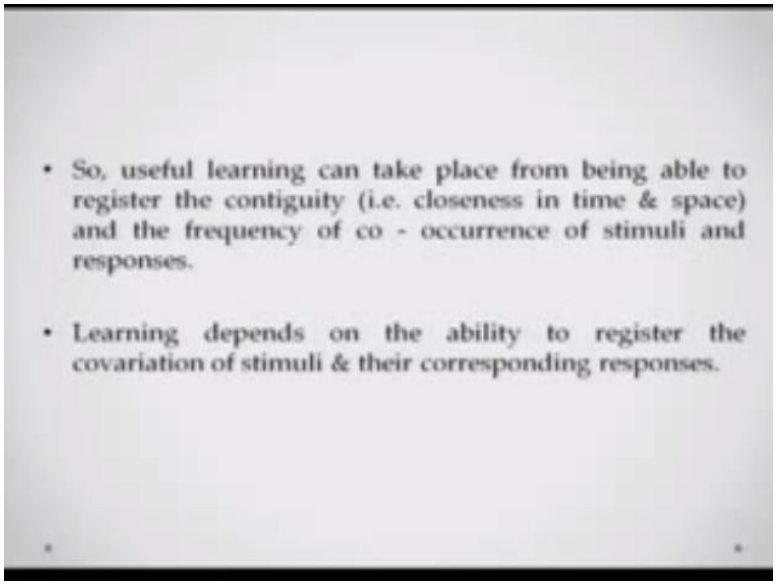

So useful learning then can take place from being able to either register the contiguity or register the frequency of co-occurrence of stimuli together okay. So what humans probably are doing, there actually registering this contiguity and this regency of this stimuli in this external world, and that is how we are actually shaping our entire behavior, that is what is suppose to be the behaviorist model of explanation of human behavior okay.

So learning then depends on the ability to do register this co-variation of stimuli and there corresponding responses. So this is a practical way of explaining behavior, it suppose to be scientific way of explaining behavior. But certainly there are some problems with it okay, certainly there are some side notes when would like to make when you are actually giving this kind of module, let us talk about those things.

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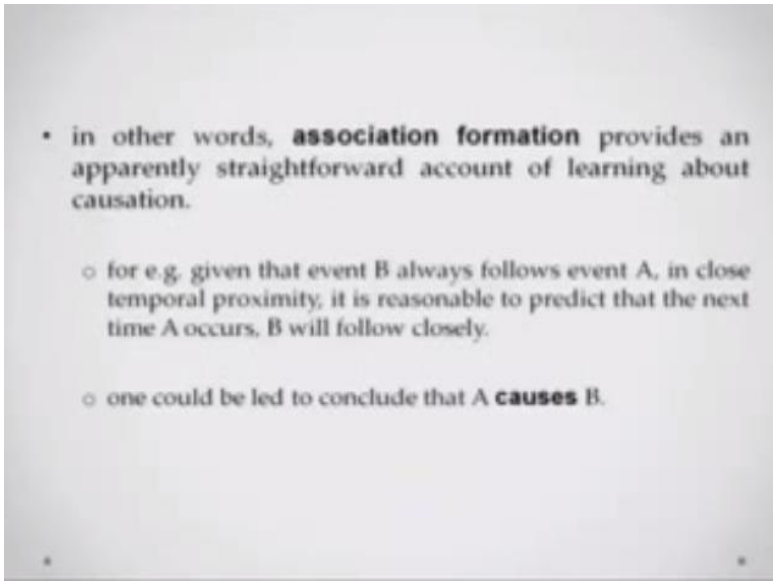

So an association formation basically provides an apparently straight forward account of learning about causation, you know we are always concerned about knowing the cause of how things happens in this entire world okay. So for example, if event B is always following event A in close temporal proximity it might be reasonable to predict that A cause B okay, whenever A occurs B will follow, closely in that A is causing B to happen.

Say for example, you are taking aspirin and your headache is going away, if it is happen 100% though time will rather quickly after taking a aspirin you might believe that the cause of aspirin is the effect of the aspirin is going away of your headache okay, that is other simple model what will see is that the story is slightly more complex than this. Now this is what the behaviorism is trying to say. So let us take a moment and see how this is really panning out.

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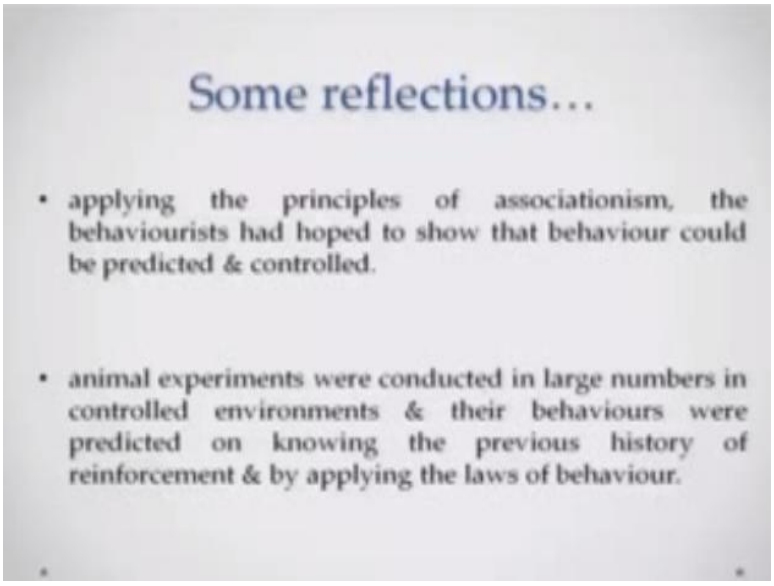

