Selected Topics in Psychology
Positioning Psychology in the Modern Context
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Technological Advances in other Areas and their Impact on Psychology

Having gone through all the lectures by these eminent speakers, you must have realized that psychology has traveled long distance of course, cutting its umbilical card from philosophical influences. And has developed more and more know scientific temper this very last lecture in essence that the remaining two or it will be following, it would be panel discussions.

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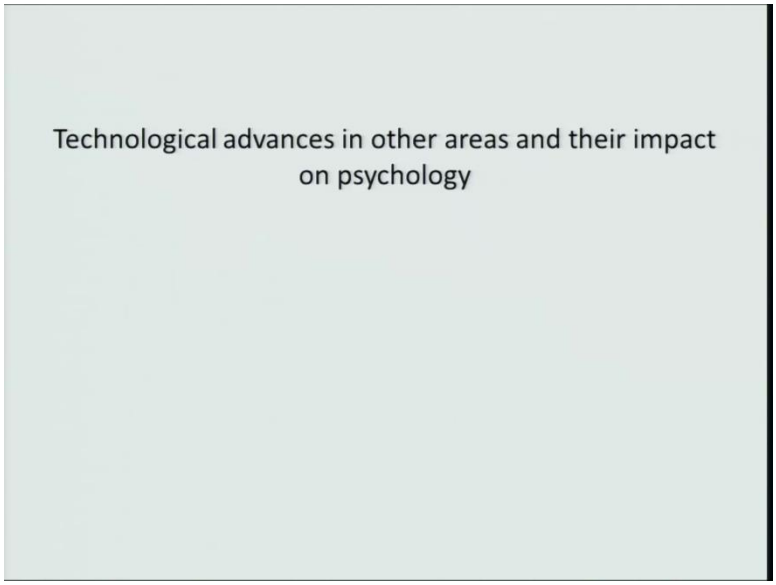

This very last lecture is exclusively dedicated to technological advances which were primarily took to the need in other domains of knowledge. But, how psychology has been influenced by it and how those technology are being used in psychology.

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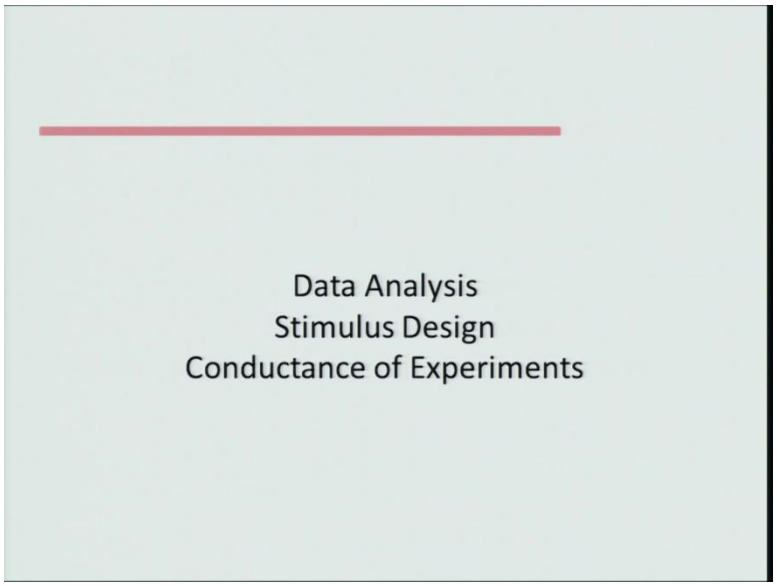

I must tell you that all of you are aware that, data analysis is something which is extremely dependent on the technological advances. There are several software's both for qualitative as well as quantitative analysis. And Data analysis is something that you cannot get rid of in psychology. And therefore, you can understand how dominant the advances in technological domains have influence psychology.

But, two interesting things one that is know the stimulus design has been influenced by the advance that has taken place in technological domain. And two the nature of conductance of experiment has also transformed because, there has been too much of advancements of technology. I am very surgically making selection here and therefore, I am not at all going to talk about data analysis I am not going to talk about conductance of experiments.

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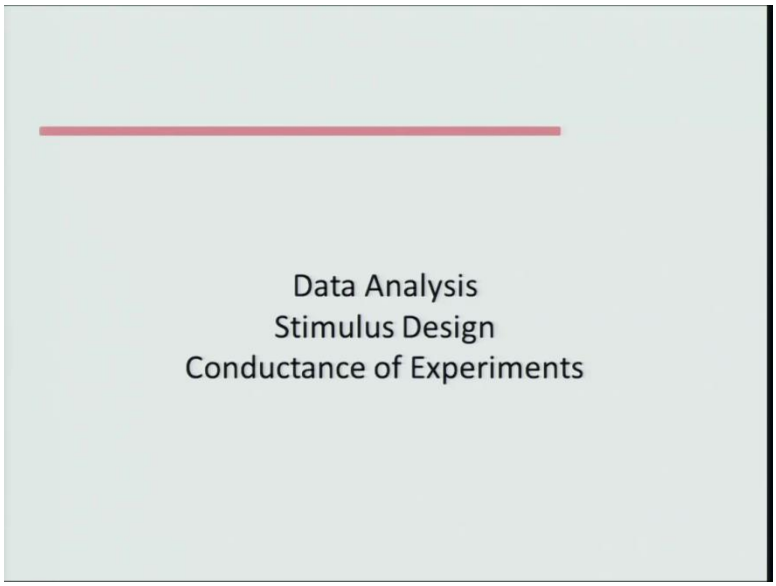

Primarily for two reasons know one that most of you are aware of it and there is futile danger that if I go into looking at the technology that has been very helpful in terms of stimulus design in conductance of experiment. Primarily I would be indirectly talking about few selected know software's that I do not want to do here. Therefore, I just wanted to share with you just t 3 visuals.

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This is map of our campus primarily and this has been designed by non-psychologist colleague of mine, he is basically a designer who is looking into the making of

isomorphic maps. I found it very interesting because know right now 1 of my student is also working on special cognition. And therefore, if you look at the map, whether it is a 2 d map, whether it is a 3 d map, whether it is an isomorphic map.

The angel from which you look at the map or if you are having aerial survey them angel at which you are looking at the space starts influencing you. So, that is an interesting thing and I think that if you have to work on such topics in the laboratory, then it becomes extremely important to look at proper software's are to modify the existing software's so as to get it to your name.

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To the student of mine you know you can see on the screen right no wok that this is using a particular software where, you have the possibility of dividing the space into grids. And then in each of these grids you add certain things you can see here most of the grids are unoccupied and few of the grids have certain images and then you can construct whatever you wish. It could be a city, it could be geographical trade, it could be a forest it could be anything and most importantly you would find here is that you can have a walk through.

So something that is otherwise impossible to think of can very easily be known done in the laboratory set up. Simply because you have under gone or you have seen that demonstrated capability of our technology.

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But, in this very last lecture, my focus is exclusively on eye tracking technology and virtual reality. Why did I do this as I told, that I do not want to indirectly endorse any of the software's which supplements know one or the other type of activities that psychologists look forward to. But, then these are two cutting edge technology and I can share with you to the latest information that is available to me that eye tracking technology is available only at 8 centers in India as if now 2013 may.

I am talking about and of course, virtual reality which has not yet come to India but, then in the western world you will see no certain type of research in psychology where virtual reality is being used in the laboratory set up. What I thought was let I will introduce you to the eye tracking technology something that we have a of with us IIT Kanpur. And then I will know just make a survey of publications in the last 5 years that is 2009 to 2013 where eye tracking technology has been used.

I have extensively done this job so as to do justice to this fact that how advancements in technology which works actually took at to some other name, has been you know very well used. It has been well adapted in psychology.

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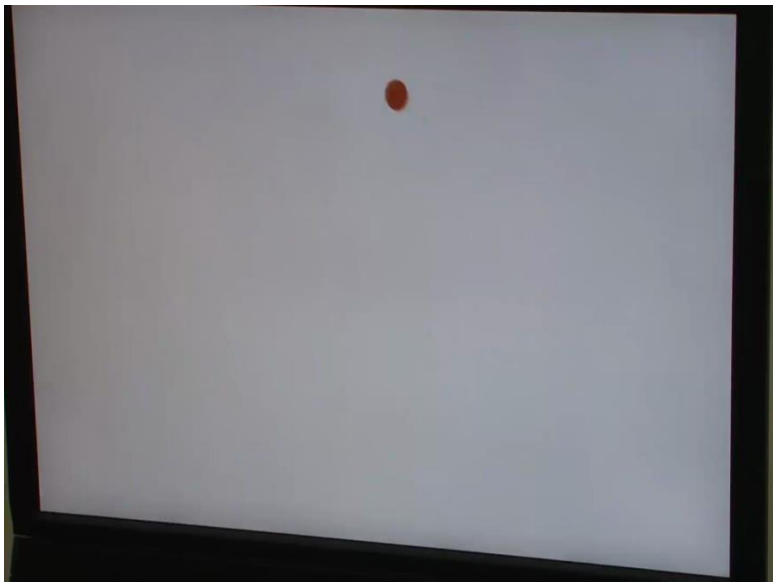

Let me take you to the psychology lab of IIT Kanpur you see the eye tracking machine here and right now what you see is the calibration being done so that, the focus of the participant can be recorded by the machine. And of course, you can see here how the individual's behavior is recorded by the eye tracking machine.

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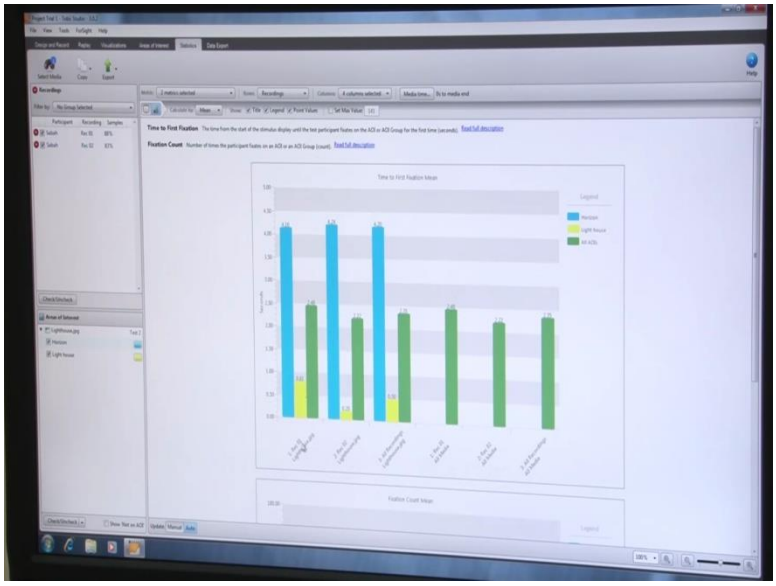

As you know psychologist would always look for the numbers therefore, there are methods of quantifying this gaze behavior and what you see on your screen now, is the quantification of this gaze behavior which has been recorded using the eye tracker.

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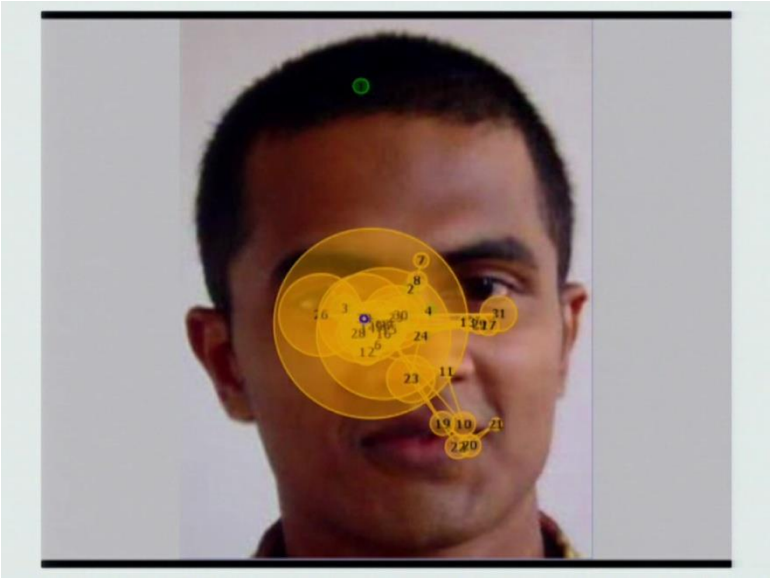

Look at this image on your screen now; this was know an experiment that I had performed couple of years back. And I was interested showing you that you can very easily plot the gaze movement when 1 tries to identify official expression. It has multiple usages of course, right from expression to different types of psychological disorders. 2 issues like deceit for forensic applications, there are there are lot many things that has to do with it.

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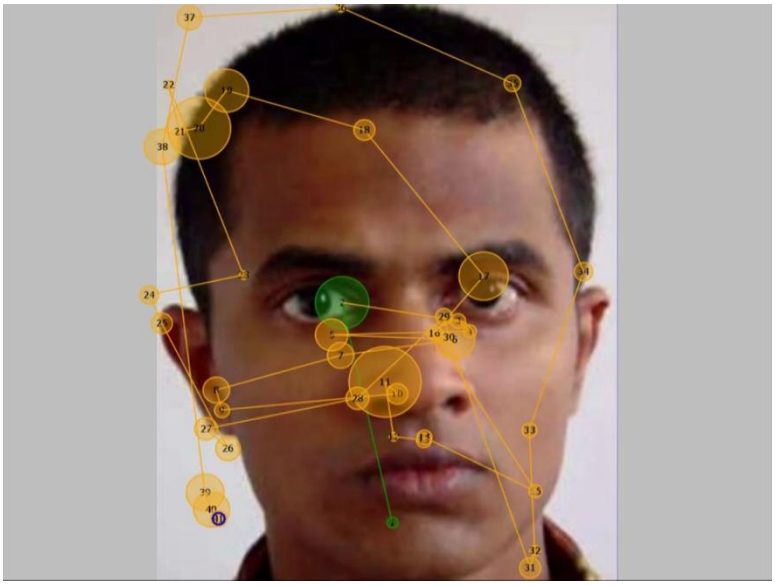

But just look at this scan path of a happy expression. You now see scan path for sad expression and now you see the scan path for fear as an expression on the face of the expresser.

