INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NPTEL
NPTEL ONLINE CERTIFICATION COURSE

Marketing Research

Lec -10
Measurement and Scaling:
Comparative scaling, Non-comparative scaling

Dr. Jogendra Kumar Nayak
Department of Management Students

Indian Institute of Technology Roorkee

Good morning everyone so today you can most important areas of marketing research or for that any research right. So what is this today we have discussing about today we will be discussing about measurement and scaling so the point is why this important I am saying scale is important because it is one it is the method or it helps you it provides you the way to compare between two different objects okay when I am saying compare between two different objects or let us say the distance between from let say A to B.

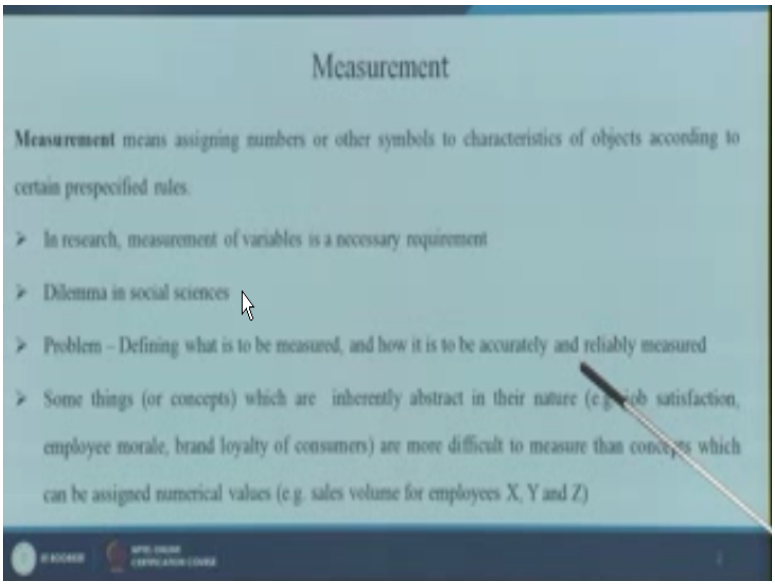
Let us say A to B and let say A to C for example when I measure the distance I can measure it by a standard unit called meter kilo meter or anything right similarly when I am asking you the weight you can tell me that you are 50kgs 70kgs 60 kg or in pounds whatever it is right so everything has a there is a way of measuring but what if I ask you how good are you right.

Or let us say how nicely do you sing right so when I am asking such questions I am putting you in a critical dilemma you do not know how to explain because if you say something then it would look may be it is high to me or it look pretty moderate to me right suppose for example let say I have one award to offer and there are three peoples from three different fields.

Let say one person is from a science right now you can say this might not to be a comparison but so be it we have only we do not have option I have only one award there is a musician right a very popular a singer may be a field of a and a sports person sports man right now the question is only one award can be given out of the among this three people.

Now how do I give them who do I select who should I select out of this three is it the scientist or the musician or the sports person whom I select so when I am coming to such a dilemma then say I have to have something to compare otherwise there is no way I can ever compare a scientist to with a musician or a sports person right.

(Refer Slide Time: 03:21)



So to help this, this is what you face in social science right and this is what you face such problems you faced in marketing research right so let us see what exactly is happening in this so what is the measurement it say measurement means a assigning numbers, numbers which or symbols to characteristics of objects according to certain prespecified rules right.

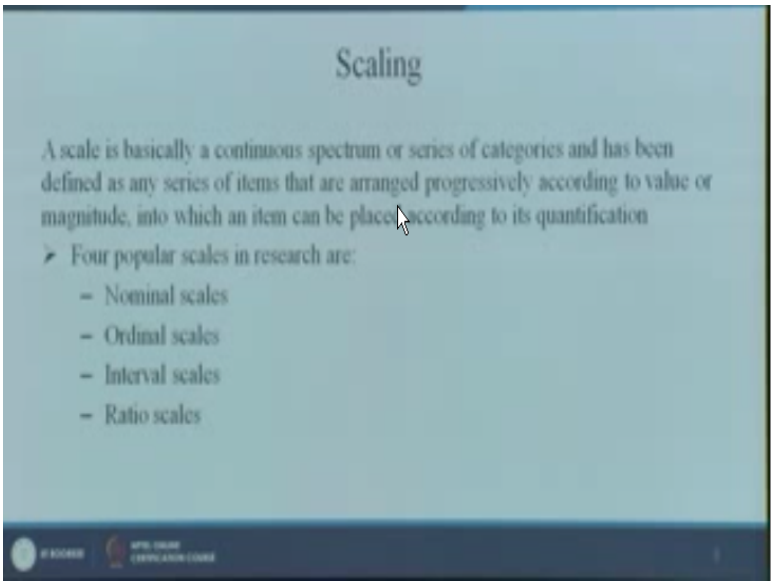
Measurement of variables is a necessary requirement now the variable that to be measured now for example I have to measure this three let say I will say the scientist okay the musician the sports person now I need to measure them now in what parameters will I measure is what may be would confuse you right.

But this is the bigger dilemma in social science as I said right so what is to be measured how it is to be measured accurately and reliably so mark the words like for example you are coming into play now new words are coming like reliable right and another term that would come in the future is valid this two terms are associated with any scale right okay.

So scale has to be reliable that means it is repeatedly giving you the same result again, again and again so the variation in the result is not much the deviation is not there right and valid means it has to be the right way of collecting the you know the result or the data right so it has to be valid that means if you want to measure how good somebody is a sports person one of the good indicator may be might be the stamina of the sports person right so that to understand that what are you is the valid instrument or not right something or concepts which are defining abstract in the nature job satisfaction more rather than employee brand loyalty or more difficult to measure the concepts which can be assigned as specific numerical value.

For example the sales volume no just imagine in engineering or in a pure science or medical science you have something at least to measure right you have done a conducted 9n a n experiment and you know thus value lies between let say 1-6 for example so 1.5, 1.2, 2.3, 2.5 whatever the value is coming you have something but how do you associate 2.5 method in human mind 2.5 times what is it mean in human min.

(Refer Slide Time: 06:07)



I do understand or anybody would confused right but you have to way of measuring so let us see what happen so scale is basically a continuous spectrum it says or series of categories and has been defined as any series of items that are arranged market progressively according to the value or magnitude right so this something which is the progression you can think of the arithmetic progression or in geometric progression whatever right.

(Refer Slide Time: 06:47)

So basically we generally we use for example arithmetic progression right so four scales are there, there are two measure in basically any data we have four types of scales that are possible so what are the four scales the first is nominal scale now this is the most basic elementary scale it means that nominal scale is something which is just to identify just understand it is something to identify.

Suppose for example if I talk about jersey number of players messy ahs a jersey number of something let say 5 it does not mean is 5th player in the team similarly Ronaldo has jersey number of 7 it does not means anything right it is just to identify that if it is 7 it must be Ronaldo if it is 5 that from the batsman seen it must be messy okay.

So nominal scales are scale which are basically to identify so the question is we come one by one so next is if you see ordinal scales ordinal right what comes to your mind when you hear the word ordinal if I break this term if you can see that is something called as odder so odder or rank right so ordinal scale is something were you are trying to order something right put something in hierarchy in from better then order or you know it a descending order or ascending order or something like that.

