Great Experiments in Psychology
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Module 1
Lecture No 3
Establishing Psychology as a Science (Contd)

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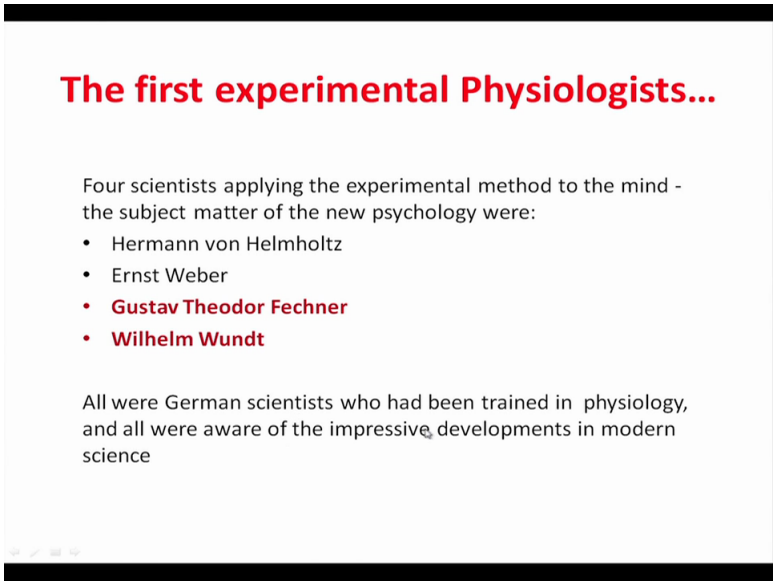

Hello everyone, welcome back to the lectures on Great experiments in psychology. In the previous class we had discussed about establishing psychology as a science and we were talking about the new movement of building up psychology as a science and we spoke about the very famous physiologists and medical practitioner primarily Helmholtz and Webber. Today, in our class we are going to talk about Fechner and Wundt and off course we will there after we will get to who other very famous psychologists primarily Wundt's student Fechner and also Evan Horse another very independent psychologists of the time.

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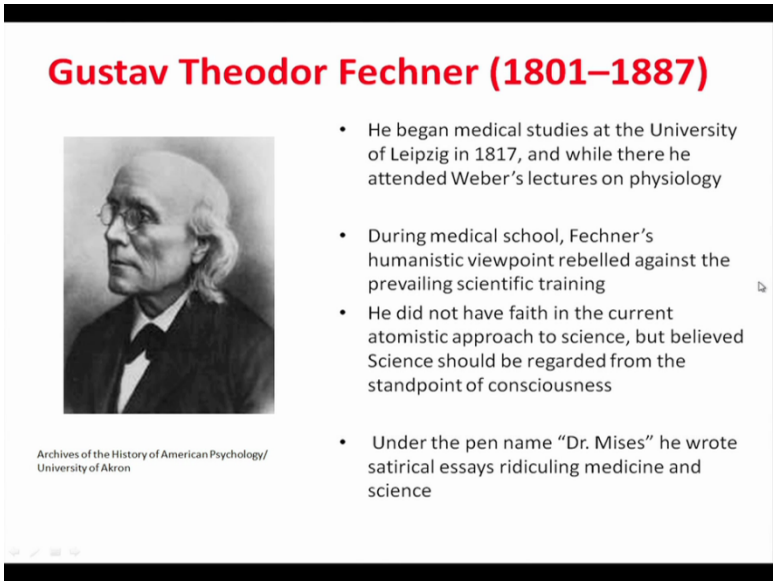

Fechner thought about it now we know that Fechner was also a German and he had done his medical studies at the University of Leipzig in 1817. And while he was there he had attended Webbers lectures on physiology, so at this point in time Fechner also got influenced by Webbers theories on just noticeable differences in fact, along with that he had a different view point towards science. So he was he had a humanistic approach towards science and he felt that science should be approved from the point of view of consciousness instead of materializing it and he bringing it to materialistic levels of elements. Now this he rebelled against the current existing scientific training and he brought it out under the pen name of Dr. Mises, he wrote several satirical essays ridiculing medicine and science.