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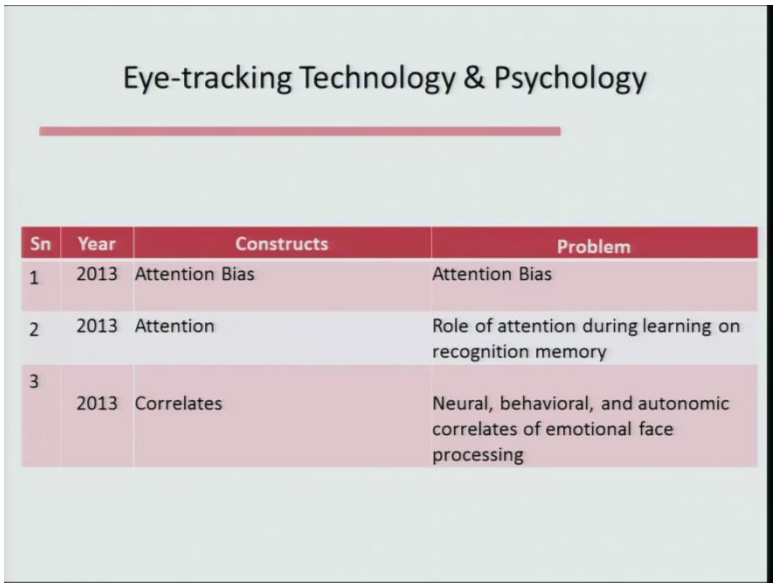

With this brief introduction to how eye tracker works, I basically come to the eye tracking technology and psychology. For this purpose I have no reviewed the publications that has come to journals in the last 5 years, when I say last 5 years this means 200 9 to April 2 013.

In 2013 till now when I am recording is start 3 paper have been published: 1 that has to do with attention bias; second, that has to do with attention and third 1 which primarily deals with the neural, behavioral and the autonomic correlates of facial processing. What I will do now is that 1 by 1 I will just briefly summarize know what was done by the researcher in this work that has been published. And on the bottom you can see the full reference, if you are interested going into the details of it you can of course, look at those papers.

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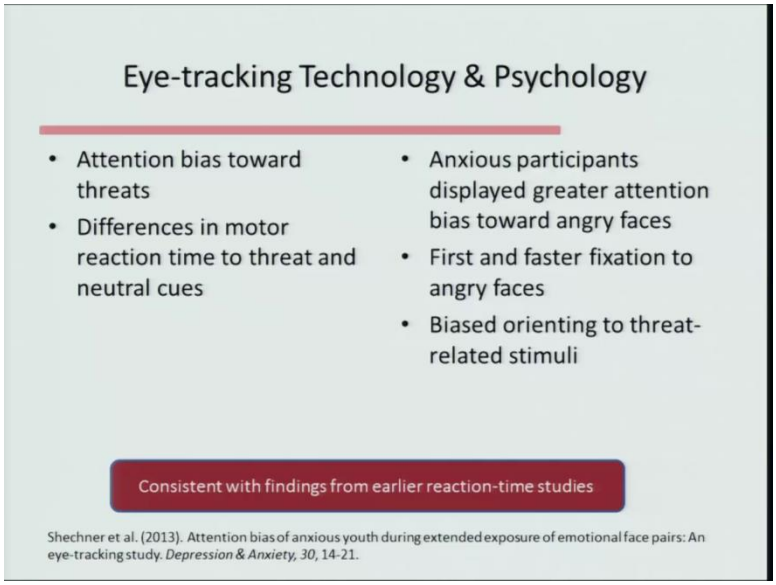

The first paper that was published in 2013 is by Shechner and his collogues, which talks about attention bias towards threats and primarily what he looks at is, the difference in the motor reaction time to threat and neutral cues. What he found was that anxious participants that displace greater attention bias towards angry faces. You remember the research in emotion thus say that anger is processed on priority evolutionary psychologists also talk about it.

Now that emotion processing when you look at their preferences and of course, the sensory getting concept if you attach it to it, then you realize that anger is an emotion is always processed know in priority compute rest of the emotions. Another interesting observation in this study was that the first and faster fixation is always to the angry faces.

This shows bias orientation towards the threat related stimuli what is important to note here is that this is actually consistent with the findings from earlier reaction time studies. So, before know eye tracking technology was being used in psychology there were studies like this but, with the advent of this technology you realize, that with precision you can actually know convey the findings of your study 1. 2, when you say that this was processed on priority you can calculate time in milliseconds. And 3, you can actually know plot the trajectory of scan; what is referred to as scan path.

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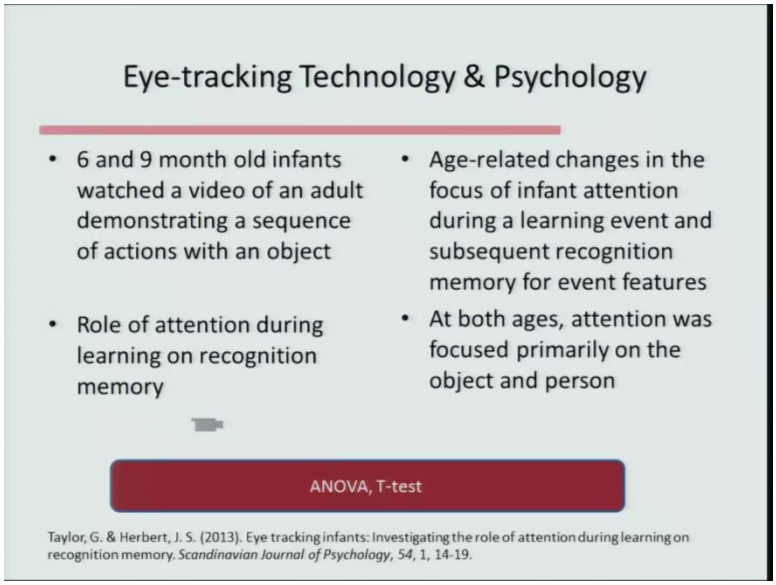

The second study, which was published this year, was by Taylor and Herbert. What they did was that they took 6 and 9 month old infants and they asked them to watch the video, of an adult demonstrating the sequence of actions with an object. And primarily, they were trying to examine was the role of attention during learning on recognition memory.

What they found was that the age related changes in the focus of infant attention during a learning event and of course, subsequent recognition memory for future events. And at both ages that is 6 and 9 months attention was focused primarily on the object and person. I must tell you that earlier studies know where also conducted on, how facial expression of the care giver especially, father and the mother and then of course, the other care givers. How new born babies or 6 month old baby they scan the facial expression of their parents. And there are interesting studies on this.

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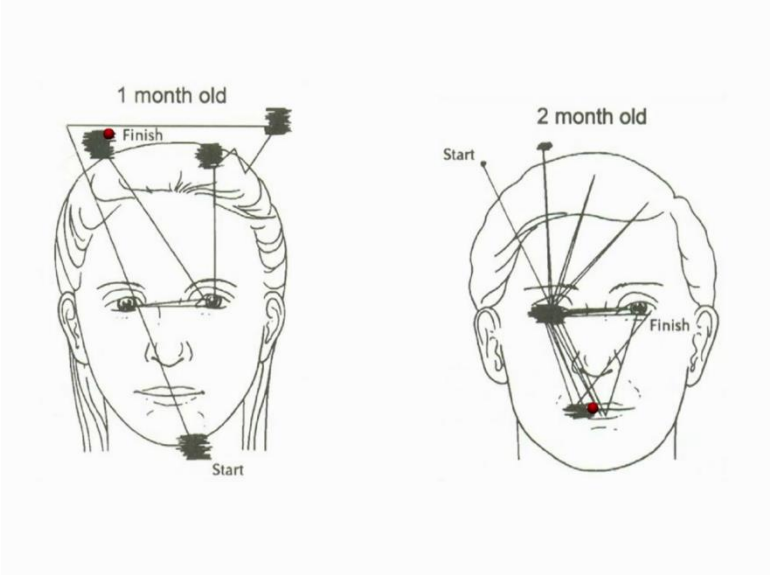

I have just know tried to show you this is not the exactly what was done by these researchers but, look at this animation which shows the eye movement of an infant. Now, what you interesting find here is that, eye tracking as a technology has been used.

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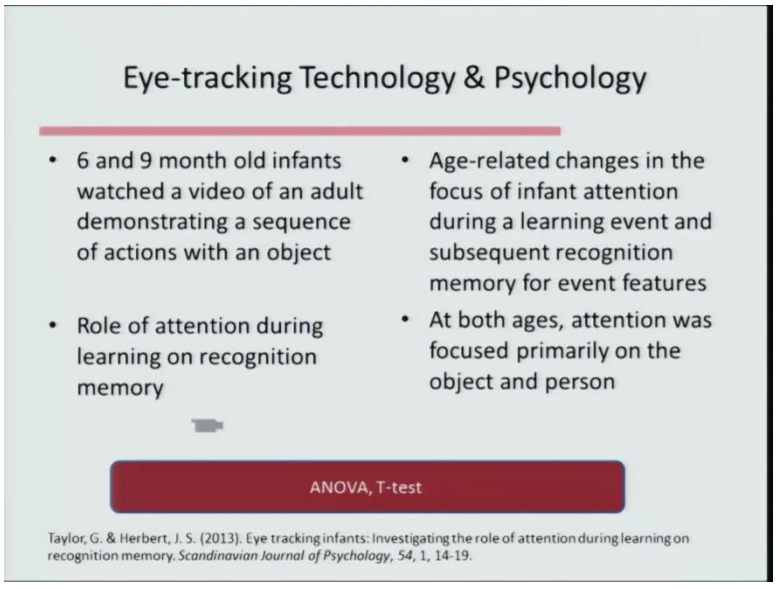

ANOVA and T-test has statistical techniques have been used. So, conventionally and of course, the problem lies no what has been usually the focus of attention by psychologist. So, problem statistical technique everything remains the same but, the new technology is being used.

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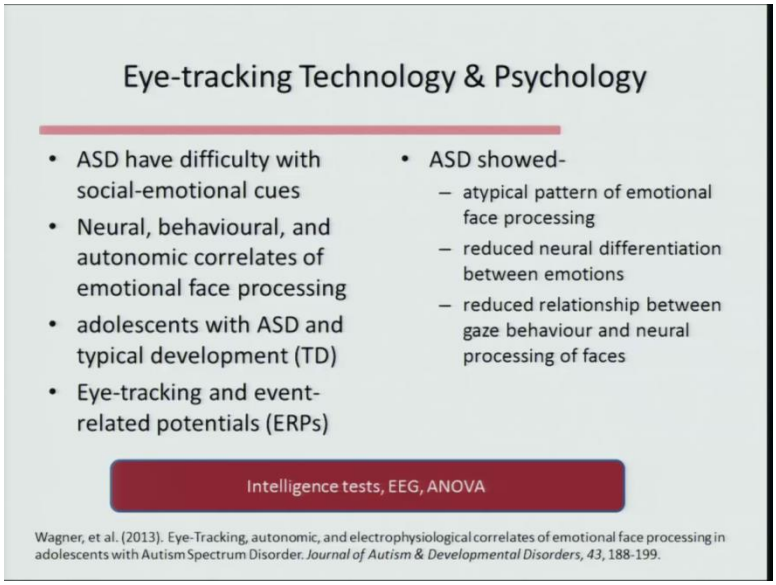

The third study are published this year was by Wagner and his associates. They have studied now autism spectrum disorder and they have tried to find out that these a s d's they have difficulty with social emotional cues ok. And then they have found that the a s d's, they show artificial pattern of emotional facial processing 1; 2, they have reduced neural adjective differentiation between emotions and third that reduction in the relationship between gaze behavior and neural processing of the face.

What is very interesting to note here in this study was, that you have intelligence test something which is very well known to all psychologists. Intelligence test has been used you also see that EEG has been used besides eye tracking technology and statistical technique analysis of variance has been used. So, that is an know interesting know mix of the existing tools and techniques and the modern technology.

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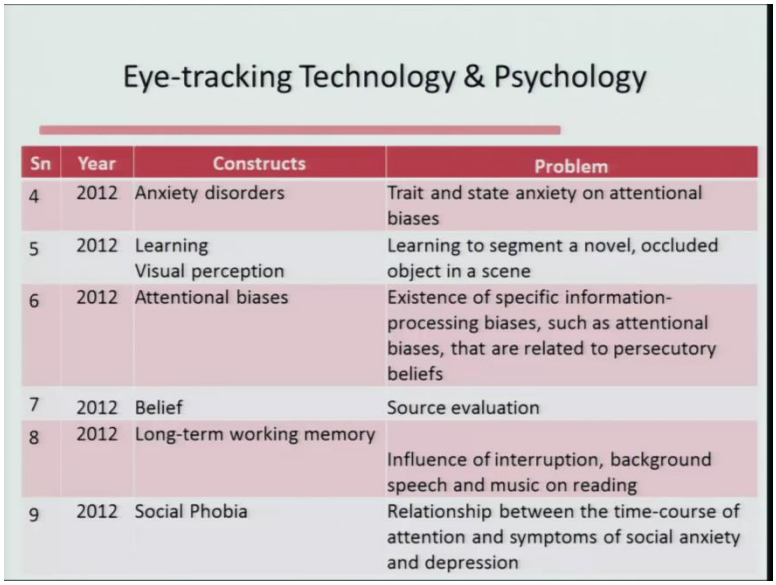

Last year, that is 2012, I found 6 papers were published in scientific journals where eye tracking technology has been used. The constructs that have been studied are anxiety disorders, learning visual perception, attention bias, belief, long term working memory and social phobia. And the problems are also very interesting first paper talks about trait and state anxiety on attentional bias. Second paper talks of learning to segment novel occluded objects in scene.

The third paper talks about existence of a specific information processing bias such as, attentional bias. The fourth paper talks about source evaluation the next paper talks about influence of interruption background speech and music on reading. And the last paper talks about the relationship between time course of attention and symptoms of social anxiety and depression. So, whole wide range of know topics have been taken into account.

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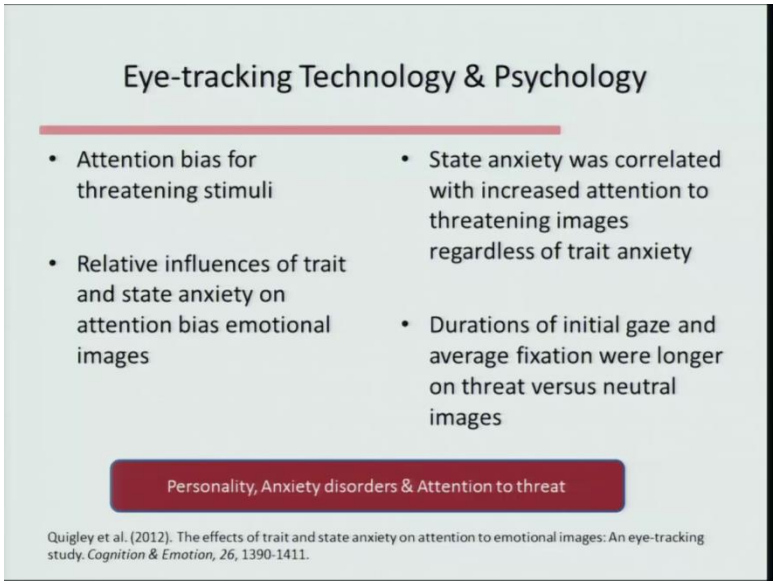

Now in 2012, the first paper added I am referring to here is by Quigley and his associates which talks about attention bias for threatening stimuli. And here the relative influence is of threat and state anxiety on attentional bias a pertaining to emotional images has been studied. What Quigley and his associates found was that its state anxiety was correlated with increased attention to threatening images regardless of the threat anxiety of the participant.