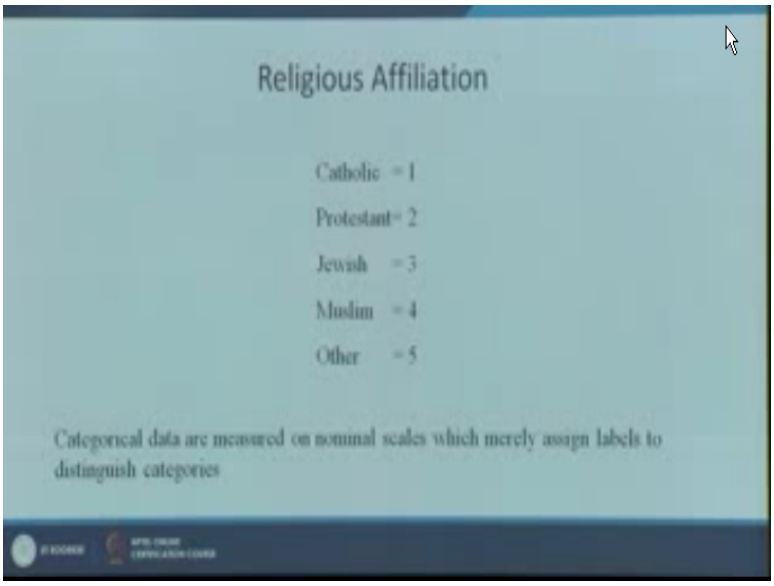
The third scale is the interval scale okay so let see interval scale now what is this interval scale the interval scale has got a definite interval so let say when you had when you identify then you create an order let say when you create an order of 1, 2, 3 so on here one thing is not sure that

this is bigger than this and this is bigger than this but you cannot say that the difference between one mange to two and different between 2-3 remains the same.

We cannot say that right for example the best player let say is messy for example let say messy has code let say 300 goals right the second best player let say is Ronaldo right so when I am saying Ronaldo, Ronaldo might have you know 250 goals so third player is I am saying is a my Ronaldino okay now he might have been a third player but he has scored only 180 goals.

So the difference between the first and the second the second and the third might not be you know in a particular manner okay fourth what is the fourth is the ratio scale so the ratio scale is the scale I am writing here the ratio scale is 1 which has got as little higher see this is all in progressive so this is most elementary then this is the second best you can say this is the third and this is the it is the scale which has got all the properties with it of that mains what ratio has got in the properties of nominal it has got the properties of ordinal.

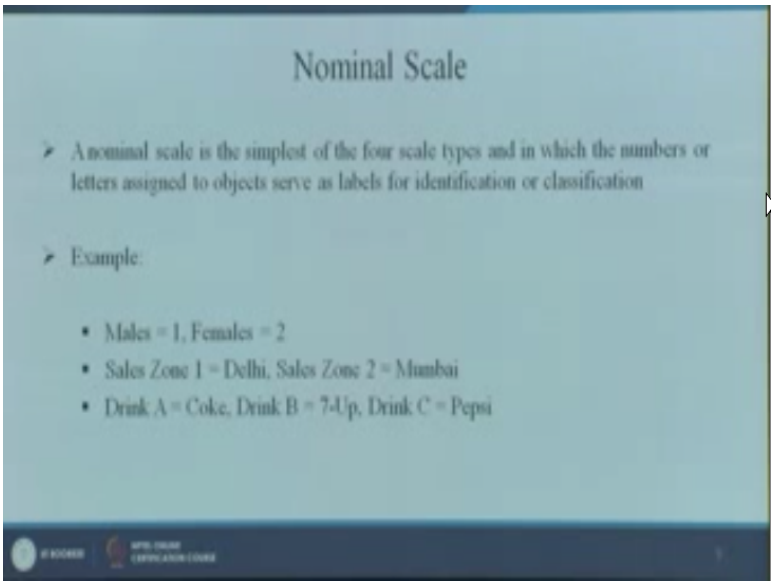
(Refer Slide Time: 10:23)



It has got the properties of interval plus his own properties now what is the own property that the interval did not have a absolute zero point which is present in the case of ratio scale okay now let us see for example this is something like religious affiliation of people right now somebody is catholic is 1 protestant is 2 Jewish is 3 Muslim is 4 other is 5 okay so do we mean that this is the best this is the second best no not at all.

It is just to quote it is to identify so categorical data are all then categorical data for example when you are saying the product in store one means let say example one means let say a parallel two means the sports item three means that is the grocery in all categorical items and all categorical items fall into a nominal category okay.

(Refer Slide Time: 11:07)

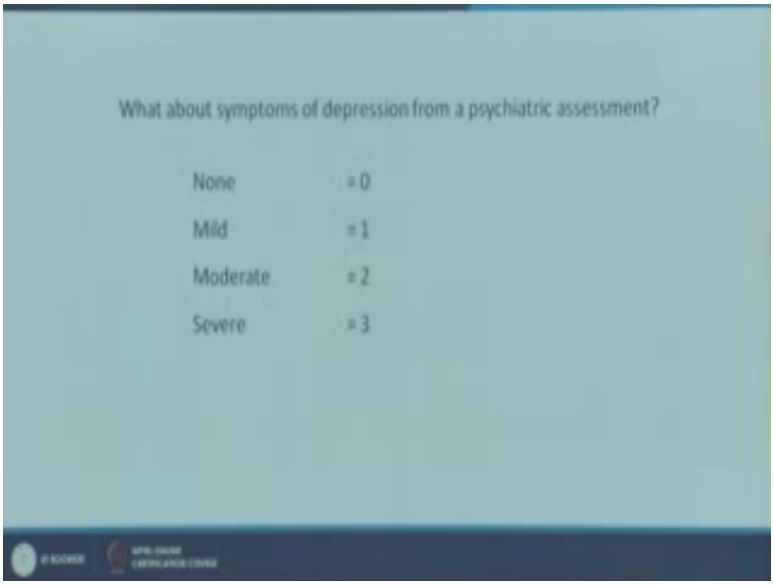


So we are assigning labels to distinguish the categories so let us some more examples like male is 1 female is 2 sales zone1 is Delhi sales zoon 2 is Mumbai similarly, similarly so the question emerges what can you do suppose you have got some nominal data can you really utilize it how do you utilize so this is what comes data analysis part right so when you are talking about a nominal data in the nominal data basically what you can do is you can create percentage right.

Now there are 20% Jewish 35% Hindus 40% Muslims whatever right so this is something like you do it right but can you do something more beyond it will see let see so for example let say I want to have I want to know key is there any connection or is there any relationships or association between the religion of the person and the habit of spending.

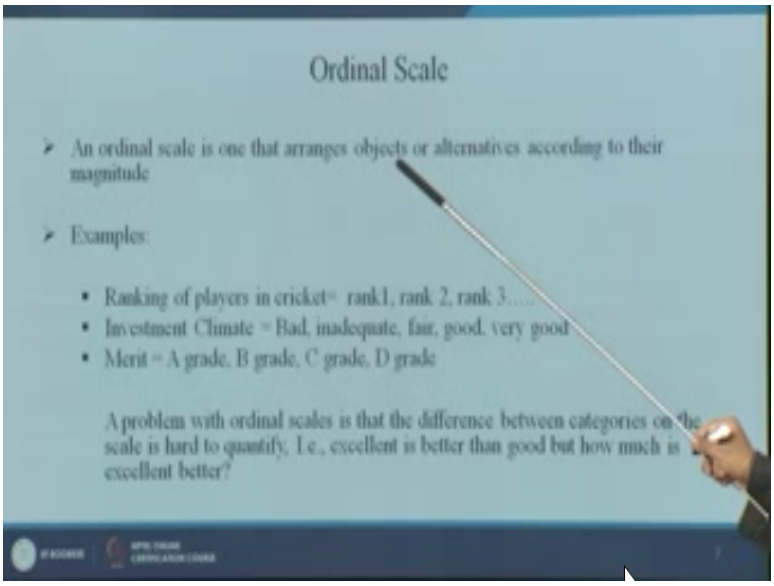
Now what I am saying is there any relationship between the religion and the habit of spending let say what is the habit of spending now this thing here I have a data which is the nominal imager so here I can what I can do is the cross tabulation right I can do it cross tabulation I can use a Chi-square test right to determine whether there is any association between may be these two okay.

