Indian Institute of Technology Kanpur

National Programme on Technology Enhanced Learning (NPTEL)

Course Title
Basic Cognitive Processes

Lecture-37
Disorders for Perception and Attention

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Hello and welcome to lecture series and basic cognitive processes I am Dr. Ark Verma from IIT Kanpur.

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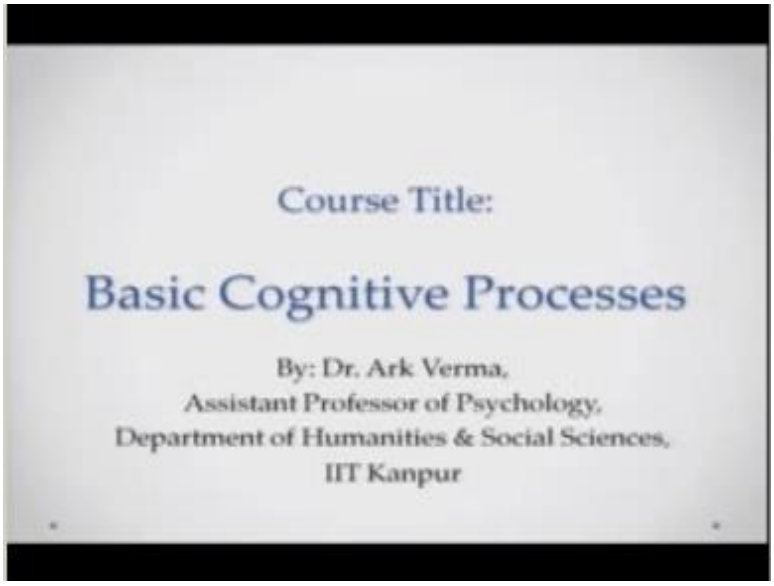

We have been talking about various cognitive functions in the last few lectures today I will begin a series on the disorders of these cognitive functions that we have studied today is lecture will be about disorders of attention and perception the cognitive functions we studied first of all during the beginning of the course.

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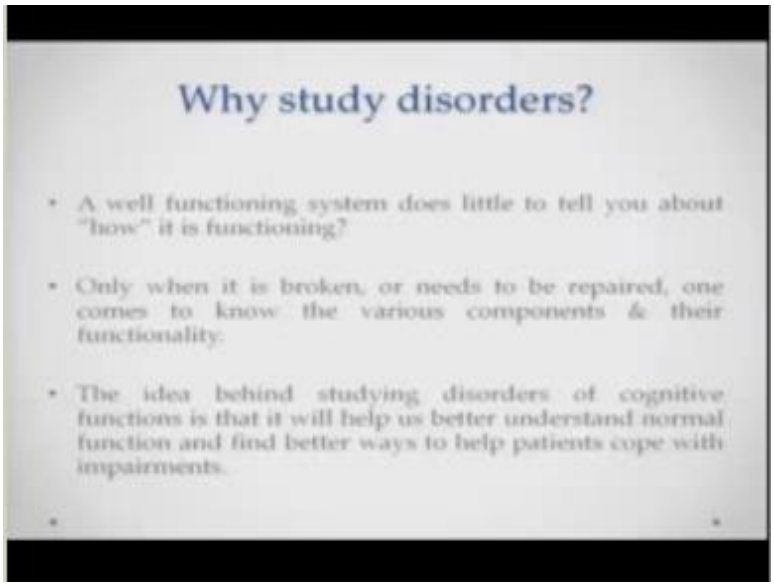

Now some of you might ask that why there is a need to study disorder machine that is not really working well but the point is that a well functioning machine or a well functioning system does not really tell us a lot about how the machine would function how the parts are related to each other how they work together with each other in those kind of things it is sometimes only when a machine is broken you would actually realize that you are okay part a is connected to Part B in a particular manner and those kind of things.

Now this is precisely why it is very important to study the cognitive functions and their disorders at the same point so what we will be trying to do in the lecture of today and the lecture after this one is basically covering the disorders associated with the cognitive functions that we have covered in this course this will basically give us an idea about how the theories that we have been reading about pan out in real life scenarios where there are people who are afflicted with these disorders and how do these theories help us understand those disorders the causes of those disorders also whether these theories can help us rehabilitate or help out these people who are suffering from these disorders.

So this is pretty much the basis or the pretty much the reason why I have included the disorders of these cognitive functions as the last two lectures of this particular course so today we will be talking about perception disorders and attention disorders I begin with a interesting disorder of perception then maybe we will go on to a couple of disorders which have - which have more to do with attention than perception per se now having said that let us let me begin with describing a very interesting case.

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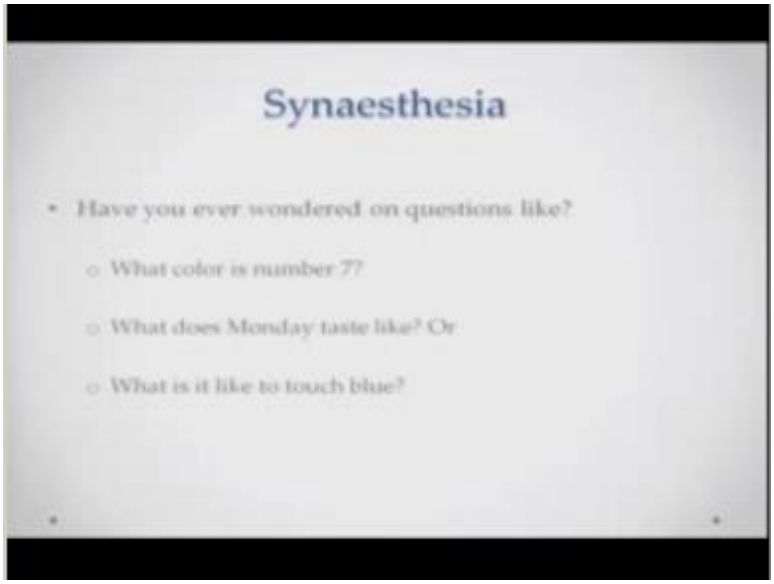

So have you ever wondered with questions say questions like what color is number seven is number seven of us particular color is number three or four of a particular color well what does Monday taste like if somebody asks you that you say tastes better or Monday tastes sweets how do you really react to that things like say for example what would it mean to touch a particular color so these kind of questions might seem slightly metaphorical slightly poetic to you.

But you will be amazed to know that there are class of people there is a small minority of people then an act that actually experiences these things there is this class of people that actually experiences color whenever you mention to them a particular letter or a particular number now these class of people are called synesthetes persons having synesthesia now what is synesthesia,

synesthesia basically is that condition wherein a person if it is if he or she is presented with a particular stimulus might simultaneously extend consistently experience another sensitive event at the same point in time.

So when people with synesthesia are presented with a stimulus they will tend to consistently and automatically all the time experience another sense event whenever you mention a letter to this person he will experience a color simultaneously and the experience will be so joined that it would feel like that letters are of a particular color there was this description in one of the books I have been reading so the material from here is basically inspired from David grooms book introduction to cognitive psychology process and disorders and one of the cases he mentions is basically about a particular child who comes back home from school.

And mentions to you know the parent that I have been having trouble with this yellow colored seven or I have been having troubles with you know blue colored eight and the parent is kind of surprised at what this person is saying and this child does not really know that it is a special condition he would as you he would have been assuming that this is exactly what everyone feels like so interesting cases or synesthesia you might actually do things like YouTube and find so many videos have been compiled on the experience of synesthesia on what it feels to be like to be a synesthete and what do these different experiences actually involve.

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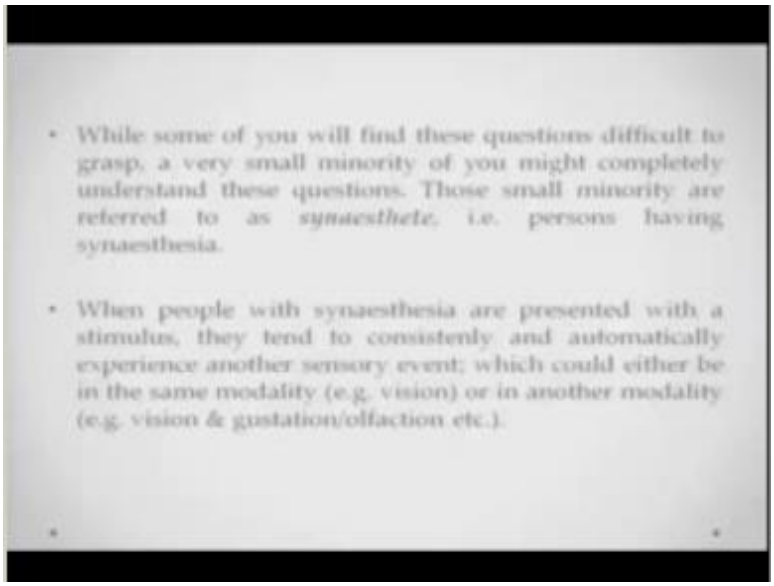

So we will try and cover the theoretical and we will try and cover the demonstration part discussion pattern synesthesia while there might be a lot of videos you might find on the Internet which will help you experience the condition more closely.