And importantly the duration of the initial gaze and the average fixation were always longer on threat stimuli compared to the neutral images. What you interestingly find here is that personality has been used as a construct you find anxiety disorder which has been for gain of prime importance and significance to psychologist and attention to treat. All 3 constructs are older constructs.

They have been thoroughly examined in psychological literature but, then you find a these constructs are revisited using eye tracking technology.

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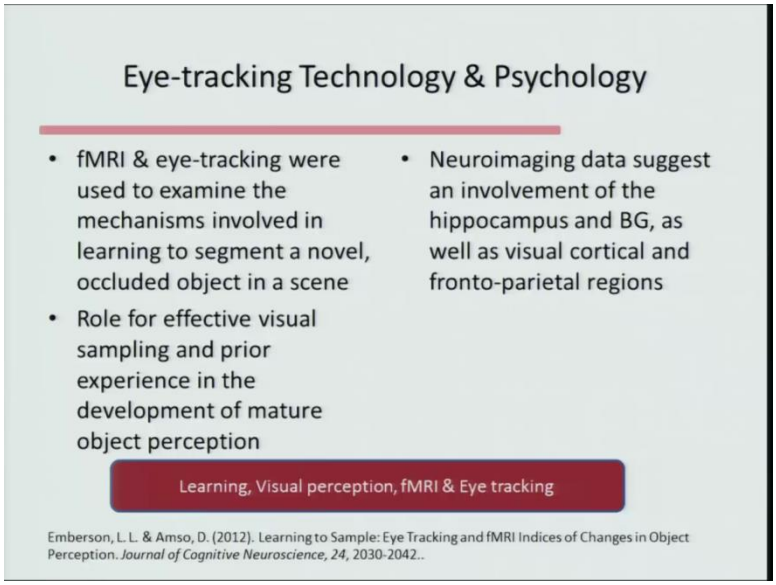

The second paper that has been published in 2012, that was by Emberson and Amso. And what they did was that they combined both: the functional magnetic results immerging and eye tracing technique. And they used it to examine the mechanism that is involved in learning to segment novel occluded object in a scene. They were trying to understand the role of effective visual sampling and prior experience in the development of mature object perception. Now, object perception pattern recognition these are known well researched areas in psychology. But, then you find 2 of the cutting its technology being used by researcher what did they find.

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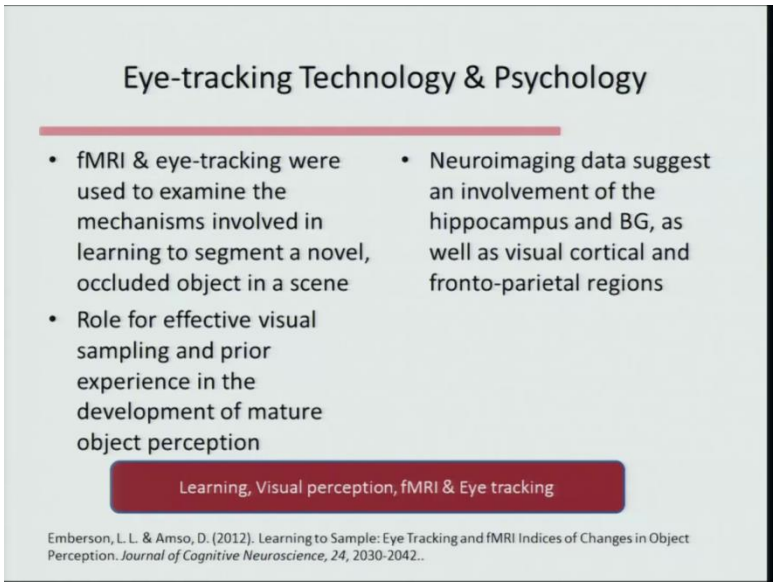

Now there neuroimaging data suggested and involvement of the hippocampus and Basal ganglia, as well as the visual cortex and fronto-parietal regions of the brain. So, the psychological constructs you find learning visual perception, technology you find functional magnetic resonance imaging and eye tracking being used in this research. So, perfect combination, by this time the modern technology, the existing constructs psychology and the relevant problems.

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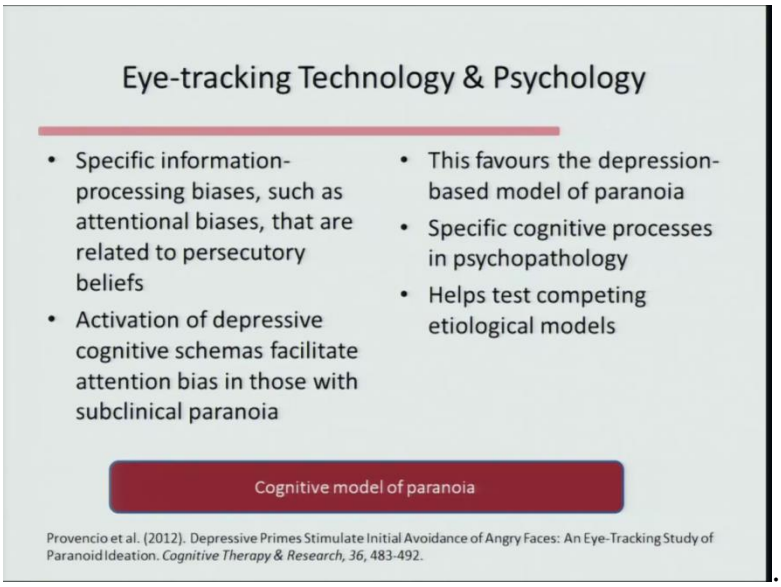

Third paper that was published in 2012, was by Provencio and his associates who worked on a specific information processing bias such as attentional bias, that has to do with the persecutory belief. Now, people studying pathological behavior, people studying paranoia, they have been know using this constructs since I do not know how long where, the whole idea of persecutory belief has been studied.

In this case, the activation of depressive cognitive schema was examined because, it is considered that they facilitate attention bias in those belong to the subclinical paranoia domain. Now this favors the depression based model of paranoia. Clinically studies on paranoia, clinical studies on depression and especially the subclinical paranoia you combine the cognitive process in psychopathology.

But, then using eye tracking technology what you succeed doing is that you are trying to examine or revisit the ethological model of paranoia or the persecutory belief. So, it is a fantastic combination of the recent technology that is being used to know revisit the

oldest 1 of the oldest existing constructs in psychology in psychopathology. And then also redefining psychopathology, in terms of cognitive processes and also verifying the ethological model of paranoia.

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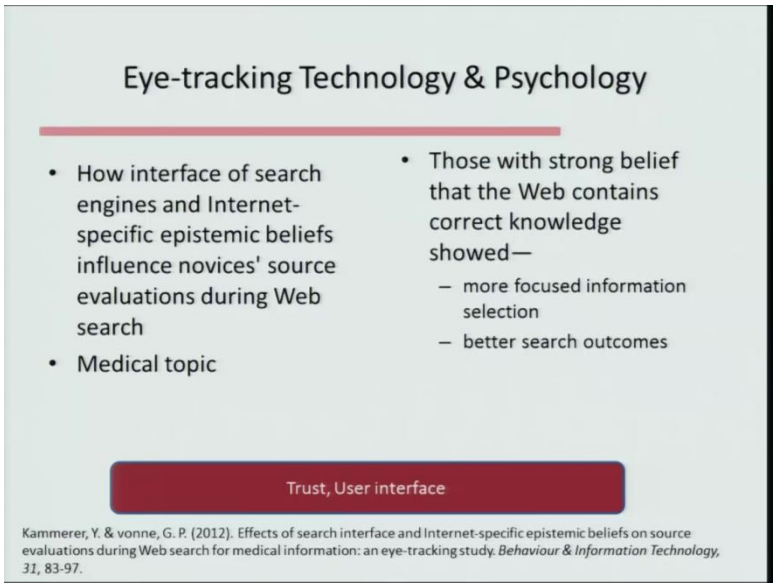

The other paper that was published last year that is in 2012 was by Kemmerer and Vonne. And they were primarily interested finding out that how interface of search engines. And the internet specific epistemic belief they influence the novices source evaluation in the web search process. What he did was basically he took medical topics and when we search using 1 or the other search engines.

Now it is it is very common practice how do you trust, the what you called the appropriateness of or how do you consider that, the information that is given on a particular website is really valid information. So, they were trying to do this so it was basically the trust factor, it had to do with the web content, it had to do with the medical search process. But, very interestingly it also has to do with user interface and those who are in design, those who are into psychology design, those who are into user experience design and those who are into human computer interaction. They really know admire this very process of learning the users experience know or what is called as user interface.

Now, what they found was that those who had strong belief that the web content correctly know showed the knowledge. They were more focused know on the

information selection and they also realized that the it has some betterment effect on the outcomes.

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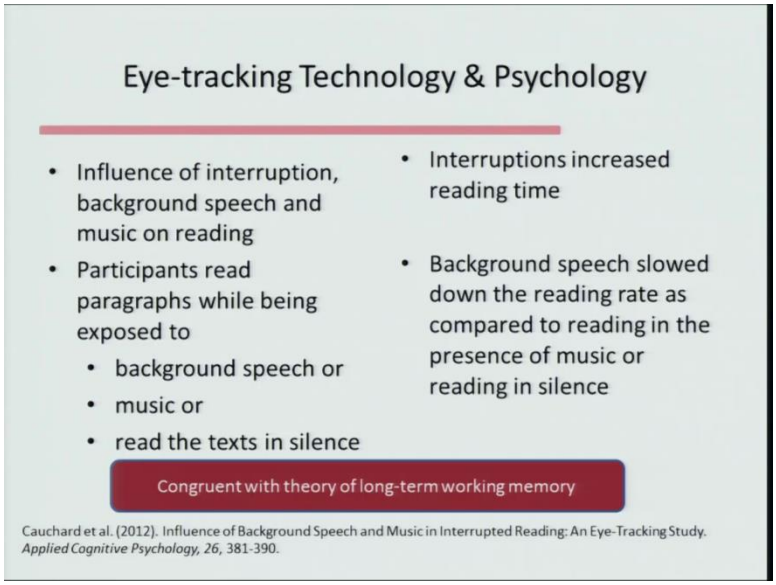

Cauchard and his associates know they published another paper in 2012, where they tried to find out the influence of interruption background speech and music on reading. I remember my own days not only my young student days but, even now at many occasions when I work on certain thing, I do play some light music in the background. And that basically, now helps me get read of this monotony effect. It also reduces the mental fatigue this is a subjective experience.

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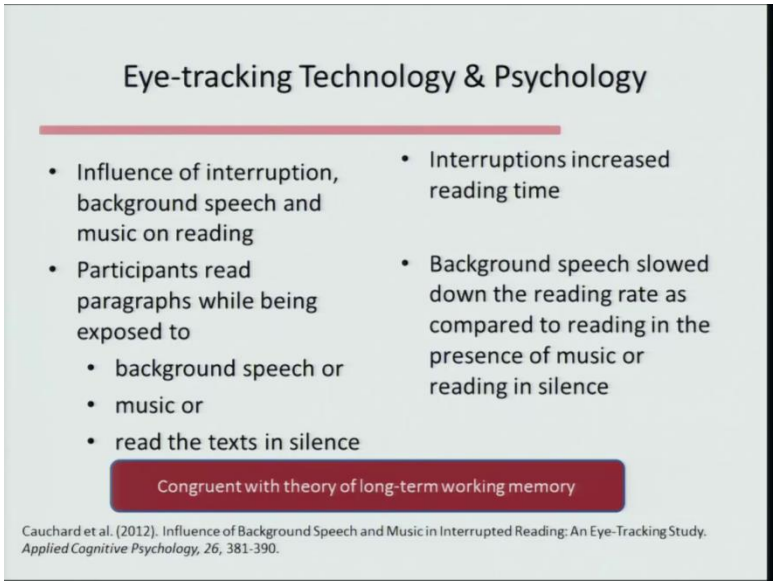

Now, here the researchers what they did was they were trying to see if the interruptions, the background speech and if you play music in the background what type of impact it has on reading. So the participants were asked to read paragraphs while they were exposed either to background speech or to music or they were supposed to read the text in complete silence. What did they define?

They found that interruptions increase reading time very obvious but, what they also found was that the background speech slow down the reading rate as compared to the reading in the presence of music or reading in silence. Now, this is actually congruent with the theory of long term working memory. Long term memory, long term working memory both have been know of interest to psychologist. In the neuropsychological section you did here Professor Vivek when you are talking about heart and the brain.

Of course, the focus was very little on music and the processing of the brain and how other cognitive domains get facilitated when you have music in the background. But, in this study you find using eye tracking technology the researchers claim how background music can know become a facilitator of a psychological phenomena.

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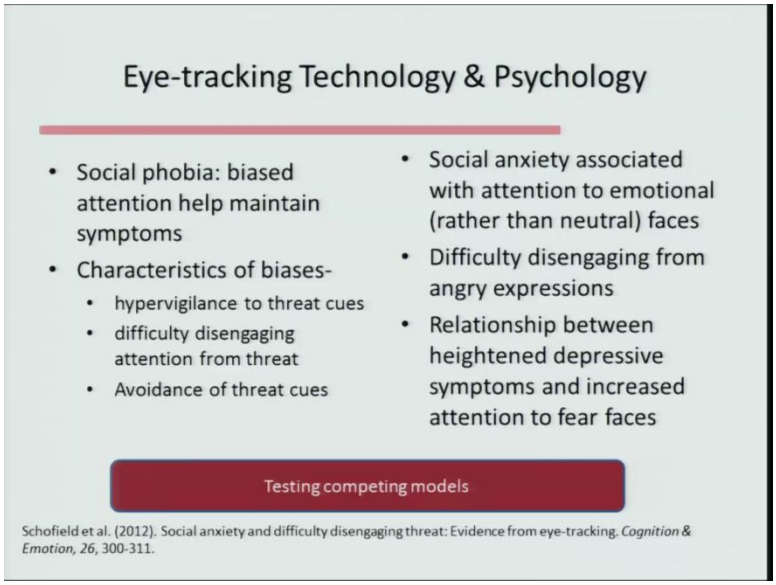

Another paper that was published last year that is 2012 was by schofield and his associates they studied social phobia and they were trying to look at the bias in the attention. Whether they help in maintaining the symptoms of social phobia or not now the characteristics of these biases include hyper vigilance to some threatening cues difficulty disengaging attention from threat and of course, the avoidance of that threat cues. What they found was that social anxiety associated with attention to emotional faces rather than the neutral once.