He did not like the atomistic approach of science and as I mentioned earlier, he was more towards a view point of seen science as a study of consciousness. Now, as you can well understand, even in the previous class we have talked about the German movement of science as compared to the British and the American movements, now British and France we spoke about Europe how they were taking science considered to be only a part of physics and chemistry movements in physics and chemistry or primarily the physical sciences. But in Germany the biological sciences and other aspects of social science were gaining ground and in this state of affairs Fechner's view was also influenced and Webbers theory Webbers lectures had a major influence on him and he tried to establish a mind and body relationship

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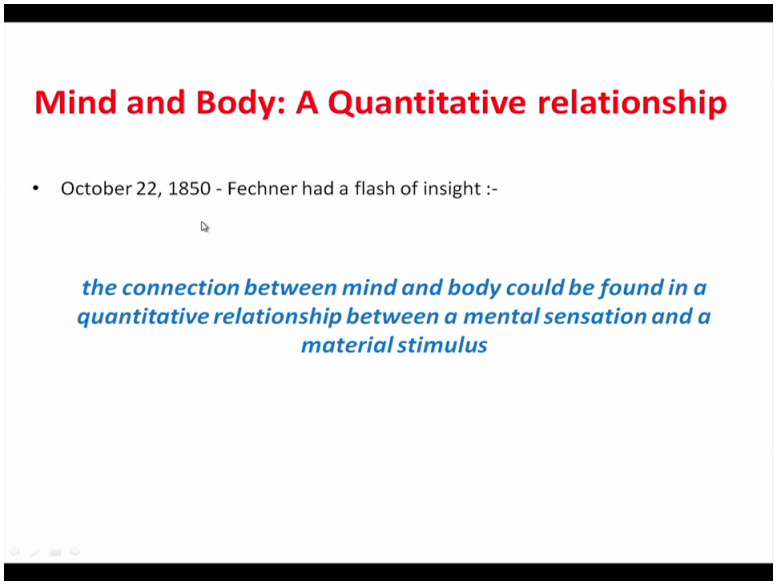

And he was a first one who started saying that a quantitative relationship would be identified between mind and body and on October 22 1850 Fechner had a flash of insight. He felt that the connection between mind and body could be found in a quantitative relationship between a mental sensation and a material stimulus, so you could actually show that quantitatively, this is the first time anybody had mentioned it that you could actually identify from mind and body relationship and explain it through quantitative terms.

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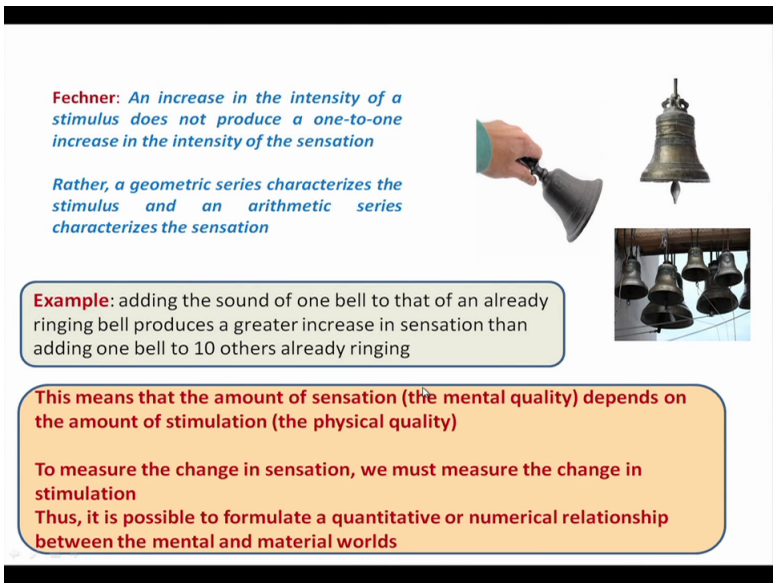

So Fechner believed that an increase in the intensity of a stimulus does not necessarily produce a one to one increase in the intensity of a sensation. So if I if I pick up a 1 gram of weight, does not mean that my perception of this will also be that of 1 gram and if I add 1

more gram over here, it does not mean that here I will not take it as unequal. So he said that this is not, so if this was considered as a unified pole, then perhaps you know it would depend on the sensation that this stimulus is creating for me to understand that this is different. Now h I am telling you several times that this is a unified hole, so if you considered this as one weight together and this as another weight, I might only this though as you can understand than this is heavier because there are two elements here and this should be lighter objectively my sensation may not consider this as lighter to this.

Now this as per Fechner is a quantitative relationship where it does not directly the stimulus directly does not produce a sensation of and it is not on a one to one increase. Rather he said that for the stimulus has to be increased in a geometrical progression for the sensation to change on an arithmetical progression. So what he meant is you have to if this is double then perhaps I will not understand the difference.

Now if there are four over here so if I have 4 weights over here, then I will understand the difference perhaps when there are two, so if there is so the difference will be only observable if suppose this had 4 and this had 3, then it could perhaps not be understood. The difference between the 2 weights could not be understood, so if this had 4 columns and this had 3 then perhaps this could not be understood ok.

