Selected Topics in Psychology
Psychological Testing and Assessment
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What a surprise: My results are nonsignificant

Let me welcome you to my third lecture here. Now, in this third session, I would like to draw your attention to something like psychology as a science. Usually, in psychology we teach students to conduct experiments, and look for significant findings. By significant findings we mean that, your test must be significant at 0.5 level of significance. Now, in all social sciences, this is a major obsession that, can we measure things, can we quantify things or not. And in that process I have learnt something, that there can be circumstances; where you do not get a significant effect nevertheless, those non significant effects are meaningful and interpretable. So, I would say are some examples of such situations with you, so that we develop respect for null findings.

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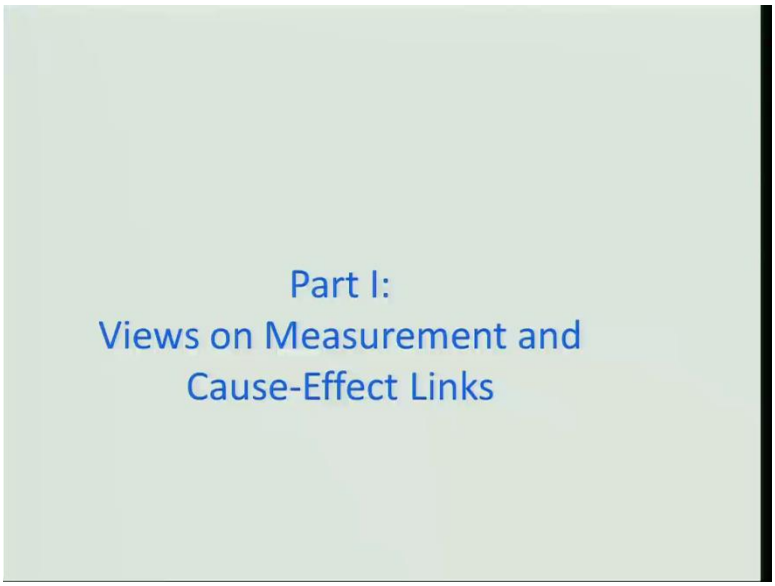

And in that context, first I take you to the work of other social scientists here, and here are two quotations for you, let us look at the first one.

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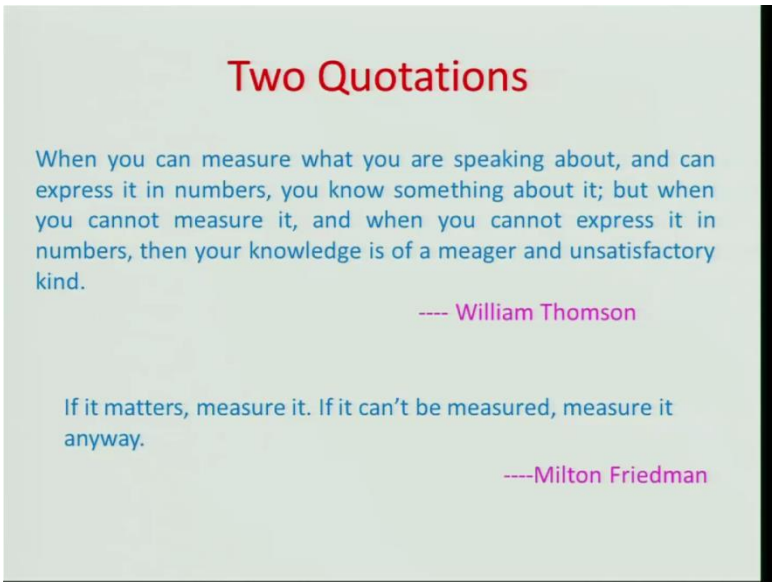

So, the first quotation you see here, what is the attitude of people toward measurement? We say, when you can measure what you are speaking about, and you can express it in numbers, you know something about it. But, when you cannot express it, you cannot measure it, and when you cannot express it in numbers; then your knowledge is of a meager and unsatisfactory kind. That means we have to measure things and quantify things, this quotation is from William Thomson.

But, if we go to a famous economist who got noble prize, he also had a very similar advice. And his advice was that if it matters measure it, and if it cannot be measured, measure it anyway. So, measurement is assign guenon, any social science which is trying to be science has to use quantification, has to use number here, and that is why we train our a students to conduct a studies, demonstrate that the effects are a statistically significant.

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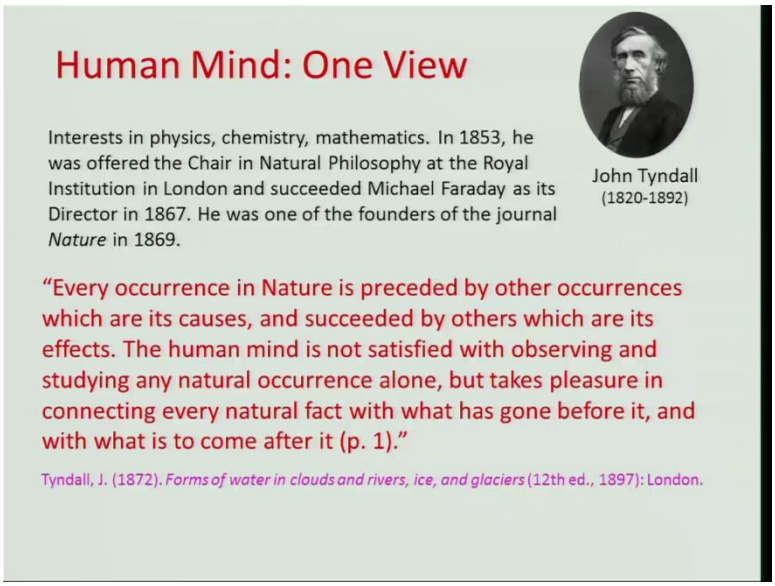

But in this process, let us go back to something about human mind, and three different kinds of use I would like to say here with you. One, view is like John Tyndall, let us look at his biography, he is not a psychologist, he is a physicist, mathematician, and a chemistry man. He is the one, who was offered the chair of natural philosophy at the royal institution of London, and he succeeded Michael Faraday as its director in 1867. And he was one of the founders of the journal nature, which is considered to be a high prestige value, what did he say about human mind or measurement or congestion. And I thought this is the most persuasive quotation I can find for you.

Every occurrence in nature is preceded by other occurrences, which are its causes, and succeeded by others which are its effects. The human mind is not satisfied with observing and studying any natural occurrence alone, but takes pleasure in connecting every natural fact with what has gone before it, and with what it will come after it. Now, that he wrote in a book in 1872, which is titled forms of water, clouds, and rivers, ice, and glaciers, 12th edition I have taken this quotation. As a psychologist I find, this is a profound a statement about human mind, and we ought to be following his advice.

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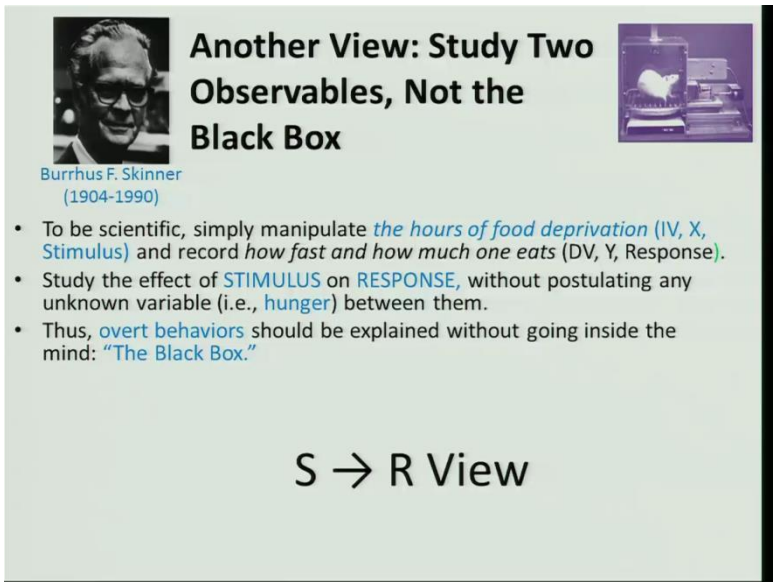

Now, on the other hand we have another view, which came from behave a regime in which we said, if we are a studying cause and effect relationship, all we should be a studying it what we can observe. So, what we manipulate are observable, what we measure are observable, why should we go in between the two. So, anything which is unobservable, do not allow us to become a scientist. So, a Skinner called such process a black box here, and this view led to what we called a stimulus response view of, what you manipulate observable, what you measure observable here and the led these two.