There was difficulty disengaging from angry expressions you remember 1 of the papers we have right now discussed know where on priority angry expressions were know analyzed. And they also found a relationship between the height and depressive symptom and the increased attention to the fear faces. Now this very work besides know adding to social phobia research, it also know helps us understand the know what you call experimentally testing the computing models that tried to describe the phenomena of social phobia. So that is another interesting way.

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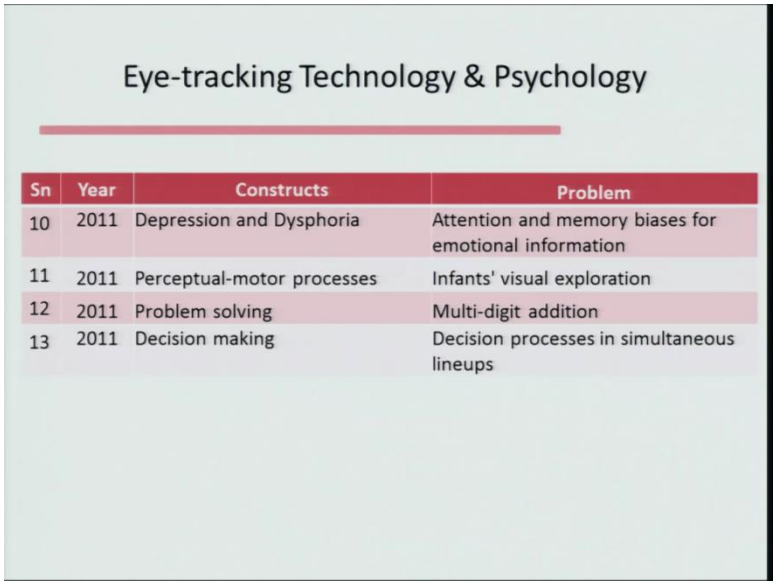

In 2011, 4 papers were published and the primary constructs that work no examined in those papers were depression, perceptual motor processes problem solving and decision making.

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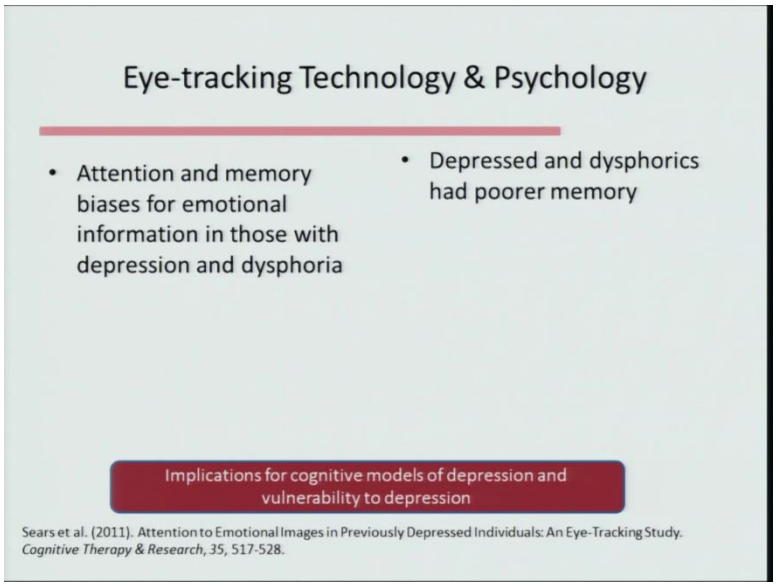

In 2011, first paper that I am referring to is by sears and his associates who tried to examine attention and memory bias for emotional information in people suffering from depression and dysphoria. And they found that people who suffer from these 2 they also have poor memory. Now, besides this very finding this experimental this very paper the findings of this very paper has implication for the cognitive model of depression and they also talked about the vulnerability of depression.

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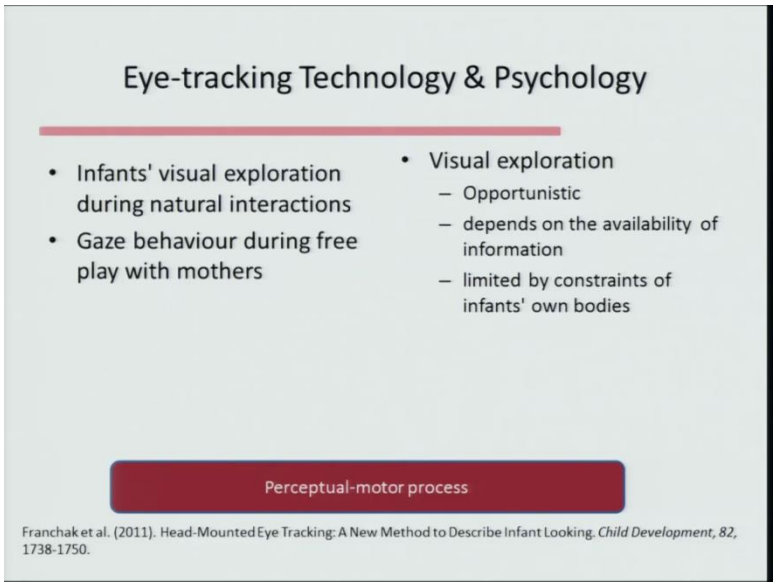

Franchak and his colleagues they have now published another paper in 2011, where they talked about infant's visual exploration during natural interaction. So, basically when children they freely play with their mother how do they look at, where do they look at? So, gaze behavior during free play with the mothers very interestingly the findings work that these children, these infants they actually explore.

So, their visual exploration has 3 interesting thing: 1 opportunistic exploration; 2 that they depend on the availability of information and 3 that they are limited by constraints of their own bodies. So in terms of looking at infant's perceptual motor behavior and of course, the visual gaze pattern this is an interesting study that way.

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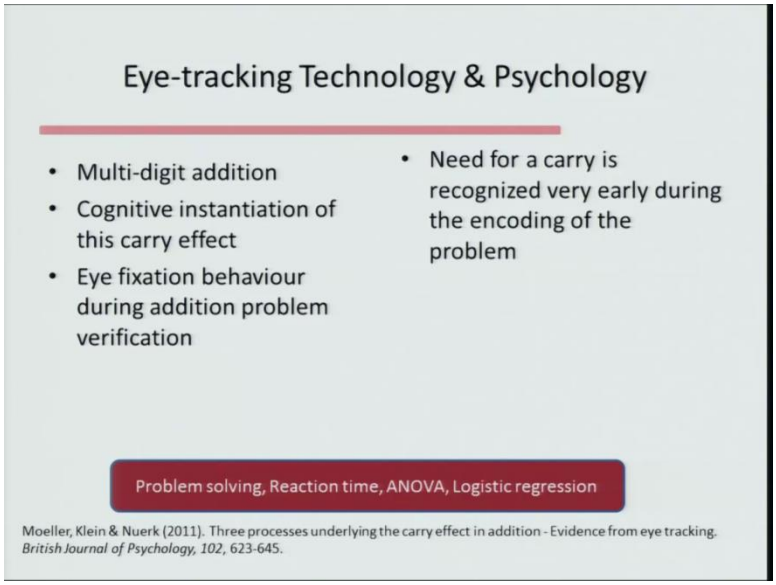

Another interesting study by Moeller Klein and Nuerk was on the multi digit addition task. Which talks about basically problem solving and of course, they have taken reaction time is measured. But, here they talk about the multi digit addition and they are looking at the cognitive instantiation of the carry effect. So, when you have to add and you have a carryover no when which you take to the next 1.

So how eye fixation behavior works during the verification of an additional problem? And they found that there is a need for a carry that is actually recognized very early during the encoding of the problem itself. So, in terms of understanding how 1 solves numerical problem, in terms of understanding how 1 performs complex addition where 1 has to carry.

So, numbers say 2 digit or more than 2 digit addition where you have a carryover effect. It was now found at encoding actually is a stage where know this thing the neat for carryover is realized. Besides and now talking about problem solving and of course, reaction time, what you interestingly find is also the application of techniques such as analysis of variants and logistic regression in this study.

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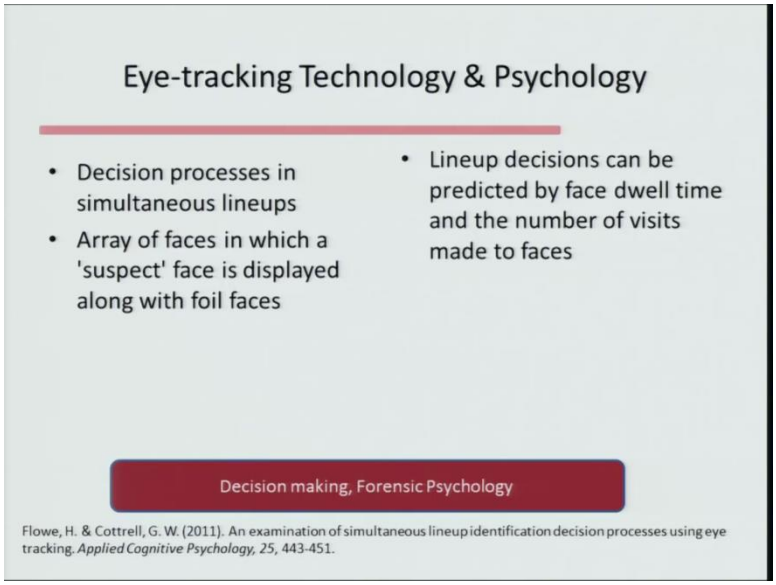

Another studied it was published in 2011 was by Flowe and Cottrell. They were working on decision making process in simultaneous lineups. So you have an array of faces of a suspect and then basically you have to know find out at the suspect who is along with or over face is represented a long with the foil faces. Now, this besides we are now being of importance for decision making this also has to this also has extreme forensic relevance.

Because, you identify a suspect or missed a set of neutral people, people who are not in world in the crimes. Now they found at the lineup decisions can be predicted by face dwell time and the number of visits made on the face. Now, there are situations in real forensic examinations where, either the police officer asks you to do that or you are asked to identify the person in the court of the law.

Where you have a suspect and you have others who resemble to the individual they are supposed to very similar type of close and stuffs like this and then you are supposed to identify the suspect. Now, there are cases know where people revote their decisions in the court of law although they had said something else before the police officer in the court of law they reverse the decision. Now, studies like this which actually tells you that how times you visit the face of the suspect, can actually know actors as predicted is an interesting finding from that point of view.

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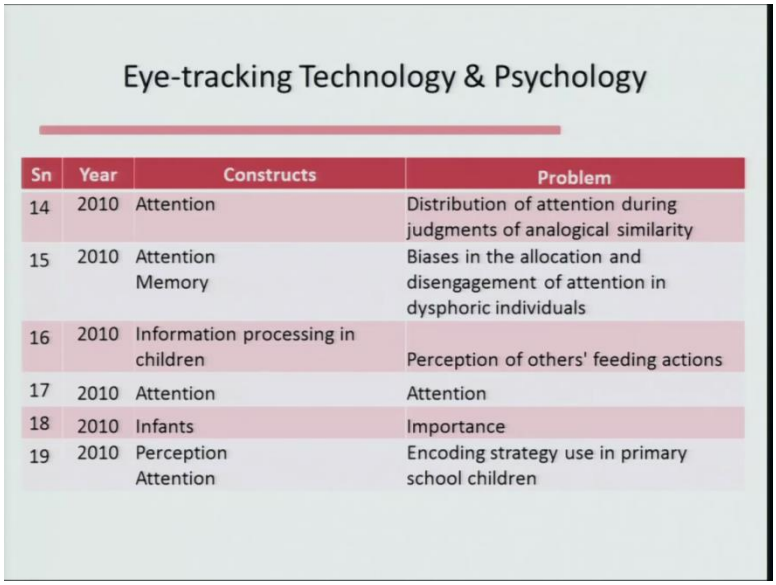

Now, I come to 2010 and you find 6 papers were eye tracking technology has been used and the constructs primarily studied over attention, memory, information processing in children and perceptual processes.

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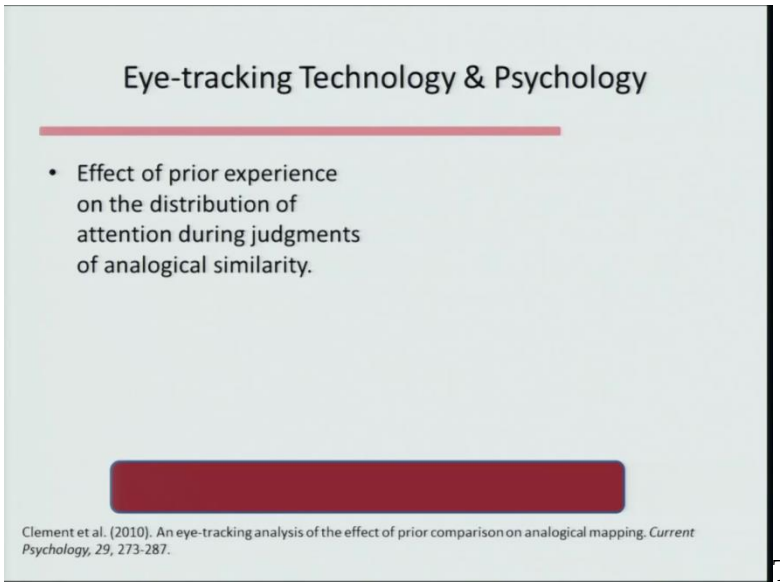

The first study that I am taking from 2010 is by Clement and his associates who studied the effect of prior experience on the distribution of attention during judgment of analogical similarity.