(Refer Slide Time: 12:48)



So nominal scale has a own simplicity but they can be use also right so now for the second question is what about the symptoms of depression from a psychiatric assessment no symptoms 0 value mild symptoms +1 moderate 2 severe 3 now all though this is 0 1 2 3 there is the difference of only 1 in each case but in real terms does it really means the 1 difference of 1.

(Refer Slide Time: 13:30)



That means can we say the difference between mild and moderate is same as moderate and severe no we cannot say right so this is something like only in order it is a rank right this is why it is ordinal scale where you are arranging the objects of alternatives according to the magnitude examples ranking of players in cricket now as I said the bets payer could be Sachin Tendulkar from India who has got 100 centuries the second best player could be Ricky Pond from Australia who has got 70 centuries the third best player is could be again from indie Rahul David but he has got 67 centuries.

So the difference between the first and second was 30 centuries were as second and third is only 3 centuries okay so the problem with ordinal scales is that the difference between the categories is hard to quantify that is excellent is better than good but how much is excellent better okay.

So the question comes is a what we do when my data is in a ordinal scale so please remember one thing when your data is in a ordinal scale what can I do I have one thing again I can find out may for example let say the median value right we can find the median right so which is the middle point basically we can find that we can say whether what is the priority or most wanted thing among the respondents right.

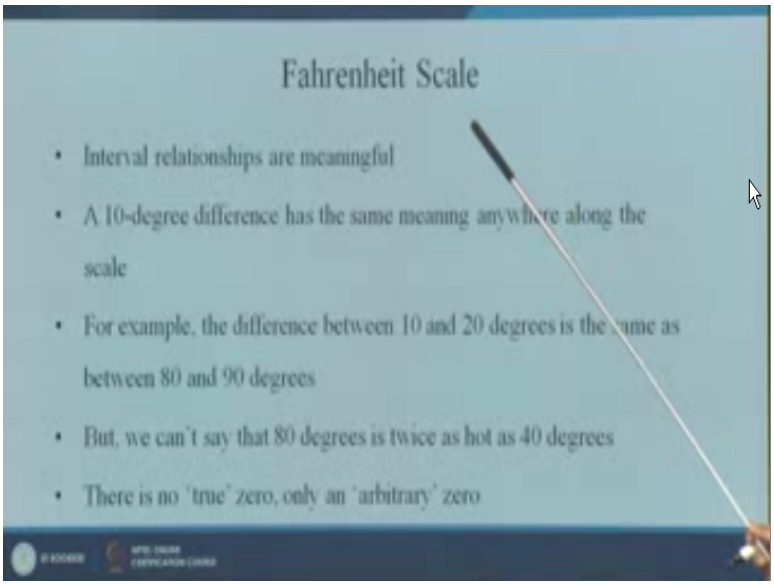
So ordinal rank there are several you know non metric non parametric which can be done so basically when you land up into these two when you land up into a nominal and the ordinal data is the basically called non metric in nature so in non metric study you have several you have

statistical test which for example Mann Whitney new test right the Mann Whitney Kruskal Wallis test right so you have rank some test right.

So you have several test and to determine for example determine the correlation between two variables which are non metric in nature you do not use the Pearson so for example correlation you use something called as spearman's correlation right which work basically on the difference between the ranks right correlation.

So these are different techniques that you are using when it is anon metric so that means what the non metric data does not follow a non normal distribution eight as good as that it could be following may be binominal distribution we do not know so mostly it is a binomial distribution right.

(Refer Slide Time: 16:19)

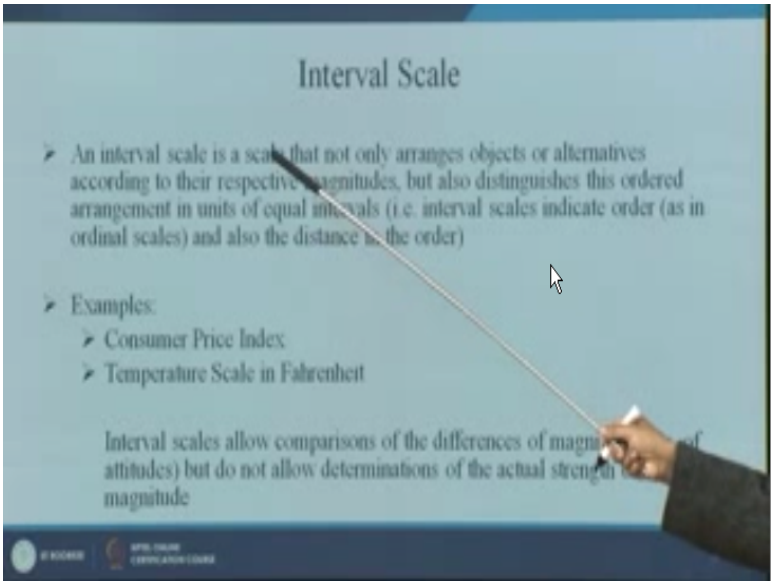


So the next is if you see this is the case where the scale is Fahrenheit scale relationships are meaningful interval relationships at 10 degree difference has the same meaning any were along the scale that means 50 degree for a night or 60 -50 is 10 30-20 is also 10 so the difference remains 10 right so this is the same but we cannot say please this is important e cannot say that 80 degrees is twice as hot as 40 degrees it is a relative concept it is not an absolute concept right.

There is no true zero only it is only a arbitrary zero you have there is no true zero so that is why most of the psychology and just imagine in the case of psychology how would you say that

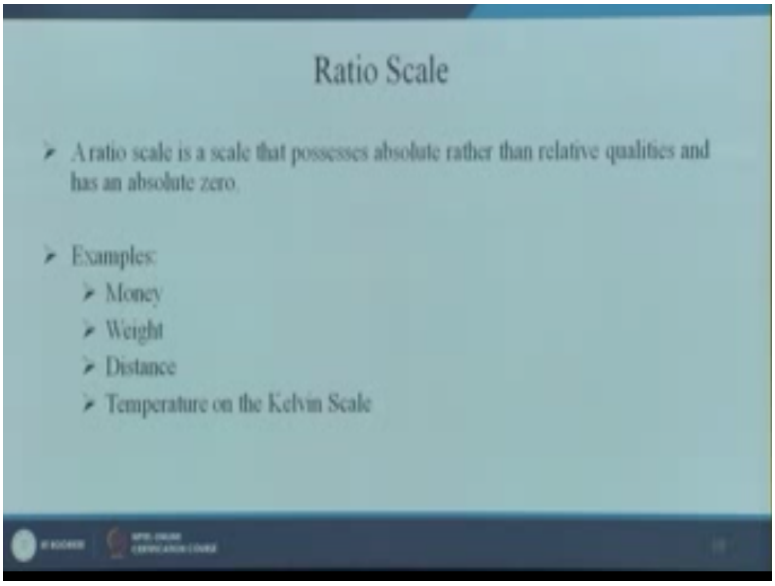
somebody is absolutely zero in fact the truth is n nature zero does not exist 00 is also does not exist so everything lies in a universe in between 0 and 1 0 is only a value which as converse to show large in a extend.