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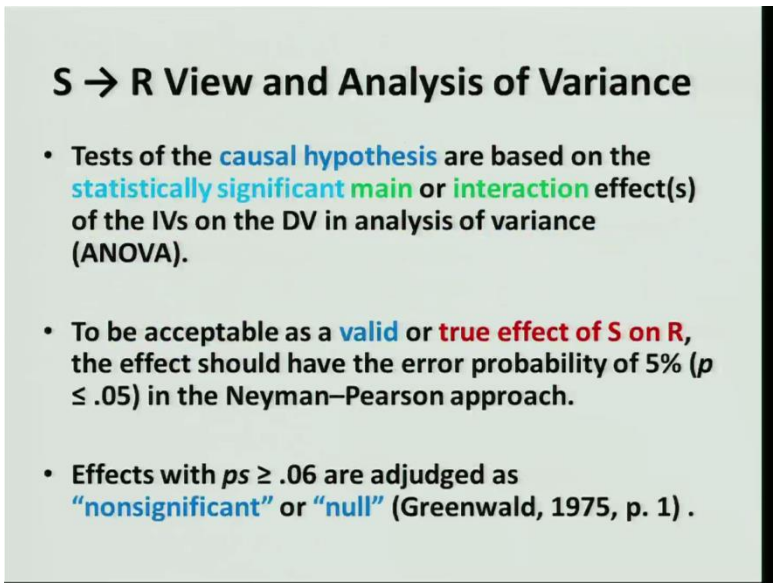

And that lead to a wider acceptance of analysis of variance in psychological research. And few things here, we are started testing any casual hypothesis. Tyndall said we always make casual connection between what proceeded, and what would follow. So, we are started using analysis of variance, to see whether the cost produced any effect or not. And that effect we will test by a statistical significance of the, either the main effect or interaction effect in analysis of variance.

And to judge something as a statistically significant, our cutting point was 0.05. So, if something is significant at the level of 0.05, we say it is truth. Anything which is more than 0.05, we say it is a null finding, it is null significant finding, it is not to be given any credibility we usually ignore it. I am concentrating on such null findings what happens, when your effects do not reach 0.05 levels of significance, should you discard them or you should interpret them, this is the goal I have set for this session.

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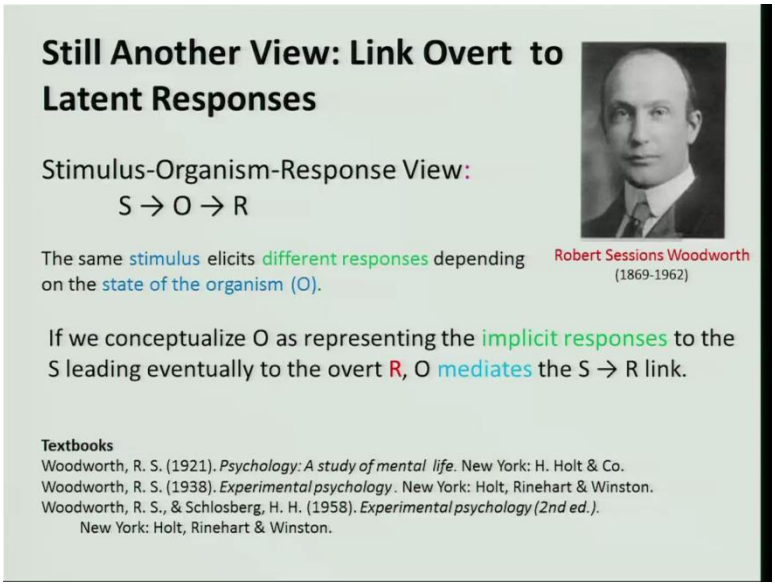

And for these, we have to take a third view, which say that simply a stimulus and the response are not enough. We had to consider organism between these two that led to the notion that effect of a stimulus what is observable, on the response which is another observable is actually transmitted by the organism, which I will call here latent variables or implicit variable or mediated ((Refer Time: 06:41)). So, three views we have, Tyndall saying we have connections, a skinner said a studied two observables. Woodworth says

that no, between the two observable we should also infer what happens in between these two, this is what is the goal now.

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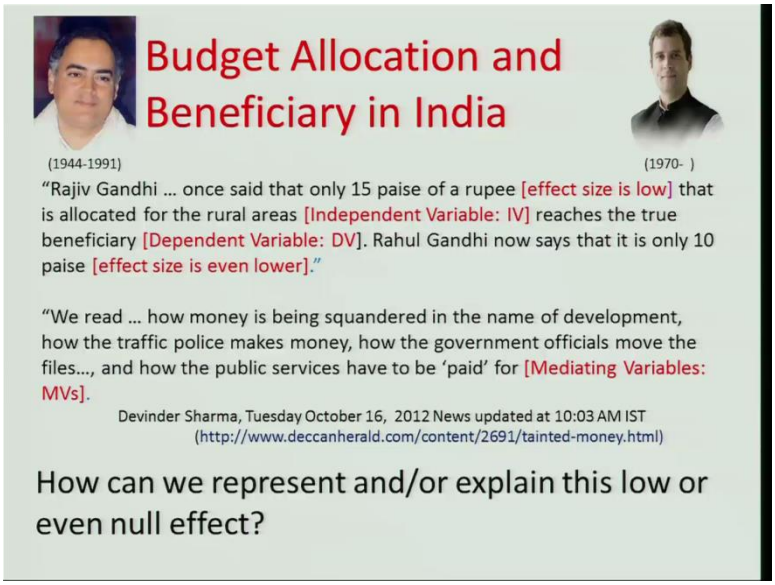

To account for this, I am raising two issues here; let us look at the national scene in this country. The way we allocate funds in our budget, and the way the fund would be reaching the beneficiary. So, our former Prime Minister Sri Rajiv Gandhi, he made a one a statement which I have produced here from internet. Rajiv Gandhi once said that only 15 paisa of a rupee that is the effect size is low, that is allocated for the rural areas which is the independent variable or I V, reaches the true beneficiary that is the dependent variable.

Rahul Gandhi now says that it is only 10 paisa, it is only 10 paisa means the effect size is really low, and this is what I am debating. And then here is Devinder Sharma who said, we read how money is being squandered in the name of development, how the traffic police makes money, how the government officials move the files, and how the public services have to be paid for, and I am calling these as mediating variables. So, budget allocation we have beneficiary we have, and what goes in between are the mediating variables.

This is what public police series are doing and psychologist can be of great help, and that is why I selected this example. Now, this is the challenge to a psychologist, how can you represent this phenomenon which is prevalent in this country, how can we explain this a

small effect or null effect, to do that I would give you few examples of here, but let to me do one exercise here.

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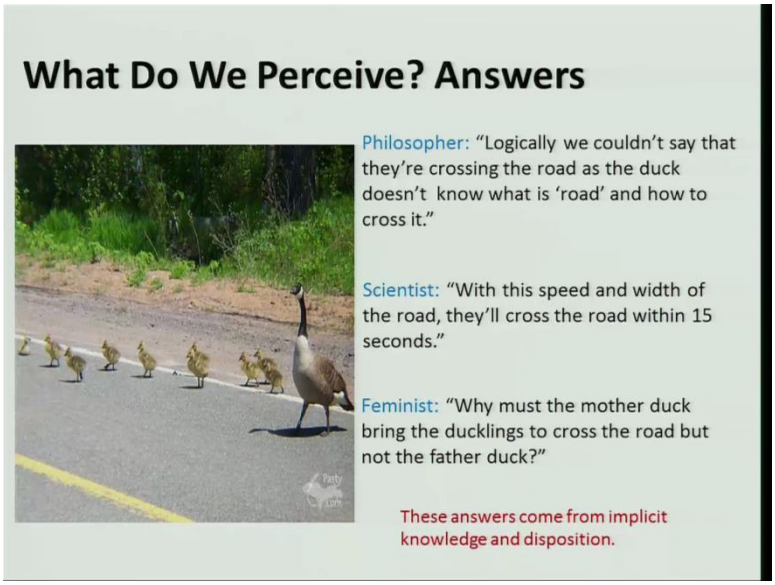

What do you see here, if you show this picture to different people and ask, what do you see, different people would come up with different answers. For example, if you would ask a group of philosophers like professor Misrah, he would say logically you could not say that they are crossing the road, as the duck does not know what is road and how to cross it. Now, you ask another person who is a scientist, he would say with this a speed and width of the road, they will cross the road within 15 seconds.

But if you ask you seem, we have most of the our audience female, if you would ask feminist they would say, why must the mother duck bring the ducklings to cross the road, but not the father duck, how did this answer come, we have manipulated picture, we have asked for their response. So, between the two observables, people are coming with different explanations, and if I am a psychologist, if I am a behavioral scientist, I should be able to tape this process latent variable their interpretations. And we have methods through which it can be done now. So, these questions are apparently coming from the implicit knowledge, responses which we have to infer or this position of the individuals.

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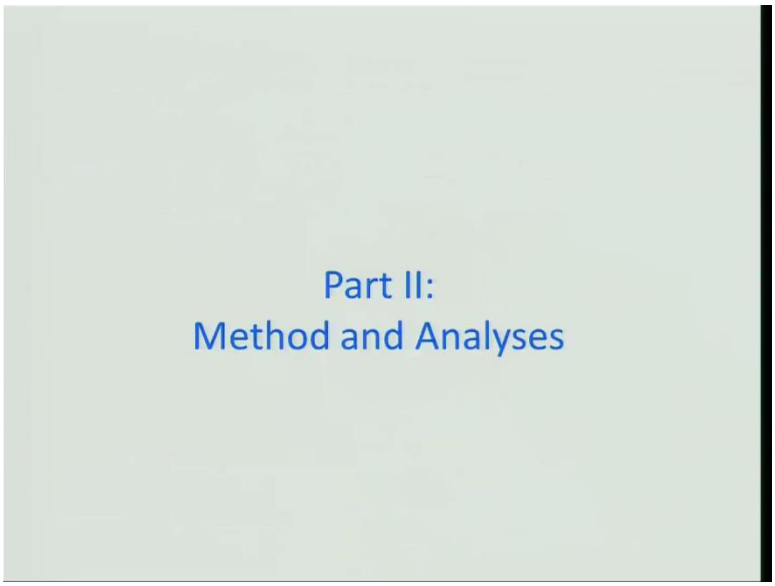

Let us consider how we are going to do. So two things, new methods and new analysis I would like to share with you, before I give the examples.