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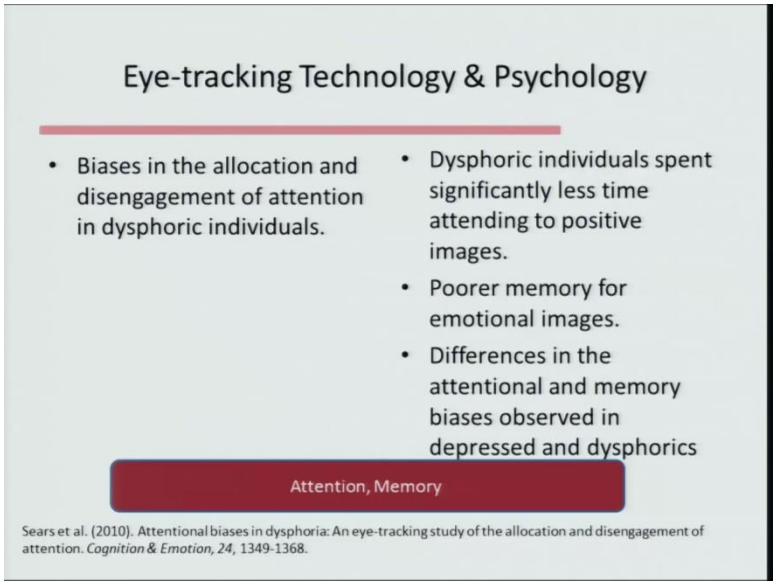

Second paper that was published was by Sears and his colleagues who worked on the biasing allocation and disengagement of attention in dysphoric individuals. What they found was that the dysphoric individuals they spent significantly less time on positive images that was 1. They also found poorer memory for emotional images. And they found difference in the attention and the memory bias that is seen in people who are depressed verses those, who have dysphoria.

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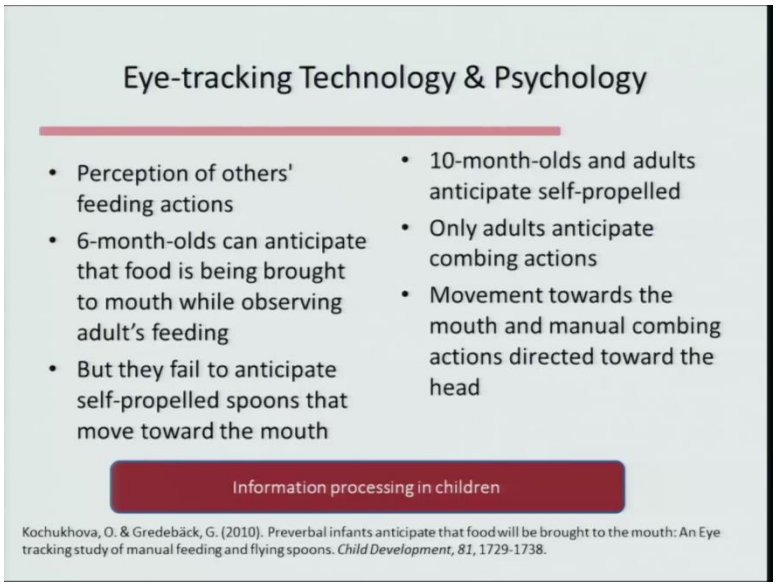

Another studied that was published in 2010 worked on the perception of others feeding actions. So, when adults they feed infant how the babies they perceive the feeding action of those adults. So, once again the study has now focused on 6 month old infants. And

what was found was that these infants can anticipate that food is being brought to their mouth, when they look at the adults. But, then they it was found that they fail these infants they fail to anticipate self propelled spoons that move towards the mouth.

So, you need actually you know an adult to move the spoon to the to the mouth of their infants to make them realize that they are actually going to be fed; whereas, in the absence of an adult figure, they do not realize so. They also found that the 10 month old babies and the adults they can very easily know anticipate the self propelled spoons. And of course, adults can anticipate the combining actions also but, this interesting study actually talks about information processing in children.

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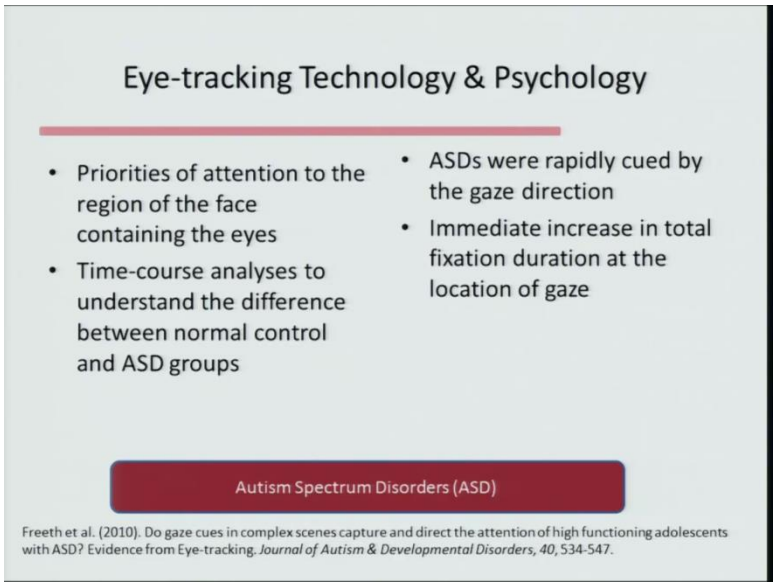

Now, another study that was published in 2010 was once again on ASD the autism spectrum disorder by Freeth and his colleagues were talked about priorities of attention to the region of the face that contains the eyes. You know that aged people they usually avoid maintaining eye contacts.

So, the time course analyses to was performed to understand the difference between normal control and those with autism spectrum disorder. And it was found that the ASD's where rapidly cued by the gaze direction and there was an immediate increase in total fixation duration at the location of the gaze.

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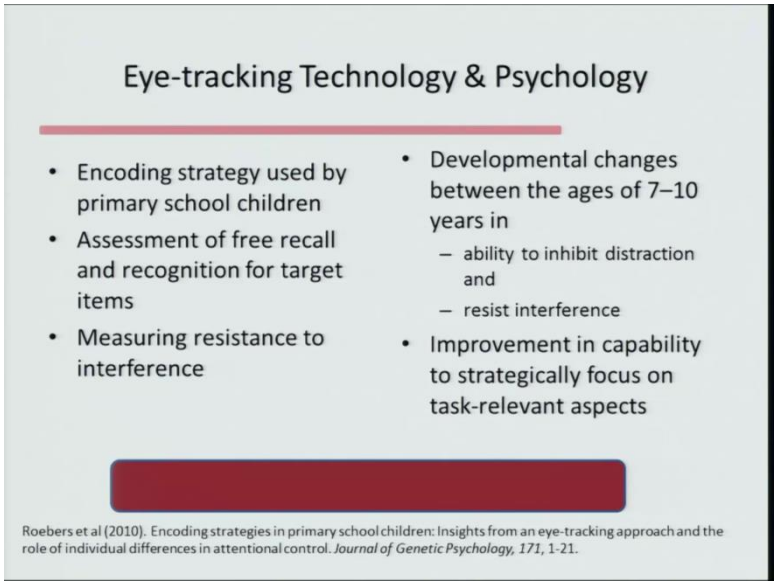

In 2010, another study was published by Roebers and his associates of who worked on the encoding strategies used by primary school children and once again they had used the free recall technique.

So this was basically assessment of free recall and recognition for target items and they have measured resistance to interference by these primary school children. The findings of this study talks about the developmental changes between the ages of 7 to 10 years especially, in terms of ability to inhibit distraction and to resist interference. So, primarily we talked about improvement in the capacity to strategically focus on task relevant aspects in the case of primary school children.

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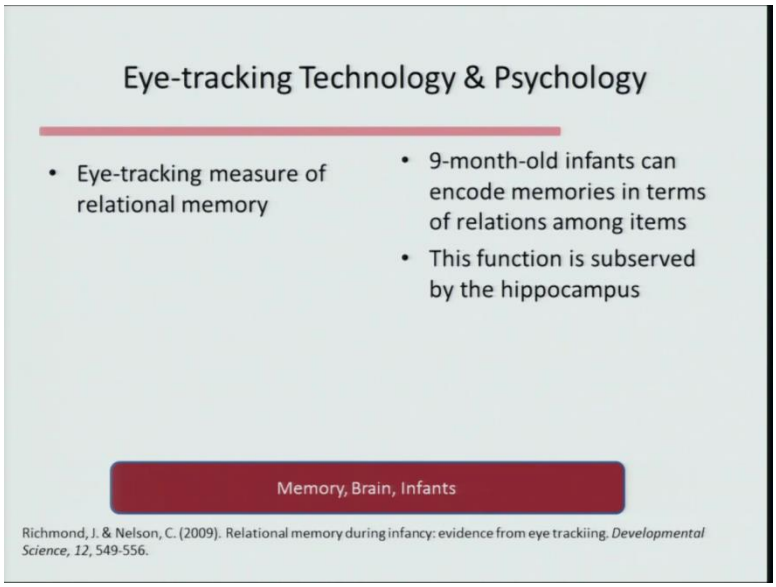

Only 1 studied that I found published in the year 2009 was by Richmond and Nelson, who had worked on memory. So basically, they had used eye tracking measures and tried to look at it look at it from the relational memory point of view they had also worked on infants the 9 month old infant.

They were found to encode memory in terms of their relationship among the items know and this function actually is sub served by the hippocampus. So, something that is remarkable here is that you find at couple of these studies focusing on infants. That group of human population which otherwise is very difficult to be examined. That, it is very difficult to make them know participate in an experiment and to precisely know come forward with the finding. You find that know eye tracking technology as an intervention has really helped psychology in big way.

What you also find is note that clinical population has also been examined and of course, know several perceptual motor and other psychological functions have also be examined.

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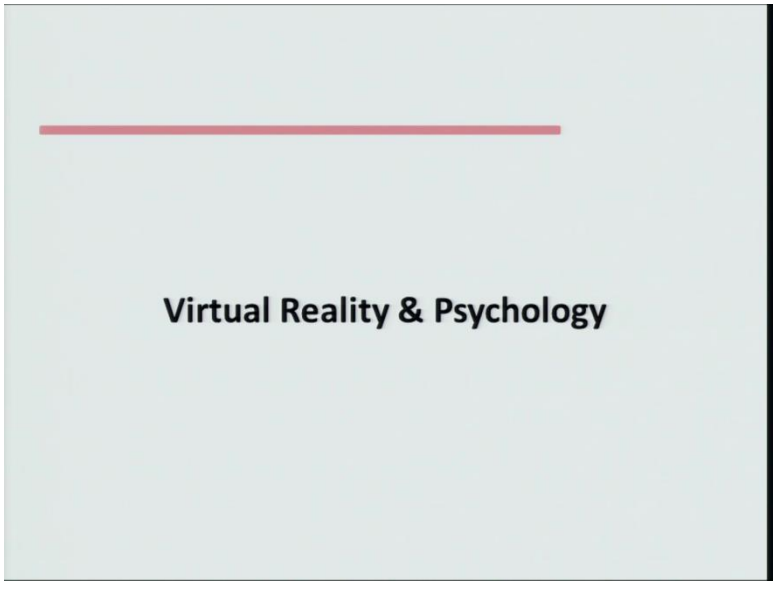

Now, it is time for me to focus on how virtual reality as a technology has been used in psychology. Unfortunately, we do not have the virtual reality facility with us and to the best of my knowledge, this country as of now virtual reality facility is not available. But, what I will do that I will try to show you how actually the stimulus looks like. If 1 uses know the head mount the visual that is used in visual reality research.

Look at this building this is the new core lab of IIT Kanpur and if I walk know from the main entrance towards the car doors reaching the psychology lab. If you use the head mounted virtual reality this is how it would look like.

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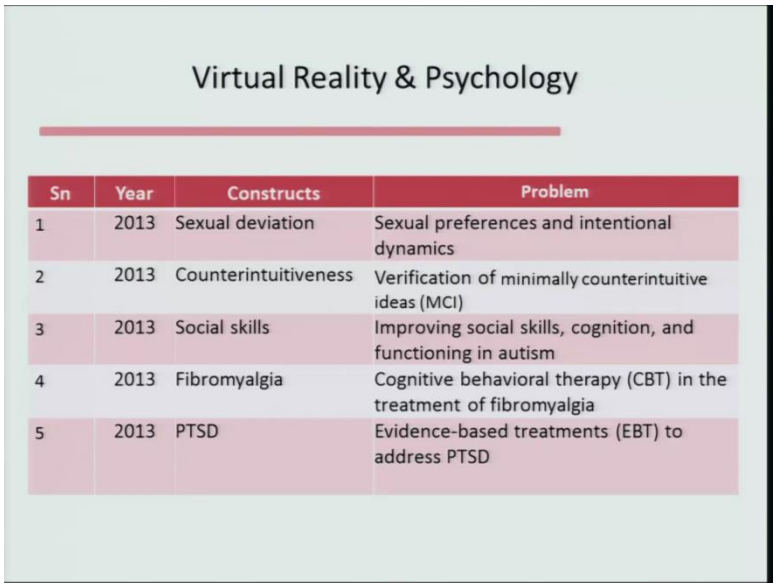

Interestingly, in 2013 5 papers have been published were virtual reality has been used as a technique. And here the constructs have been studied such as sexual deviation, such as counter intuitiveness, social skills. fibromyalgia and posttraumatic stress disorder.

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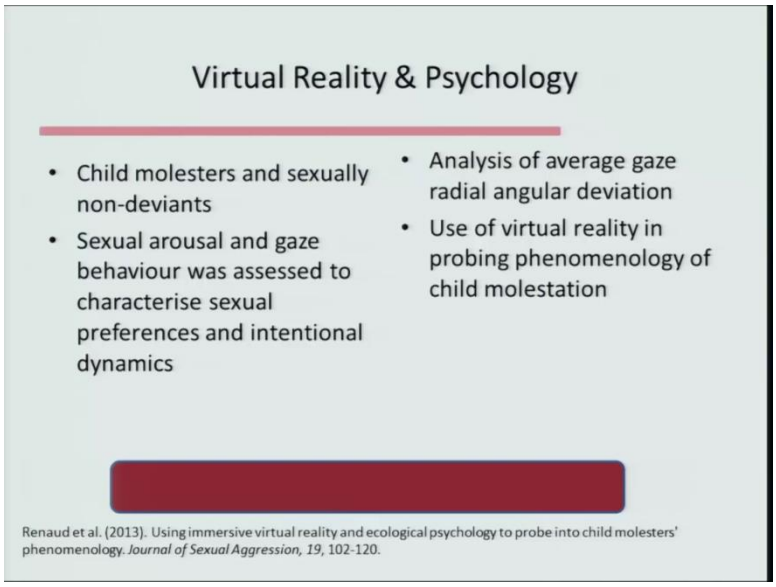

The first studied that I am coating here that are that was published this year was by Renaud and his associates who examined the child molesters and sexually non deviant people. Now, sexual arousal and gaze behavior was assessed to characterize sexual preferences and intentional dynamics. So, you find a that gaze behavior which is actually an outcome of the eye tracking and virtual reality which is yet another technology is being used. And then what they found was that the analysis of average gaze radial angular deviation can be used to identify people, who could be you know molesters.