Now applying these principle of associationism and behaviorism, the behaviorists had hoped to show that behavior could be predicted and controlled, you can reliably predict how person will be behave in particular circumstances or actually taking it further, you can also control how person would behave in particular circumstance. Now that was actually the program that is called the behaviorist program.

Animal experiments were then conducted in large numbers in controlled environments and their behaviors predicted, because of knowing the previous history of re enforcement and applying the loss of behavior. This is pretty much this is something that which gain lot of popularity, in the early 1900's and pretty much like becoming the flavor of physiology, nobody wanted to talk about mental states and stuff like you know there is something called the mind. Because it was giving rather reasonable, job of explaining simple behavior, people were not really talking about, mental state so much that point of time.

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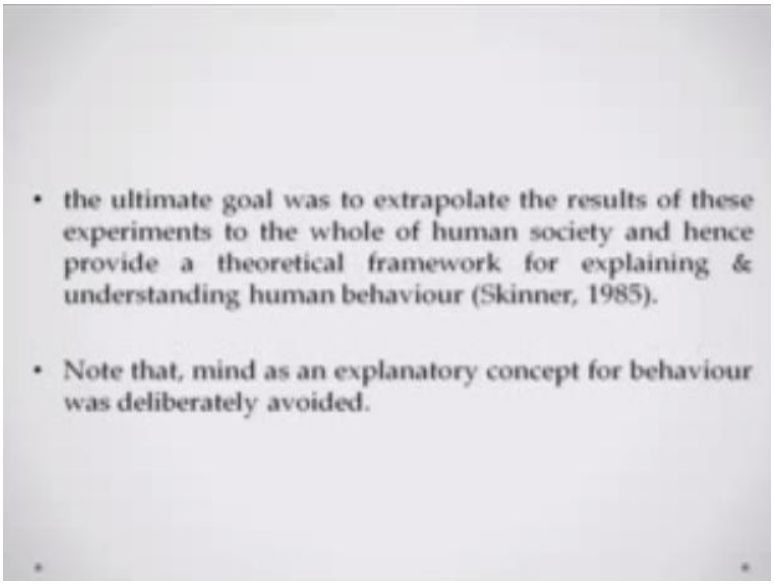

So ultimate goal was to the result of this animal experiment, to the whole of human society, and hence provide the theoretical frame work for explaining and understanding the human behavior. If you remember in the history classes telling that skinners idea was if you give me a set of individual, and if you give me a right condition to raise them, I can actually make them to run out whatever you ask me to, I can make them to be run lawyers, you know artists, actors, whatever.

This is the kind of confidence they had in this theoretical framework. Note however, that an explanatory concept for behavior mind is not being used, mind they are not really talking about, mind at all. An implication of this whole exercise could be that you know animals and even humans are consider only nothing more than machines. For example, if you know machine you press a particular button a particular response is got 100% at a time, this is pretty much what they want to say and what are actually moving ahead with.

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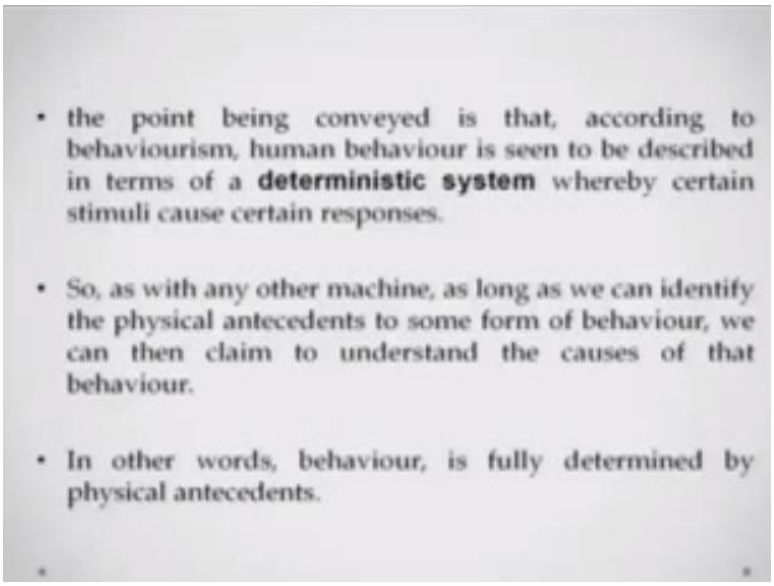

That the point that has been convert here if you focus and if actually think of this update, is according to behaviorism human behavior is seem to describe in terms of a deterministic system, in which everything happens all the time with 100% certainty okay, you do you have a stimuli you will have a response be and then will happen 100% of the time. There is nothing that can change it okay, it is almost as good as machine.