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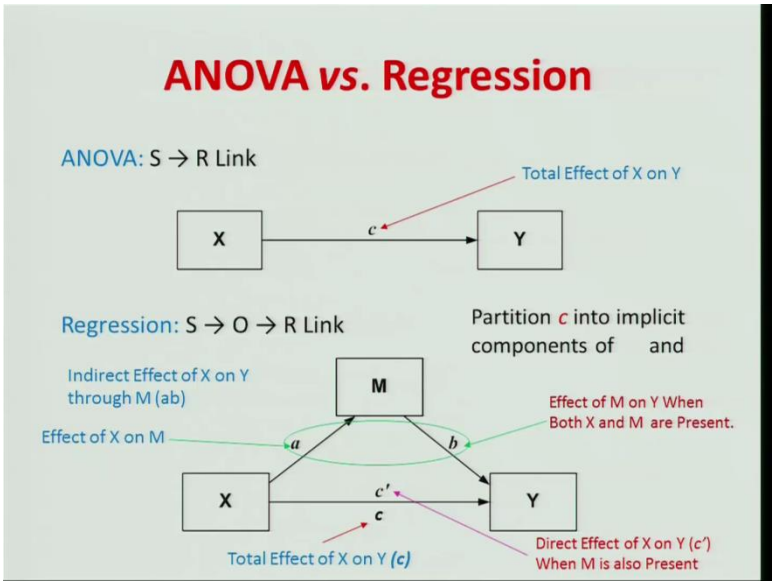

The first one, we had 2 major analytic tools available to us to make psychology as a science, one was analysis of variance or Anova, and another is called regression analysis, just make a small comparison and contrast of these two. In Anova what do we do, we manipulate the X, we measure the Y, and the effect of X on Y, we represent by this c, that is the total effect. Now, those who believe in S O R view, they became dissatisfied

and the example I gave you, that people come up with they have their own implicit disposition, their own implicit knowledge.

So, they said we must divide a methodwhich can tap that process. So, here we need to consider 3 things, X which is known variable, Y which is known variable, but the implicit variable is M which is mediator. So, this c you see is the total effect of X on Y, which is the observable effect. Now, the question is how this c can be partitioned into c prime, which is the direct effect of the I V on the d b. And how can we estimate effect of X on M, and effect of M on Y that we represent by path a and b, that is a simple two S tape regression analysis.

In the first stage you predict Y from X, second stage you predict Y from X and M together. You have to do another simple regression analysis, in which you predict M from X. So, once you had these, you would be able to construct a model like this. So, a times b would become the mediating effect, the effect of X on Y through M, effect the c we already know, we have been knowing through analysis of variance. So, regression analysis gave a new tool, a new perspective in tracing the implicit variable, that what carries the effect of X on Y, to what extent the effect is of X by itself, and to what extent it is coming through the M.

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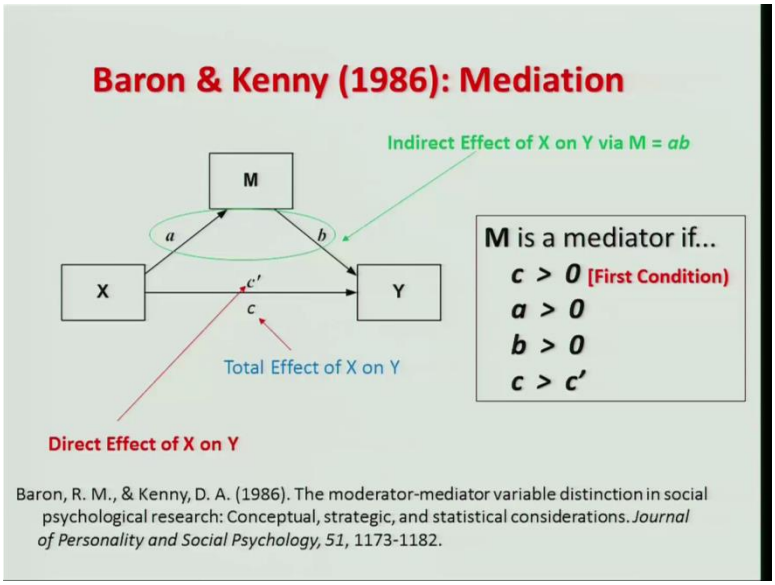

So, this technique Baron and Kenny when they proposed, they set some conditions. Let us look at those 4 conditions, the first requirement was c which is the total effect must be

greater than 0 that means, it should not be non-significant. And I am dealing with even though it is null significant we can do it, this is the departure I am making, even though it is nonsignificant these technique is useful. According to Baron and Kenny if this is not true you need not do anything, people would say what effect you are trying to a study to be mediated. I am saying it is not necessary that X would have effect on Y, a still you can interpret it and see how we can do this.

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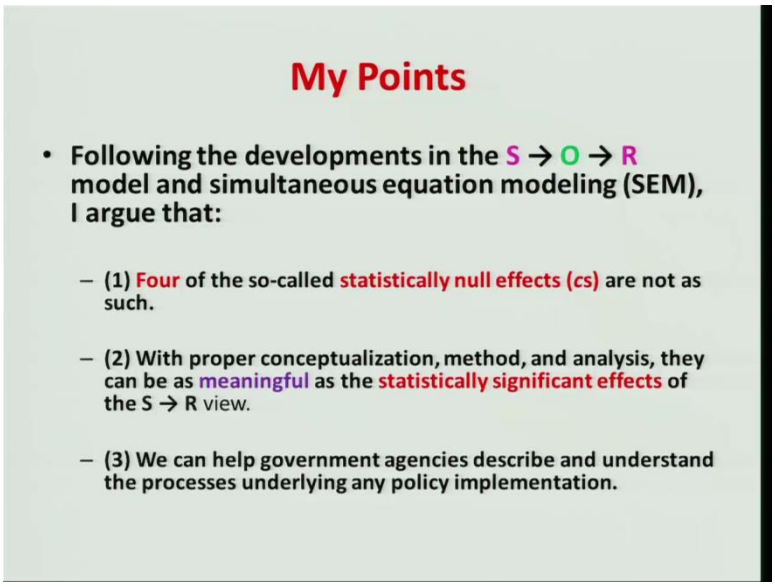

So, I would like to make 3 main points, that if we consider the development in S O R, and regression analysis technique which gave simultaneous equation modeling. We would be able to deal with such phenomenon which we consider to be irrelevant, nonsignificant, useless examples of poor research. So, first point I would give you 4 examples in which the effects are not significant, but they are meaningful and interpretable.

Second thing I would say that with these, with proper conceptualization method and analysis, you make those effects as meaningful, as any statistically significant one from their stimulus response view. And final point is if Psychology is ever to be of used to the government to the society, it can be able to give a good answer for most of the policy analysis. So, the issue I raised at why 15 paisa has become 10 paisa now from the budget allocation. We should be able to explain it using our methods; this is what I have set as my goal.

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Let us come to 4 cases here in part 3.

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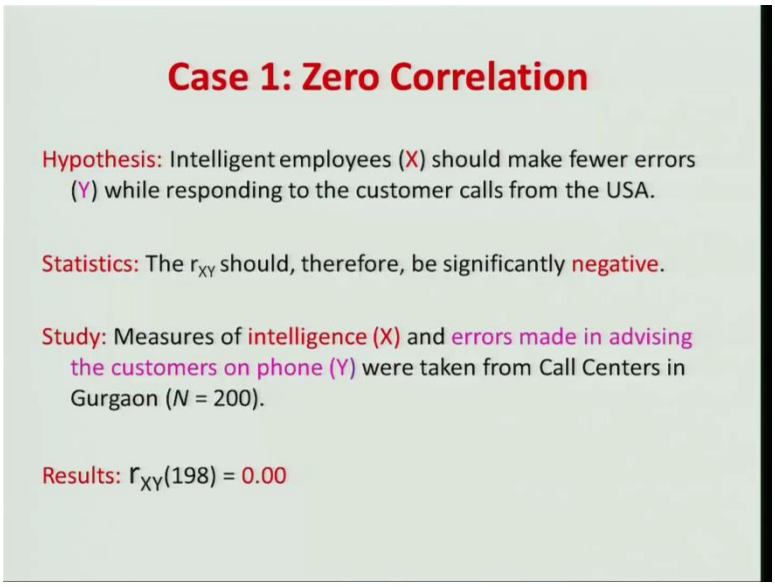

The first case, it is a very interesting and humorous example you have seen. Let us suppose, you get a consulting project from one of the call centers. And they feel that if the hire intelligent employees who would be attending to the calls from US, UK, Germany so on and so forth, they would be doing good service and would be making less error. So, the hypothesis is that intelligent people would make few errors while responding to the customer calls from the US that means, if you calculate correlation

between X and Y, that correlations would be significantly negative, greater the intelligence, less the error by the employees of the call centers.