So once again the findings of this study if they are validated by others also could be of great help to the law enforcement agencies. And this also shows the use of virtual reality in probing the phenomenology of child molestation. So, both it has clinical application it has forensic application.

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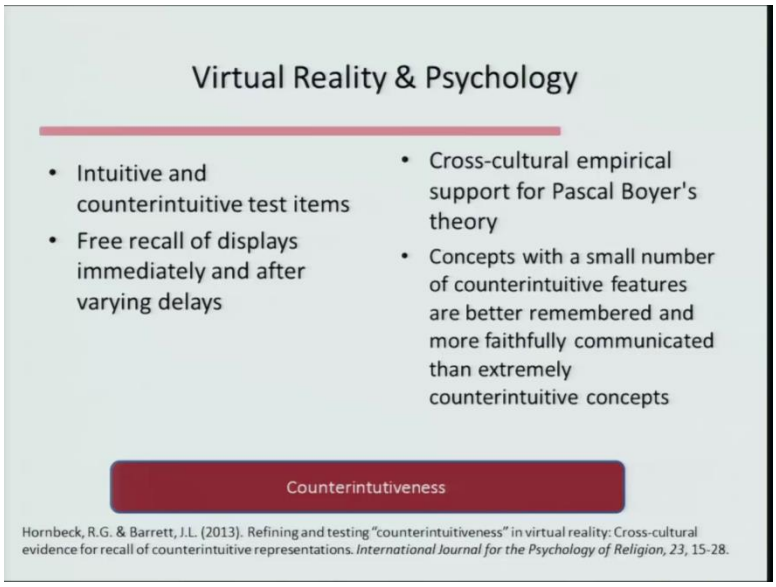

Another study that was published this year was by Hornbeck and Barrett. And they actually examined the intuitive when counterintuitive test items the free recall of display is now and how immediately and after certain delays how this things work. Basically, they were found a cross cultural support for Pascal Boyer's theory.

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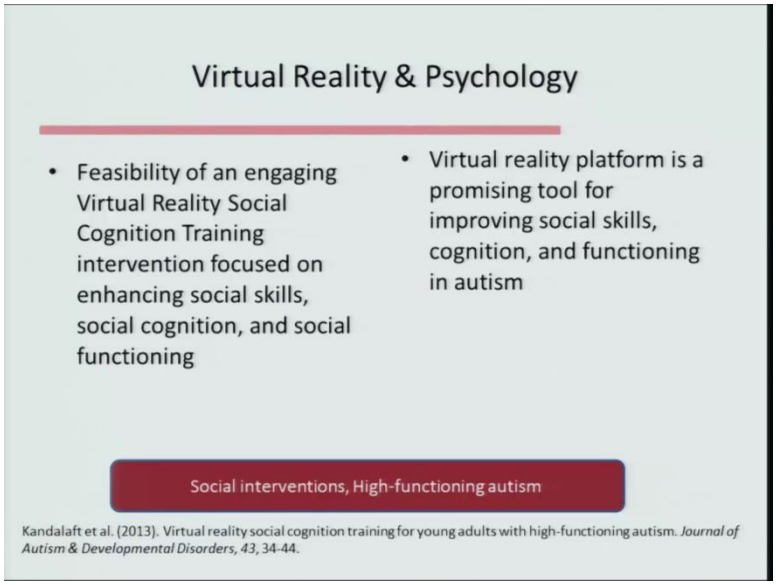

The third study that was published this year was by Kandalaft and his associates. Who talked about the feasibility of an engaging virtual reality social cognition training intervention which was primarily focused on enhancement of social skill social cognition and social functioning. And here virtual reality platform has been used as a promising tool that can improve all this 3 interestingly in artistic children. So, that is an interesting thing you find her eye functioning autism, group and you also find social interventions.

Both of these things have been of prime interest to people in clinical domain of psychology. But, here you find virtual reality being used to understand and explain certain phenomena's.

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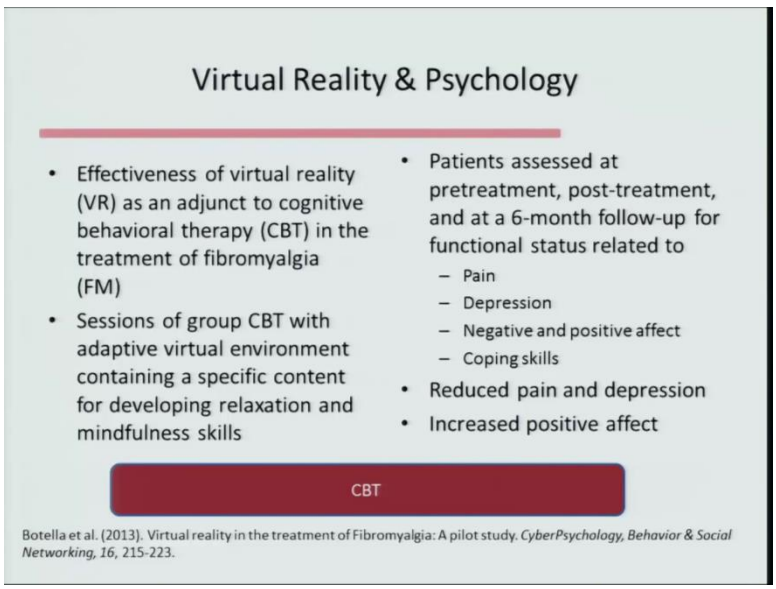

This year itself the third paper it was published was by Botella and his associates would talks about the effectiveness of virtual reality as an adjunct to cognitive behavior therapy. Now, cognitive behavior therapy is well known therapeutic technique to psychologists.

But then, virtual reality and c b t this being now put together is an interesting construct. Now, the sessions of group CBT with adoptive virtual environment that contained a specific content for developing relaxation and mindfulness skill was used here. The patients were assessed at pretreatment post treatment and of course, after 6 months follow up. With respect to pain depression, negative and positive affect and coping skills.

What was found was that reduction in the pain and depression was there and also there was an increase in the positive affect. So, usually know this would look very interesting very fascinating to people working in the clinical domain to see how virtual reality can be used as a technology.

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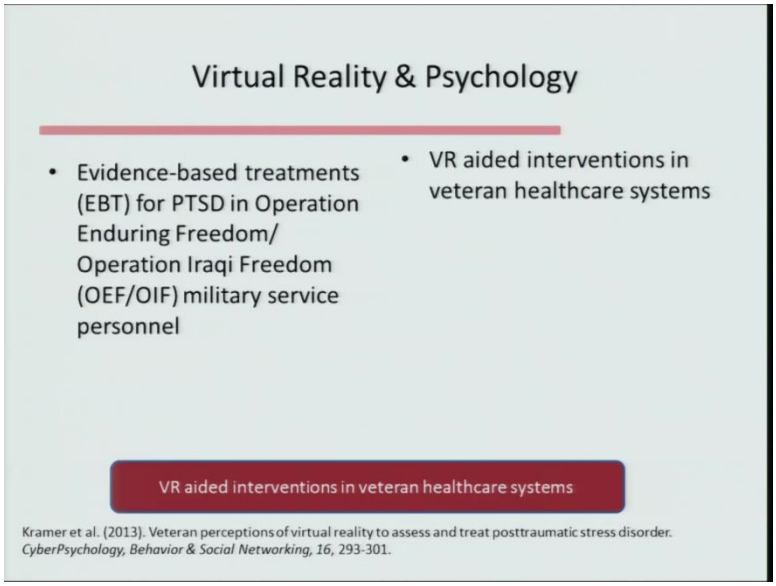

Another study published this year itself is by Kramer by its associates who talks about evidence based treatment for PTSD. And remember the group that he has studied is basically the military service personnel, who participated in operation iraq freedom. Here, a virtual reality has been used as an 8 for intervention in the veteran health care system. So, how psychological care, how mental health issues how psychopathology and how virtual reality can be now put together under this same umbrella; that is an interesting demonstration.

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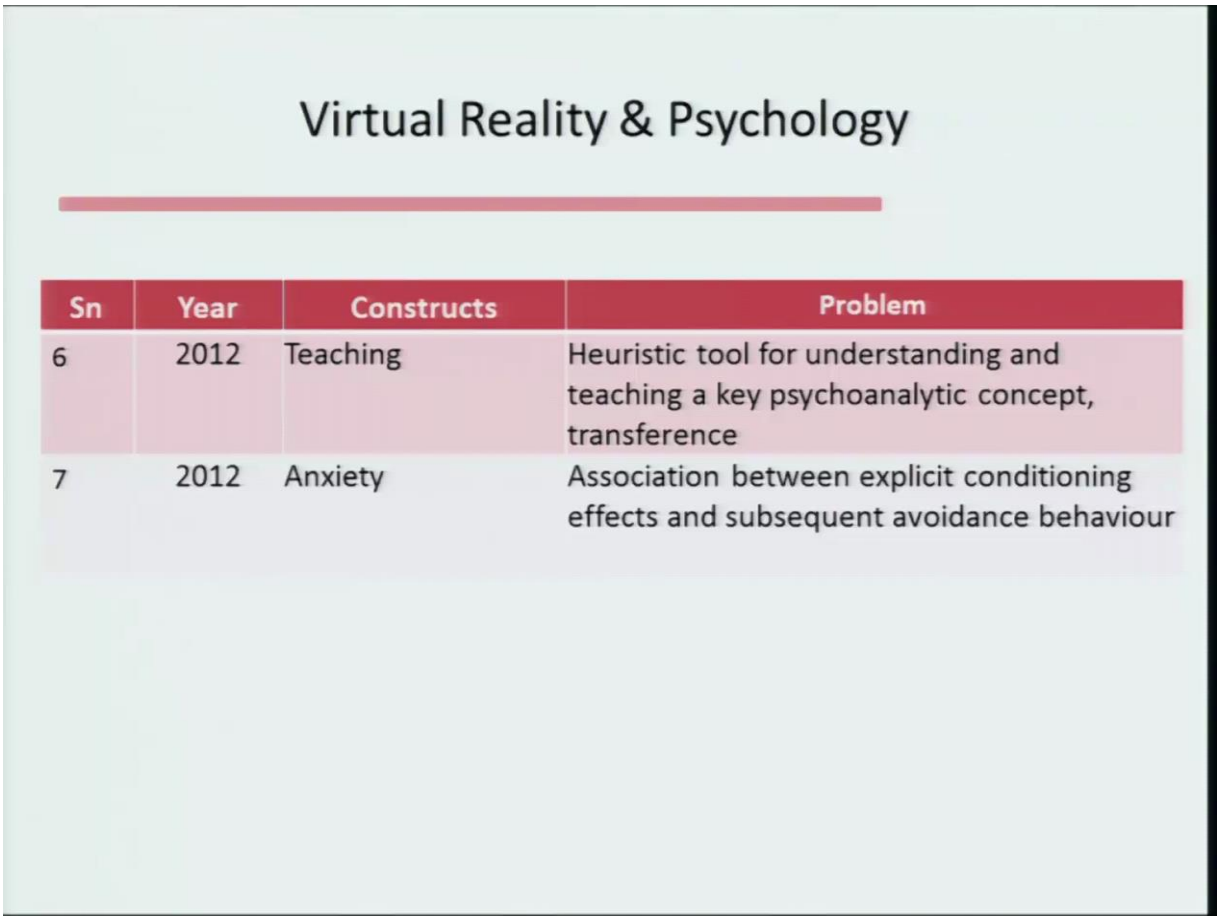

Last year, that is 2012 2 papers were published were virtual reality has been used. 1, where the heuristic tool for understanding and teaching key concept in psychology, what that is transference. That was examined and the other paper where anxiety has been studied which talks about, association between explicit conditioning effect and subsequent avoidance behavior by human subjects.

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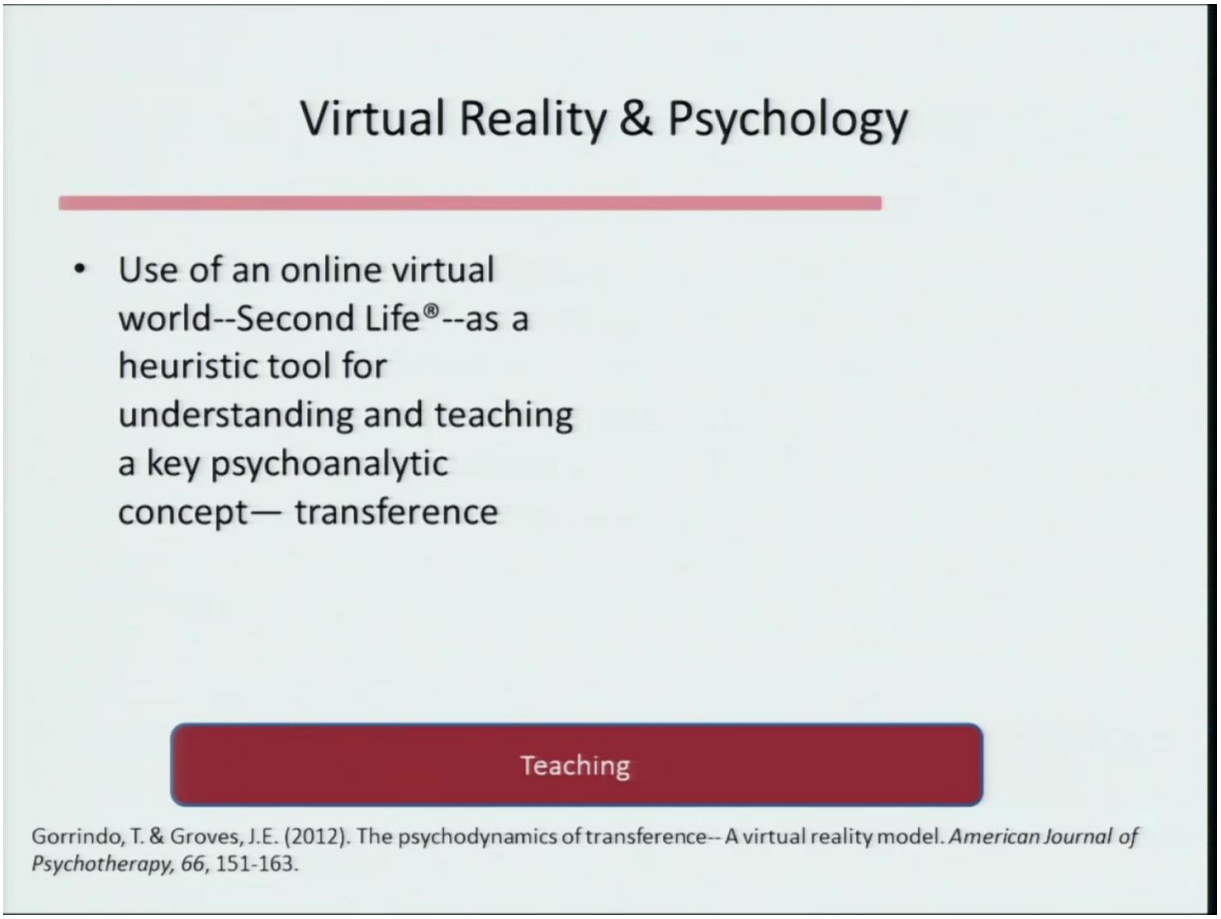

2012, the first paper that was published was by Gorrindo and Groves, who talked about the use of an online virtual world that is second life; most of you must be aware of it. How that can be used as heuristic tool to make people understand that key concept of psychoanalysis that is, transference. So, that is an interesting thing how virtual reality can be used for that.