So with any other machine as long as we can identify the physical antecedents to some form of behavior we can then claim to understand causes of the behavior. So if you actually study that what led to the particular behavior if you study that there was a situation was like this, you know something was said, somebody did something, that was led to particular kind of behavior, and this pretty much very comfortable way or simple way of understanding what human behaviorism is about.

Is that over simplify model, or is that the model or is that the model you would actually you know really explain all of human behaviorism, something that I leave on you to think of okay. So in other words behavior could be define fully by its physical antecedents.

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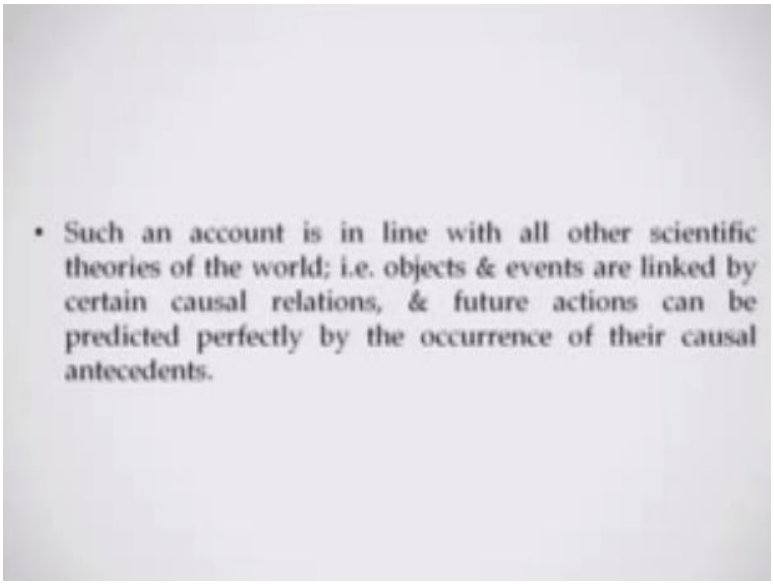

Now such an account is basically in line with all other scientific theories of the world okay, physics, chemistry, you know even biology, and all other strong nature sciences that you would say wherein the whole paradigm is that objects and events are linked by certain causal variations and future action can be practiced by the occurrence of the causal antecedents. If you have a X and Y condition of the temperature and pressure and volume you can reliably predict that how a particular you a material behave in these situation.

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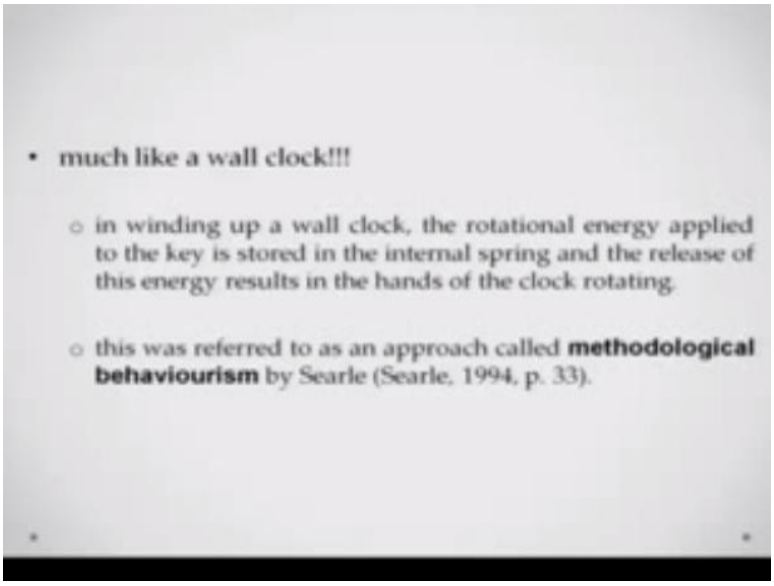

This is pretty much what human behavior was about much like wall clock you know in winding up a wall clock the rotational energy applied to the key, is stored in the internal spring and the release of this energy is basically what results in the hands of the clock rotating, is this a satisfactory module of or satisfactory explanation of human behavior is something we have to really think of. This pretty was called methodological behaviorism, and this is basically a term which was given by Searle.