In now, you conducted a study in Gurgaon with 200 people, measure their intelligence and the errors made by them, and got zero correlation. And degree of freedom of 198 what to do with it, would you write in your consulting report, intelligence has no relationship with error made, why are you wasting your money over measurement of intelligence. A stimulus response model would say the matter stops here, S O R approach mediation analysis says no, there is a problem this effect means something, and what it means I will show you next.

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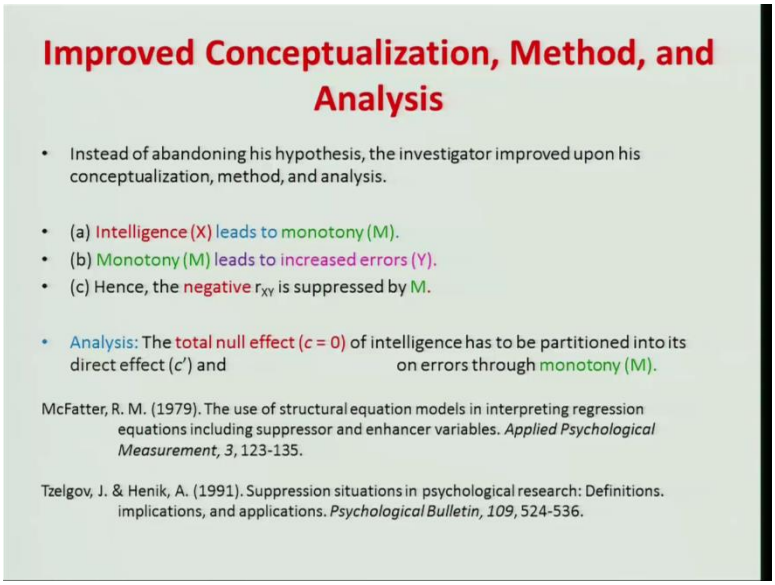

Now, another researcher instead of abandoning his research program, he thought there was some problem I conceptualized my research. Truth is intelligence leads to monotony, monotony leads to increased errors. Hence, negative relationship between X and Y that is intelligence and error is suppressed by monotony. So, if we measure 3 things now, intelligence, monotony, and errors, you would be able to point out what you wanted to demonstrate. And precisely when we did it, and what I am telling you is nothing propound, this idea was given in 1979, and later on in 1991 psychological Bulletin. But somehow we psychologists lose sight of these things, anything which does not fit within our model we ignore it.

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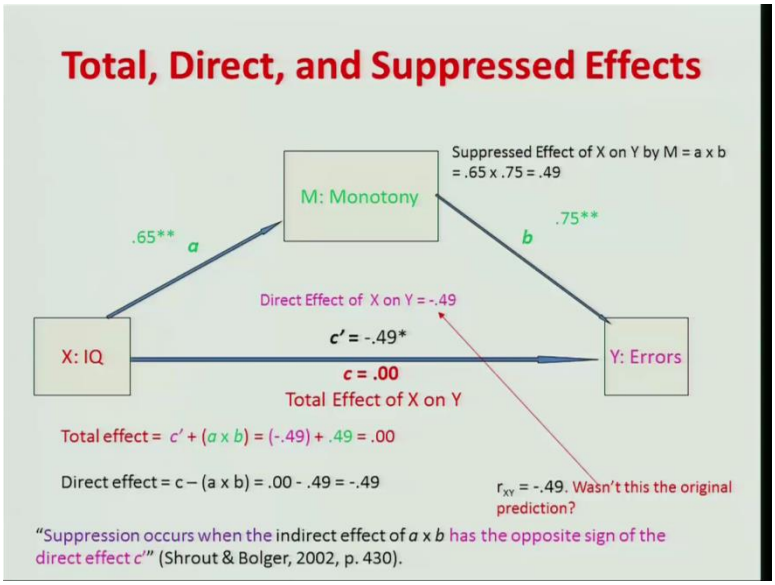

So, let us say look at the same example now, what I had shown before, let us look at these data now. Relationship between when you conducted this experiment, relationship between I Q and error is just in 00 like your previous a study, fine. Look at the chart now, but this time I Q does lead to monotony, this regression coefficient is 0.65, and when you predict error from I Q, and these this value is 0.75. And this c minus c prime is minus 0.49 is not this what you had predicted.

That relationship between intelligence and error would be significantly negative when you have it. This effect was nullified, because of the suppressing variable of monotony. Go to the chart and see, and I have given here numerical example to see, and in 2002 Shrout and Bolger said it. And they actually challenged Baron and Kenny, that there is no need to have significant effect of X on Y to do mediation analysis, and here is one example I have given, got it.

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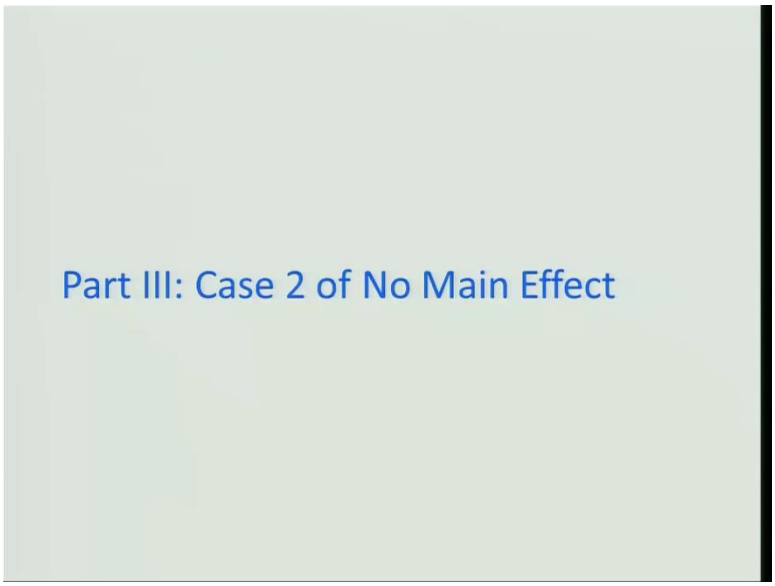

Now, let us come to another example, these days second case I am illustrating. In India, 80 percent of the research by the psychologist deals with the stress. And workers are over loaded, a students are over loaded, those who are working for what we call the other service, the service when we send outside, sub contract who to they are working 12 hours, from 8 to 8 p m they would work. A student's bag you would say everyone is going like this. So, if you are asked to a study by ministry of human resource development, what is the impact of work load on health of their students or employees, how would you do the study?

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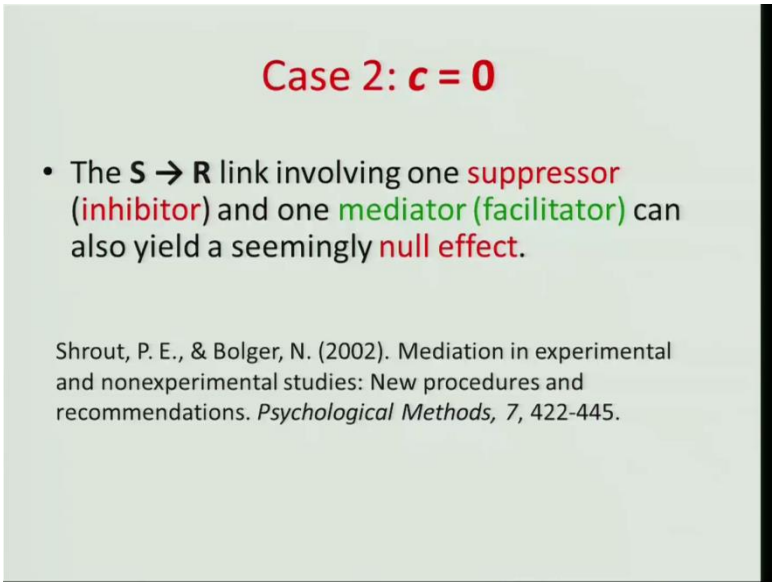

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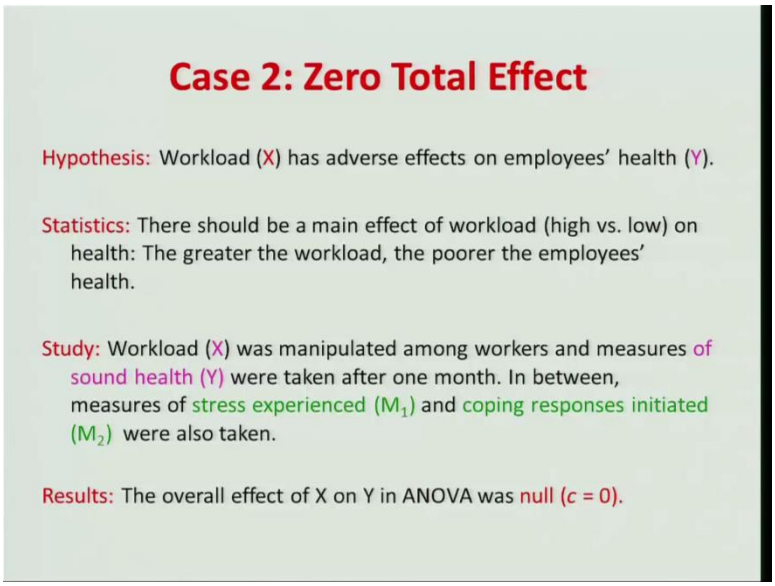

Now, let us suppose you did this a study, and Shrout and Bolger example I give you. We have to consider both inhibitor and facilitator, something augments, something suppresses. The first example I had given you of monotony was suppressor, this one I am giving you the 2 examples. Now, let us suppose here, come here to this case. Now, workload your hypothesis is workload has adverse effects on employee's health, again negative correlation negative ((Refer Time: 19:46)). So, if you manipulate X and Y, then there should be a main effect that is high workload to verse health than. So, greater the work load poor the employees health, this is your hypothesis.