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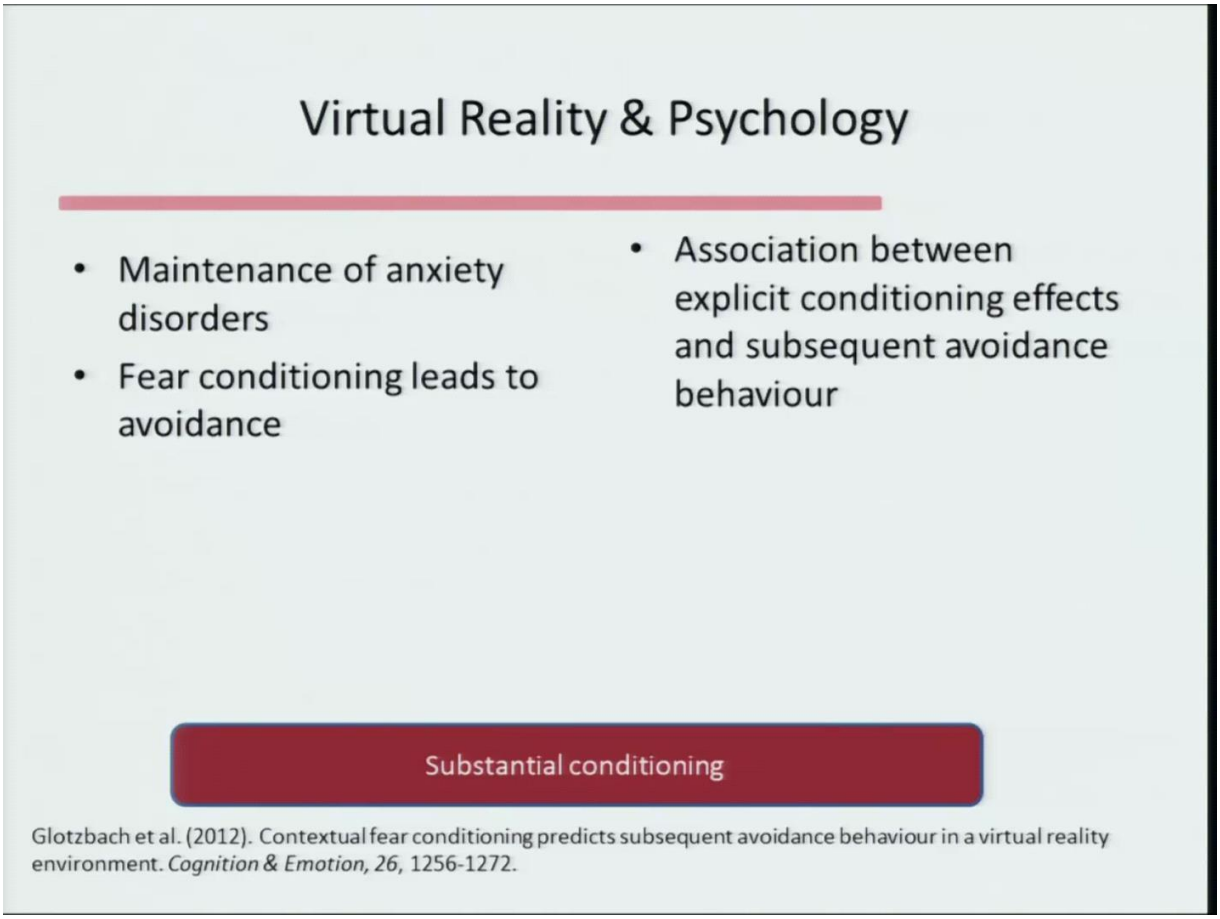

The other paper was by Glotzbach and his associates, who talks about the maintenance of anxiety disorder, primarily it is now talking about conditioning.

So, fear conditioning how it leads to avoidance and using virtual reality they found association between explicit conditioning effect and subsequent avoidance behavior. Remember the best part of virtual reality is that you do not know interact in real life with that situation. It is all in the lab set up in very very controlled and safe environment but, that can be no give an impression to the participant as if 1 is really experiencing at.

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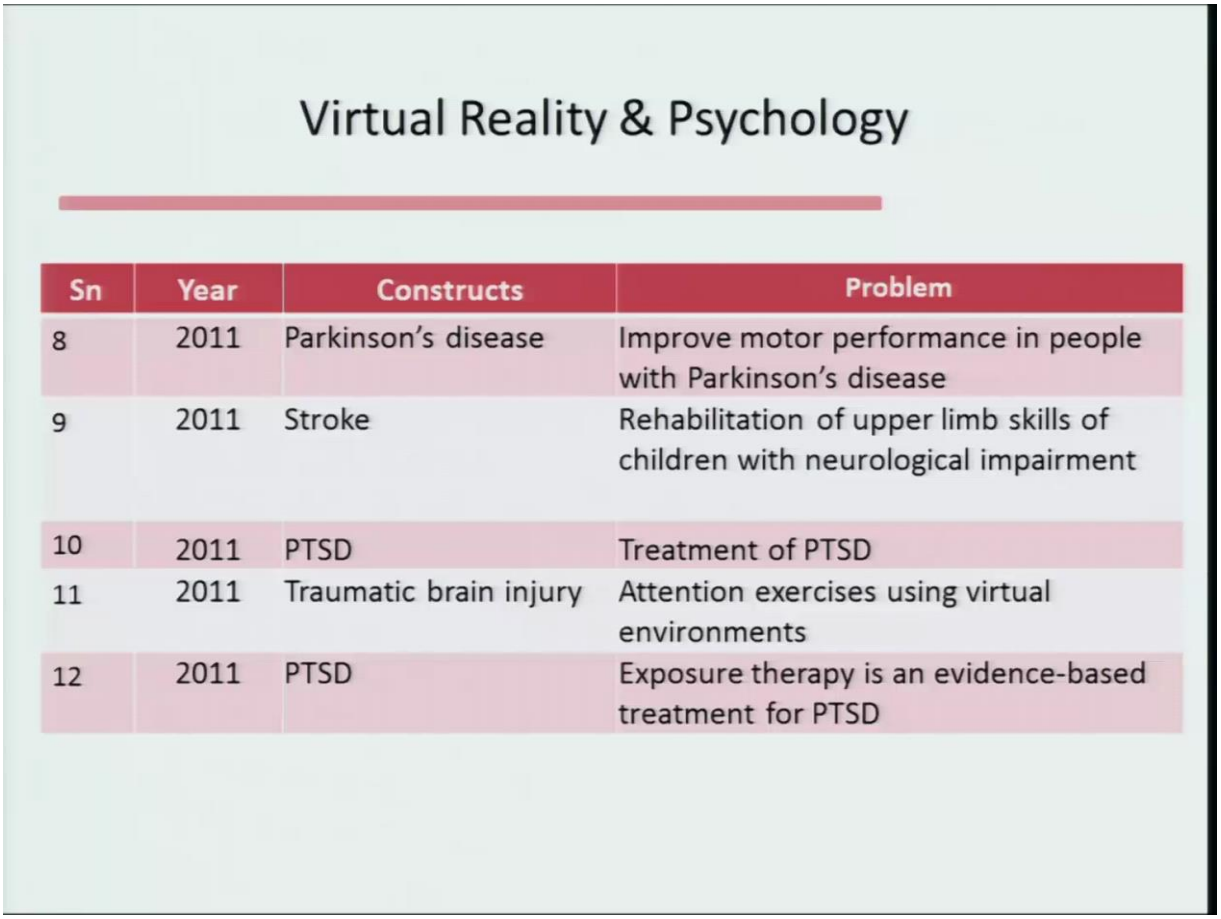

2011, there were 5 papers to dealing with posttraumatic stress disorder, 1 dealing with the stroke 1 dealing with Parkinson's disease and 1 dealing with traumatic brain injury ma and associates they worked on the kinematics of the Parkinson's disease patients and they were now trying to understand the practicing effect of reach in the virtually moving targets.

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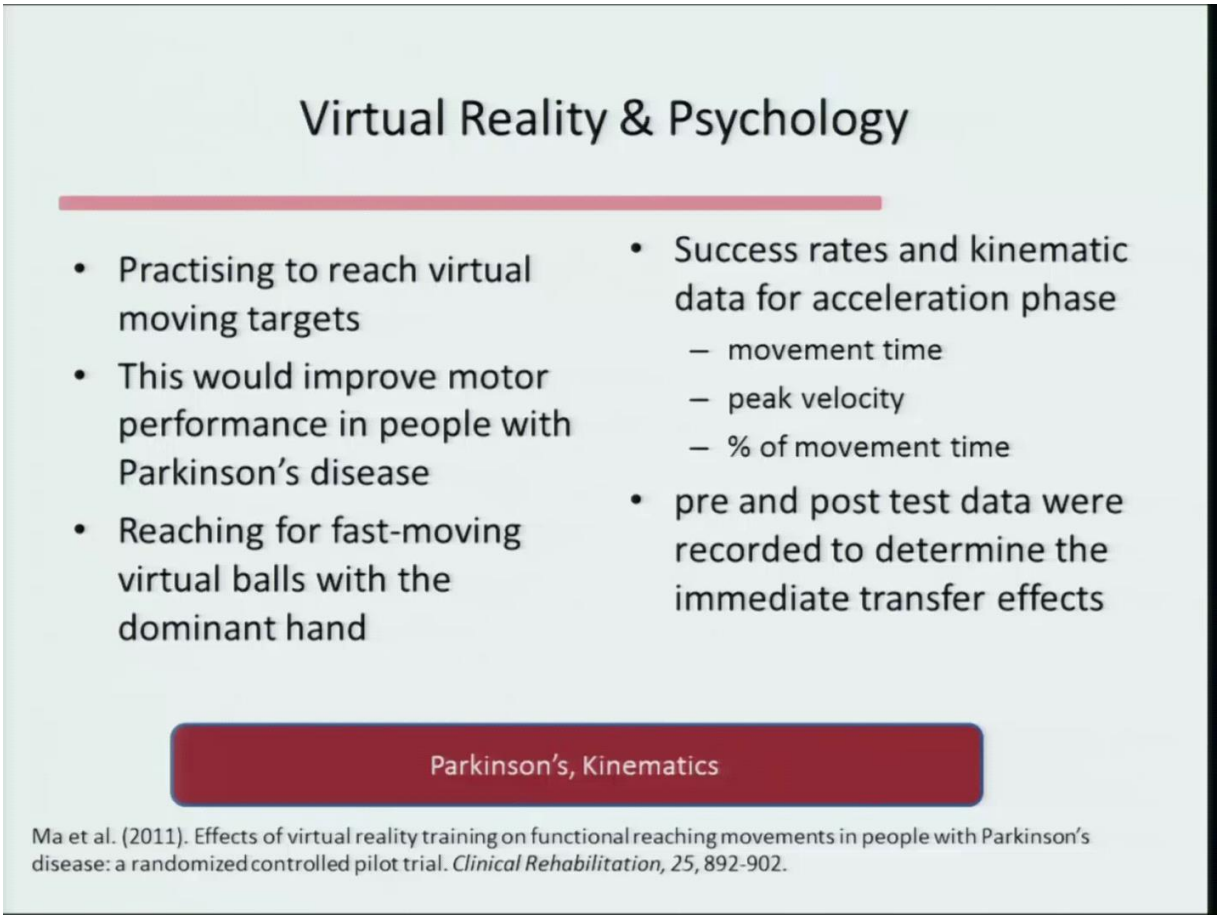

So you have a virtually moving target and people with Parkinson disease. So, you will have lots of difficulty moving their arm, how they try to reach the target. And they found that at using virtual reality they can study what would improve motor performance in people who suffer from Parkinson disease. Now, reaching for faster moving virtual balls with the dominant hand that was the task here and what was observed was that the success rate and the kinematic data for acceleration phase. All movement time peal velocity and percentage of movement time with the pre and post test data showed that, there is an immediate transfer effect.

So fantastic research are on Parkinson's diseased patients where you use virtual reality for neurorehabilitation.

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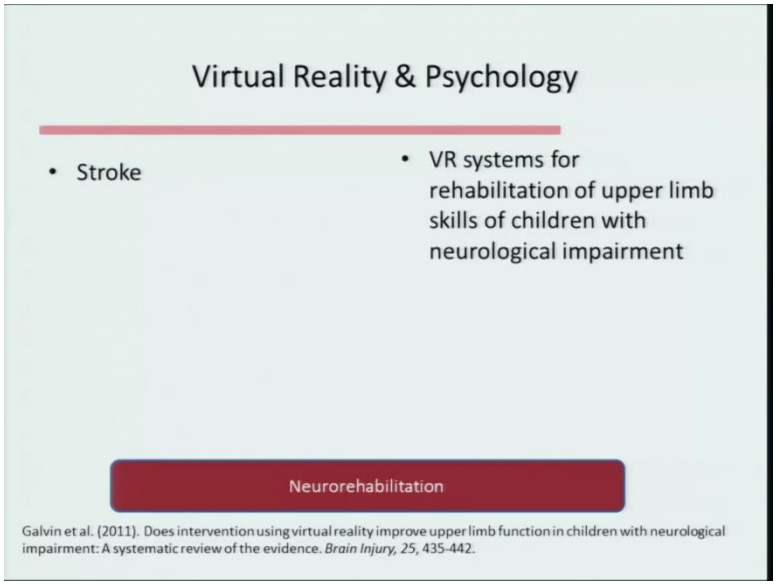

Another study published in 2011 was by galvin and and his colleagues, where stroke patients were examined and this very study actually looked at virtual reality systems for rehabilitation of upper limb. Skills of children who had neurological impairments; once again you find virtual reality neurore habilitation for the stroke patients.