(Refer Slide Time: 17:39)



That you consider it zero but it is not actually zero right so and when that is the pure science how do you possibly explained 0 and 100 or 0 and 1 in confess of social science it is impossible right so an interval scale is a scale not only arranges objects or alternatives according to their respective magnitudes but also distinguishes this ordered arrangement in equal intervals so the intervals scales I indicate order as you ordinal as I said earlier the ordinal scale has the property of nominal and itself the intervals has the property of nominal ordinal and itself and ratios has the property of all the three and itself okay so consumer prices index temperature scale interval scales are for example if I ask you how much do you like this class for example in a scale of 1 to 7 so when I am saying the scale of 1 to 7, 7 being the most and 1 being let say the lowest I have not given an option of 0 deliberately.

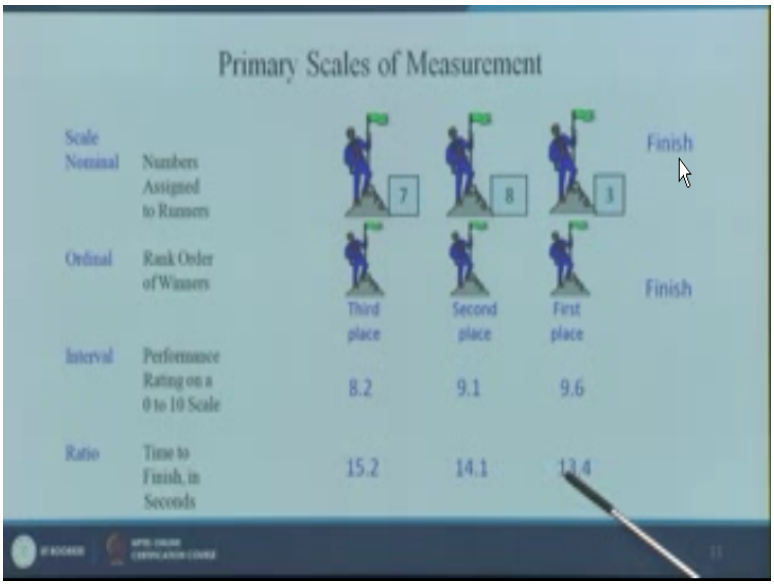
(Refer Slide Time: 18:35)



It because it is every difficult to say what is 0 means right so I have given you an interval in between you have to tell me 1 and 7 were is your interest line for this class okay as I asked suppose I asked you a weight right how much is your weight now your weight as I said is 60kg now 60kg is a point which starts from absolutes zero right.

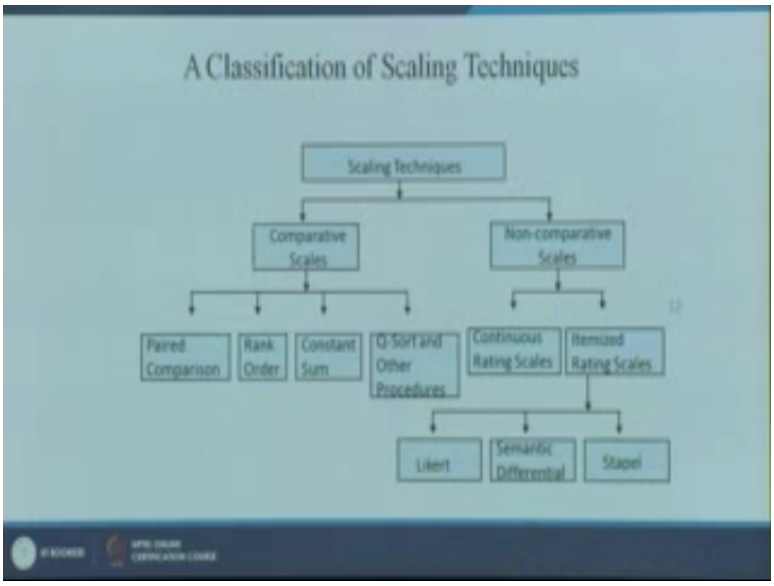
From 0 to 60 similarly the how much money do you have in your bank for example now hen I am saying suppose a 1000 rupees so that means the last point is 0 either you could have 0 no money or you could have 1000 rupees right similarly all this are having a 0 absolute 0 point that is why this is the ratio scale.

(Refer Slide Time: 19:07)



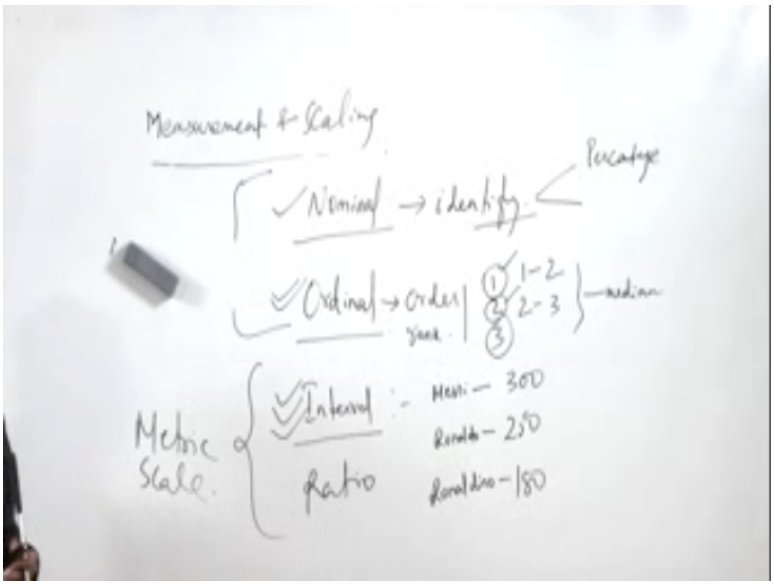
Now you can see a example nominal 7 8 3 the guy who is coming first is 7th one and the similarly ordinal now it is a rank first place second place third place interval now this are given in the scale 9.6, 9.1, 8.2 right so it is a performance interval a performance rating on the 0 to 10 scale so do not get confused with the looking at the 0 because this is actually it could be arbitrary ratio. So this is 1 which is real 0 value have right so time to finish in seconds is from 15.2 seconds 14.1 seconds and 13.4.

(Refer Slide Time: 19:43)



Now after understanding this four scales and let me tell you what can you do when your data is in let say when your data is in a let say interval and ratio let say the four ratio scalene right so when your data is an interval or ratio scale you basically say it is a matrix scale you say it is a matrix scale.

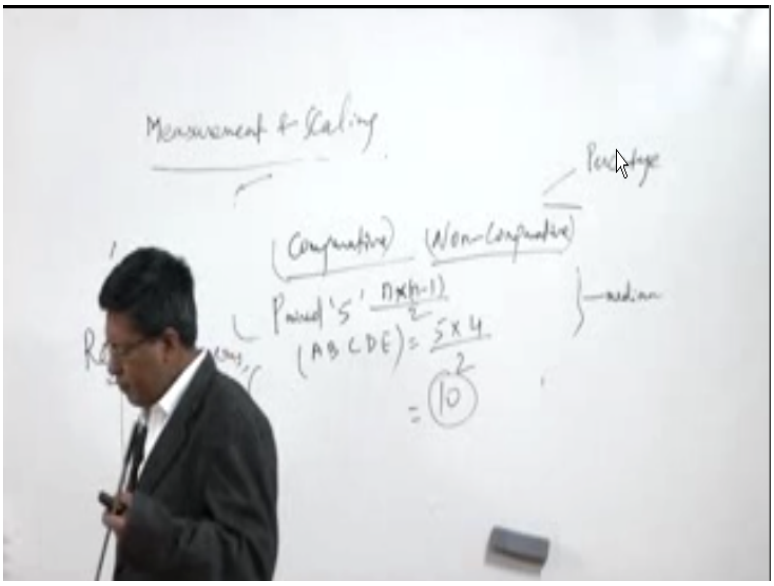
(Refer Slide Time: 20:10)



So when the data is in matrix scale automatically what happens you your power of analysis expands to a very large extend that means almost all statistical tests can be conducted when the data is in matrix scale so your data is you can technique like this regression you can use techniques like for example test of means right or you can use almost all the research data analysis techniques that you can think of right.