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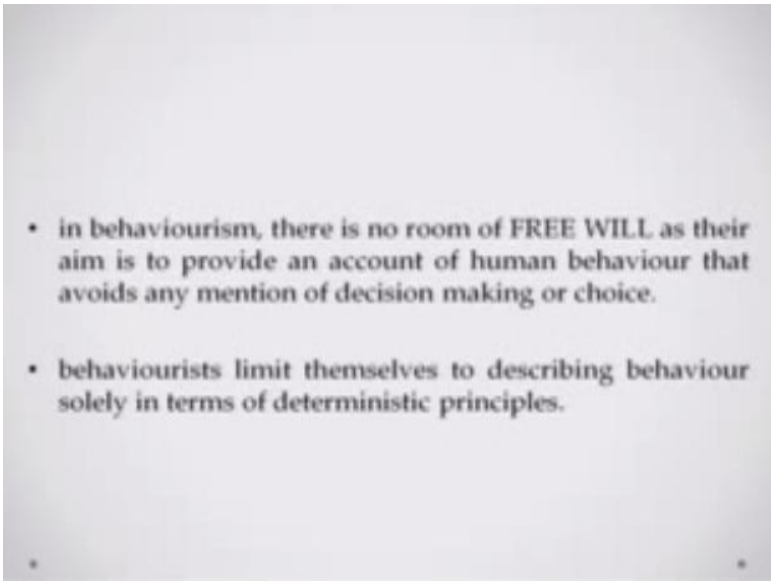

In behaviorism if you have been notice till now there is no room of free will as they aim is to provide an account of human behavior that wide any mention of decision making or choice okay. So you can not want to do something, and you have not have a desire to do something, unless the physical antecedents permute you. So this physical antecedents will completely determine how your behavior will be in a particular situation, that is what the behavior explanation is.

Behaviorists also limits them self to describing behavior solely in term of these determinates principles, law of effect learning, reinforcement, punishment these kind of principles.

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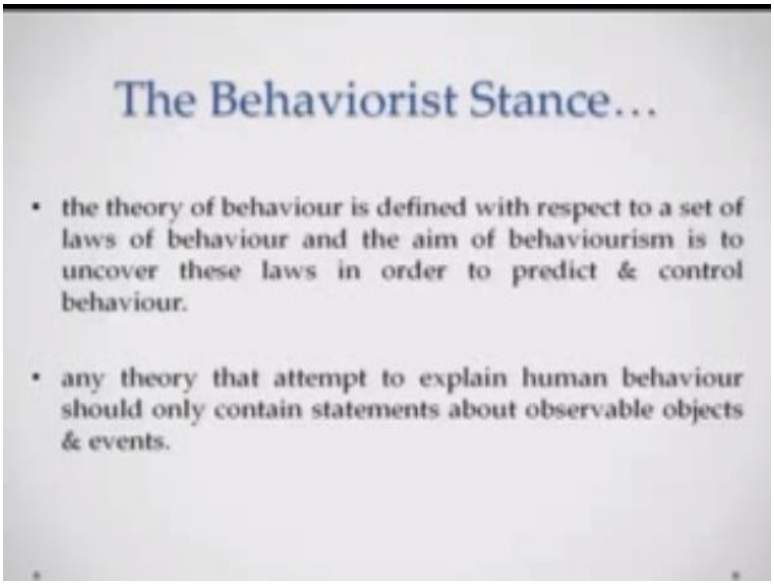

Now so, behaviorist stance then is to sum up the theory of behavior define in respect to set up to loss of behavior and aim of behaviorism is to uncover these loss in order to predict and control behavior okay. Any theory that terms of explain the human behavior, should only contains statements about observable objects and events okay. So this kind of behavior was reinforced for this amount of time, that is why it really to particular kind of human. That is what they were actually taking about.

Now coming to a different flavor of behaviorism which is login behaviorism, logical behaviorism was actually a more radical stands that was taken by the behaviorism.

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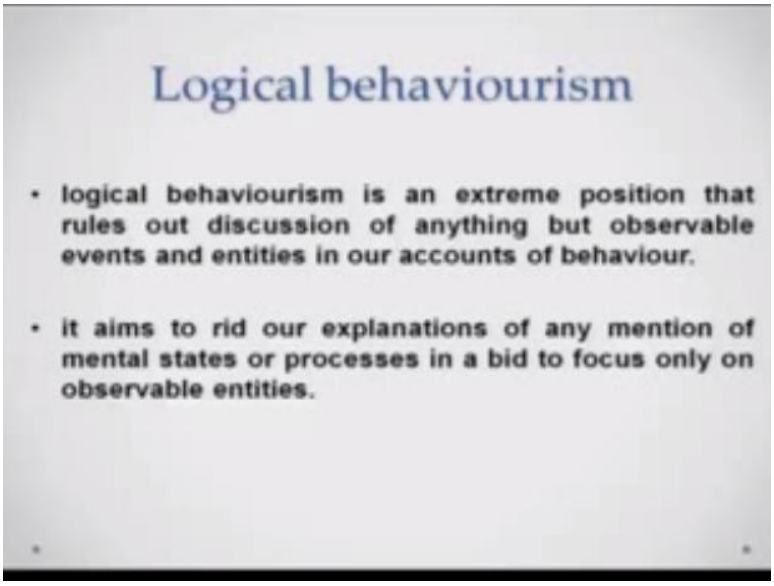

Logical behaviorism is basically rules out the discussion of anything but observable events and entities in our account of behavior. So it says unless you can observe a measure the antecedents you cannot really use those to explain behavior. Anything that cannot be observed should not be figure in this you know the whole contact of human behavior. Now also logical behaviorism it aims to redirect explanations, any mentions of mental states, or processes in a bit to focus only on a observable entities that is pretty much what logical behaviorism really pushes for.

