Introduction to Psychology
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Lecture – 32
Intelligence

Today we are going to talk about one of the most celebrated constructs in psychology and something that is very commonsensically used, very generously by the mass I should. In fact, say that there are, couple of terminologies in psychology which are so generously used by people at large that you might realized that either people have understood the constructs so well or perhaps psychologist have picked up some very celebrated constructs and assimilated that very construct, their understanding in the subject matter or we could even are think that perhaps the way commonsensically understanding goes, the way people at large try to define that very constructed or the way they look at it, perhaps scientifically that constructs does not represent what commonsensically people think of it. One of it is personality for instance.

Usually people look at somebody and comment what a personality - where you realize that the word personality actually represents the physical make up of that very individual and we all have heard it, I heard it several times, I am sure all of you must have heard it that the commonsensical representation of what personality means for the community which is not aware of the term and the intricacies. They primarily use the term to report to represent some type of a physical makeup which is little more attractive, the features, and the overall appearance which is far more appealing. The other psychological constructs which is very generously used by people at large is intelligence, you do something and people say – oh, great he is very intelligent or they will say – oh, his intelligence is beyond certain limit.

Now the type of the people I have met who use this terms very generously I am more than sure that they have neither studied psychology nor do they understand what intelligence or personality mean, but then people use it. Because this is one of the constructs which is so generously used, this is one of the construct which is of extreme important as for as certain type of disabilities are concerned say for example, if you have look at intellectual impairment. Suddenly you realize that the intelligence score become

extremely important, there was a time even when intelligence or the assessment of intelligence measurement of IQ was even used historically at one point in time in history in US for granting immigration certificates. So, people who were considered to have IQ below a certain level they would not be allowed to enter the political boundaries of the US.

There was a time when Europe saw division of students in classroom based on their intelligence score. So, these two constructs in psychology you would realize that people have used it to all type of usage and it has been used as well as misused. To the best of my understanding IQ is one of the constructs in psychology which is extremely celebrated which saw down fall as well with the uprise of the concept of emotional stability, emotional quotient and when people started coming forward with studies were the relative contribution of IQ and EQ - the intelligence and the emotional quotient respectively was taken into account. So, that was a time when the celebrity status of with IQ I should say it started diminishing, but still in certain areas you realize that there is no substitute of an IQ score. Say for instance if you have to look at the intellectual disability, if you have to assess the intellectual level of in intellectual impairment in children you have no choice, but to go for something like IQ assessment besides other type of assessment.

So, today we would be now talking about intelligence how psychology has tried to understand it, how psychology has tried to assess it. I take the definition given by Wechsler and I quote him here.

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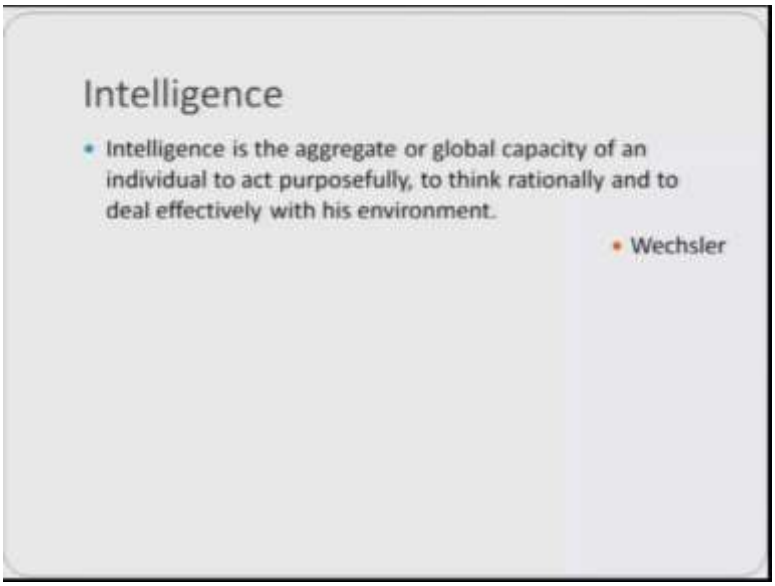

Intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with the environment. Now there are three important things here, he considers that intelligence has to be global in nature; it is your aggregative capacity. So, the sum total of the capacity which helps you to act purposefully now which act is purposeful and which act is meaningless, could be a matter of debate if you look at it in philosophical term, but if you look at it in pragmatic terms say purposeful act where you have a goal driven behavior and your capacity helps you attend that very goal. If you have the ability to rationally think, so you have arguments which helps you make some deduction and finally, with the help of the arguments that have made you arrive at a conclusion and with goal that you set for yourself and therefore, you act in purposeful manner finally, you are able to efficiently, effectively take care of the environmental demand which you are facing right now.

So, if you are capable of doing this and to what extent you are capable of doing this, this capability according to Wechsler is intelligence. Now if you look at intelligence the construct you would realize very interesting things.

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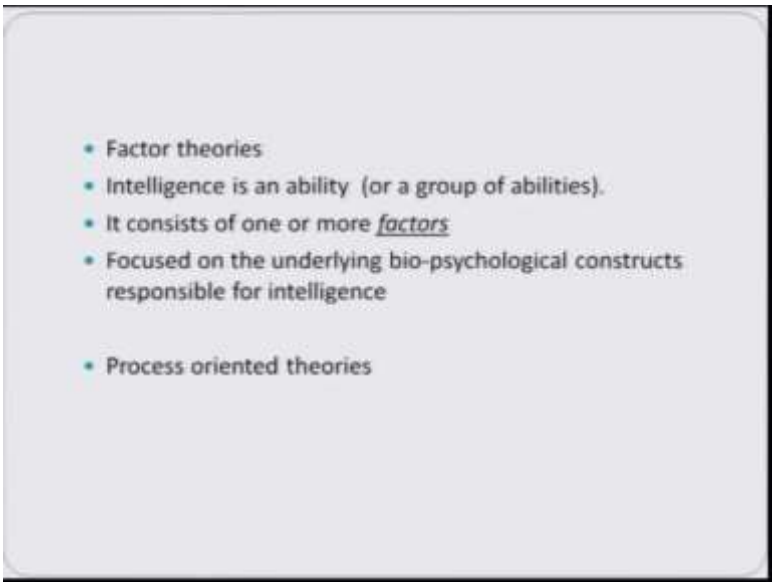

Two important things, that people look that the abilities - what type of ability you have and then people adopted certain type of statistical technique to find out what constitutes intelligence, what are the factors they are, right now because this is an introductory course therefore, we are not going into one of the what we call - famously use technique in statistics call factor analysis which help you reduce large number of items into clusters of items. And each of these factors are given some name and this is how factor analysis done, all tests of psychology you would realize that statistical applications are heavily use there and factor analysis is one of them.