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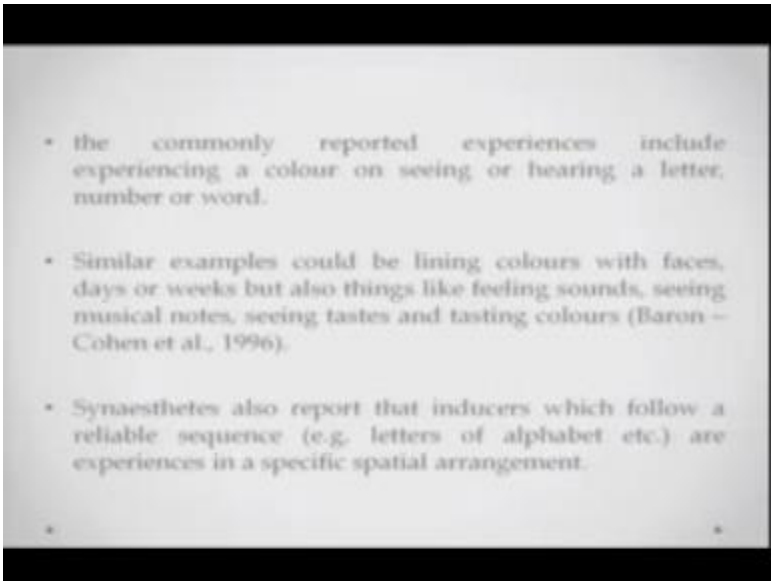

Now the commonly reported experiences in synesthesia include experiencing a color on seeing or hearing a letter a letter or a number or even words for that matter so if you tell somebody about particular letters of the alphabet they might report back experiencing colors simultaneously if your string specific words they might tell you that you know you are having this particular sane aesthetic experience at the same time it could also be that some people might be linking colors with faces days or weeks but also things like they might say that you know I feel this sound in a particular way.

When I see the musical notes in a particular way my seeing taste and tasting colors something like this Baron Cohen and Kalisz have done a lot of research in the area of synesthesia and a lot of it is published some of the common papers are in 1986 now synesthetes basically the people who have this exquisite ability also report that inducers generally follow are liable sequence particular kinds of letters will reliably produce very consistent color sequences but Eli kind of say for example if somebody is experiencing spatial arrangements particular letters will induce very specific spatial arrangements at the same time.

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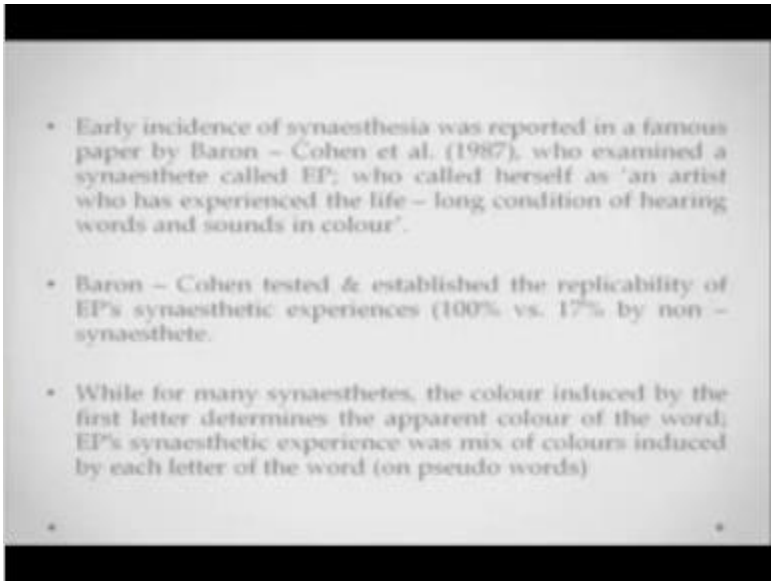

Now early incidence of synesthesia when it was first reported was basically in a very famous paper by Baron Cohen and colleagues in 1987 and they were examining this a synesthete called who called herself an artist who has experienced lifelong condition of hearing words and sounds in color so this person actually BP is an interesting tale she's given out an advertisement in the newspaper asking people to you know come in the condition she was having.

So baron-Cohen basically tested and established the reliability of apes synesthetic experiences yeah actually establishing that she was undergoing these experiences and these experiences were consistent and automatic over a period of time the comparison was typically like 100% of EP synesthetic experiences were replicable she could replicate.

And tell them on simply what she was experiencing by only 17% of non synesthete controls could actually repeat that kind of a performance now for many synesthetes the color induced by the first letter determines the color of the entire word see for example if you have a condition wherein you will see yellow color every time you come across the letter C then any word that starts with C will be colored yellow for you but with it was special in the sense that each letter of the word would induce separate colors and she would actually experience the word as a mix of

all of these colors now this was interesting and this test was basically done with her on pseudo words which do not have any meaning at all so you could just combine letters in a particular sequence that is pronounce a bill but not really is a meaningful word so that was done.

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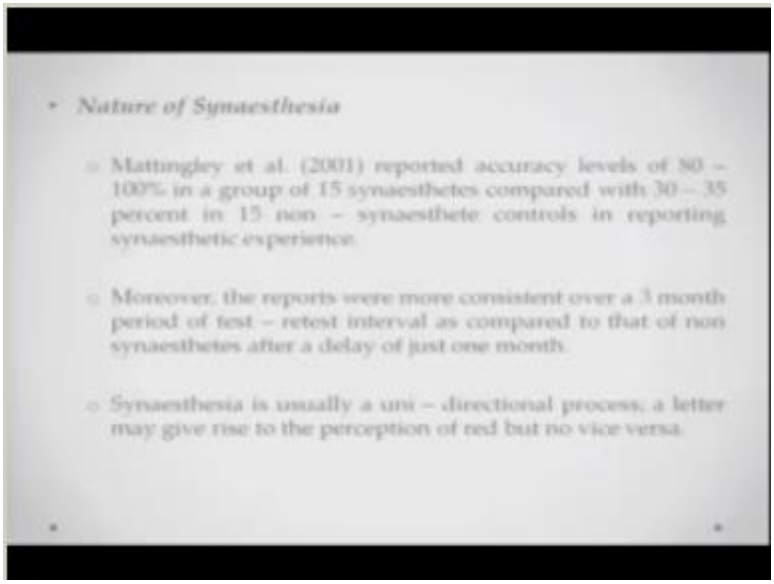

Now we can talk about let us proceed to talk about the nature of synesthesia what is synesthesia actually like now Mattingly and colleagues in2001 they reported accuracy levels of around eighty two hundred percent in a group of fifteen synesthetes compared with thirty to thirty five percent in a group of fifteen non synesthete controls in reporting the synthetic experience.

So it has been again verified and multiple times reported that the people who are basically having this condition are almost eighty two hundred percent times accurate in the reporting of what they are actually feeling also there were reports of emoticons or the reports by synesthetes was more consistent over a longer period of three months test retest intervals as compared to that of non synesthetic controls even after one delay one month delay of testing.

So if you test synesthetes experience over a longer period of time for three months and you compare the non-synesthetes experience even after one month of time there will be a lot of gap

there will be a lot of the non-match between these performances this kind of tells us that this experience is real and this experience is replicable and the people are actually undergoing this particular experience now synesthesia usually is a unidirectional process say for example if a letter induces a particular color the letter will consistently automatically and always induce that particular color.

But it is important to remember that the color will not induce memories of that letter so if you are seeing that color say for example at some unrelated place that color will not remind you of that letter so induces and target so there is this concept in synesthesia that there are inducers which induce the synesthetic experience the simultaneous sensory experience of the other modality but it does not really a kind of transfer from target to the inducer so synesthesia is a unidirectional process.

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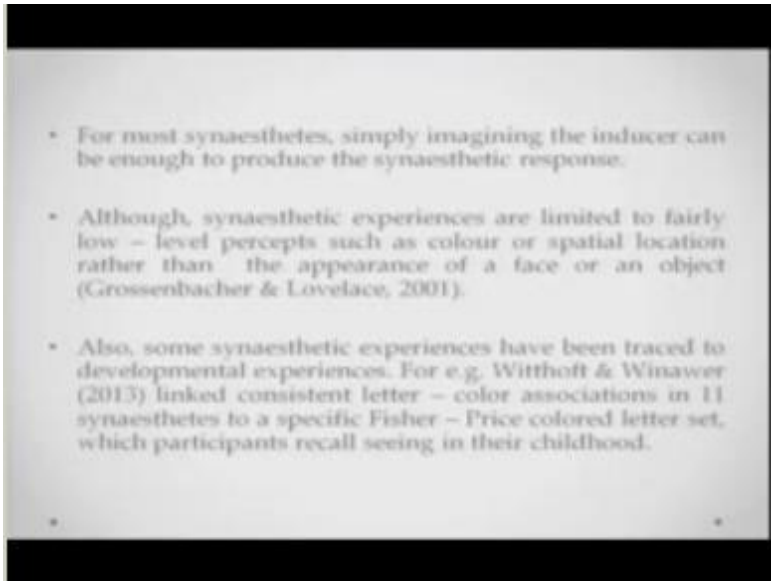

For most synesthetes simply imagining the inducer can also lead to synesthetic response if I were a synesthete and I was thinking of the letter C or a letter P and let us say as I already said let us see might induce a yellow color letter P might induce a blue color while saying this while already even imagining the these letters I would assume to have this synesthetic experience of

experiencing this color now all those synesthetic experiences are limited to a fairly low level perceptual state such as colors or spatial locations there rather than the appearance of a face or an object.

So there are basically very low-level perceptual things say things like color spatial arrangements those are typically things that get associated with a particular aesthetic experience not really very complex things like faces or objects or you know events in those kind of things also some synesthetic experiences have also been linked to developmental experiences.