And when you manipulated workload among the workers, and took measures of sound health how many times they report, how many times they take leave on the basis of health reasons, so on and so forth. You came up with your finding in the, so you took this measure after one month. Now, in between you also took measures of how much a stress they experienced, and also how many times they went to temple did exercise, took vitamins so on and so forth, two things you measured. So, what kind of coping activity they are engaged into, one feeling of a stress, another is what kind of coping activity you have initiated to deal with it.

So, once you have taken it, and when you analyze the effect of X and Y, again your c was 0, effect of X on employees health was non-significant, not even it was 0. Just like the first case relationship between intelligence and error is 0, effect of workload on

worker and a student health is 0, would you say ministry increase load it has no effect, no. The two other variables, you have measured would help you answer the question.

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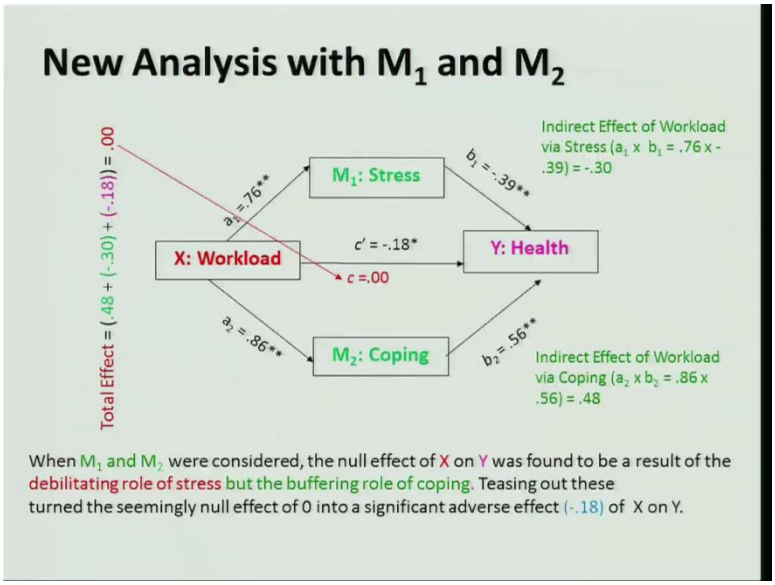

Look at this chart, work load has no effect on health 0 c. Now, workload is increasing a stress, look at path a 0.76, and a stress is making them, this as a negative effect on health or the stress poorer the health, poor measure we have. Now, look at the bottom, work load increases coping device, good food, physical exercise, regular swimming, vitamins, going to temple, so on and so forth, and coping leads to good health. So, take the product of the a and b in the first part, that is the negative value of minus 3 0, and this one is a positive value. Coping has a positive effect on health; a stress has a negative effect on health that is of prediction.

And when you enter these two, look at your c prime now. When you have control for the facilitator that is coping device, and a stress which is inhibitor or negative your predicted effect, negative relationship between work load and health is significant that is regression coefficient is minus 0.18. So, in a experimental a study, when there are two mediator, one is facilitating, another is ((Refer Time: 22:51)) you may get total zero effect, no effect if both are equally powerful.

If inhibitor is more a stronger than facilitator, then you would find some effect, but weaker or vice versa something like this. So, here is another way, that even though your effect is null nonsignificant or null, they make psychological, they are psychologically

meaningful such findings. We need to consider such implicit processes or latent variables here.

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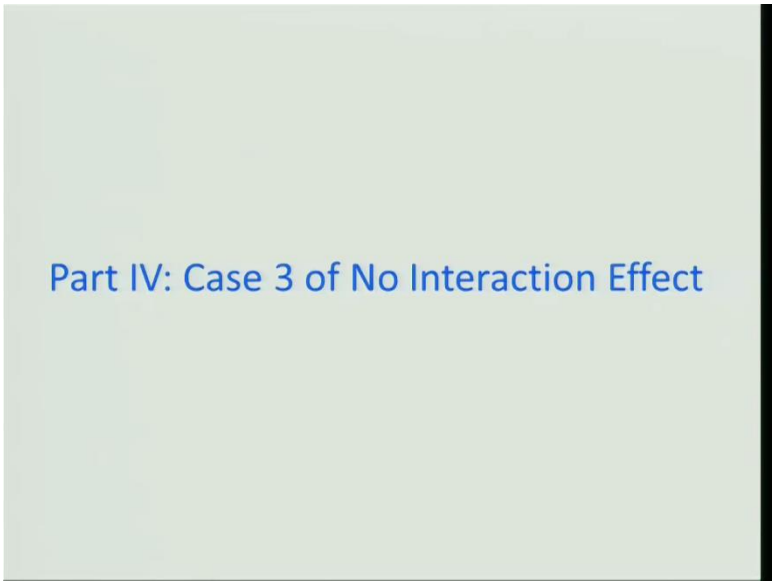

Let us come to a third case, these days people talk about moderating variables.

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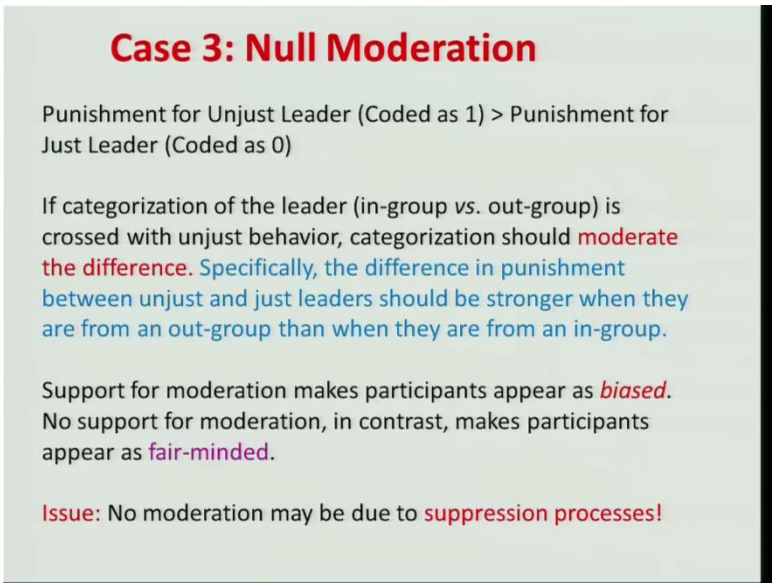

Now, moderating variable means, here I give you just one example. Leaders are supposed to be fair; they are not supposed to be unjust. So, if you do one a study in which you manipulate, a leader was given a chance to do some distributive justice, distribute things between different sub ordinates. So, we believe he should be fair, he

should be objective and fair, but one leader is fair, another is unfair, whom would you punish more, this is the experiment I did, this is our own a study here. So, our idea here is that people would generally like punish unjust leader more than a just leader.

Now, I am bringing a moderator, when would you follow this rule, this you would follow with out-group if somebody is membered from the other group. But, if he is of your own group, many examples in this country in political scene organizations you may have seen. This rule is true when you are dealing with out-group member; with in group member you may not punish, ignore it. So, we are predicting interaction between categorization and leader's behavior, fine. So, leader punishment is the dependent variable, categorization into leader behavior are I V s, we are predicting interaction.

Now, in between we have measured a number of, and it is very interesting if you find only effect, main effect of leader behavior, then you would say that people are fair, because they do not go by categorization. If you find effect of it, then we will say we have double a standard, in group we do not follow this group with out-group, so there should be interaction. So, now I am demonstrating it, if you in experiment if you find no moderation means nonsignificant interaction effect. This nonsignificant interaction does not mean that you are a poor researcher, what it means that some suppressing variables are taking place.

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And here one example I give you, what we did in this experiment. We manipulated distributive injustice, and in group versus out group managers by gender men and women. At the same time, punishment is at the bottom our dependent variable, we measured outrage how angry you feel, how embarrassed you feel, how mad you feel with this leader, how happy you feel with this leader.

Because, if in group does favor you would be happy, out group would be angry. Then we measured this positional attribution is this leader this kind of person, objective type in group every type; we also measured external attribution. So, when what is your attitude, are you going to support or you are going to take a position, so attitude is another mediator we measure.