Now based on factor analysis a set of theories were proposed what a called as factor theories, little later we go through some of the theories prominent once. Now these theories basically accept that intelligence is inability or it is perhaps collection of abilities group of abilities and it has one or it could have more than one factors, and how do you derive these factors again it is the factor analysis as a technique. And then they focus on the underline bio psychological constructs responsible for intelligence of the individual and there are other sets of theories of personality which basically define personality more in terms of process, so they are called as process oriented theories. So, you have factor oriented theories and you have process oriented theories.

Charles spearman was the psychologist who said that intelligence is basically an ability which has two factors and therefore, this theory is called as two factor theory.

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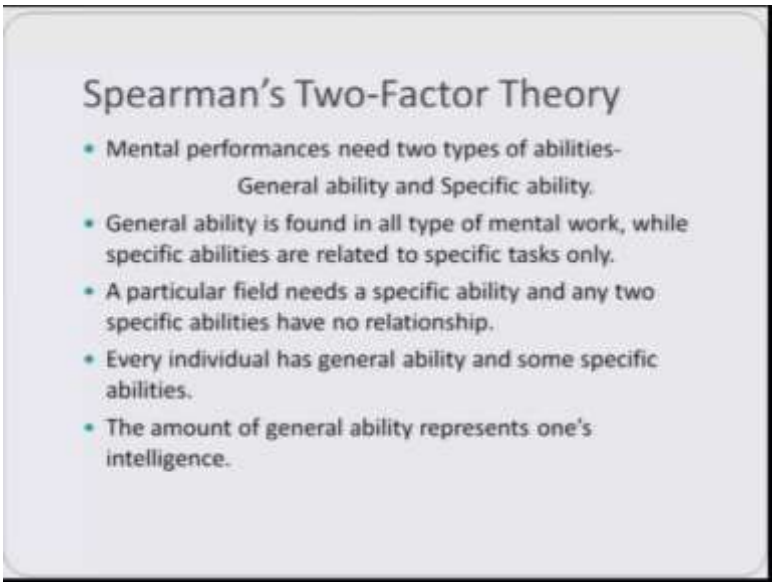

He said that the mental performances need two types of abilities - the general and the specific abilities. So, what are general abilities? These are the abilities which are found in all types of mental work, whereas, specific abilities are related to very specific types of tasks. So, a particular field needs a specific ability, and any two specific ability basically would have no relationship. So, all specific abilities would basically cater to your special ability to work in a particular domain. Now every individual has general ability and some specific abilities according to spearman, and the amount of general ability actually according to spearman represents one's intelligence. So, if you have your specific abilities it will help you take care of this specific type of activities that a given task demands, but over all your general ability the aggregate of it is what would constitute your intelligence. So, this is what he talked about.

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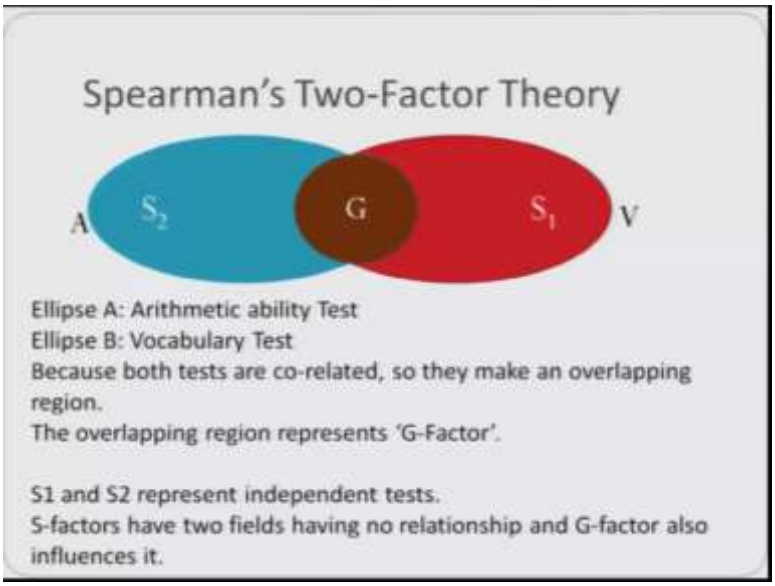

So, look at the blue ellipse here and he says that fine if the blue ellipse is a say S2 and the red ellipse is S1. Representing two different types of abilities, so ellipse one represents arithmetic ability, ellipse two which represents vocabulary. Now you realized that there is an overlap between the two because certain type of arithmetic ability would require you to have certain degree of verbal ability which would by default demand that you should have at least some amount of vocabulary with you. So, these two constructs gets related and therefore, there is an overlapping zone. The overlapping zone between the two ellipses is what is represented here in brown called G.

So, now, this overlapping region represents the general factor the G factor. The S1 and S2 that is the vocabulary and the arithmetic ability they represents basically two independent type of factors which can be mapped using two different types of tests and S factor has basically two fields having no relationship whereas, the G factor influences both of them. So, this was the two factor theory proposed by Spearman.