So some of these synesthetic experience have been shown and which often win our basically in 2013 they linked consistent letter associations in eleven synesthetes to a fisher-price colored letter set so for example these participants would have learned their letters learn their alphabets through this fisher-price said is basically a set of toys which had colored letters.

And probably these people recall seeing those letters in the specific colors produced by the fisher-price people this is a toy company that is and they kind of made those associations to such an extent that it led to the synesthesia happening so this link has also been made however there is nothing to say suggest here that there is a causal relation it is just a coincidental dilution which has been traced by with often with our in their2013 paper.

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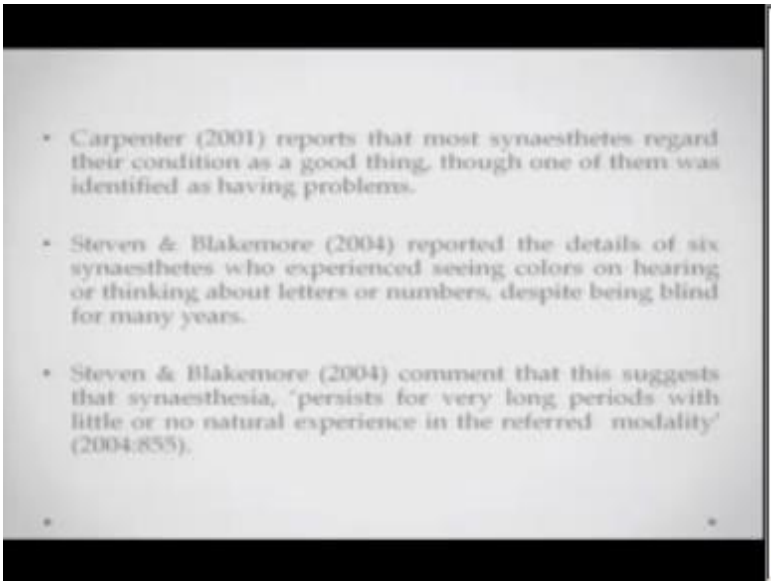

Now a carpenter 2001 reports that most synesthetes regard the condition as a good thing they do not really mind having that condition they are not really particularly troubled b having that condition though they also report one of the patients who said that this was becoming a problem for him to handle for the most part this is not really debilitating experience of any kind this is rather an experience that people have and they interpreted in various ways but not really as rather troublesome one of the patients as I already said reported having some kind of trouble with this now Stephen.

And Blakemore in 2004 they reported the details of 6 Ana States who had experience seeing colors on hearing or thinking about letters or numbers despite having been blind for a lot of years so they are not blind anymore but they experienced as seeing colors even though they did not really have a lot of experience in seeing colors for a longtime so Stephen Blakemore basically commented that this suggests that synesthesia persists for persists for very long periods of time with little or no natural experience in the referred modality.

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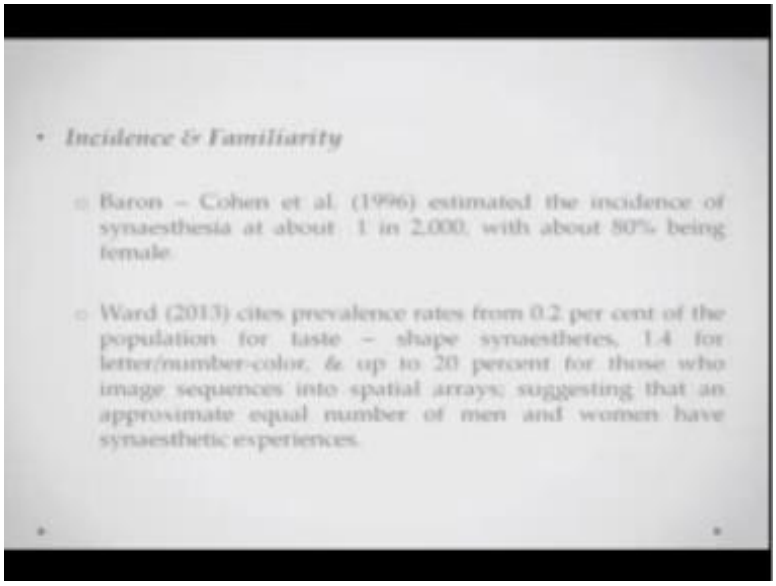

Now let us talk about the incidence and the familiarity of synesthesia baron-Cohen enclaves in their 1996 paper estimated the incidence of synesthesia at about one in 2000 individuals with about eighty percent of the patients being eighty percent of the affected being females watch in 2013 sites prevalence rates of 0.2% for the population they could taste a shape 1.44letter or number versus color synesthetes all these people will experience color even they will hear a particular letter or a particular number and up to 20% for those who emerge sequences into a spatial arrays suggesting that an approximate approximately equal number of men.

And women both have synesthetic experience so this last kind of people they will actually put events in a spatial arrangement that X happened first and then serve I happen and they are all arranged all of their experiences in a special manner so these are the different kind of synesthesia as possible and we also discuss about the kind of incidence rates for these synesthesia.

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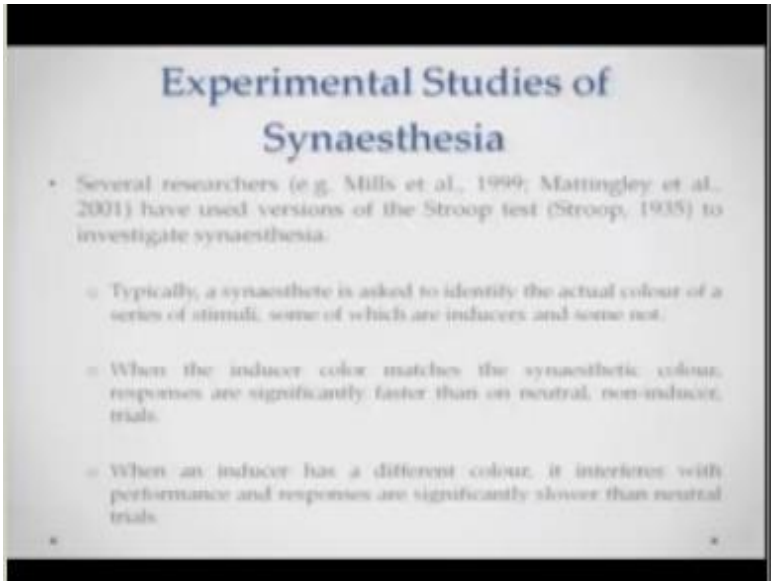

Now there have been a lot of experimental research with synesthesia since this is an interesting phenomenon itself so several researchers basically have used the versions of the Strophes proposed by Diaz troupe in 1935 to investigate the occurrence of synesthesia if just to remind you swoop test is basically wearing you are asked to name letters which are in some colored ink your Sauna may read these words out and say for example it could be a blue written in a green ink it Could be green written in a blue ink and.

So when you are reading blue and one of the things is a so you can either be asked to read the letter or you can either be asked to name the color of the ink and because these two information's are both automatic you will see the color immediately and you read the word immediately there is a conflict between two and these two sources of information and participants have reported slowing down in naming these colored words because of this interference now how does that map onto synesthesia let us see.

Typically a synesthete is asked to identify the actual color of a series of stimuli so there will be colored words or color letters or numbers and these participants will ask to tell what the color of these you know stimuli are now some of these stimuli are actually inducer so they will induce

some different color system there could be a letter let us say there could be a word called cap and cap basically will induce a yellow color because C stands for yellow.

As we have been talking about now when the inducer color say for example matches the synesthetic colors the word is written in yellow and it induces the yellow color itself then the responses will be significantly faster compared to when the inducer color is different and the Cove a different color so this basically the second part will interfere with the performance and the responses are found to be significantly slower than on neutral trials so this is something which they found out.

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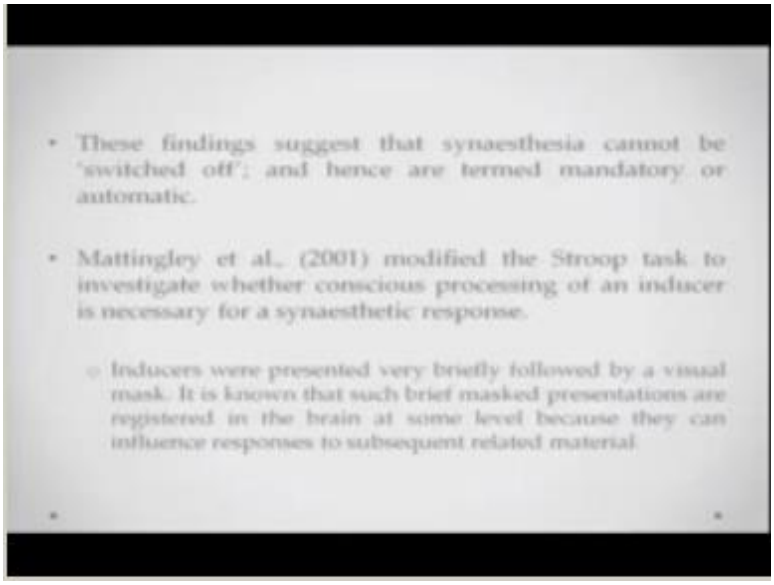

And these findings not taken to suggest that synesthesia is something that cannot be switched off it is almost as automatic as reading a word when you are presented with the word and hence they are termed as mandatory processes or automatic processes now Mattingly in colleagues in2001 they modified the swoop task a bit to investigate whether the conscious processing of an inducer is necessary for a synesthetic response now see we will been talking about when a person you know comes across an inducer a target synesthetic experiences generated almost automatically consistently in all the time.