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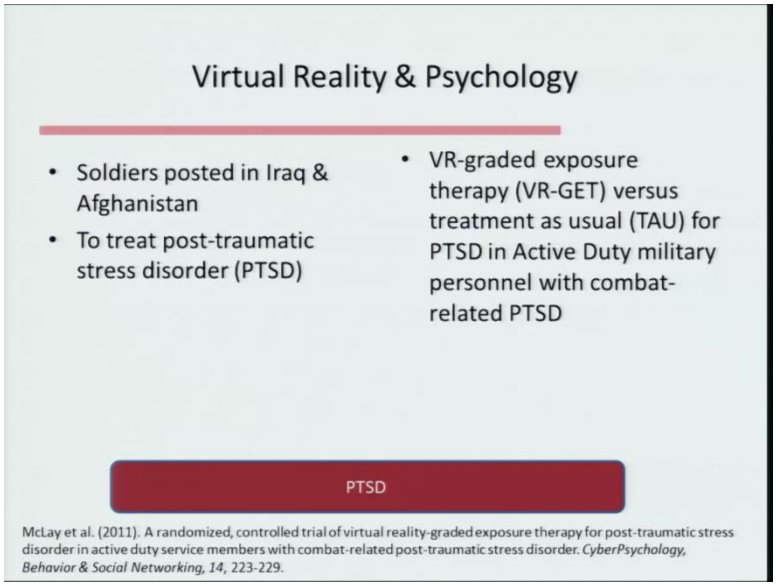

PTSD of course, right now we discussed 1 paper another paper is by Mclay and his associates who worked on soldiers who were posted in Iraq and Afghanistan. And they were working on the treatment of the PTSD. What they found was that the virtual reality grades exposure therapy and the usual treatment know that is the t a u for PTSD. How

know combat related stress and PTSD can be handled using posttraumatic stress disorder; so, great clinical application of the virtual reality technology.

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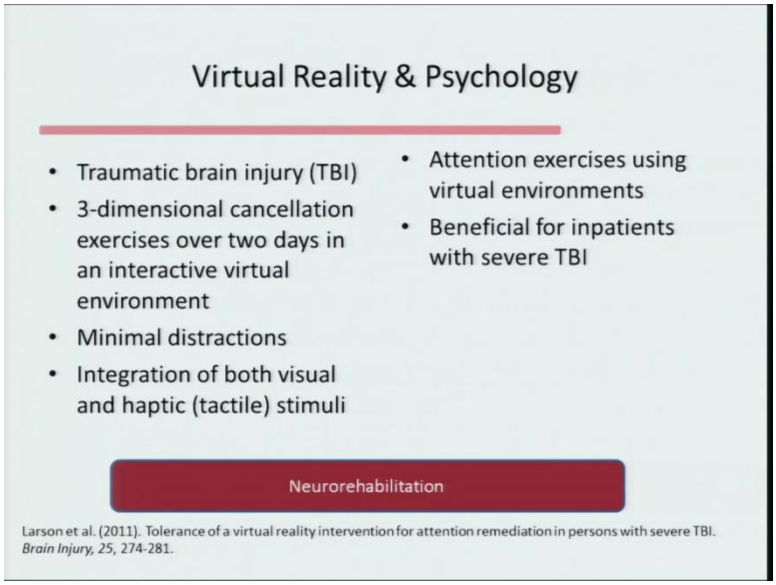

Traumatic brain injury patients were also studied by Larson and his associates. This paper was published in 2011, where the 3 dimensional cancellation exercise now cancellation test is something it is known to all psychologist but, 3 dimensional cancellation exercise over 2 days in an interactive virtual environment was the demand in this case. With minimal distraction and this study also looked at the integration of the visual and the haptic stimuli.

Once again the findings have great relevance for neurorehabilitation. What they found was at there was there is an attention exercise using virtual environment that can be done. And of course, now it is very beneficial for the inpatients who come with the traumatic brain injury.

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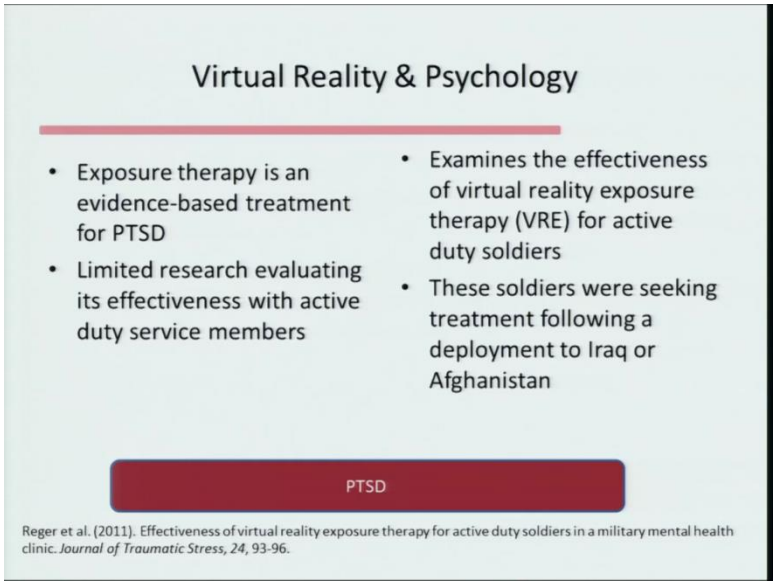

Reger and his colleagues now published another paper in 2011 where, once again the exposure therapy in PTSD treatment was being examined. And now there are of course, very limited research that evaluates the effectiveness know in the active duty service members. So, this very therapy the VRE is the virtual reality exposure therapy, in the active duty soldiers were was done and once again know the soldiers who were posted in Iraq and Afghanistan, they were the participants of the very study. So, the health care system both in the civil and defense sector; both have no benefit of the usage of virtual reality in psychology.

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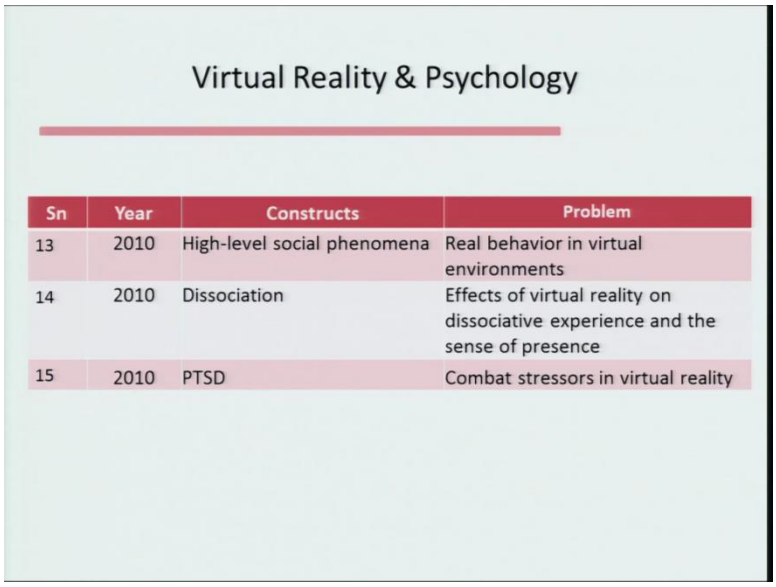

In 2010, 3 papers were published using virtual reality technology 1 working on the high level social phenomena second 1dissociation and the third on PTSD.

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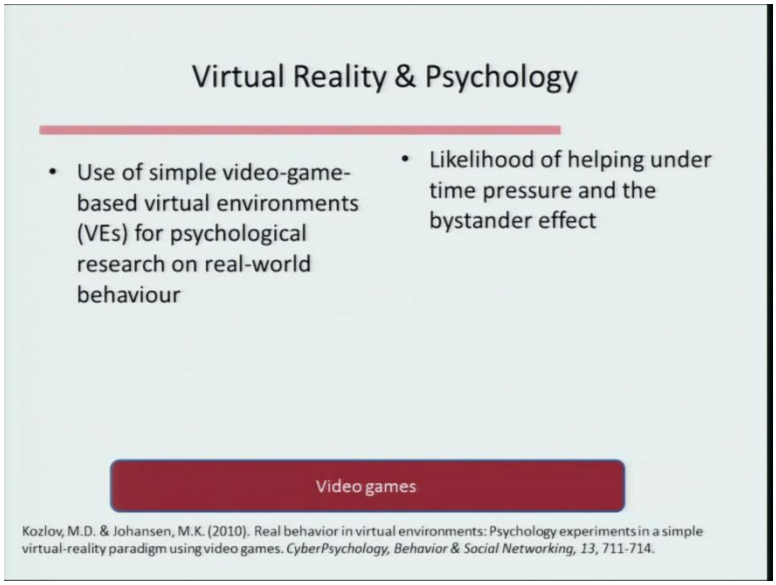

Now Kozlov and Johansen they worked on the simple video game based virtual environment. And they were trying to look at psychological research on real world behavior and the likelihood of helping others when you have your own time pressure and when you have the bystander. What type of likelihood it has now on your helping behavior that was being examined here.

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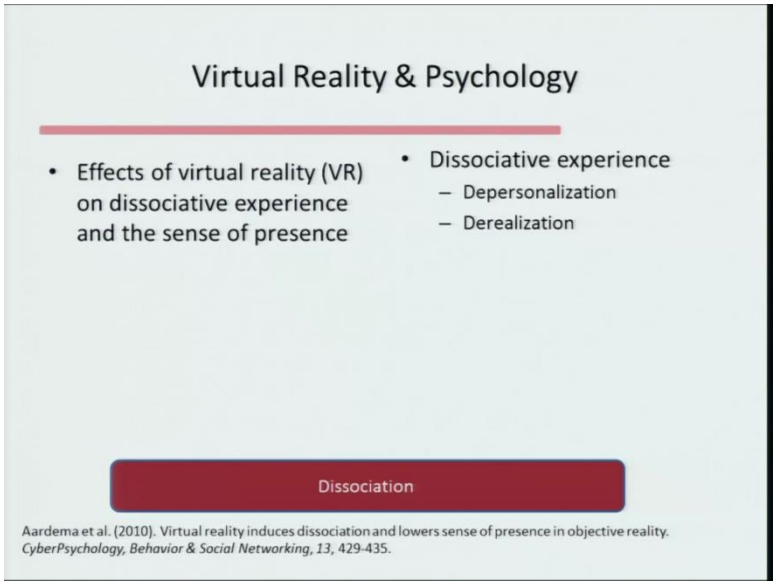

So, that is another interesting study another study publishes in 2010 was by Aardema and his associates which was on the effect of virtual reality on dissociative experience and the sense of presence. And here both know depersonalization an de realization both of these dissociative experience where examined.

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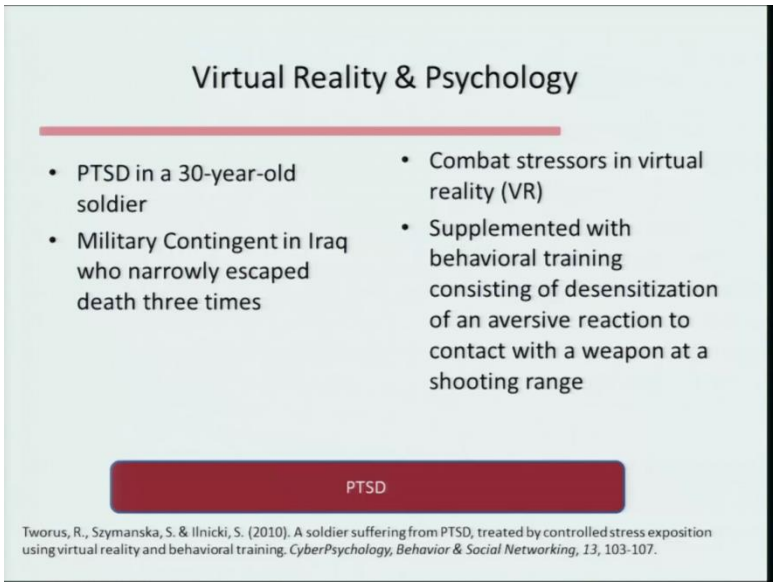

In 2010, another study that came forward studied the PTSD in a 30 year old soldier. And here the military contingent know who had gone to Iraq and had a very narrow escape to death this soldier was specifically chosen for the study because; thrice during his posting in Iraq he narrowly escaped death. And here once again virtual reality was used to examine combat stressors. And know this was supplemented with behavioral training that consisted of desensitization, aversive reaction all types of things no contact with weapon in the shooting range and so for.

A beautiful way of know looking after the mental health of individual soldiers, who have experienced such type of situations in their profession.

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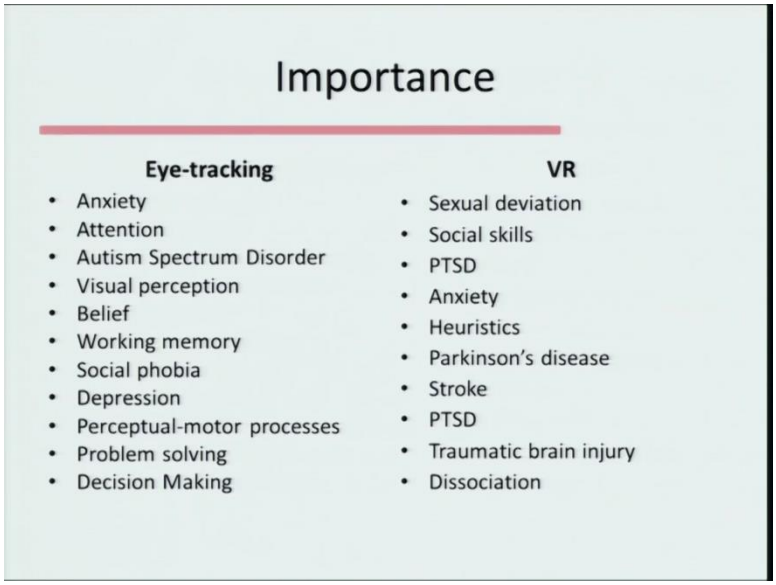

If you look at the importance of these 2 technologies in psychology, right now what we saw was eye tracking being used for: anxiety, attention, autism spectrum disorder, visual perception belief, working memory, social phobia, depression problem, solving decision making, perceptual motor processes. Virtual reality being once again used for PTSD, anxiety, Parkinson's disease, dissociation, traumatic brain injury of course, sexual deviation and social skills.

You find a great degree of know significance of these 2 technology on this examination of human behavior. This was actually an attempt to take you right from the first lecture where I talked to you about how psychology we know as a discipline. So, right from looking at the philosophical influence on psychology to psychology becoming science of behavior the whole process of systematic and scientific study exploration, examination of human behavior to the last lecture, where we have come to the cutting technology being used in psychology.

So, with this now we complete this whole discussion on the wide range of topics pertaining to psychology. And this is the last lecture of this very course what is named as selected topics in psychology.