So correlation regression factor analysis cluster analysis everything okay so now let us look at the classification of the scaling techniques no scaling techniques basically basis of that two basics scaling techniques okay comparative and non-comparative right so let see what are this comparative and non-comparatives so after understanding the measurements or the four scales when we are talking about classify then right.

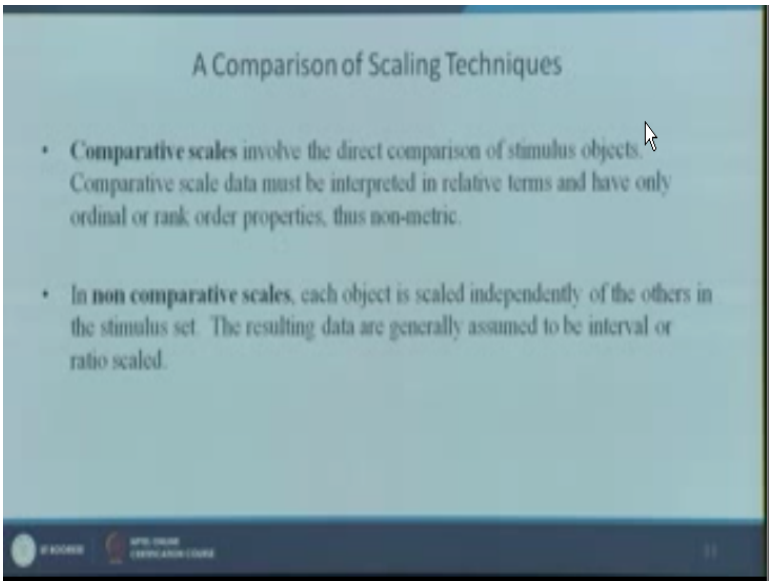
(Refer Slide Time: 21:14)



So one is comparative so as the name suggests you can compare between two different objects right and the other is non-comparative so you have not comparing here anything right so there is no comparison in this case there is comparisons in this case now suppose I am asking you what do you like listening to music or watching a movie right so I am asking you to compare right if I ask you what do you like watching a movie or watching a sports match so that is the comparison I am comparing what do you like more right so this is something which comes in the paired comparison.

The paired comparison basically is made to compare between pairs of objects pair comparison so if there are let say five objects where I have to compare let say A B C D E how many combinations or comparisons I will have I will have n*n-1/2 so that is in this case equal to 5*4/2 that is equal to 10 so I will have 10 combinations so the problem with paired comparison only is when my number of n when my n is going on increasing the number of combinations I wil have will be the much, much higher.

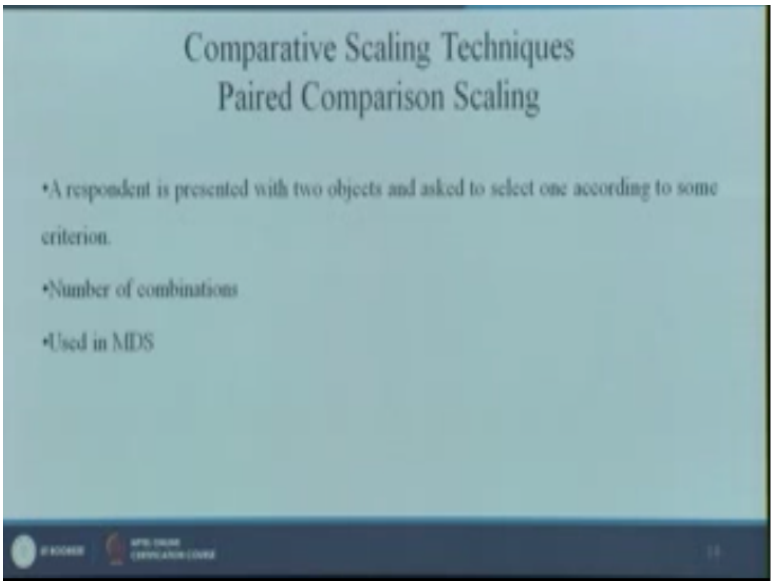
(Refer Slide Time: 22:50)



And that becomes our tough criteria to tough job to do okay second is the rank order test let us look at it from may be go through this slides also comparative scales involvers the direct comparison of the stimulus objects right which can be interpreted and relative terms and have only ordinal or rank order properties thus non-metric okay comparative scales.

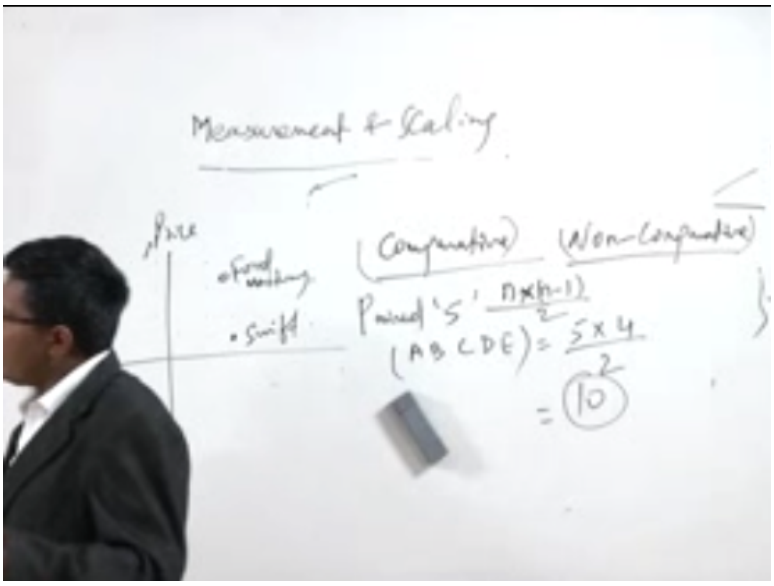
In the non-comparative scales so that means you can understand the first nominal ordinal comes here right in the non-comparative scales each object in the scales independently of the others in the stimulus set so the resulting data are generally assumed to be interval or ratio so this si the metric one right.