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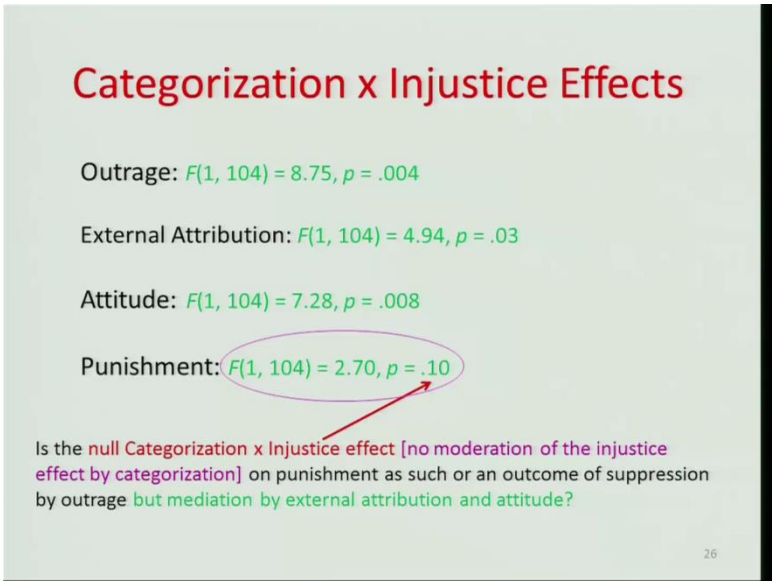

Now, when you would look at these, and look at the interaction effect. On outrage we have significant interaction, on external attribution we have significant interaction, on attitude we have significant interaction, but on your d b, the interaction is not significant 0.10. So, by traditional a standard your research is gone, you would not get your degree. This is these, so we have to me this is not true, this categorization or no moderation is an outcome of separation of by outrage, and mediation by external attribution and attitude. My leader in group does not because of external situation, no rules regulations, because of preferable attitude towards them; this is what I have demonstrated here.

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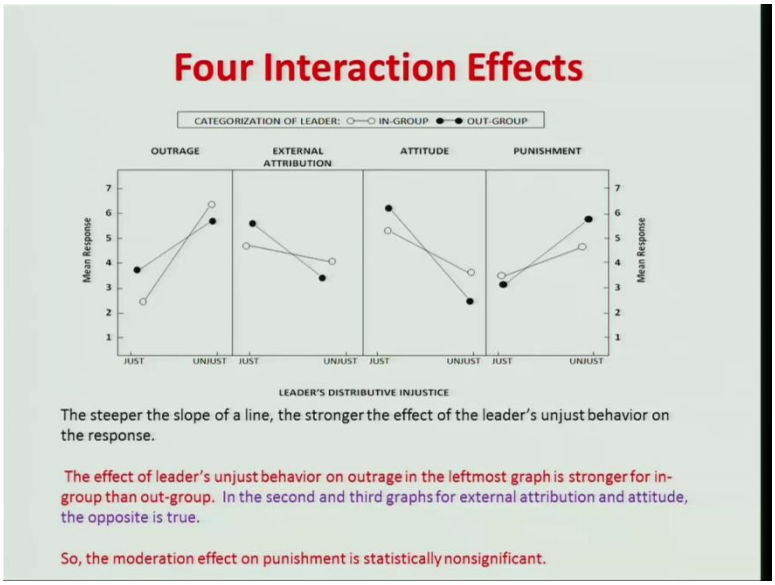

And let us look at the interaction effect here, if we look at the plot the four interaction graphs, your d b is here, and your m v s are here. You see the reversal pattern like just look at the solid line and open line with. So, here and here you see one kind of pattern, here you see reverse kind of pattern outrage, but external attribution in attitude like, we are protecting our in group. But in like, if my in group has done something wrong, I feel very angry, nevertheless I protect. These kinds of two kinds of forces are operating in my decision making and when we do this.

Now, let us suppose when you would look at this I am simply saying, just look at the slope of the two lines, anger is stronger in case of in group. But, external attribution and out group is weaker, you see the slope slower slope in case of the in group, when it comes to punishment, it is with the out group mode. So, because of these contradictions your interaction effect is not reaching 0.05, but it is possible to bring it back to 0. 05, and how do we do it.

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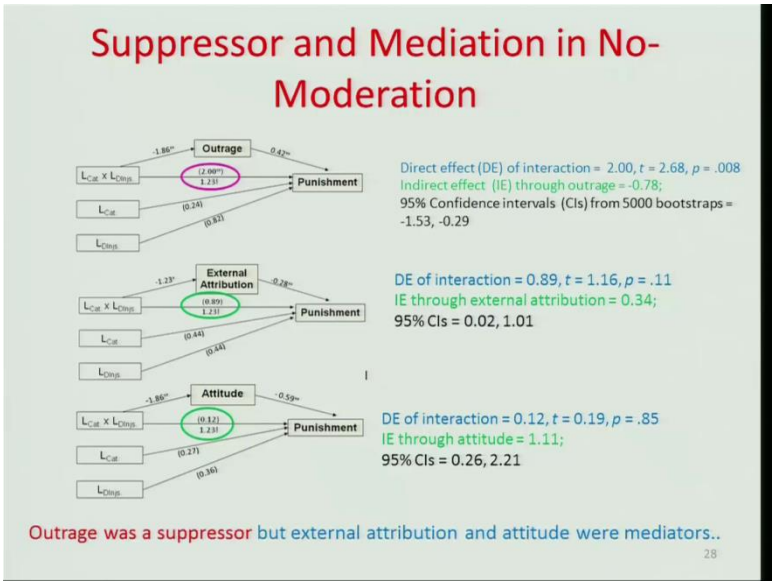

If we can consider, I have done three simultaneous equations modeling here, in which the predictor is here. The first one you say the interaction between behavior and categorization, and two main effects I am controlling, this is the requirement whenever you have interaction. See the first one, original effect 1.20, interaction effect which is not significant. Once you control for outrage that interaction is becoming now significant two, and that was your prediction, the interaction should be in punishment. When you come to external attribution, see 1.20 is been further reduced, so external attribution is a mediator, when we come to attitude, the same thing you are noticing.

So, attitude and external attribution was doing moderated mediation in case of categorization and leader behavior, but outrage was doing, outrage was doing a suppressing role. So, we feel angry with our in group nevertheless we support, and we externalize their wrong doings by other forces. And in that case, they would not be punished the way you had predicted, and we have to do analysis like this. So, when I did all the simultaneous equation, modeling the different things I have written on that side, you would see that we had separation in the first graph, we had mediations in the second graph; we had mediations in the third graph.

In other that means, the original null significant effect was further reduced in the second and third cases, but it was increased in the first case. So, anything that increases the effect is a suppressing variable. So, if you would look at the three a structural equation

modeling here. In the first case, non significant effect is being made significant, if you bring in outrage. In the other two cases, the non significant interaction regression coefficient that is reduced, so that means mediation is taking place here.

And when you come to the right side, you see like I am giving you direct effect and indirect effect like 0.30, and the confidence interval is between 0.022101, so that 1 is greater than 0. And in the second case I say that it is 1.11, and the confidence interval is between 0.26221, so that one is also a significant mediation. So, your overall non significant interaction was, because of separation and mediation mediating variables, if you control them, picture is clearer. So, be a good master not a bad servant of a statistics. Now, so you see like both outrages was a suppressor, external attribution, and attitude they are mediators.

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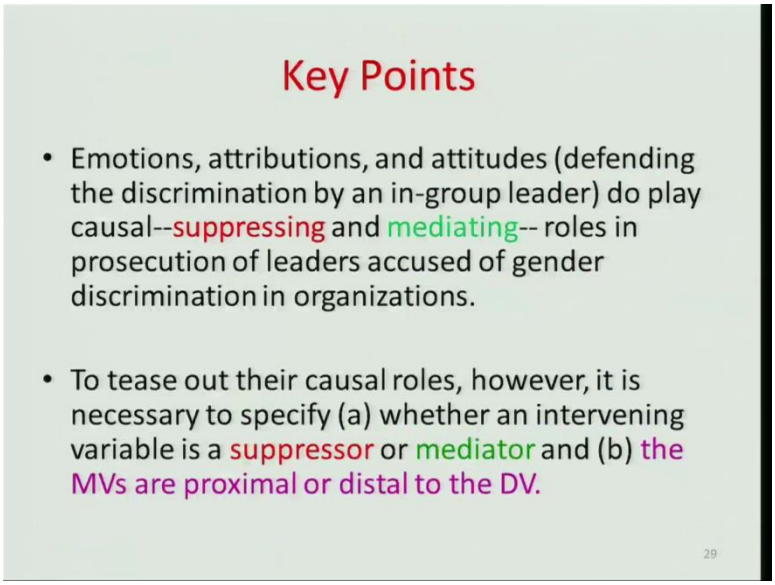

So, what the points I am making here, emotions, attributions, and attitudes like the defending discrimination by your in group leader, do play causal that is suppressing, and mediating roles in prosecution of the leaders accused of gender discriminations in organizations. To tease out these causal roles however, it is necessary to a specify which whether an intervening variable is a suppressor or it is a mediator, and which one is a proximal, and which one is a distal variable means who which one should be closer to the I V, and which one should be closer to the D V.