Now they wanted to test whether it is necessary to consciously perceive the inducer if the inducer is presented in such a way that you cannot consciously perceive it whether it would still cause the synesthetic experience so what they did was that they presented induces very briefly followed by a visual mask so let us say for a period of around 35 to 50milliseconds below which it is not possible to consciously experience something and then you hide this off with a particular mass that comes after it.

So it is known now that such brief and mask presentations are registered in the brain at some level but they can influence the responses of the participants in ways which we have discussed earlier in priming studies etc.

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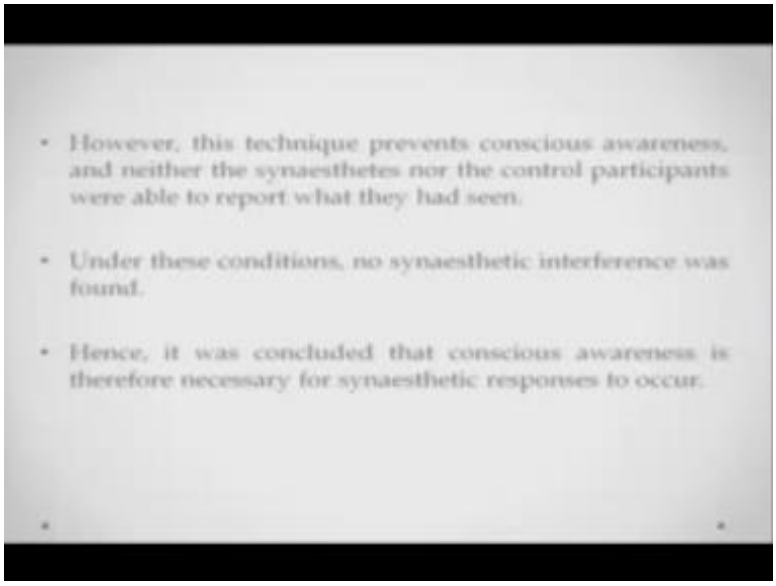

Now this technique incidentally prevents conscious awareness of these kind of stimuli which you are presenting and neither the synesthetes nor the control participants in this kind of arrangement were able to report what they had seen so they are not really conscious of whatever was presented to them under these kind of conditions no synthetic interference was found none of these individuals also reported having a synesthetic experience of any kind.

So it was concluded and reliably so that conscious awareness is therefore necessary for the synesthetic experience to occur so we know a few things but of synesthesia by now that it is automatic mandatory process it cannot be switched off it is consistent happens all time and now also we know that the inducers need to be consciously perceived for synesthesia to occur.

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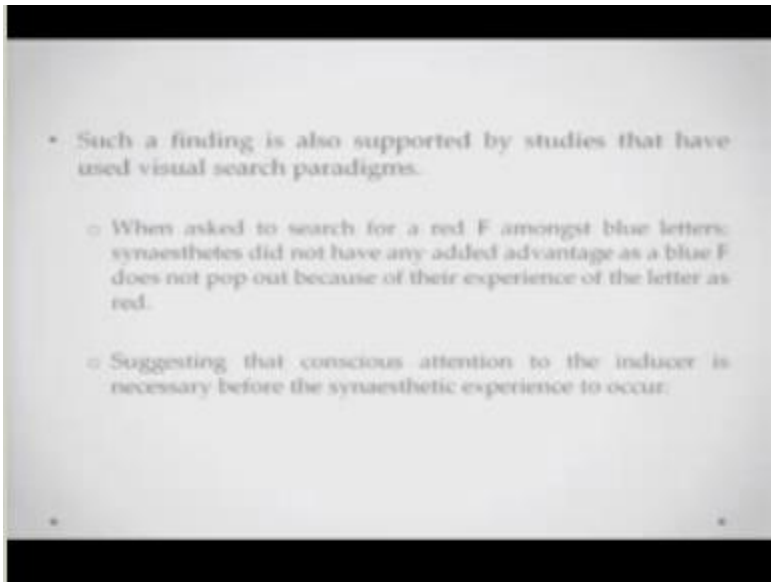

Such a finding has also been supported by a studies that have used visual search paradigms so when asked to search for the red F among blue letters synesthetes did not have any added advantage as a blue F will not pop out because of their experience of the letter S red okay so in a visual search scenario the property of that letter being an inducer also does not make it stand out in.

Any sense it does not lead to any significant advantage for sale it also suggests that conscious attention to the inducer is therefore necessary before the synthetic experience it in visual search scenarios you will see a lot of time your search is not really consciously you are probably looking at one thing but your uncle but you are in a cover attention way now looking at some other things as well.

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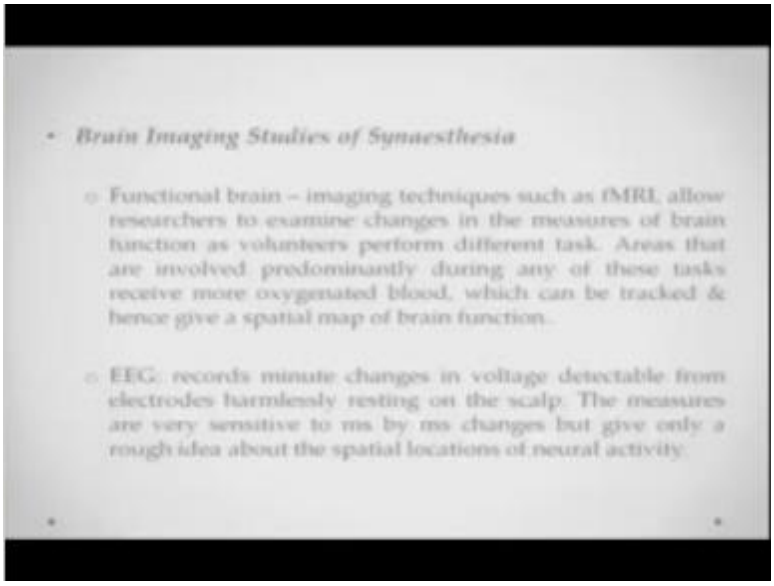

Now let us talk about a few brain imaging studies of synesthesia just to revise FMRI or functional brain imaging techniques basically allow the researchers to examine changes in the measure of brain function as volunteers perform different tasks areas that are predominantly active during any of these cells receive more oxygenated blood and which can be tracked and hence you know one can generate a spatial map of brain function say for example if there is the fuse form gyros which is known to be involved in phase 2 cognition that is the area which will start receiving more blood.

And there ways to trace more blood in a particular area as compared to less blood in other areas other ways is EEG electroencephalography or ERP event-related potentials these basically these methods record very minor changes in a voltage and detectable from electrodes that are arrested on decapods on a scalp and these measures are very sensitive to millisecond level changes that are happening in brains processing so they give us a very good temporal resolution of how processing in the brain is happening though they are not really able to give us a very good spatial resolution of where this processing is happening so there is a second thing we've probably done all of this in the methods part I am just kind of doing a division here.

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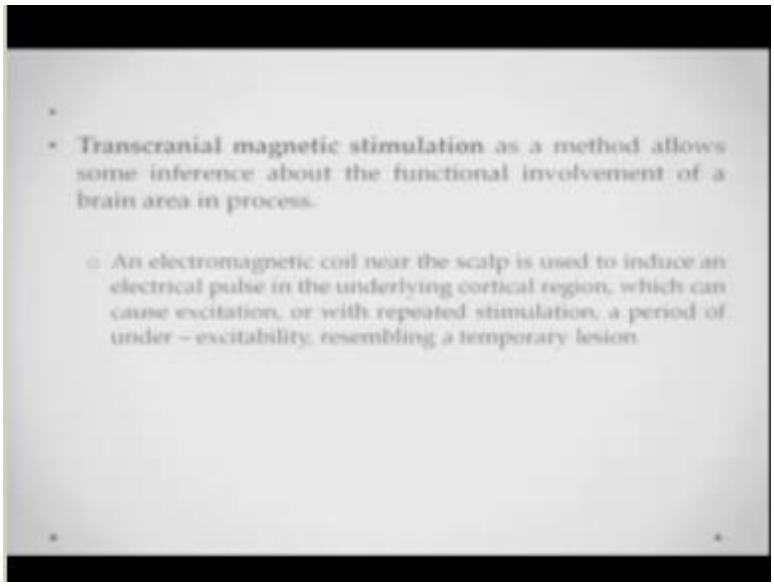

Now a transcranial magnetic stimulation TMS is also one of these methods that allows of some inference of the functional involvement of the brain areas so what happens here is there is an electromagnetic coil there is placed on the scalp to induce an electrical pulse in the underlying cortical region so it is basically a coil and you place it on the head and it kind of induces a magnetic field in the cortical region now what this does is it leads to either excitation or inhibition of that particular cortical area and you know can be used to either test the excitability or the involvement of that area in any given task which will give to the participant after that.