(Refer Slide Time: 23:25)



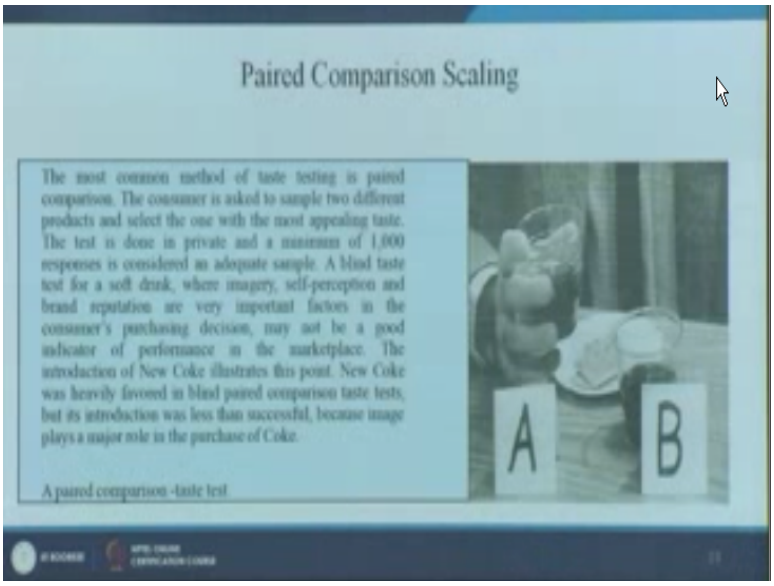
Now paired comparison as I am saying for example number of combinations and this is has the high use in the multi dimensional scaling were the technique were I m trying to understand how do people any be behave what do people like for example suppose I am asking okay how do you like a car in terms of fuel efficiency and let say price.

(Refer Slide Time: 23:53)



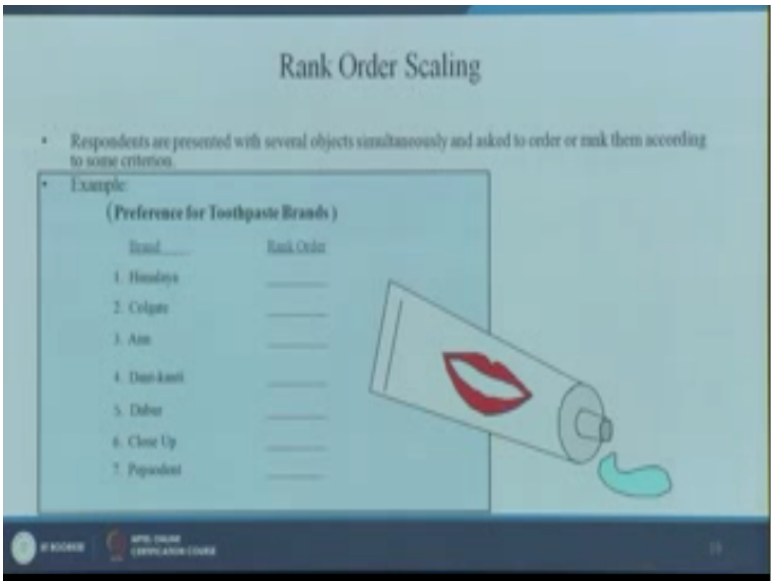
Now when I am saying I can place a different list this is ford let say anything like for example ford right this is let say swift or something so when I am doing it I am doing basically the paired comparisons so this is useful in techniques like multi dimensional scaling.

(Refer Slide Time: 24:11)



So as you can see two glasses are there and two drinks may be Pepsi and Cola or something like this so A versus B so this is the comparison okay.

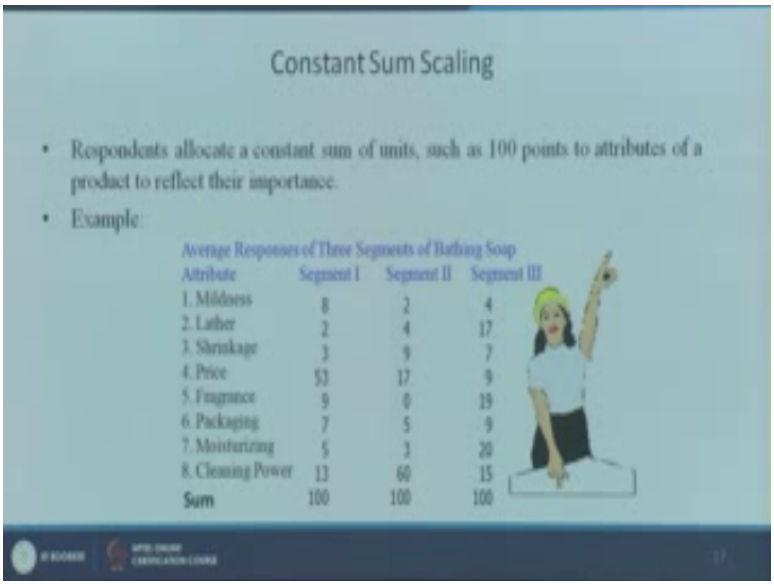
(Refer Slide Time: 24:21)



Similarly rank order scaling has you had seen from the rank order scale like the different brands of the tooth paste and Himalaya, Colgate, aim, you know dhankanti, Dabur, Close up, Pepsodent and you are asked to rank them so in one way when you are ranking also you are doing paired comparison you rank against others right.

So you rank Himalaya you compare Himalaya against the rest and then you compare Colgate against the rest it goes on right so rank order is also a very important technique because it helps you to identify that among the so host of the objects which one is most likely hood or which is the most liked one right the paired device.

(Refer Slide Time: 25:08)

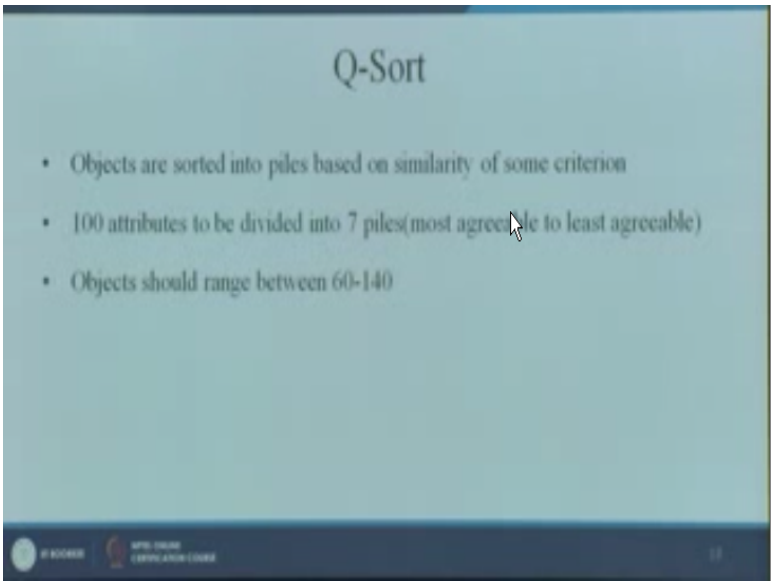


The third is the constant sum scaling the constant sum scaling is a method were I would give you let say 100 value the value 100 you know 100 marks or 100 score and I ask you to divide it now for example in the case of the bathing soap three segments of people were asked on this factors now the factors mildness first segment gave a score of 8 right out of 100 8 second segment gave an importance of 2 only third 4 rather 2 4 17 so in case 3 9 7 price 53.

Now from if you look at this when you do a constant sum scale you can understand that this case price becomes the most domain factor now in segment 1 so if the marketer wants to cater to segment 1 he should be more careful in addressing the problem of price and the cleaning power of the detergent may be this is the economical segment right.

Segment 2 is more bothered about cleaning power and price so theses re the moderately income group any be right the third group is 1 were leather matters and mosituring mtters because they are very sensitive they do not want the hand to get affected or something so they have given a score of mosituring cleaning power and leather right and fragrance also so this is may be the high income class or something I do not know but I am just giving the example.