So now the next thing so if I give you another example as you can see on the slide, the example it could be that adding the sound of one bell to that of an already ringing bell produces a greater increase in the sensation rather than adding one bell to ten others already ringing. So if you have, if there is the sound of one bell already ringing and you introduce the sound of another bell, then maybe it will add on to the increase in sensation but if there are ten bells already ringing and you introduce a sound of another bell, so you make it eleven bell then it might not be noticeable.

One example from this of this is that if you are travelling in a very busy road, so and there is too much of sound of traffic, so an additional sound of traffic unless it is extremely shriek or you know of extremely high amplitude, you will not be able to understand another addition of a sound of in the of vehicle sound in a lot of traffic, if there is a lot of traffic around. On the other hand, if there was only one car who was honking and there is a new car that starts honking, so if there is an addition of another sound only one stimulus, then you will be able to distinguish and you will be able to say that ok the sensation there is another sound, so you can actually there is an increase in sensation.

But if it is there are too many vehicles honking and there is one more sound of a horn added to it, you might not make the difference at all. Just like in the previous examples where I showed that addition of another weight may not actually make you understand the difference between the two. Now, this means that the amount of sensation or the mental quality depends on the amount of stimulation that is the physical quality.

So, to measure the change in sensation we must thus measure the change in stimulation, so how much of sensation is produced will also depend on how much stimulation is being made. Now does he said that it is possible to formulate a quantitative or a numerical relationship between the mental and the material worlds, so to understand now much of a stimulus is required to produce a sensation and then how much of an additional stimulus is required to produce a change in stimulation. So you can easily find out through an experiment and Fechner way back in the 1800s did actually experiment on this. Strangely you know Fechner had been involved in several forms of experimentation and one of his experimentation with light rays, he was looking at the light rays with a screen and that had almost damaged his eyes, so he had impaired his vision to a great extent while doing his experimentation.

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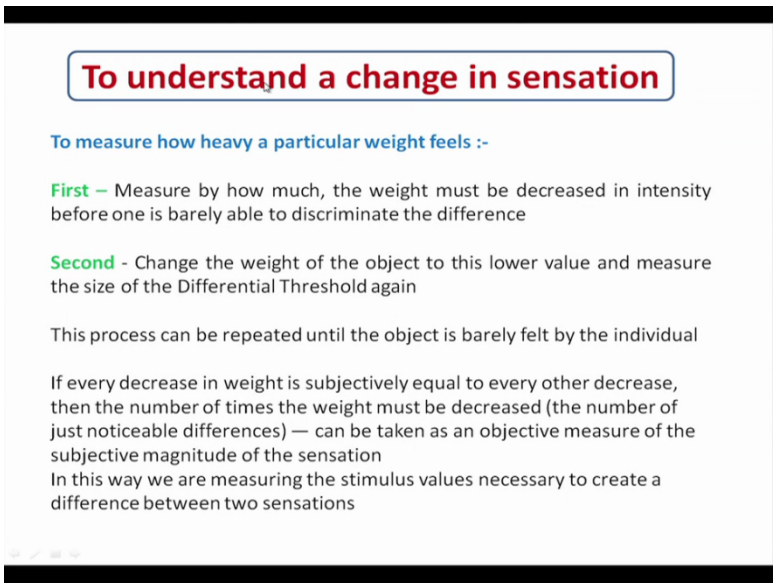

This is a little off record ok so now to understand a change in sensation you can actually carry on this experiment at home and you can see how heavy a particular weight feels. So I just put some sugar on a tea cup small tea cup and I think it will be around may be 10-15 grams of sugar ok, so you can try this out at home and it is quite similar to the experimentation that Fechner tried out, so this is a very rudimentary form, so to measure how heavy a particular weight feels. First measured by how much the weight must be decreased in intensity before

one is barely able to discriminate the difference, say I can do this with a single weight, I can do this with two weights also.