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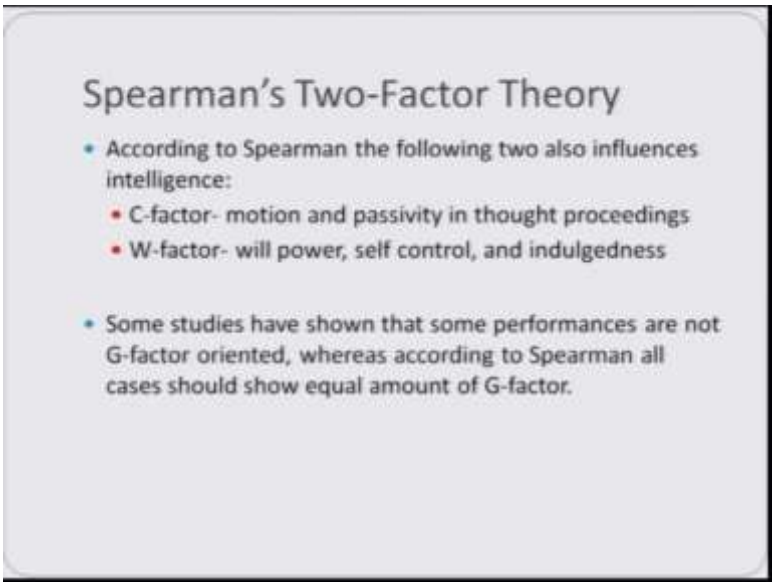

Now, according to spearman two other factors they also influence intelligence the C factor and the W factor. C factor is defined as motion and passivity in thought proceedings and W factor is will power self control and indulgedness. So, some studies have shown that some performances are not G factor oriented, whereas according to spearman all cases show some amount of involvement of the G factor.

So, although this was a theory which was proposed historically long back, but then this is one of the very dominant theories which remained in limelight for quite some time.

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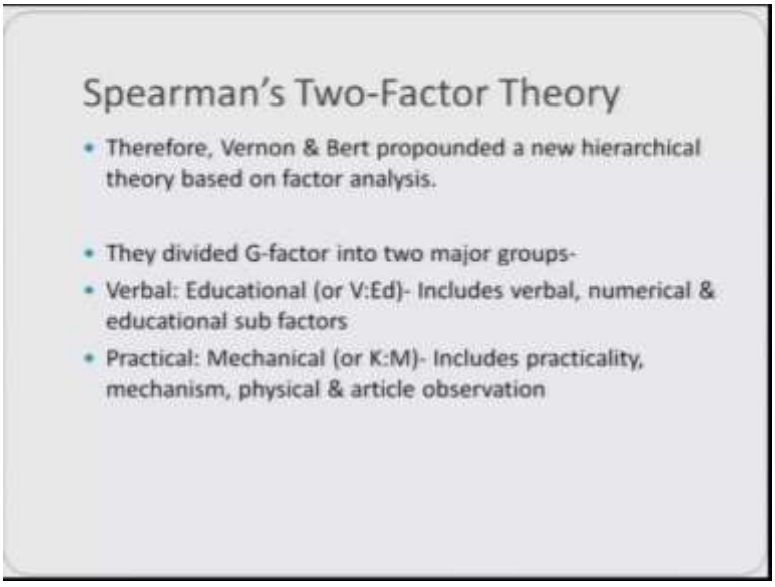

And then Vernon and Bert they came, they propounded a new hierarchical theory based on factor analysis and they said that the G factor now could be put into two major groups - the verbal versus educational that is the V is to ED what you see here on the screen. Now this includes verbal ability numerical ability and the educational sub factors, the other factor we talked about the other major group was practical versus the mechanical the K is to M what you see here on the screen which includes practicality mechanism physical and article observation. So, now, the two factor theory remained there, but then you realized at G factor got further refine by Vernon and Bert.

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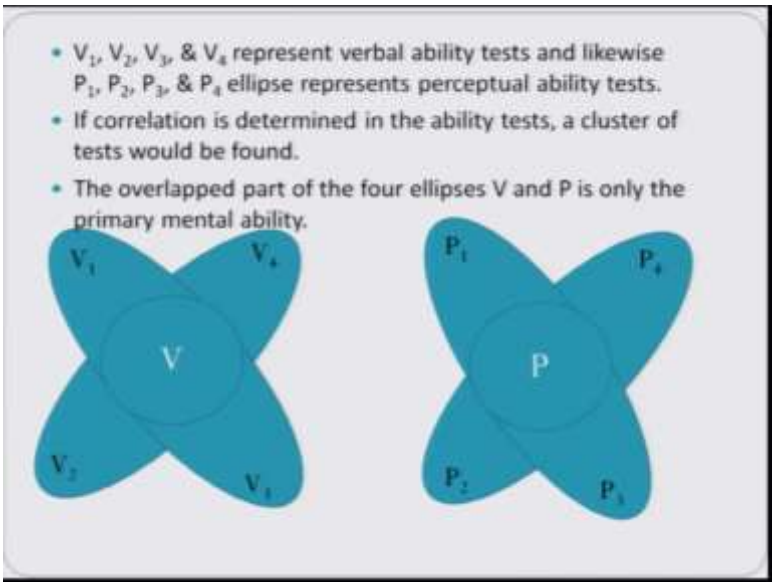

And then came Thurston, Thurston proposed a very interesting type of a concept what is called as the group factor. Now we rejected the concept of G and the S factors what he said was that we have the ellipses what you see here as V, V 1, V 2, V 3, V 4, and similarly P 1, P 2, P 3 and P 4, and then you have an overlapping zone. So, the overlapping zone between V 1 to V 4 is V and again the overlapping zone of the four ellipse of P, the overlapping zone is P. So, what he said was that V 1, V 2, V 3 and V 4 they represents verbal ability test and similarly P 1, P 2, P 3 and P 4, these four ellipse they represent the perceptual ability. Now if correlation is determined in the ability test a cluster of test would be found and the overlap part according to him of the four ellipses is the V and P and these is only the primary mental ability of the individual.