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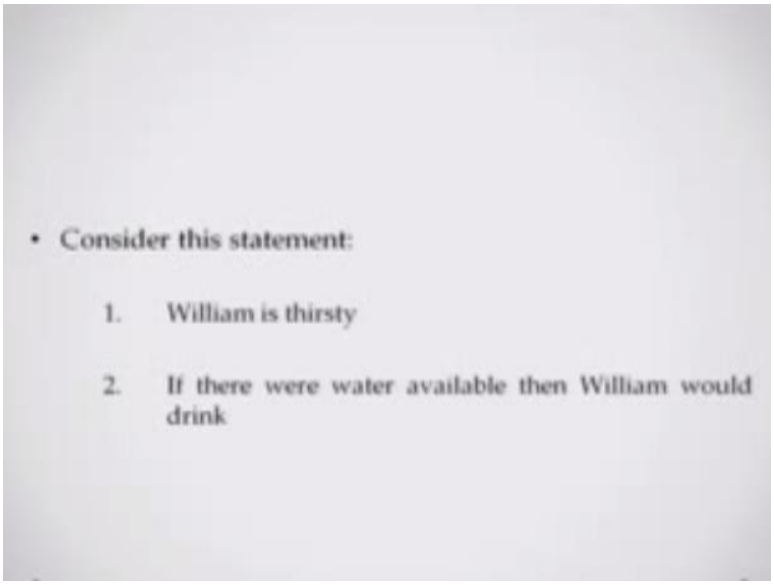

So consider this statement, I say William is trusty and other statement is there were water available then William would drink okay.

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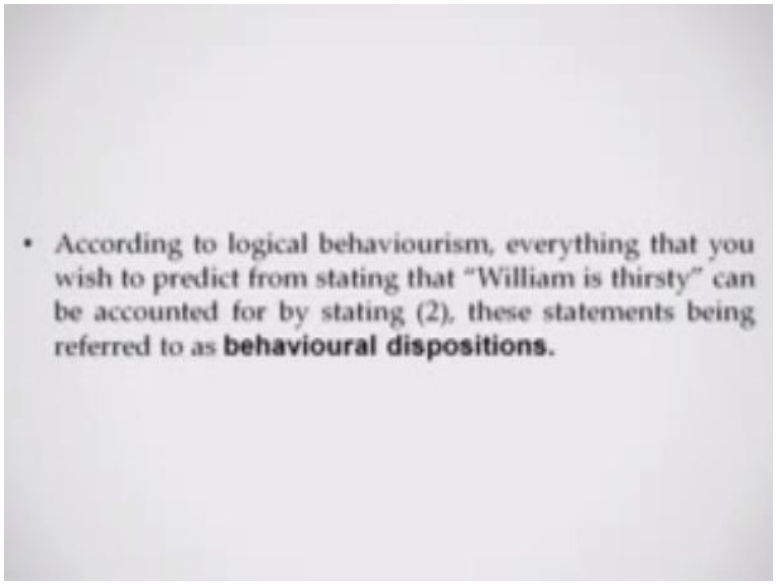

Now according to logical behaviorism everything you wish to predict form saying that William is trusty, because thirsty is a unobservable mental state can be account for by stating a statement to, if there is a water William will drink it why do you need to say that William is thirsty okay, that is what the logical behaviorist stance is okay. And this thing they basically refer to the behavioral deposition if there is water available I am dispose to make use of that water, by drinking it okay.

It is not I do not need to talk about that, you know I am thirsty I feel that I want to drink water nothing like that. If there is water I will drink it and that is the pretty much those simple explanation.

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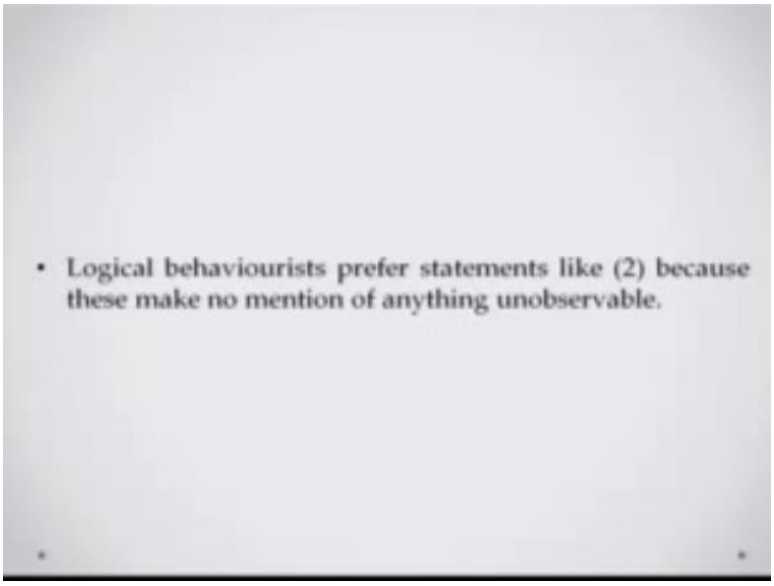

Now Logical behavior is basically prefer statement like this, because they do not have to mention of anything unobservable, thirsty feeling those kind of things are not really there.