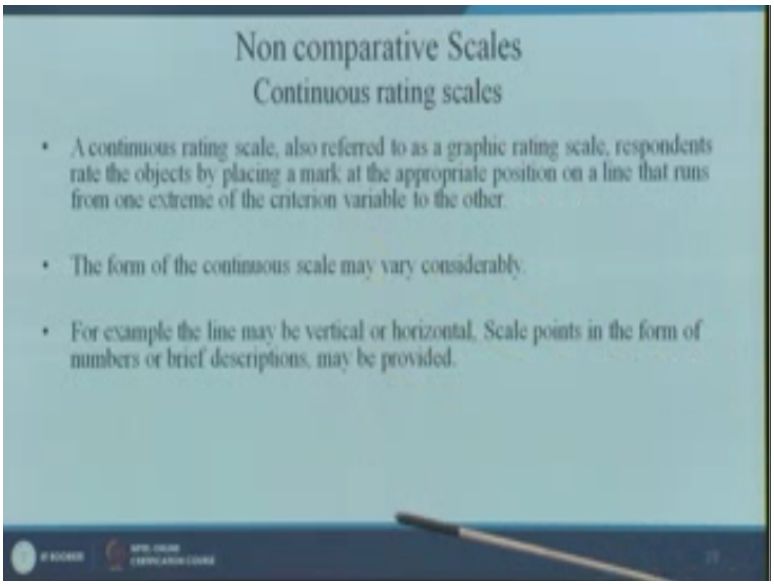
(Refer Slide Time: 26:38)



Q-sort is an another technique what happens is it is sorting Q-sort so sorting is done for example let say 50 objects or 60 objects are given to you and you are ask this two groups may be now group 1, 2, 3 and 4 so I will ask you to pile up this 60 objects into this may be 1 4 3 5 17 19 goes on comes into group if you have understood if you know what is factor analysis for example so we do this similar kind of technique in factor analysis we use were in this group I am compiling all the similar looking items.

In similarly group 2 and group 3 and group 4 and the summation of this four will be equal to 60 okay object should range from 7 is known as number you can have 10 piles also you can have 5 piles it depends on how many want right depends on your how is you feel to do that work it should not be too many should do too many then it becomes a very comparison tasks to 140 or 150 items even 140 is the large number.

(Refer Slide Time: 28:15)

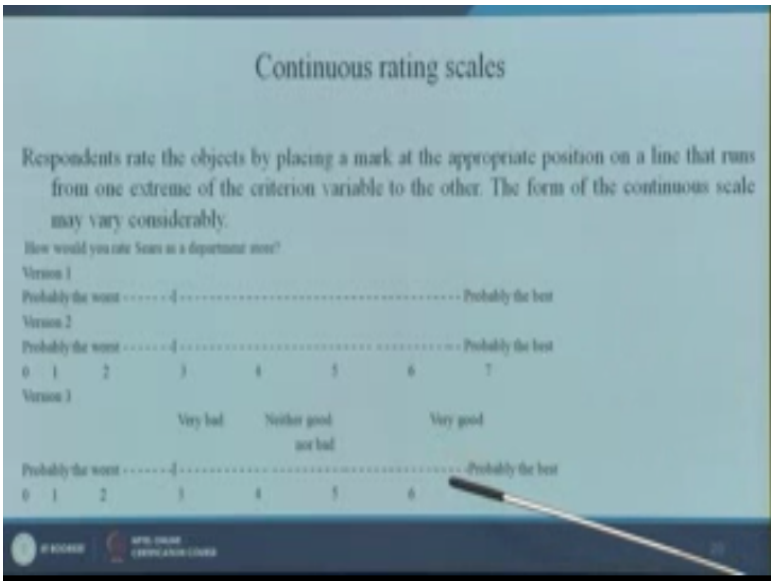


But then this is what we have done theoretical statements if it is 140to pile up in a7 or 8 or 9 groups it becomes a very tough task to were to do it takes a lot of time and consume lot of time now coming to the after comparisons the comparative scales you are next moving on to them non comparative scales so non comparative scales are like for example continuous rating scale which is also refer to us graphic rating scale that helps the respondents to place a mark.

Now for example let say I will ask a will what I do is I will ask somebody okay what is the you know how much do you like the I am asking the farmer how much do you like a fertilizer now if I am asking scale let say 1 2 3 4 5, 5 being the most liked and 1 will be the less so least and most so the problem here is he might not exactly understand the real meaning of the word 4 5 or something right.

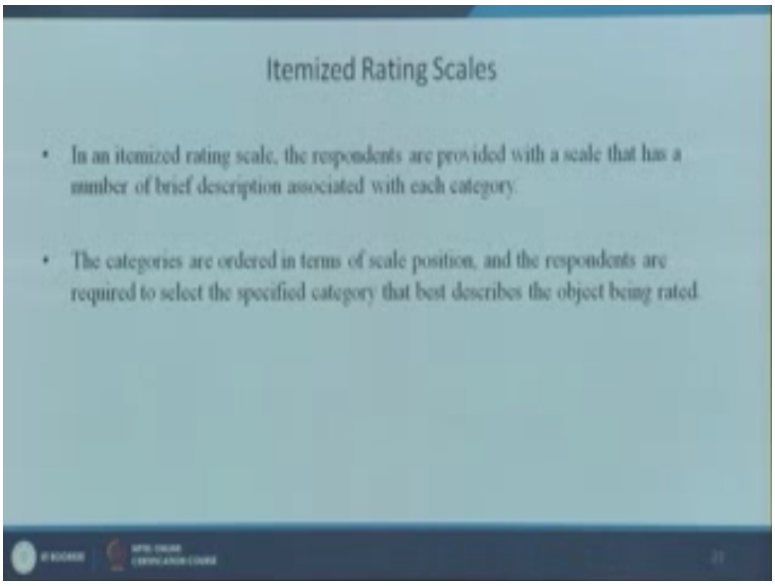
So in such situations hate happens we give them a scale in kind of a line or a distance so we say if this is 0 or the last let say and this is the most okay tell me how much do you like it now he might look at it and graphically thinks and say here so this fertilizer lies on here another fertilizer it will lies here so we can know if A lies here B lies here so they like B more than A by a margin substantial margin.

(Refer Slide Time: 39:39)



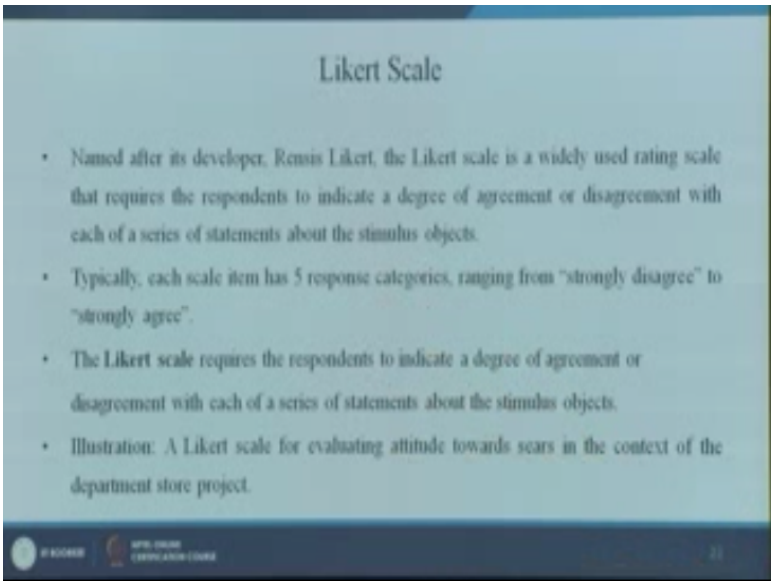
Continuous rating scales this is what you can see.