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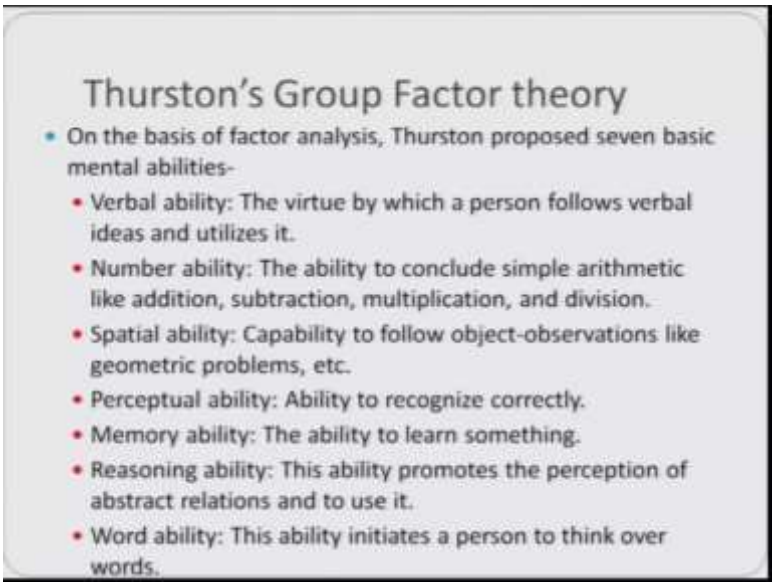

Now, on the basis of factor analysis Thurston propose seven basic mental abilities - the verbal ability, number ability, spatial ability, perceptual ability, memory ability, reasoning ability and word ability. So, according to him verbal ability basically is the ability the virtue of which a person follows verbal ideas and uses them number ability has to do with a simple arithmetic's like addition, subtraction, multiplication and division. The basic mathematical operations then the third is the spatial ability this is the capability to follow object observations like geometric problems, perceptual ability is the ability to recognize something correctly, memory ability which is ability to learn something to store it, reasoning ability this ability promotes the perception of abstract relationship and the usage of it and the word ability which basically is the ability initiates a person to think over certain type of words.

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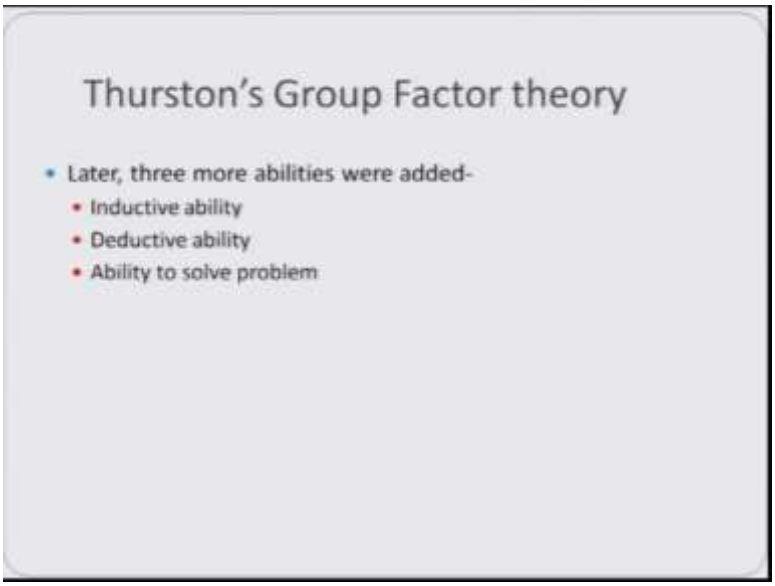

Now, later he added three more abilities that is the inductive ability, the deductive ability and the ability to solve problem. And if you going to the literature all interdict psychology books would be talking about reasoning creativity and if you look at the chapter on reasoning you will find again the usage of the terms inductive and deductive reasoning.

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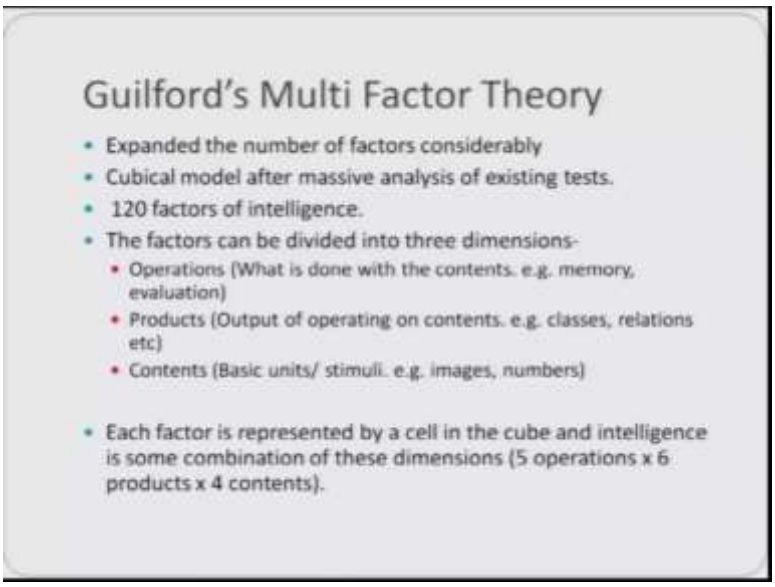

The third theory which came out of knows factor analysis was Guilford's multi factor theory. Now Guilford what he did was that he expanded the number of factors

considerably and he proposed a cubical model after massive analysis of existing tests that existing in those days. So, based on the massive analysis of the existing tests that would measure intellectual ability he came forward with some model which had 120 factors. Now think, two factor then seven factors which was further complemented by three more and then come suddenly 120 factors and I must tell you that later on he again expanded it to include 180 factors.

Now the factors that Guilford talks about can be divided into three dimensions – operations, products and contents. So, contents they are the basic units or they are the stimuli like images like numbers, then products which are the output of operations of the content like class, relationship, etc… and operations what is done with the contents so the memory evaluation and so forth. So, what he did that each factor represented a cell in the cube and he said that intelligence is some combination of these dimensions. So, 5 operations, 6 products and 4 type of contents, this is what his model is - therefore it is called as the cubic model.