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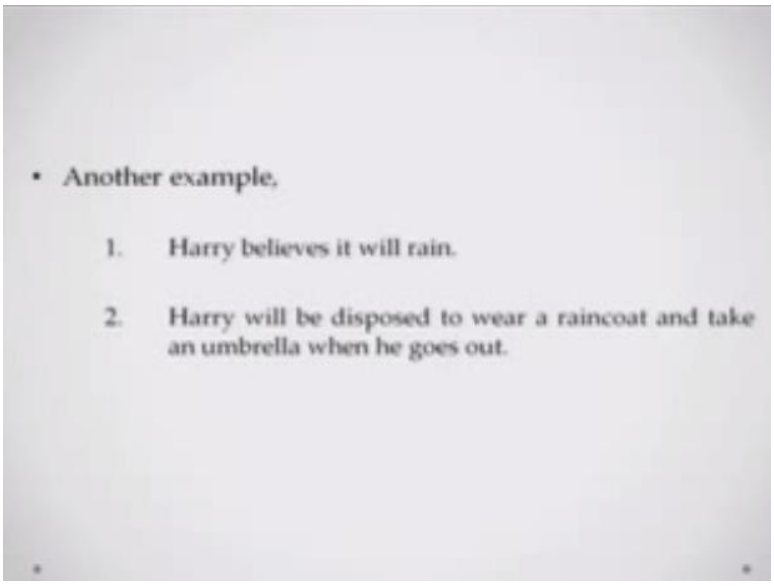

Let us take another example, harry believes it will drink, harry will be the other two sides that will be, harry will be dispose to wear a raincoat and take an umbrella and he goes out okay.

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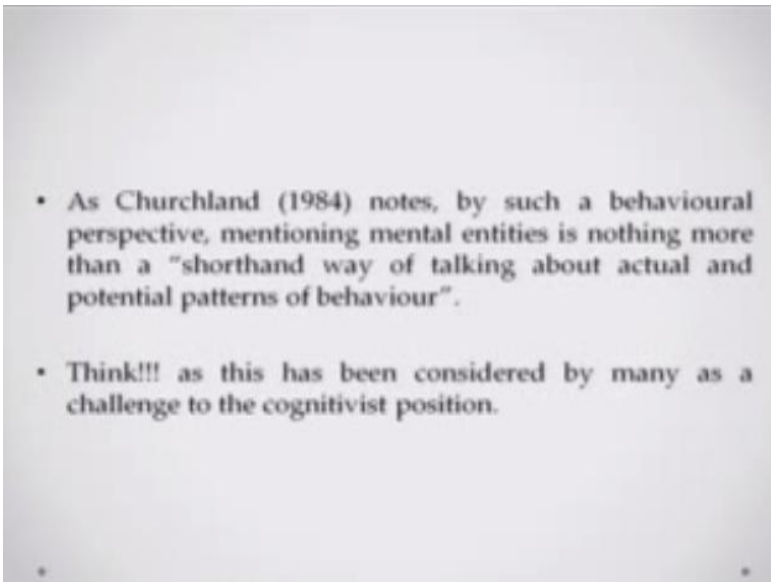

Now Churchland notes that such a behavioral perspective which we talked about of these logical behavior is mentioning mental entity is nothing more than is shorten view of talking out potential patterns of behavior. So if there is going to be rain, and if you know there is going to be rain you will be disposed of taking an umbrella with you okay. It is not like you felt like take an umbrella, or you wanted to take an umbrella, do not take about those things talk about that if there is a chance of rain you are disposed of using an umbrella with you, that is very much what that the behavioral is really wanted to pose.

As this has been consider to be the challenge to the cognitive position, now you can see that from this position what you can see is you can actually know in some sense you really wonder whether you really need to talk about mental activities or mental functions at all.