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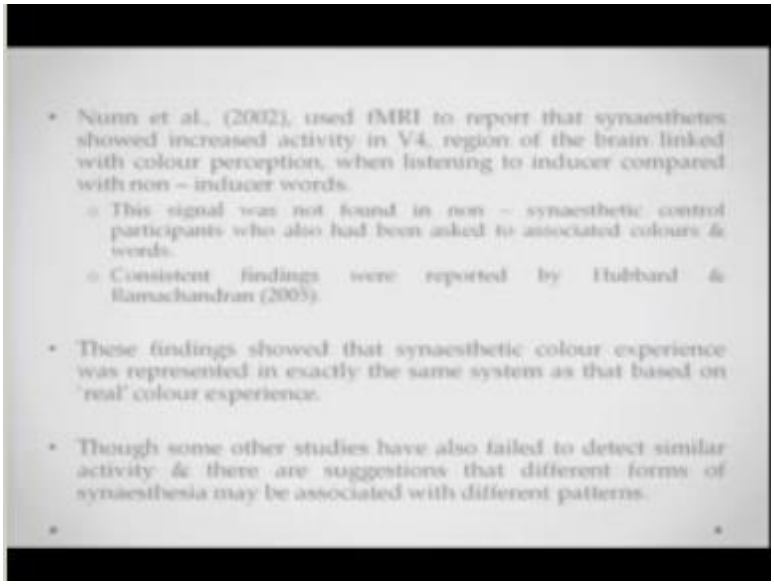

Now there have been studies using these kind of methods with their synesthetes and one of them I will just mention so none in colleagues in 2002 they used FMRI to report that synesthetes showed increase activity in the area v4 of the occipital lobe in the sand this area v4 is basically the region that is connected with color perception and when in this activation was found when these participants were actually listening to the inducer compared to the non-Indian servers if you are listening to these letters and if you are a senior seed there is a certain activity actually going on in the color perception color perceiving areas of your brain verifying for the fact that you are in a you know actually experiencing those colors.

Now this signal was not found in non synesthetic control participants who had also been asked to associate colors in words so it is not something that you can learn and you know start having an experience of it is something that is a condition and that is there by itself you cannot really learn to have synesthesia for that matter these kind of consistent findings were also supported by Hubbard and Rama Chandra in their paper in 2005.

Now these findings tell us something about the synesthetic color experience and they tell us that you know it basically is based on the real experience of color it is not that somebody is

associating a particular letter with a particular color it is actually happening in the brain when you listen to that letter you do experience that color very reliably some of the other studies have also fails to detect similar activity and there are suggestions that different forms of synesthesia may be associated with different patterns so again these kind of linkages with the brain.

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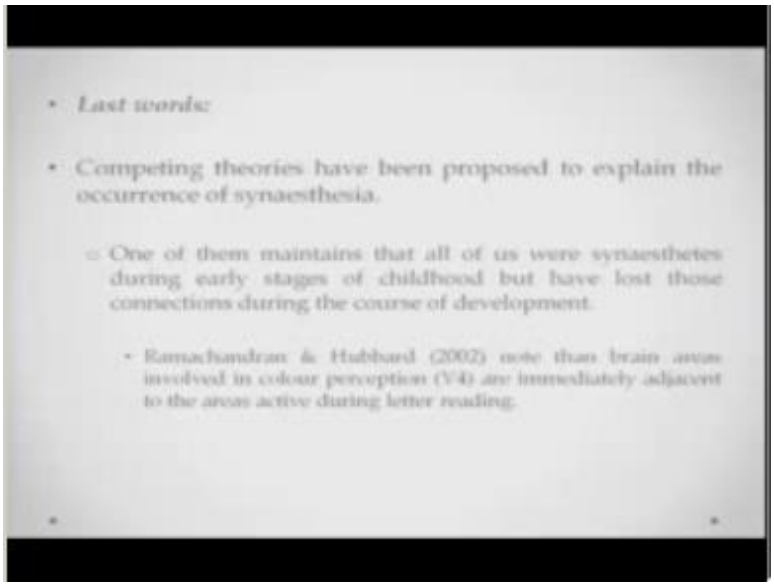

And with these areas of synesthesia are also you know have also been established now coming to the coming to summing up what synesthesia was about let us talk a little bit about the theories that have attempted to explain synesthesia one of these theories maintains that all of us were synesthetes at one point in time during early stages of childhood when say for example we were growing up but we lose these connections.

Between these different sensory experiences during the course of development probably because these are undated and they are not fruitful for any you know meaningful interaction with the world Rama Chandra in Hubbard point out that the brain areas involved in color perception areas like v4 are actually immediately as adjacent to the areas involved or areas that become active during reading of letters it might be just a coincidence or it might not be a coincidence that these areas are very close together.

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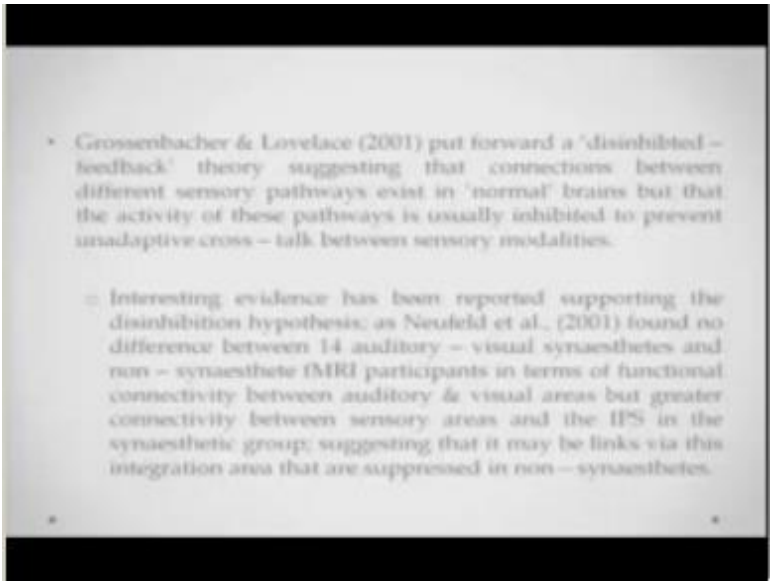

The grosser barker and Lovelace they basically put forward a particular hypothesis called the disinherited feedback theory and the disinherited feedback theory proposes that connections between different sensory pathways exist in normal brains but that the activity of these path way sis usually inhibited to prevent an adaptive crosstalk between these sensory champs interesting evidence has been reported about this disinhibition I have a hypothesis say for example new fields and colleagues in 2001 found no difference between the 14 auditory visual synthetic.

And 14 non synthetic participants using FMRI in terms of the functional connectivity between the auditory and visual areas where they found greater connectivity between the sensory areas and the IPS in the synesthetic group suggesting that it may be the links via this integration area that is the IPS that are suppressed in non-synesthetes but are not suppressed in synesthetes and that is what is allowing them to have this multimodal multi-sensory experience now we have talked a little bit about synesthesia let us move our attention to a different kind of a disorder again since there was a disorder of perception this another disorder called blind sight.

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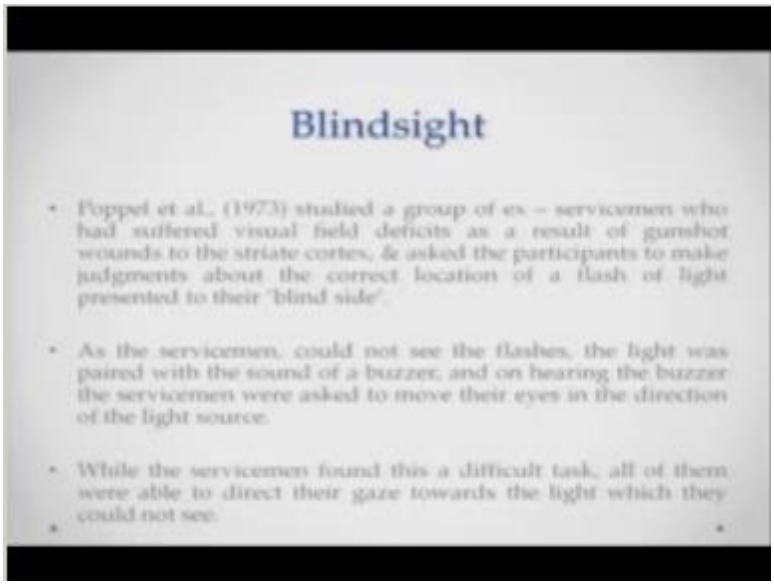

Now populism colleagues in 1973 they were studying a group of ex-servicemen who had suffered visual field deficit as a result of gunshot wound through their extra Sphere is Fiat cortex and to destroy it cortex and they asked these participants to make judgments about the correct location of a flash of light presented to their blind side so the idea was that these people have lost sight in a particular visual field because of the injury in destroyed cortex and then what these people are asked to do is that people will show a flash of light in the blind region and they will be asked to detect it or try to detect it as the servicemen could not see the flashes the light was paired with the sound of a buzzer.

And on hearing the buzzer these were these people are asked to move their eyes in the direction to which the flash light was while the servicemen found this a very difficult task almost all of them were able to gauge their eyes to move their gaze towards the light which accidentally which basically they cannot see so this was a very interesting phenomena how are these people being able to move their eyes to the direction of the flash even you know though they cannot really see the flash so the buzzer is just a hint that there will be a light flash but it is not in any way tell you about the location of the flash so these people are in some ways being able to decipher where

these you know flashes of light are occurring even in their blind visual field now vice grants in 1974 he describes a patient DB.