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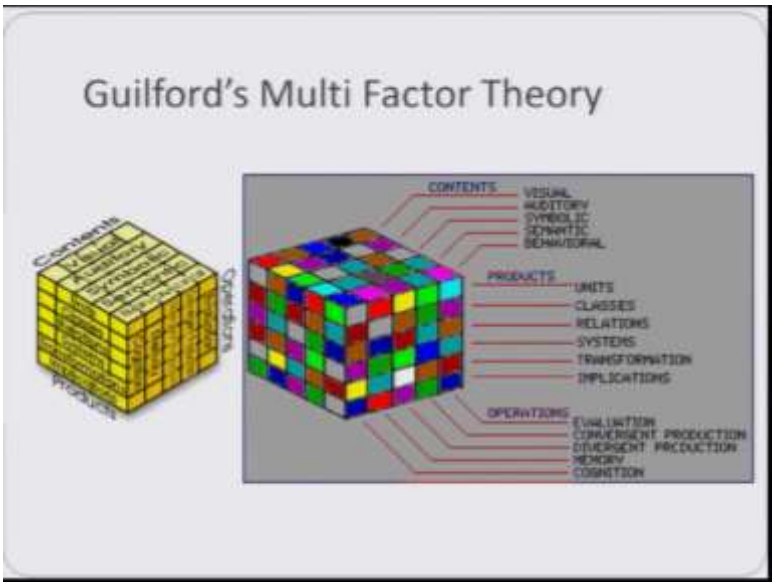

So, the contents he said that visual, auditory, symbolic, semantic and behavioral these are the constituent elements of contents. Products he said that we have units, classes, relations, systems, transformation and implications and then he talked about operations that is evaluation, conversion production, diversion production, memory and cognition. Now if you look at the cube and then you would realized that the three broad

categorization that he did content product and operations so finally, you will arrive at 120 factors that determine intelligence of the individual. Then theory came what was called as the Theory of Multiple Intelligence by Gardner.

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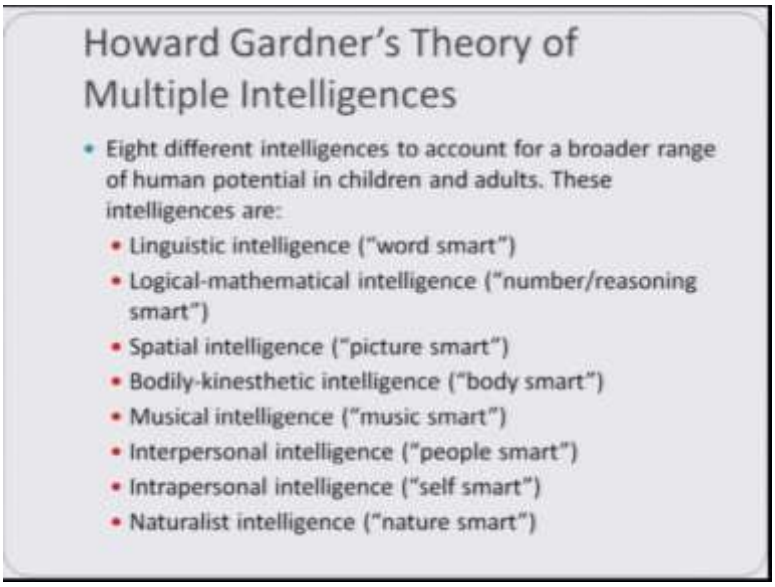

According Gardner eight different intelligences account for a broad range of human potential in children as well as adults and these are linguistic intelligence what he also said as word smart, logical mathematical intelligence what he says as number or reasoning smart, spatial intelligence that is picture smart, bodily kinesthetic intelligence that is body smart, musical intelligence that is music smart, interpersonal intelligence that is people smart, intrapersonal intelligence that is self smart and naturalist intelligence that is nature smart. So, this was an interesting theory again that was given by Gardner.

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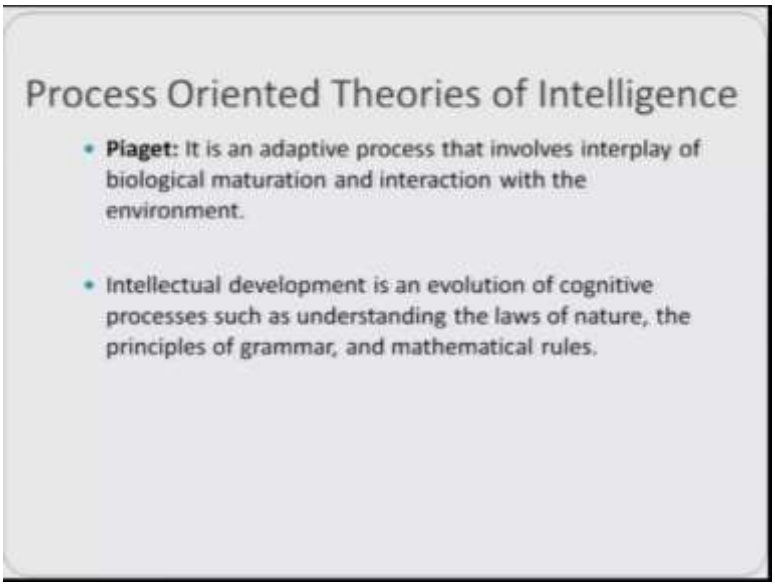

Then comes the process oriented theories that try to explain what intelligence says and the lead person here was Jean Piaget. Now Jean Piaget said that basically it is an adaptive process that involves interplay of biological maturation and the interaction with the environment. So, the growing child basically becomes biologically more and more matured, interacts with environment and he learns out of his interaction or her interaction with the environment. So, he said that the intellectual development is basically an evolution of cognitive processes such as understanding the law of nature, the principles of grammar and mathematical rules.

One very interesting thing that Piaget also talked about was learning out of committing errors. So, when you evolve you realize that what you thought of was not appropriate and therefore, with the increase in the level of interaction with environment you keep getting feedback and it is this feedback from the environment that further makes you little more matured little more experienced and which also helps you cut shot on the number of errors that you commit and therefore, you understand the natural laws more and more clearly. Same is the case with the usage of language when you learned the principles of the grammar by committing errors and then also the mathematical operations the rules of the maths.