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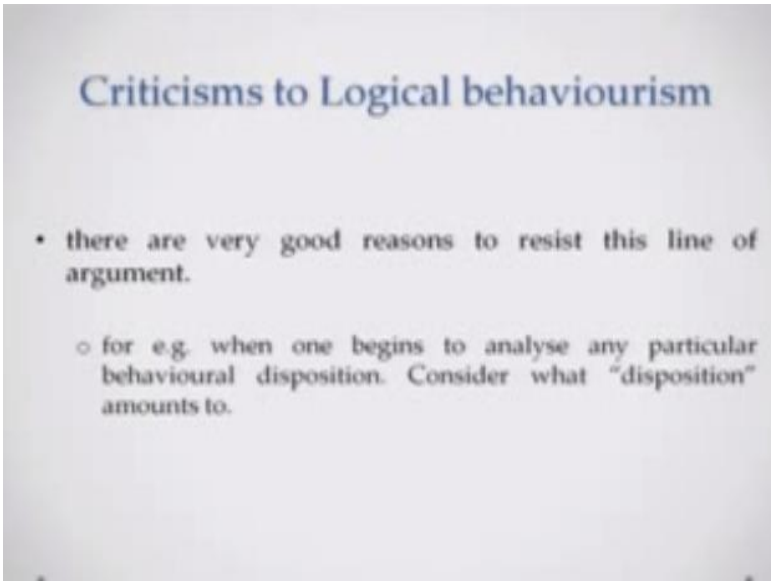

There was certain decision to the logical behaviorism; we just visit them for a short while for example let us try and analyze what disposition really means okay, you say that harry dispose to rain water or harry, or William is dispose to take an umbrella, what does this disposing thing really mean.

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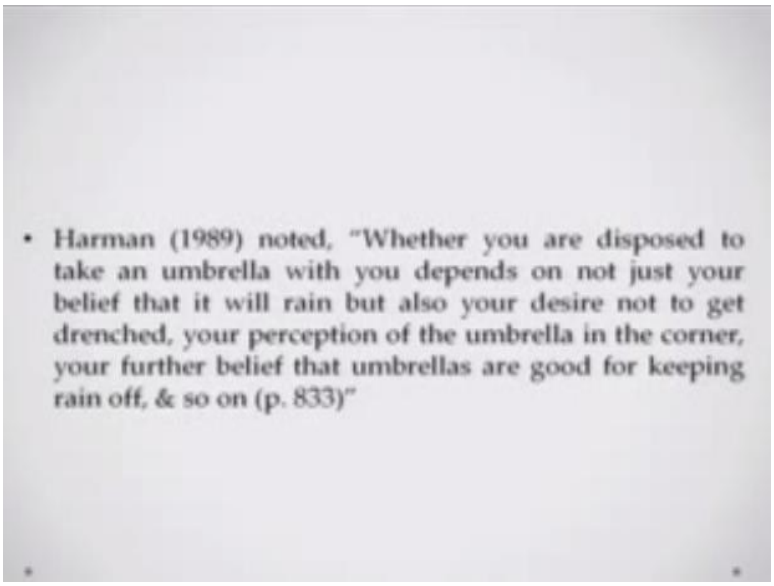

Harman basically knows that whether you dispose to take an umbrella with you depends, on not just you believe that it will rain, but also its desire, not to get wet, and your perception of the umbrella, in corner and your further believe that umbrella are good for keeping rain off, and so on. Now you see this statement really has so many references to what basically the logical behavior is would not like, you know the belief that you it will rain and the desire that you do not want to get wet, and perception that there is an umbrella.

And again the belief that the umbrella is good to save you to from getting wet. So even if you try and explain the disposition you really you know making use of things which are abstract, things which are mental entity. S you cannot really escape from these from the mention of these mental entity is by just talking about this analyzes in terms of dispossession, that is one major criticism of logical behaviorism.

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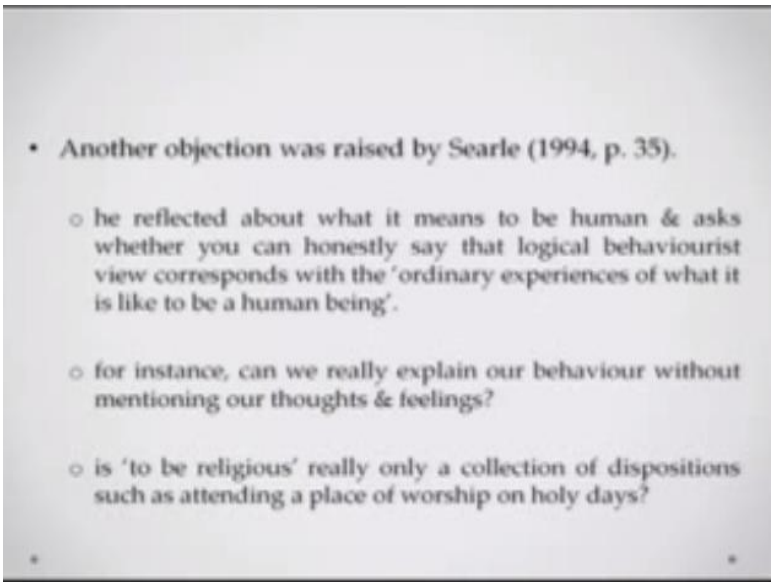

Another objection to logical behaviorism is made by Searle, and Searle says and he basically raises a very interesting question, he says that can you talk about that is means to be human, and you know without really talking about the ordinary experience, of what it is like to be human being. For instance, can you really explain about our human behavior without mentioning our thoughts and feelings.