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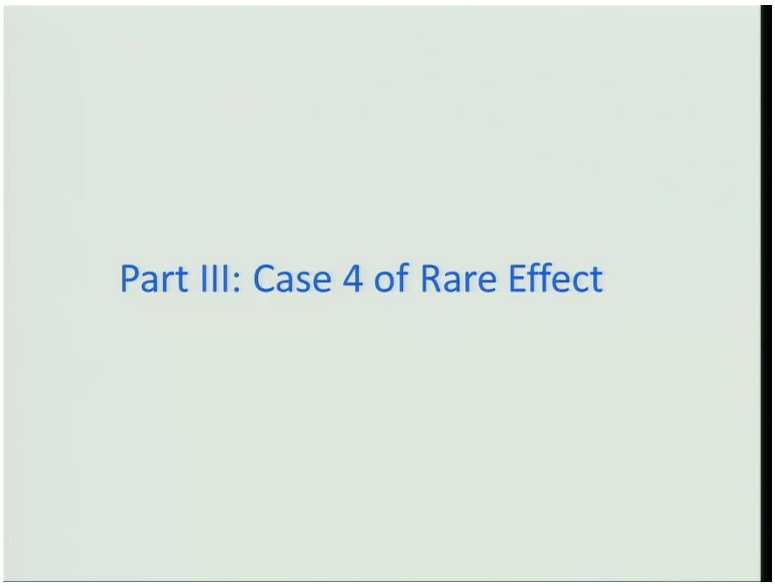

Now, I give you another fourth example for this rare effect, what do I mean by rare effect.

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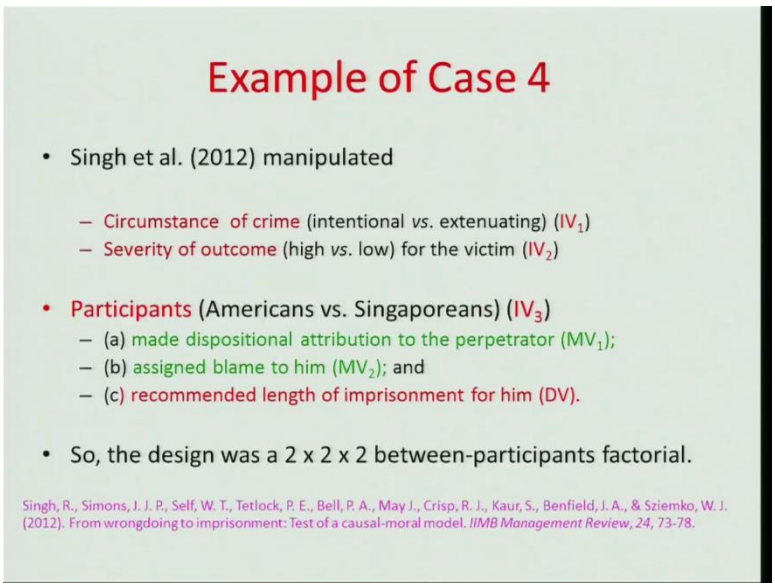

Here one example I said, in that I I M management tribute 2012, we manipulated two things. Circumstances of crime, somebody committed crime intentionally or he was provoked extenuating circumstances. And the victim had a major consequence or a minor consequence high and low, plus we manipulate we had participants from two

cultures, United States and Singapore. So, we have really three kinds of things culture, circumstances, and severity.

And what we measured, we ask the participants here is the newspaper report in which a lady has been hurt under these circumstances, one of the two, and this is the severity. So, I want you to say, whether this fellow is this kind of person this positional attribution, whoever committed perpetrator is a criminal type. Second one, how much you would point finger at him means blaming moral responsibility. And third one, how long he should be sent to jail, three things I am measuring here. So, our design is essentially a three way 2 into 2 purely between participants factorial.

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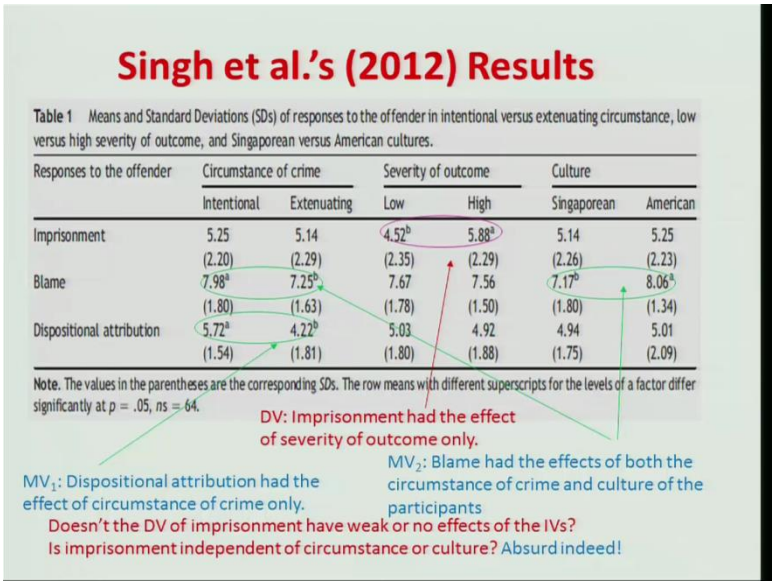

Look at these means now. So, three responses I am showing in my three rows imprisonment, blame, and dispositional attribution. And the three things circumstances, severity, and culture I am showing in the columns with two levels. Let us look at imprisonment; on imprisonment you have effect of only severity of consequence. So, whether crime is committed intentionally or under extenuating circumstances which has same level of punishment, whether we give this to American or we give to Singaporean, they give the same level of punishment.

The only effect you find that those who had committed crime of severe consequence is being punished more 5.88. Then one who had committed crime of low severity that is 4.52, it is significant difference got it. So, your dependent variable has one main effect

not the two other main effects. So, should laws say that there should be no mitigating circumstances while punishing a person; this would be implication for law.

Then come to the second one moral judgment now. In moral judgment you see, there is effect of circumstances, the person was blamed more when he had committed circumstances intentionally, then when he was provoked by his friend to do. When it came to severity, there is no effect on severity on blame, but there is a cultural difference, American blamed at perpetrator more than Singaporeans. So, when we come to blame there are two effects, when we come to punishment one effect, when we come to attribution let us come to the third variable, you have effect of circumstances on attribution.

Then we have no effect of severity, and we have no effect of culture, how to make a coherent story out of this data. One would spend whole life writing the story about it, and you would be making wrong recommendations based on this data, if you have not conceptualized it properly. So, first I have shown you the findings, because my purpose is to show how to make sense out of non significant findings.

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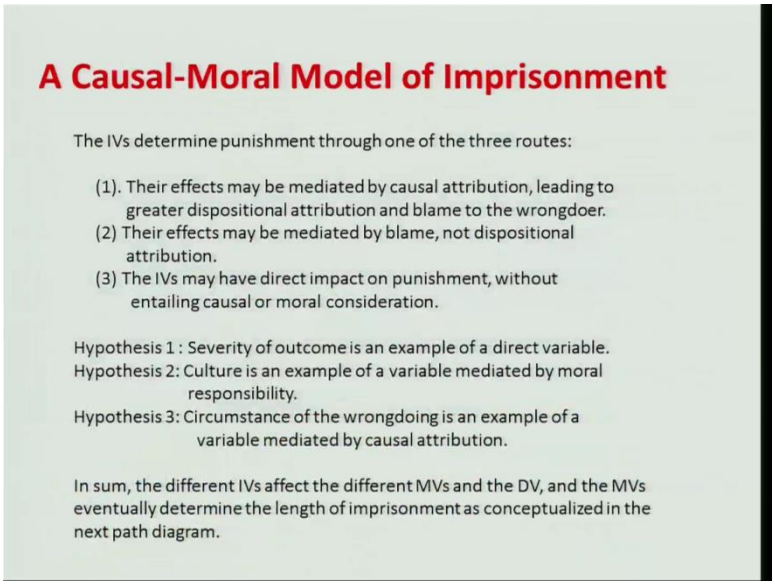

Let us come to the model which we were testing. I had proposed a causal moral model of imprisonment. Now, in this model we say that some of these variables influence your D V and M V through different roots. For example, the effect these effects may be mediated by causal attribution, that is like so and so this kind of person. It may be

mediated by moral not causal attribution; they may have a direct effect on punishment. So, if you put like this and our hypothesis begins, there are 12 authors of this paper from so many countries, because we had a large program on this. So, our hypothesis is severity of outcome is an example of a direct variable, greater the severity, greater the punishment automatic tendency we have.

Then we have a second culture is an example of a variable, mediated by moral responsibility. So, like Richard ((Refer Time: 37:47)) says cultures differ in attribution, I say no they do not differ in attribution, they differ in assigning moral responsibility. And this is what I am saying American and Singaporeans would differ in assigning moral responsibility, not attribution and that you have seen. And third thing I am saying, circumstances effect dispositional attribution. So, when you have done intentionally, people would say you are more criminal then when you are provoked to do.