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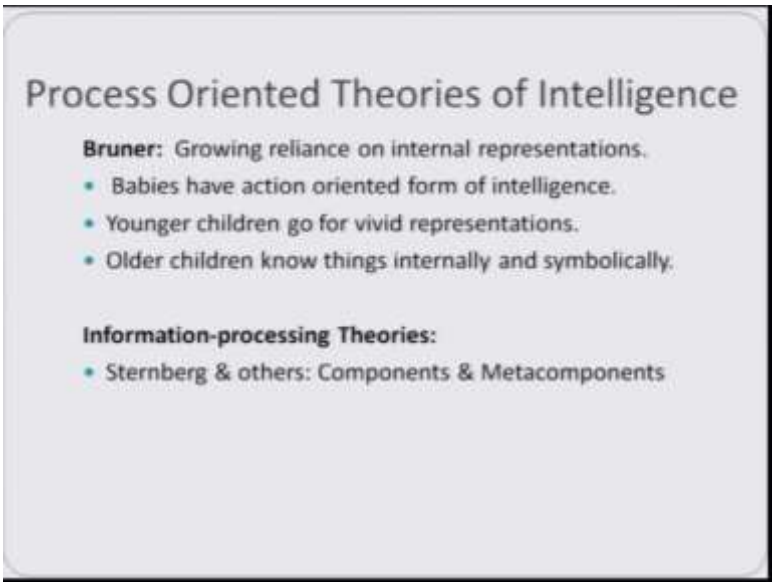

Another theory was proposed by Bruner who talked about the growing reliance on internal representations - he said that babies have action oriented form of intelligence, younger children go for vivid representations, whereas older children they know things internally as well as symbolically and then came forward the information processing theories and Sternberg who gave the concept of the components and the meta components. What Sternberg said was also termed as triarchic theory and he said that there are three different types of intelligence - The analytical intelligence, The creative intelligence and The practical intelligence.

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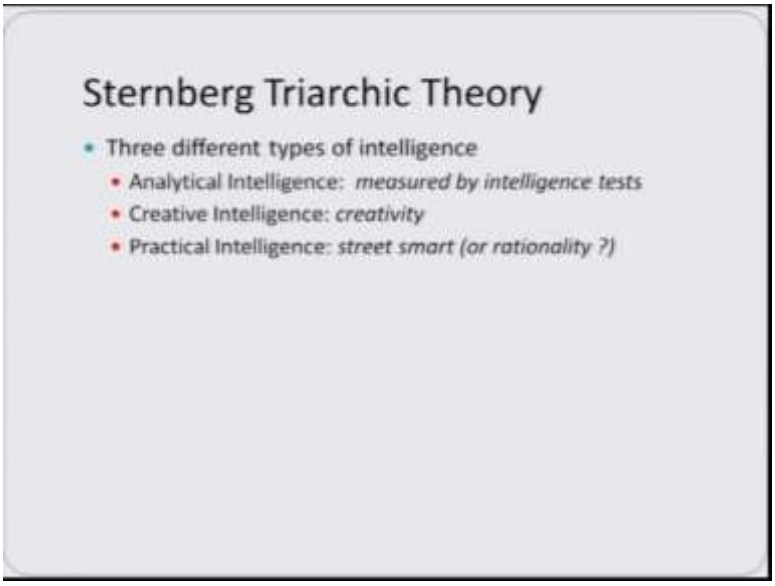

Analytical intelligence which is measured by intelligence tests, creative intelligence which is something that determines your level of creativity and the practical intelligence which basically makes you more and more street smart. People say that this perhaps is practically intelligence is also the one which also makes you more and more rational in nature.

Now, we come to the assessment of intelligence. Again if you look at the introductory psychology books you would realize that lot of tests are there and historically army-alpha, army-beta test that was used historically for assessment of the civilians to get recruited into the armed forces the world war. And now from there if you come you would see two types of things - one that the nature of intelligence tests has undergone a massive change. So, instead of just something being only verbally guided you also have test which is more and more performance dominated you have a mix and now you also have intelligence test which has now many sub components.

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So, broadly you can classify intelligence test as individual intelligence tests which can be administered on a single individual and if you want to administer on a larger number then one by one you will have to conduct it. There are also group intelligence tests and of course, the test of intelligence which are verbal in nature and the test of intelligence which are performance oriented that is nonverbal in nature.

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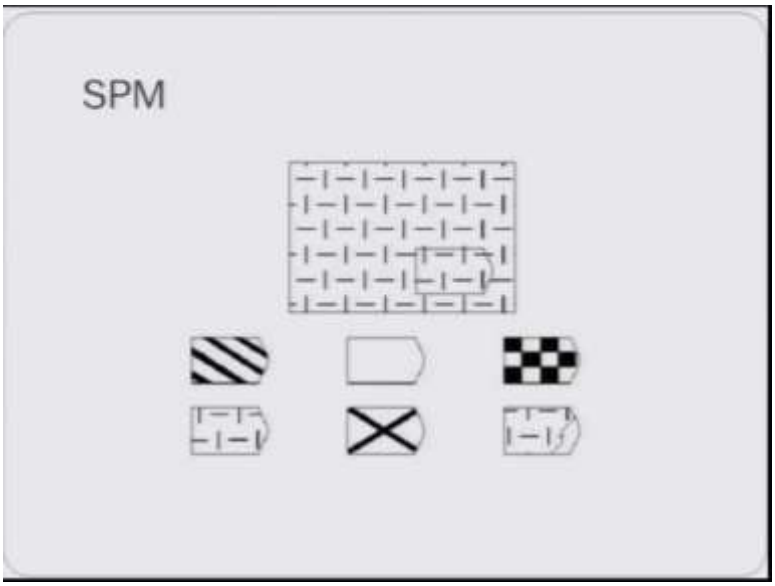

I would be talking about only couple of them here - the first one what is called as the Raven's progressive matrices are also called as the standard progressive matrices ,JC Raven and collogues they came forward with this very test which is available in two versions - the achromatic version what you see here on your screen and the chromatic version means achromatic would be the black and white that you see here on the screen. There is also the chromatic version of a standard progressive matrices where you have this patterns made in colors.

Now what this test requires you to do is that look at the pattern that shown on the top of this screen and then you have options you have to look at the options given at the bottom and you have to quickly decide which of these pieces will fit the cut piece from the top image so that the pattern gets completed. Now if you look at it you can very easily say that the fourth part is the one which will fit the gap there. Now in standard progressive matrices you are of course, looking at the simplest one right now, but if you look at the full test you would realize that the difficulty level keeps on increasing. So, it has sets and then you realize that the first item if you compare the first item with say an item that come little later the patterns becomes more and more complex in nature and therefore, selection of a choice is not that easy. So, the test is one where you have the graded difficulty level and therefore, how much time you take and how accurate you are these are the two indicators based on which the final assessment is made.