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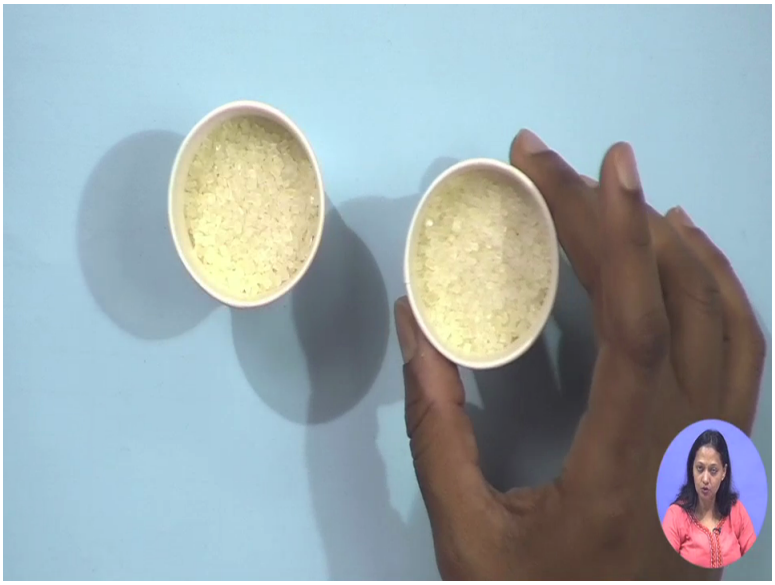

So currently this is equal right now and now I take this up and I say this is equal to this, so now how much do I need to change to understand this is lighter or heavier? So say I reduce a little bit of sugar, I reduce a little bit of the sugar and now I see well is this lighter, no it seems the same. Now this is a standard weight, now I reduce a little more and here I can see the difference. So yes this definitely is lighter, so this is definitely lighter than this. So this process can be again then I can actually remove a little more to see when the next difference that I find is? I can actually do this with one weight also so say I am taking this up and how much do I need to remove say a little bit I have removed and here is this lighter than the previous one or is it the same? And then you reduce a little more and is this lighter than the previous one or is it the same.

So this can be repeated till the so every time a change is noticed, you can see the weight of the of this and see what is the difference in weight that is required to understand that there is a change in sensation and you will see that every time you notice the difference in change, it is generally constant, so the difference is constant and this difference is the differential threshold.

Now, this process can be repeated until the object is barely felt, so you can actually start removing this till a point when you are… now you cannot do it with this you will probably to do it with another thing where you cannot feel a weight at all like if I put this on my hand I

can hardly fell the weight. Now if every decrease in weight is subjectively equal to every other decrease, then the number of times the weight must be decreased or just noticeable difference can be taken as an objective measure of the subjective magnitude of the sensation.

So what does this be that this change in weight is actually the change it brings out the change in sensation, so that is the objective measure of the sensation and in this weight we are actually measuring the stimulus values into necessary to create a difference in two sensation, so you are when you are measuring the weight, you are actually seen what amount of weight what amount of stimulus change in real terms in objective terms is required to bring about a change in the sensation.

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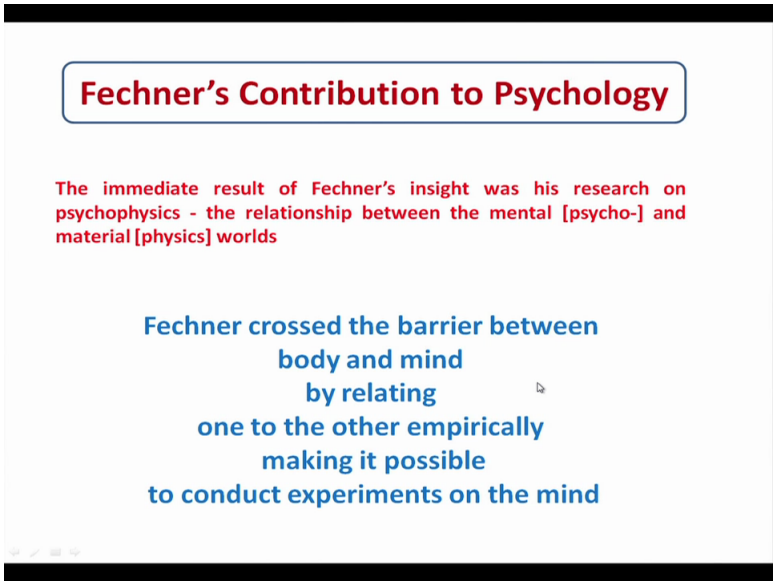

Now what is Fechner's contribution to psychology? Mind it, Fechner was a physiologists and he had no intentions, psychology was third of his choice, so he had no intentions of actually bringing up psychology as a new science but his contribution to psychology is immense. The immediate result of Fechner's insight was his research on psychophysics and we have discussed about the mind-body relationship. So what is psychophysics, it is a relationship between the mental and the material worlds. So Fechner is a first one of course Webber is important, but Fechner crossed the barrier between the body and mind by relating one to the other empirically and making it possible to conduct experiments on the mind.