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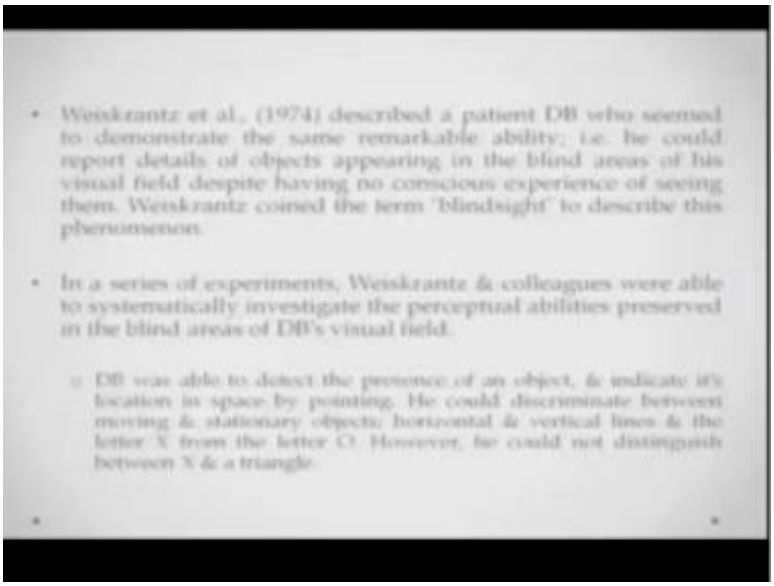

Who seemed to demonstrate the same kind of are makeable ability he could report the details of objects appearing in the blind areas of his visual field despite having no conscious experience of seeing them so if let us say if this person is blind in the right visual field if you keep an object somewhere there this person after some time will be able to tell you what have you kept or the general shape and whether this is moving or not those kind of things even though he is reliably shown to be blind in this area completely.

Now they did this series of experiments Y stands and clicks they did this you know series of experiments in DB and they basically systematically were trying to investigate the perceptual abilities preserved in the blind areas of DB so DB it was found the DB was able to detect the presence of an object indicate its location in space by point he would also discriminate between moving and stationary objects horizontal and vertical lines and could also even distinguish the letter X from O if it was presented in the blind area now this is something completely interesting so vise currents basically named this phenomena as blind sight.

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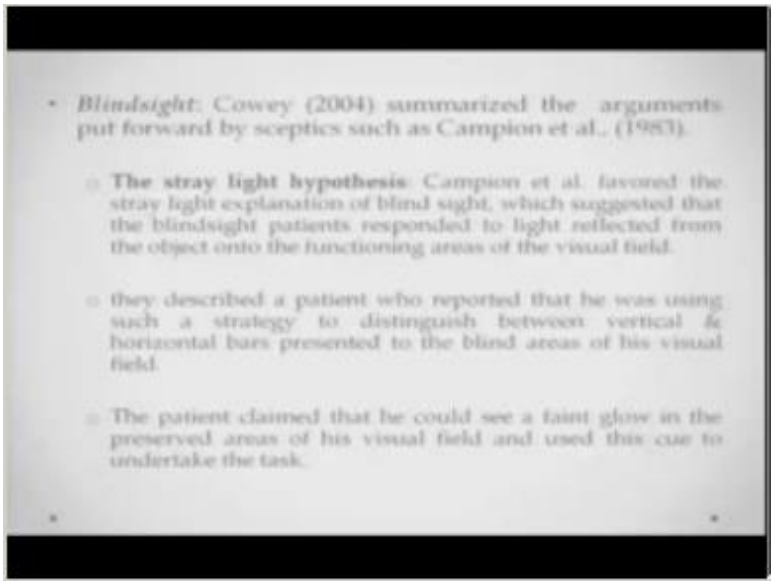

Let us talk about blind side a bit more go V in 2004summarize the arguments put forward by skeptic such as Campion at all so a lot of people were actually skeptical about you know whether blind side is a really phenomena at all so people like Campion enclave's they basically favored what is called stray light explanation so they said that these participants are basically being able to detect these objects in the blind visual field because of stray light that is reflecting from around the areas and falling in the region where they can see so the stray light hypothesis goes like this Campion in colleagues they favor.

The stray light explanation of blind sight which suggests said that the blindside patients responded to light reflected from the object onto the functioning area solution so this is what the stray light definition is now they were describing a patient who reported that he actually used such a strategy to distinguish between a vertical and horizontal bars presented to the blind areas of his visual field now this patient claimed that he could see a faint glow in the preserved areas of the vision field and use this cue to undertake this particular task.

So it could be shown that you know people are not entirely blind and they are not being you know they're not really using the blind area to decipher the where the light flashes they are

actually using light reflected from a different source and using that as a cue to actually guess where this you know stray land where this light flash will be

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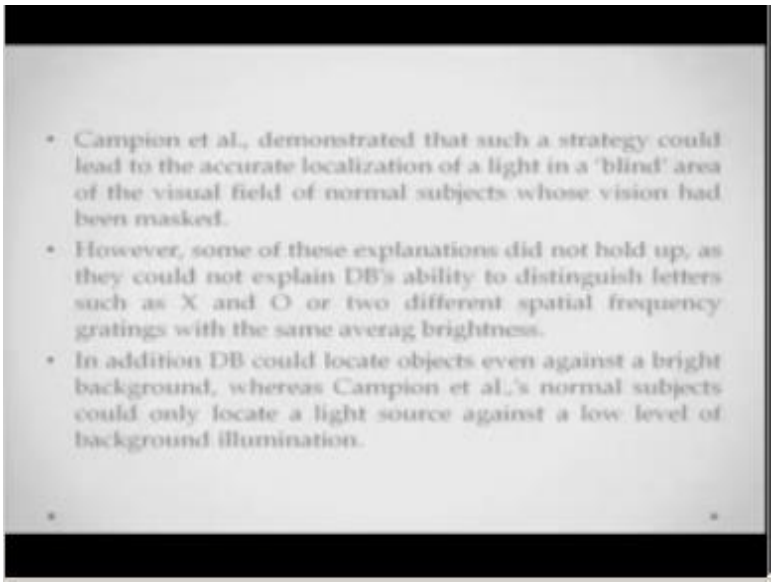

Now campaigning colleagues demonstrated that such a strategy could actually be used and you know could be utilized to get an accurate localization of light in a blind area of a person's social field of normal subjects whose vision had been masked so you put a mask on these people's vision and you will see that these people are can also use this stray light to locate these things however some of the explanations are given by these.

The stray light theorists did not really hold as they could not explain TVs ability to distinguish between letters such as X and O or two different spatial frequency gratings with the same average brightness in addition DB could also look at objects even against a rather bright background varying you will not really you know be able to use this stray light explanation very favorably so that as Campion's normal subjects could only locate this light source against a low-level background illumination.

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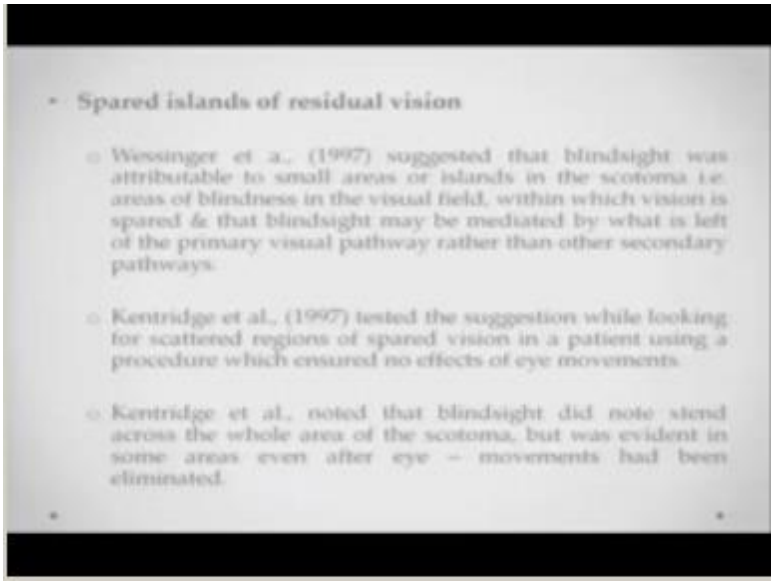

So if there is a flash of light and you can locate it even against a bright background it tells you that you are probably not using the reflection of the light another theory which talks about blind sight was given by a singer in colleagues in 1997 and they said that Blind Side was attributable to small areas or islands in the score to must go to my is basically the areas of blindness in the mission field within which vision is spared and that Blind Side may be mediated by what is left of the primary visual pathway rather than other secondary pathway.

So they are saying that there might be areas in the blind part which are you know partially preserved or partially as still active and participants can be using these partially preserved areas - you know guess where these light flashes are or where these different objects are now Kent region colleagues on the other hand they tested this suggestion by looking for catered regions of spared vision in a patient using roscoe a that ensured no effects of eye moon so this person basically so contagion clicks basically wanted to test this you know proposal and they actually went out.

And tested this with particular people they found out contagion clicks they noted that blind sight does not extend across the whole area of the Scotia but was evident in only some areas even after

I movements had been eliminated so again there is particular areas in the scrofula particular areas in the blind region where in the blind site is actually active are these the same areas where in the people are experiencing something or is the spared island you know spared island thing true.