(Refer Slide Time: 29:41)



Then comes the itemized rating scales this is the most utilize rating scales but one has to be careful that you know itemized rating scale every item now suppose this is an itemized rating scale every item should be given description this is what it says number of brief description if you cannot describe that particular number then how do we expect the respondent to understand it suppose people would say why was there Likert scales.

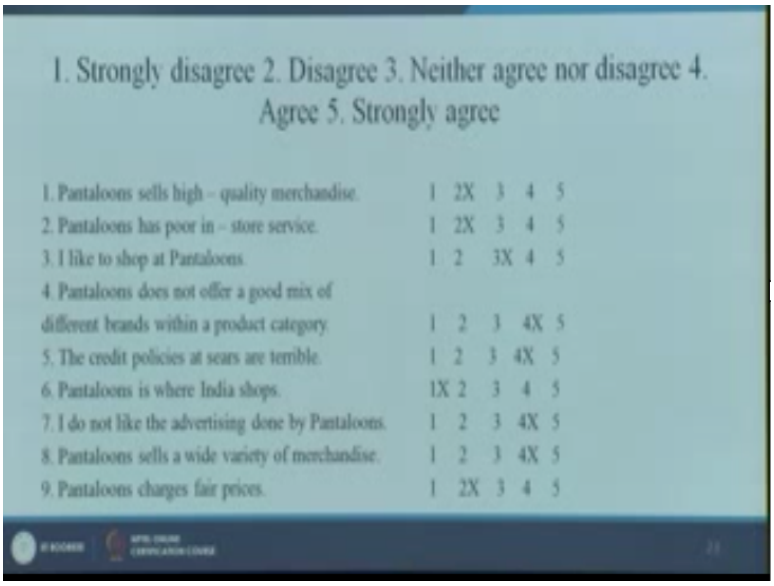
(Refer Slide Time: 30:15)



This is called the Likert scales which is develop by Likert they gave a 5 response category from strongly disagree to strongly agree and the question is why 5 why not 7 why not 9 why not 11 in fact many of the researcher they are suing 7 also when what happens when I am not using 1question is the when I am using 11 how do I write what do I write to 1 what do I write for 2 what do I write for 3 and the question is when I cannot rite myself and it is my own research.

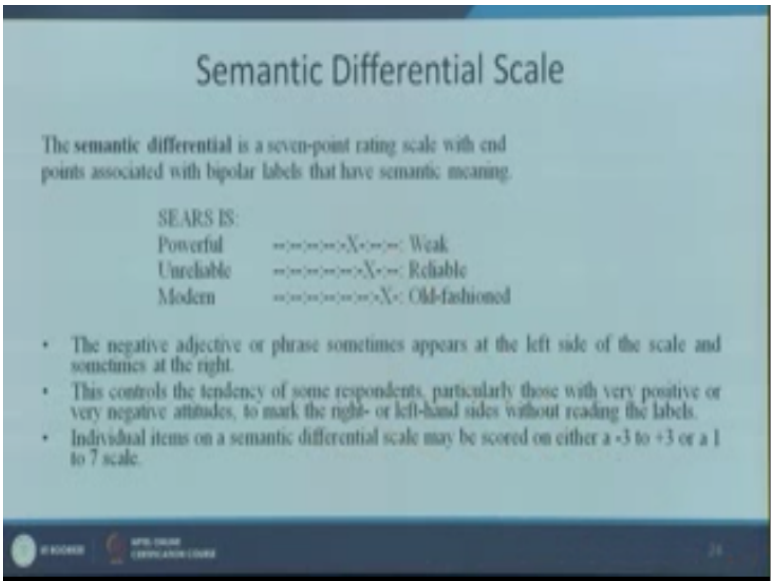
How do I expect the respondents to understand that and comprehend it and then give me the reply so that is 2 one has to has a researcher one has always look you know where the shoe of the respondent and then think accordingly okay .

(Refer Slide Time: 31:00)



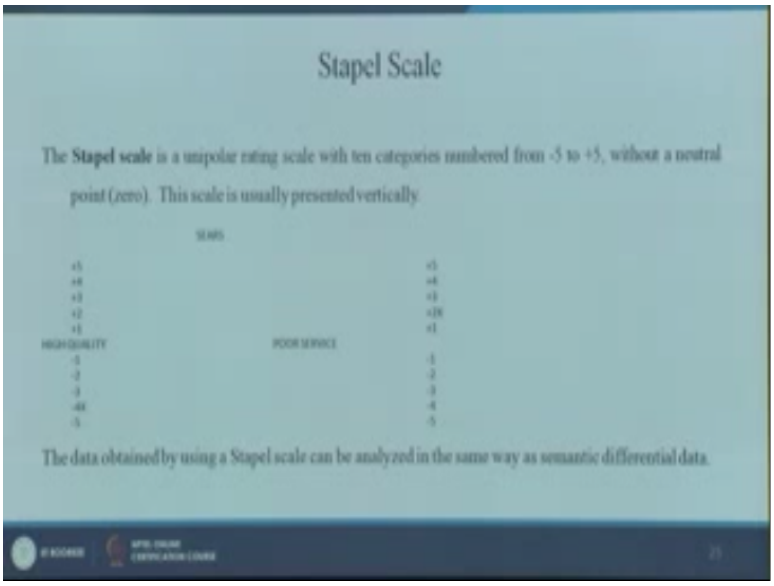
So then you have a some questions pantaloons sells high quality merchandise so this is the 2X score has we given here pantaloons as poor in store service that 2i like shopping at pantaloons 3 right the credit policy is that terrible yes 4 so here one is to understand there could be a question of rector negative which may be handling it in the next session right so this is all what you do in a Likert scale.

(Refer Slide Time: 31:31)



So next is the semantic differential is one were the two bipolar objectives powerful weak but I would always suggest please never take the this way rather you take the reverse way keep the weak or the negative value or the lowest value on the left hand side and the powerful value at the right hand side the higher number because it is the way that human mind behave because we always tend to our progressive attitude right. And so when it when you give you such a dimension and there are 7 points in between 1 2 3 4 5 6 7 okay so this 7 points are 7 values now where does it fit so that is what the semantic differential uses right.

(Refer Slide Time: 31:12)



So staple scale is another which has +5, -5 and on a particular variable let say service or quality the respondent is asked to give score right so but nowadays it is very seldom used as staple scale but though still it is theoretically scale is been used.

So this is all today we had right let me just in actual brief what we did so we talked about scale the importance of scale and how scale is useful in analysis and then what are the types of the scales basically four measurement scales and then be classified those scales to comparative and non comparative and under comparative we have few like paired comparisons constant sum and all.

And under non comparative were there is no comparison between the two different objects but rather you are asking in a scale may be 1 to 5 how much do you like now suppose 4 somebody says and do the next question suppose if we say I like 3 automatically you understand in a holistic way the first one is lied more than the second one so this is all what we did in the second one so this is all we did in the session thank you very much.

For Further Details Contact

Coordinator.Educational Technolgy Cell
Indian Institute of Technology Roorkee
Roorkee 247 667
E-Mail Etcellitrke@gmail.com etcell@itr.ernet.in
Website: www.itr.ac.in/centers/ETC. www.nptel.ac.in

Production Team **Sarath Koovery**

Mohan Raj. S
Jithin. K
Pankaj saini
Graphics
Binoy. V.P
Camera
Arun. S

Online Editing
Arun.S
Video Editing
Arun.S

NPTEL Cooridinator
Prof B.K Gandhi

An Educational Technology Cell
IIT Roorkee Production