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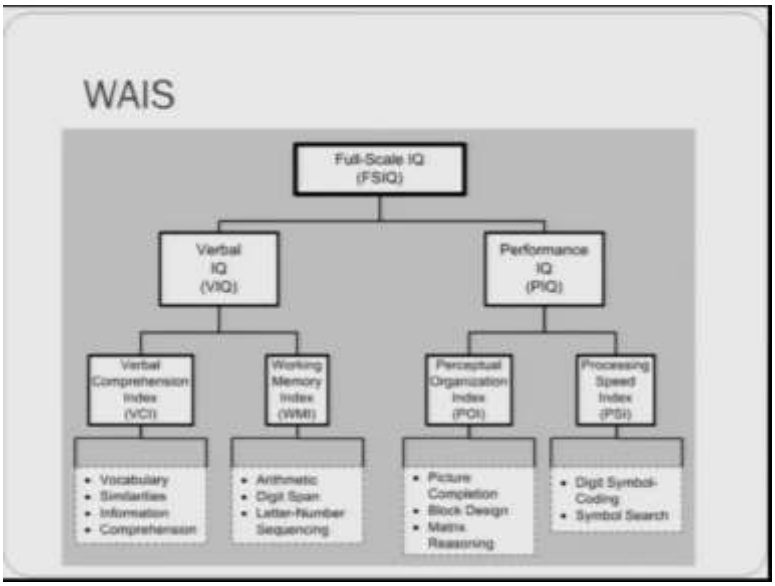

And another test which has undergone multiple revision and in my opinion perhaps this is one of the widely used test is the Wechsler intelligence skill which has both the versions the WISC and WAIS. WISC is the Wechsler Intelligence Skill for Children that is for smaller kids and then you have the Wechsler Adults Intelligence Skill what is called as the WAIS. The WAIS and WISC both of them you would find perhaps if you look at the test across the world which are used to assess intelligence perhaps this would be the one which is widely used.

Now this has both the elements the verbal and the performance elements, we discussed in the beginning that intelligence tests can be divided broadly into two categories. Now these are the test which historically came much later, but then this had both the elements the verbal as well as the performance indicators. Now the verbal indicator has the verbal comprehension index and the working memory index and the performance capability looks at the perceptual organization index and the processing speed index. And then comes the types of tests that are involved the sub tests – vocabulary, similarities, information, comprehension; similarly for working memory arithmetic, digit span letter, number sequencing; for picture organization you have picture completion, block design, matrix reasoning and similarly for processing speed you have digit symbol coding and symbol search.

Now, based on this finally, you come forward with the score. Wechsler test, you would find that it has been used in all types of setups for normal children as well as for the study of some type of mythological diagnoses, there also you would realize that Wechsler test has been used

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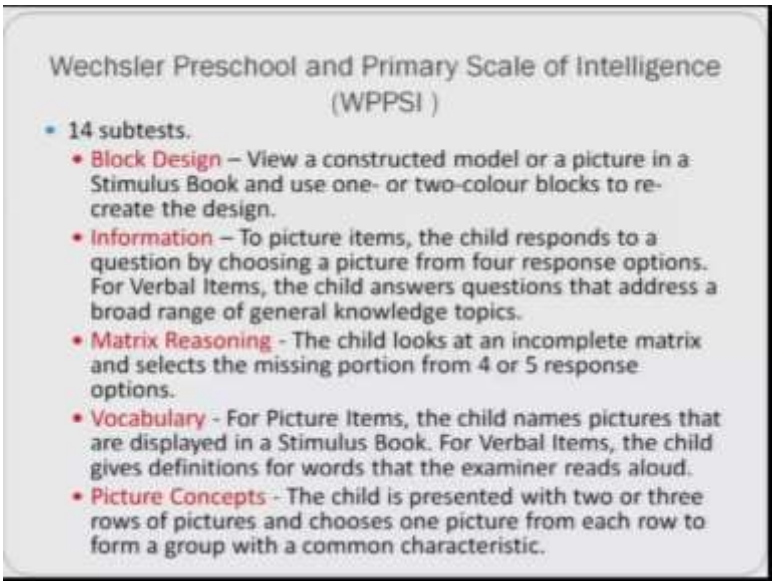

In the Wechsler test for children you would realized that it has 14 different sub tests -the block design, information, matrix reasoning, vocabulary, picture concepts, symbol search, word reasoning, coding comprehension and picture completion.

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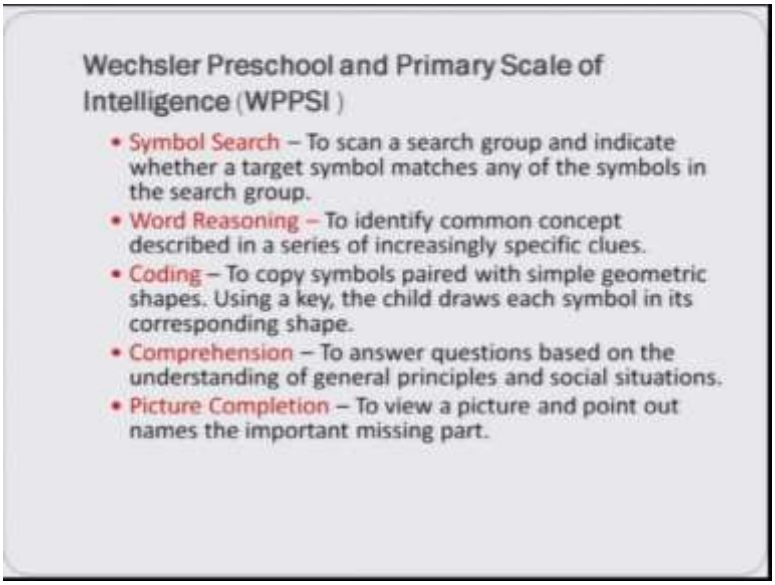

So, again little difference in terms of the content of the test material if you compare between adults and the kids. Another interesting test which is more performance oriented is the pass along test, Alexander's pass along test again nowadays you would not find so many know studies perhaps no study where Alexander's pass along test is used there, but at one point in time in history this was one of the very popular test and perhaps the older departments of psychology their labs would have this very test.