So we do not really going to say that I did this or I did that, we generally talk about that okay, you know I felt something feeling, sad so I went and did this for that feeling very happy, so I went did. But generally in a mood naturally level our explanation of behavior rests on these mental entities, rests on these abstract concepts. And pretty much this psychology has to do a good job of explaining mental human behavior, it needs to take in these account, it cannot really survive without taking about these things okay.

That is a very interesting observation to make. Say for example, Searle says how do you describe you know the aspects of to be religious, you know how do you say that you know X is religious, what is the aspect of religious, you know that thing is being religious only a collection of dispossession such as for example, if there is a temple I am dispose to visit the temple, and if

there is a mosque you know I am dispose to pray in the mosque, or is being religious something entirely different which is again something that exist in your mental space exits in your abstract world.

Now if you see these two criticism of logical behaviorism by Searle and otherwise are actually very found it, and this is what really lead gradually to the response that we see as cognitive physiology okay, this is what really takes us to the fair that cognitive physiology should be there, and we will talk about how that really happens.

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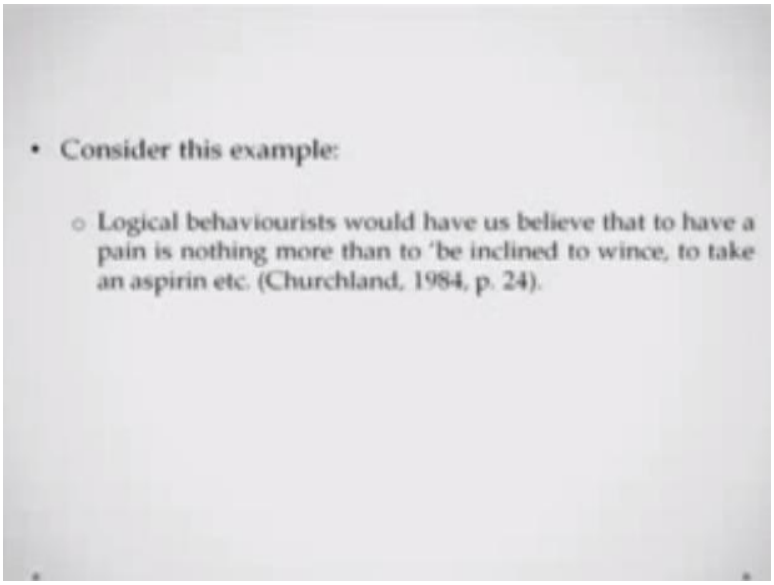

Consider this example you logical behaviorism would have us believe that to have a pain is nothing more than to be in client to veins or to take an aspirant etc. Now if I tell you that you know you come to me with pain, you know you got hurt in your foot or something and you say that you have lot of pain, and I telling you that it is not that you are having the pain or anything you are just in client to take an aspirin.

That does not really seem like a very good explanation, and I am sure it is not go well, if you tell somebody this. So this is in some sense you know overall or the basic short coming, in

behaviorism which we will see how gradually leads us to the whole explanatory frame work that is called cognitive physiology.

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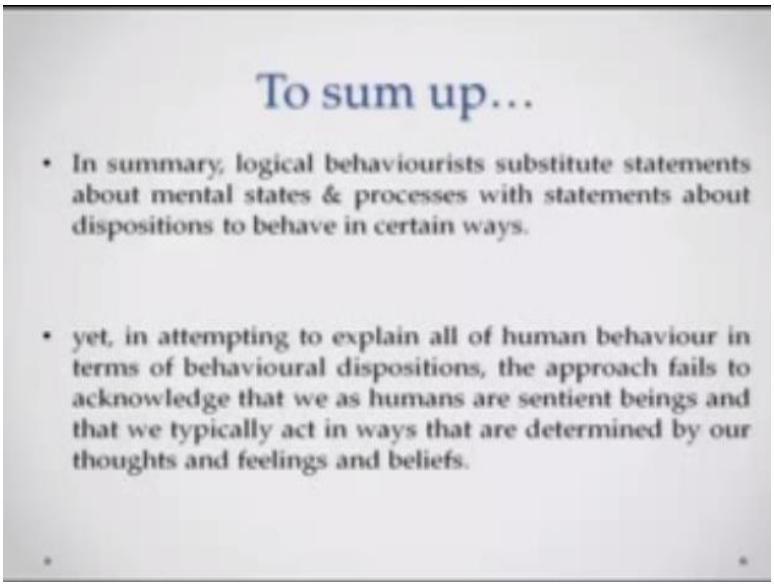

Let us sum up what we did today in summary logical behavior is substitute statement of about mental states and processes, and statements about dispositions and to behave in certain ways, yet in attempting to explain all of human behavior in terms of these behavioral dispositions, these approach actually face to acknowledge that as we human beings, we are sentient beings typically act in ways that are determine by our thoughts and feelings which are not our physical entities, which are mental entities.

So we are pretty much always taking into account the mental world. So thank you for today we will go in the next lecture to the cognitive position, we talked about the behaviorism positions today thank you.

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