So when you talking about the development of psychology as a science, we know that philosophers would consider it as the psychology of the soul. Psychology as a study of the soul or the science of the soul and then it came to study of the mind and now from mind we

are actually trying to establish a scientific interpretation of the system. So we are trying to establish here that it can be mind can be measured. Now, the empiricists of the time, the empirical philosophers of the time had started questioning it on the basis of experimentation.

Any philosophical question query may try to establish through experimentation and here Fechner is one of the major contributors to psychology, when he tried to establish that experiments could be conducted on the mind. So, he showed that by now it was established that the mind existed, so how do you know that the mind existed that you could actually experiment on it and you could experiment on it through the and find out that sensations are not a direct product of the stimulus that is presented.

So or rather it is not a one to one relationship between a sensation and a stimulus and a sensation, so if you give a one unit of a stimulus, it may not produce a one unit of a sensation. And after that if you increase the stimulus by another one unit, it does not mean that there will be a change in sensation by another one unit, so it could be that you have to increase the stimulus to say four units to have a sensation of one unit.

So there is a concept of the threshold so the point where you can differentiate that the sensation is present and from there on by increasing the sensation, so here we come across the influence of physics in the development of psychology also. So like say we know that there is an absolute threshold, so there is say if we talk of audition, so 20 to 20,000 Hertz could be the audibility range of a human being. So anything below 20 Hertz would not be audible to the individual so it does not mean that this stimulus does not exist. So but for a human to understand the auditory sensation to work it will need to the stimulus range has to be beyond 20 Hertz. Similarly, if the stimulus range is beyond 20,000 Hertz then the individual will not be able to understand that sensation so it is too much for our too much of vibration for our impairment brain to take so that is rear membrane and we can cannot understand the sensation, we cannot perceive the sensation.

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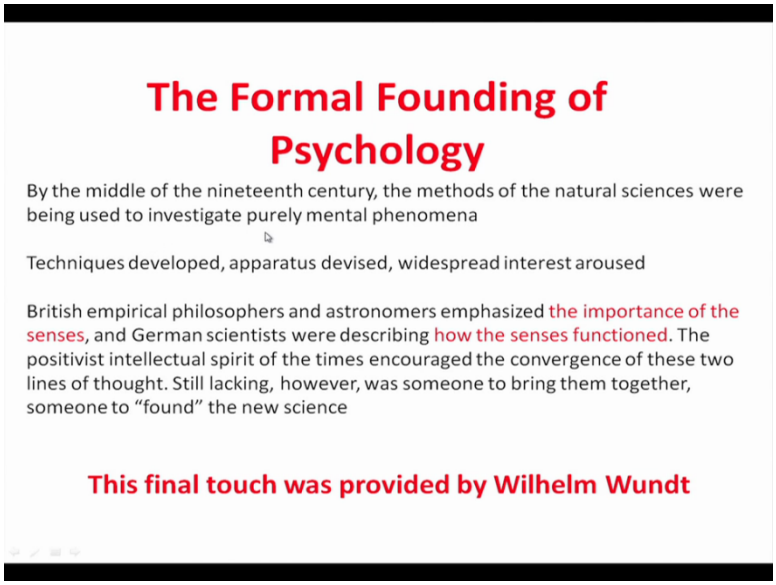

So here you see the influence of the physics also taking you know showing that you know stimulus and sensation could be related and you could Fechner showed that it could be quantified also. Now that brings us to the next very important person in psychology the new era of psychology that is and the another German scientist and medical practitioner and here physiologist primarily and here he is also known as the founding father of psychology, so how this is where you know this was a platform created for psychology to be built up and we saw that Helmholtz then Webber and Fechner, all three German scientists who were approaching the human organism and the psychological processes through different ways.

And they had brought about the platform they had created the platform to develop the new science of psychology, but yet they needed to be one individual who would bring and accept or make the world accept psychology as an independent scientific discipline and that is where Wilhelm Wundt came in. So by this time by the time of the 19th century we see that people were starting to investigate mental phenomenon and techniques were developed, apparatus devised and a lot of interest was aroused in understanding mental phenomenon.

There were British empirical philosophers and astronomers who emphasised on the importance of the senses and there were German scientists now who were actually seen how these senses functioned. So we have physiologists actively working on understanding sensations and the sense organs and there were other Britishers who were actually trying to establish that these were important to understand the sense organs.

Now, the positive intellectual spirit or the (())(21:06) that is the intellectual movement of the time encouraged the convergence of these two lines of thought and this was the platform where there was somebody who was needed to bring up introduce the new science of psychology as a separate discipline and that is where Wilhelm Wundt came in. So we will discuss about Wilhelm Wundt in the next class Thank you.