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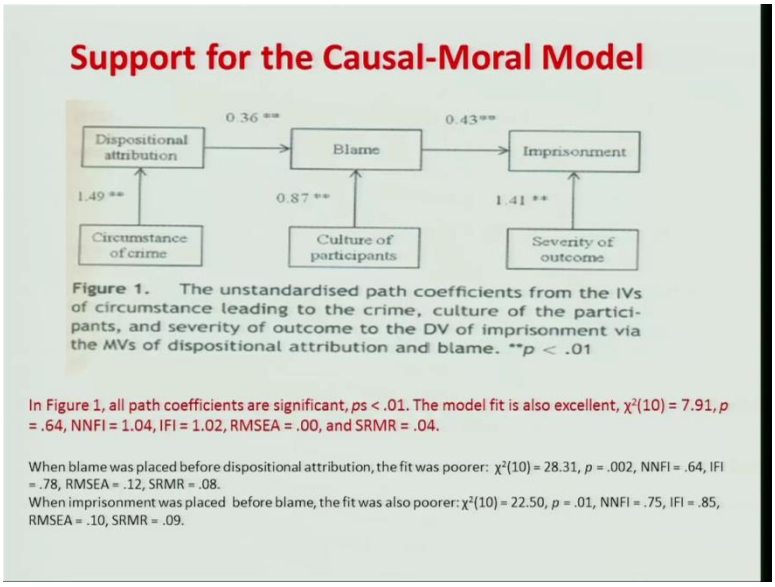

So, if you put in this story, and look at this chart, a story becomes very simple to write and simple to understand. So, all I have done here, circumstances leads to dispositional attribution, culture leads to blame, but blame is being built by dispositional attribution and culture. Just like the actually this study gave me idea for the sequential mediation; you see here situation is leading you to make causal attribution disposition. So, that plus culture, the cultural on notions which my colleagues have been talking here, the two are building the blame.

And once the blame is built now you see, punishment is being determined by severity of outcome and also through blame. So, both causal attributions, blame determine imprisonment this is what the legal system says. So, things which appeared very difficult to understand, if you put within a model and analyze correctly, the non significant effects on punishment were not as such circumstances have effect on punishment. Culture has effect on punishment, we have to conceptualize them appropriately, and this is what we I have done here.

So, once we do it and look at here, when we tested this model look at the fit indices ((Refer Time: 39:47)) square is non significant N N FI is 1.04, I F I is 1.01, R M S E A is 00, S R M R is 0.04 that is satisfactory fit to the model and all paths are significant. So, a story can be made simple like this here, but if I reverse some of the variables in the same model you see, they did not fit to the data, that is the correct conceptualization of the sequence. If you alternate them then they fail, this is what I am demonstrating you at the bottom.

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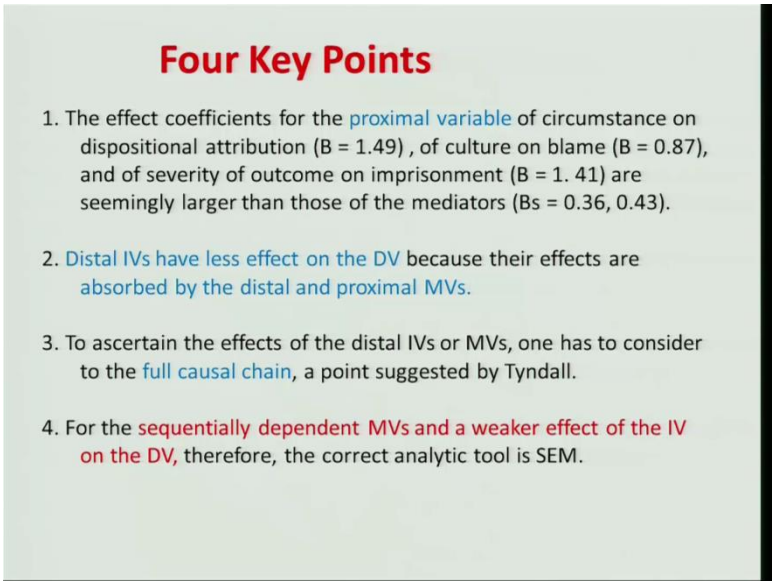

So, we have to hear we are learning effectively then four points here. The effect of coefficient you see here, proximal variable of circumstances on disposition you see, regression weight is 1.49. So, any proximal effect is stronger, effect of circumstances on dispositional attribution is 0.149, which is a strong one. So, another effect of culture on blame is 0.87, effect of severity is 1.41, but when you compare the mediators, their

effects are 0.036 and 0.043. That means, we also need to understand proximal variable and distal variables in any causal chain, which one is closer to the I V, which one is closer to the D V, and this has implication for understanding.

So, distal variable have less effect on the D V like circumstances and blame, and because those effects are really absorbed by the distal variables, which were occurring at the initial stage. And when we come to show to ascertain this effect, you have to consider the full causal chain not part of it. As Tyndall suggested what came, what would follow, what would happen, this is the way we have to do it.

And that idea we are getting from chemistry, mathematics, and physics, clouds, rivers, heights they are suggesting how mental process should be studied. And if you put like this to sequentially dependent, a weaker effect of I V and D V, we have to use this simultaneous equation modeling that is the correct analysis using t test regression analysis is not the correct way.

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So, let us go back to the public policy issue, that if psychology is to become relevant for India, how this issue we could have explained to the government, very simple answer we have. Given so many intervening agencies some suppressors, some mediators, some distal, some proximal, a state capital, district, block, panchayat etc, between central budget and the beneficiary. The allocation and beneficiary link has to be weak 10 paisa,

15 paisa, you cannot expect them to be one to one correspondence, and this is what our leaders have been complaining.

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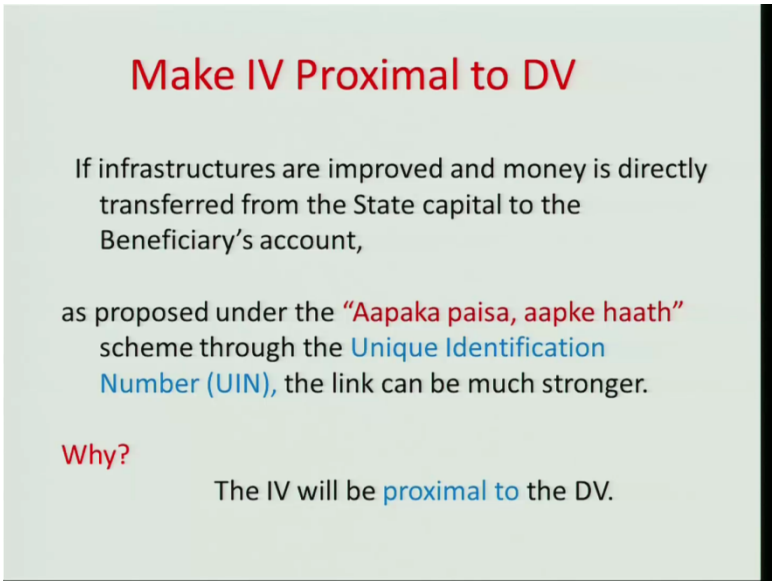

And what the solution we will recommend, the I V has to made proximal to the D V, like the government policy saying [FL]. If we can really implement if internet is working, if banking system is working, it should be possible to reduce it, like through the unique identification number. If there are not so many intervening agencies, 1 rupee would reach as 1 rupee to the beneficiary, this is what we I am demonstrating through these experiments. And the question is why it should happen; the answer is very simple that we have to have I V proximal to the D V, if there are so many mediating variable we do not know where the excitement, where the effect would be lost.

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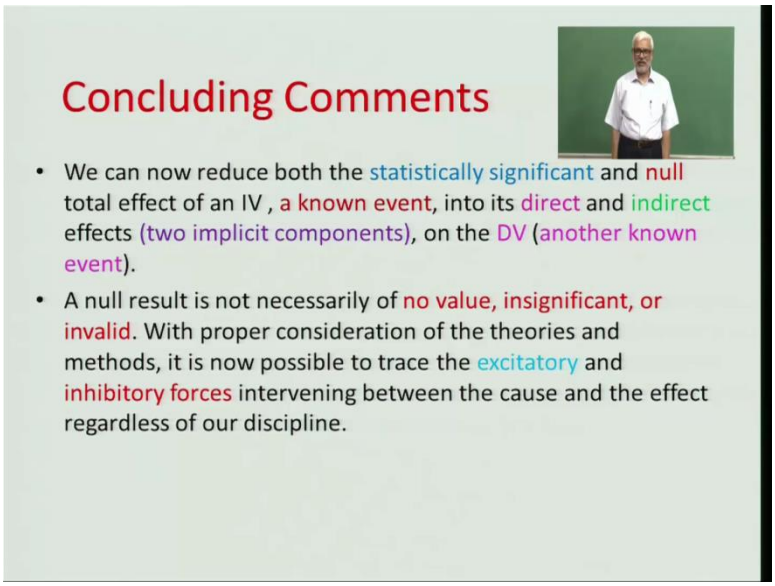

So, I had started with a gloomy lady face that my effects are not significant. I am showing my own picture an old man here, now you see he is laughing, ((Refer Time: 43:52)) I have designed like this. So, what we have learned out of it, we can now reduce the effect of both the statistically significant and null total effect of an I V, a known event, into it is direct and indirect effect like a two implicit you know components, on the D V which is another known effect. Number 2, a null result is not necessarily of no value, insignificant or invalid.

With proper consideration of the theories and methods, it is now possible to trace the excitatory and inhibitory forces intervening between the cause and the effect. Regardless of our discipline, whether we are in economic, psychology, biology, theoretical sciences, animal husbandry approach is the same. If we follow the approach we would be able to answer it.

Thank you very much for your attention.