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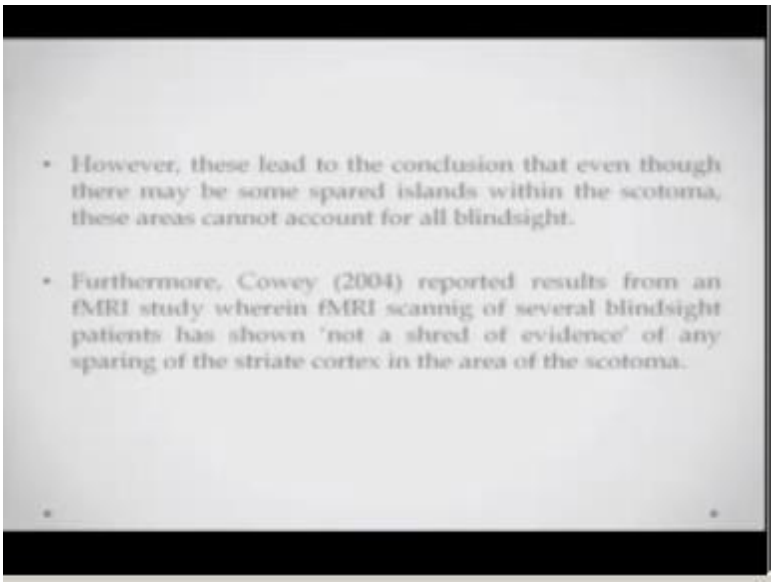

So this could not lead to the conclusion that even though there might be some spared islands of vision within this Kodama these areas could not account for all phenomena in blindside he could not allow counting for movement or other things like that in 2004 also reported results from an FMRI study where an FMRI scanning of several blind side patients could not show a single shred of evidence for sparing of the striate cortex in the area of the Scotia even then these people were not were able to detect objects in their blind region and hence were patients of blind sight.

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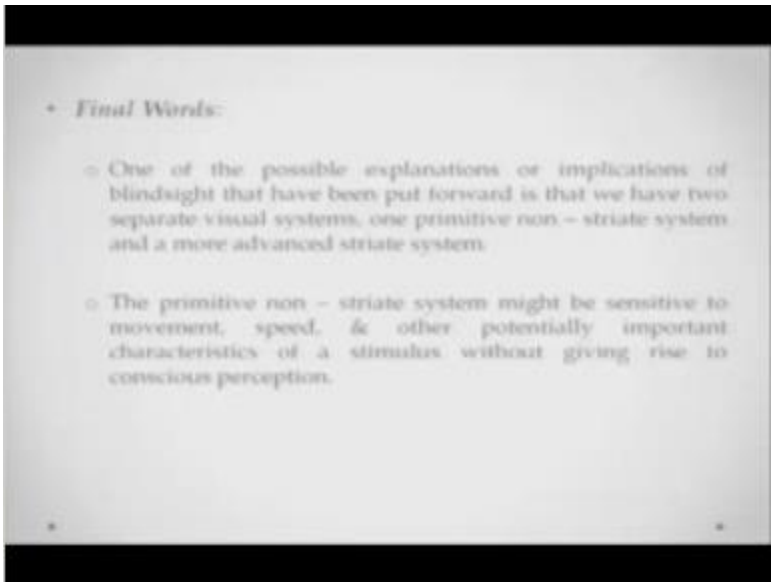

Coming to the final words just coming to what blind site is about so one of the possible explanations or implications of blind sight that have been put forward is that we have two separate visual systems one slightly primitive non-straight system that does not really build upon the straight cortex area and a more advanced straight system that is the you know enhanced area wherein we do all kinds of complex calculations.

The primitive non-straight system might be sensitive to movement speed and other potentially important basic low-level characteristics giving without even giving rise to conscious perception so these, these calculations are so a low-level or so a simple or initial to do that they do not really need to be consciously known that you are calculating the motion or you are calculating the sheer shape or color etc.

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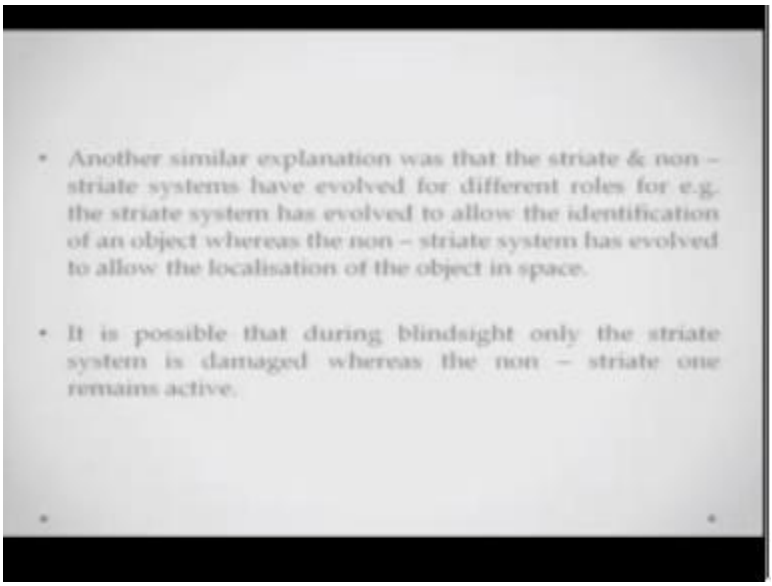

The other similar explanation was that the straight and all straight systems have evolved for different roles for example the straight system has evolved to allow for the identification of an object whereas the non-street system has just evolved for the localization of the object and it is possible that what is happening during blind sight is that only this create system is damaged whereas the non straight system remains active and remains preserved and that non spirit system is basically leading to you know the incidences of blight site in patients having Scotia patients having blind regions because of damage to the street context this was all about Blind Side we have talked about disorders of perception we have talked about synesthesia we have talked about Blind Side.

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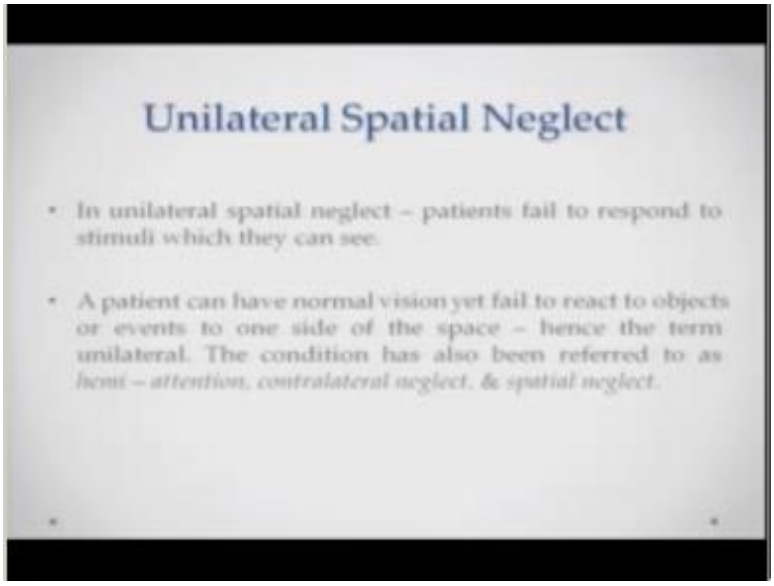

Let us now turn towards disorders which might more be disorders attention than perception so this very interesting disorders that one comes across is the is order called unilateral spatial neglect there are other names for the same disorder as well say for example Hemmer attention or contra lateral neglector spatial neglect etc now what happens in this particular disorder in unilateral spatial neglect that is what we will refer and this as the USN patients do fail to respond to simile which they can actually see.

So there could be a patient who has a normal vision but still fails to react to objects or events to one side of the space hence this is termed unilateral say for example they could be a patient who is who has having some deficit in the left part of the brain and will basically neglect everything that is forming in the right visual field even though the visual apparatus is completely intact even though everything is actually seen but the patient do not you know interact with that object they do not report seeing that object they completely report being oblivious to that objects presence.

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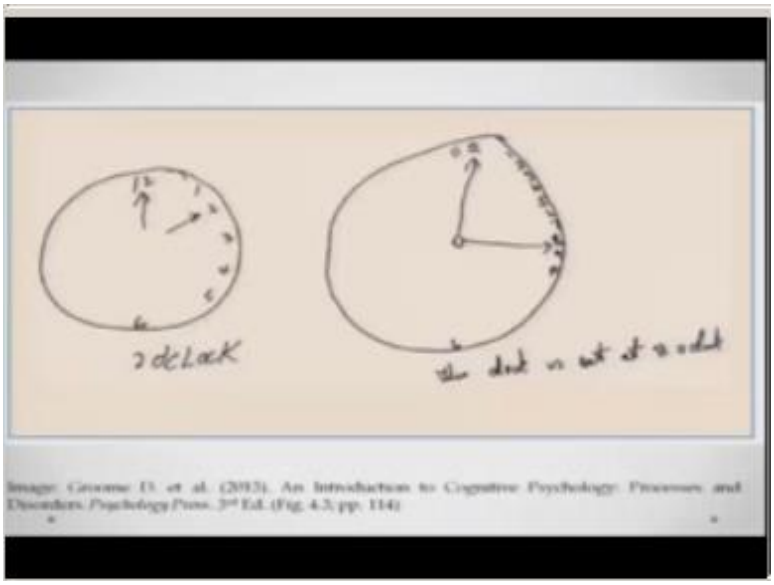

So you can see here this is the drawing by a patient of a unilateral spatial neglect and you see that if you ask this person to draw a clock this person draws all the numbers only to one side of the visual field and does not draw anything to the other side it is not that the eyes are not working again it is not a disorder of visual perception it is basically that this person is not being able to attend anything that is on the contra lateral visual field this is what is called unilateral spatial neglect.