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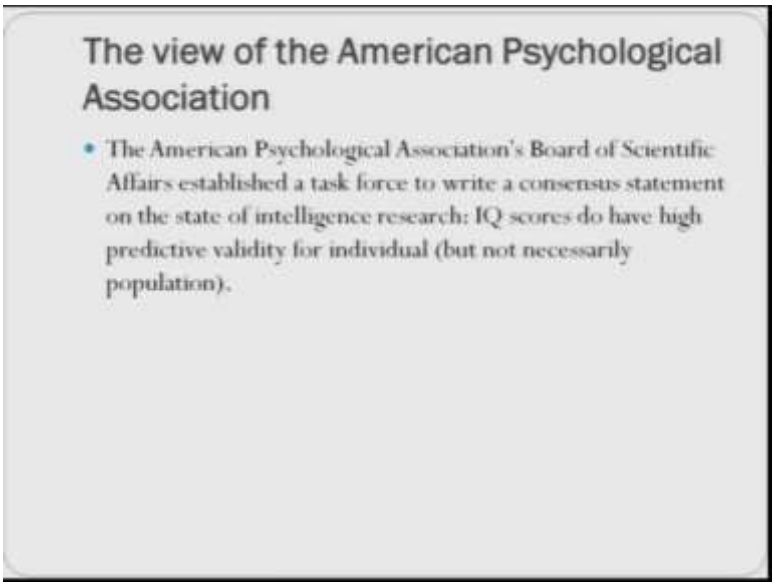

So, to conclude here, as I said that intelligence is a construct which was extremely celebrated at one point in time, IQ was perhaps one of the very dominant concepts in psychology and IQ was used for what not at one point in history. But then gradually with a rise of the concept of emotion, emotional stability and especially when EQ, intelligence quotient came into being what you call the predict power of IQ that it enjoyed and therefore, the celebrity status of this very construct gradually started diminishing.

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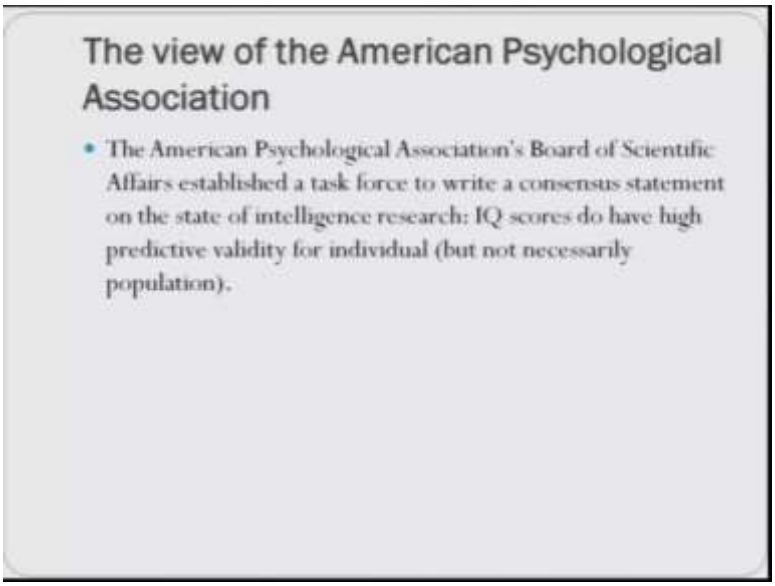

At one point in time in history the American psychological Association Board of Scientific Affairs it established a task force to write a consensus statement on the state of intelligence research and I quote that IQ scores do have high predictive validity for individual. So, this is just to give you a comprehensive idea of that what actually intelligence meant, how intelligence is described in the literature and of course, you do not have to remember all these theories, but then broadly you have to understand what intelligence constitutes of. The relative importance of this very construct and then even the change in the nature of the tools that are used to assess this and then of course, to understand the fact that now it is not exclusively the IQ that is given importance, but rather it is also EQ.

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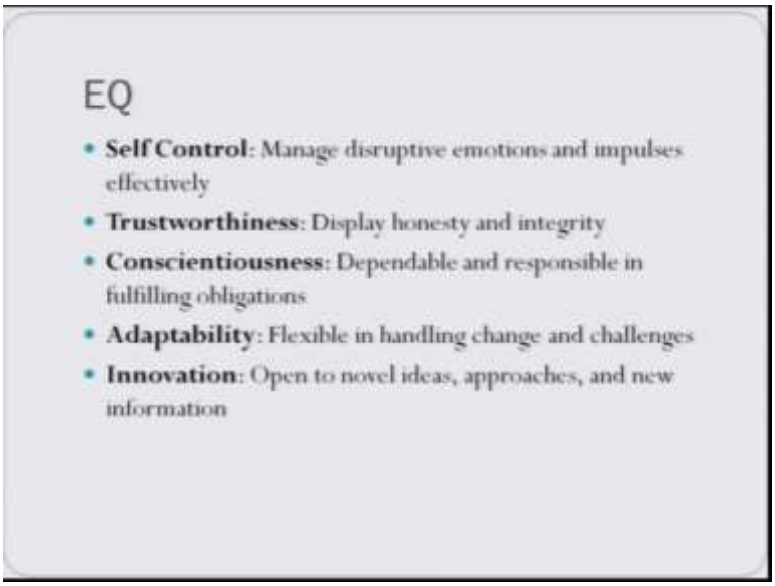

An EQ has basically five different components self control trustworthiness conscientiousness adaptability and innovation. Self control which basically helps you manage the disruptive emotions and impulses very effectively, trustworthiness which is of course, the ability which helps you demonstrate on your honesty and integrity as an individual conscientiousness which is related to dependability and responsibility of fulfilling the obligations, adaptability which is your ability to flexible in handling changes and challenges that you experience and then finally, innovation which is your openness to novel ideas approaches and the new information that you attain in your life and if you look at studies which of course, is not essential for those who are just doing introductory psychology course.

There are good number of studies which has try to understand the relative contribution of IQ and EQ in the overall success of the life of individuals and you would realize that these studies endorse that it is EQ which plays far more important role compared to IQ.

Key words - intelligence, two-factor theory, spearman, group factor theory, multi factor, theory of multiple intelligences, process oriented, sternberg triarchic theory, tests, WISC, WAIS, EQ