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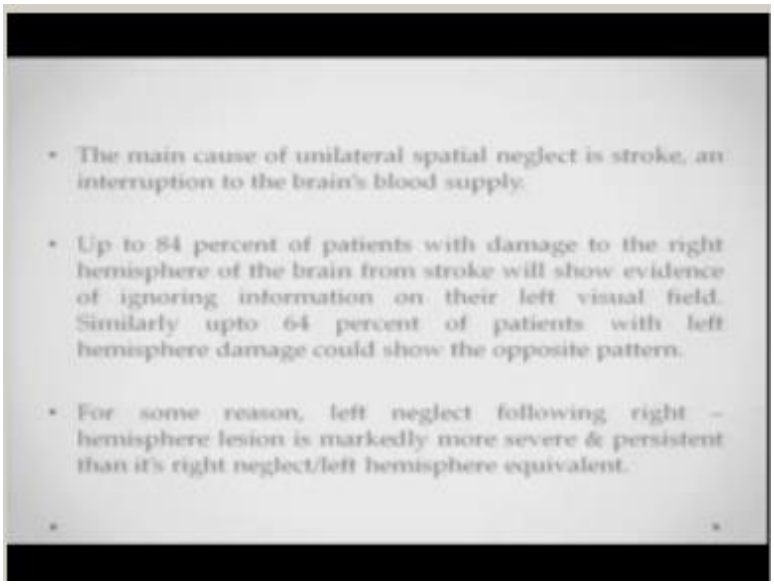

Now the main cause of unilateral spatial neglect is a stroke or hemorrhage which is basically an interruption to the brains blood supply up to 84 percent of patients with damage to the right hemisphere of the brain from stroke will show evidence of ignoring information on the left side of the visual field similarly up to 64percent of the patients with damage to the left hemisphere could show the opposite pattern they will start ignoring information on the right hemisphere now for some reason and it has been shown that the left neglect following right hemisphere damage is markedly more severe.

And persistent than is right neglect following left hemisphere damage because probably the right MSO still does some of the remaining processing now patients with USN unilateral spatial neglect may fail to notice an object in clear view on the left side they ignored people approaching from the left side they would eat only from the left side of the plate they would basically dress only the right side of the body there is interesting anecdotes about us n you might find in a lot of books in neuropsychology that there was this patient who was suffering from un registration neglect every time you know he would go on to shave or go on to dress himself.

He will just shave one side of the face and wear shirt or pant only on one side of the body and not on the other side it is because this person is not being able to attend to anything that is on the contra lateral hemi field now USN if you kind of dwell on.

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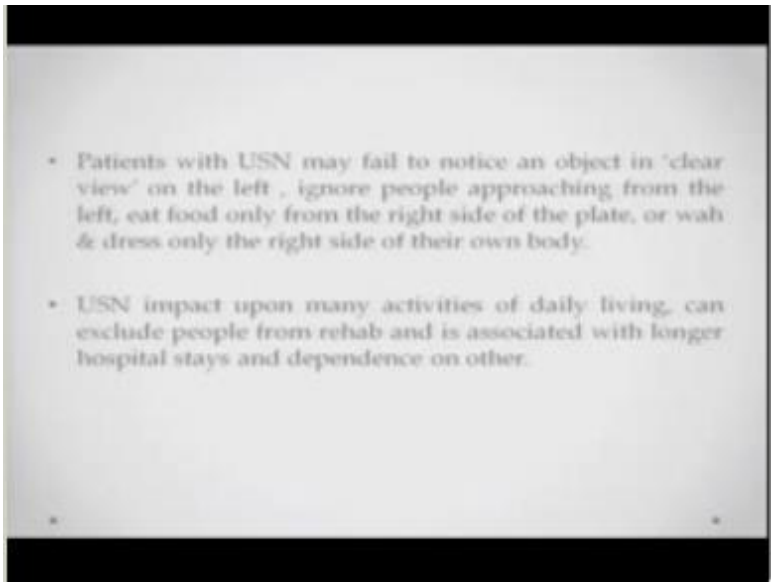

The kind of description have given of this particular disorder may impact people's daily living may exclude them from rehabs and is associated with longer hospital stays and dependence on the other if a person is not capable of really looking at anything on one entire side of the visual field obviously the person would need a lot of help even doing daily chores like you know brushing their teeth or shaving and things like that.

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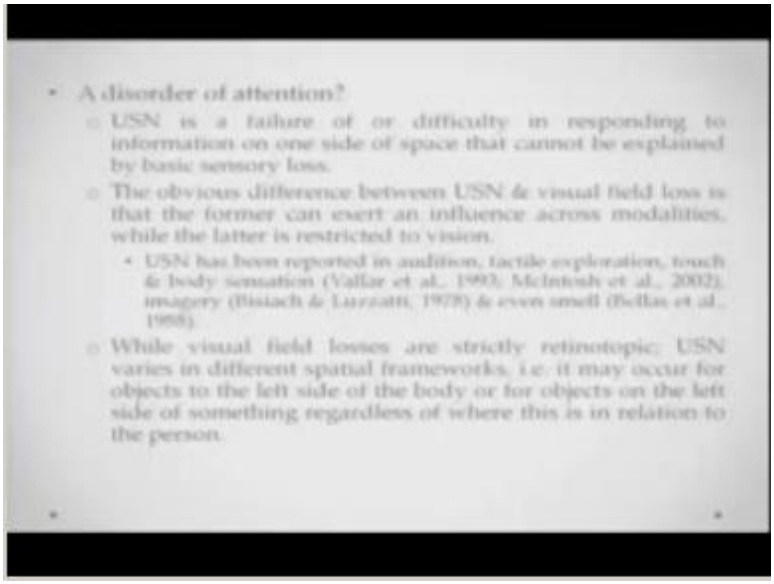

A disorder for tension so there has been considerable debate about this as well So USN seems to be a failure of or a difficulty in responding to information on one side of the space that cannot be explained by any sensory loss there is no basic sensory loss here there are visual systems are intact and functioning normally now the obvious difference between a unilateral special neglect and which we feel loss is that the former can exert influence on across modalities that is the USN can actually exist across modalities hearing might also be affected listening might also be affected while the visual field loss things like you know in blind sight is basically limited.

And limited to one modality only USN has been as I was saying reported in audition tactile exploration touching body sensation etcetera my visual field losses are strictly retie no topic USN varies indifferent spatial frameworks that is it may occur from objects to the left side of the body or for objects on the left side of a particular you know something about example if I'm looking at a particular car I might not see the left side of the car but only the right side of the car so it can be you know in that sense as well.

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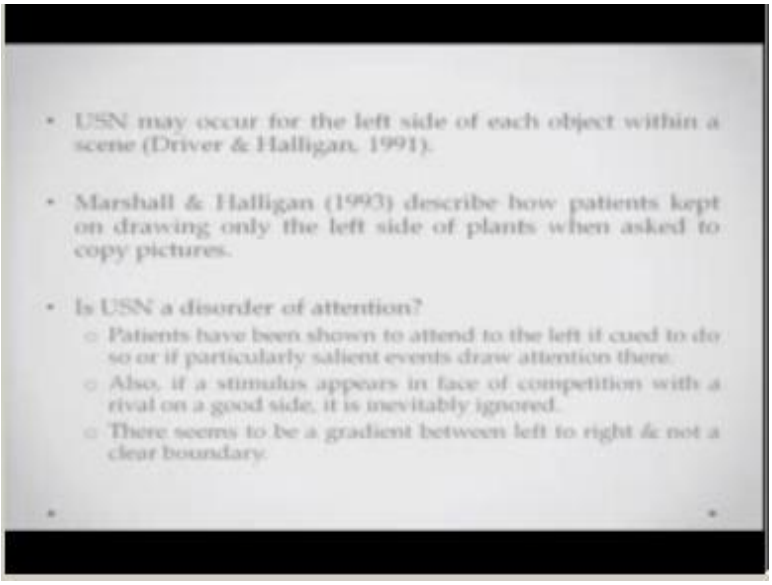

Now USN may occur for the left side of the each object within a scene so if you are actually you know a patient of USN you are looking at a particular painting you might not be able to see anything on the right side of painting or say for example if you are you know if you are having right over so damage you not being able to see anything on the left side of the painting now Marshall and Hooligan in 1993 they described how patients kept on drawing pictures only of the left side of the plants when asked to copy pictures so they gave people these you know drawings to copy and they would consistently only copy the left side in plants.

But not the right side because they are not being able to see that is USN again a disorder of attention patients have been shown to attend to the left if qj-- to do so this is interesting because the visual sensory system is working fine if you can somehow get them to attend to this neglect site they have been shown to be able to attain that this is something which will you know kind of establish that this is more a disorder of attention than perception also if a stimulus appears in face of a competition with you know within a rival with a rival in the good side then it is inevitably at not.

So if for example you are giving two stimuli to people one is on the left side one is on the right side and the left side is your neglected side if you could draw the attention to the left side the person might be able to see it but if at the same time there is a competing object on the good side that is the right side this competition will lead to this ignored part being ignored permanently now there seems to be gradient also between the left to right and there is no clear boundary say for example till a particular point the person will see after that you know the activity or the experience of that object will be going on in tapering off so they have been a lot of studies, studies say for example.

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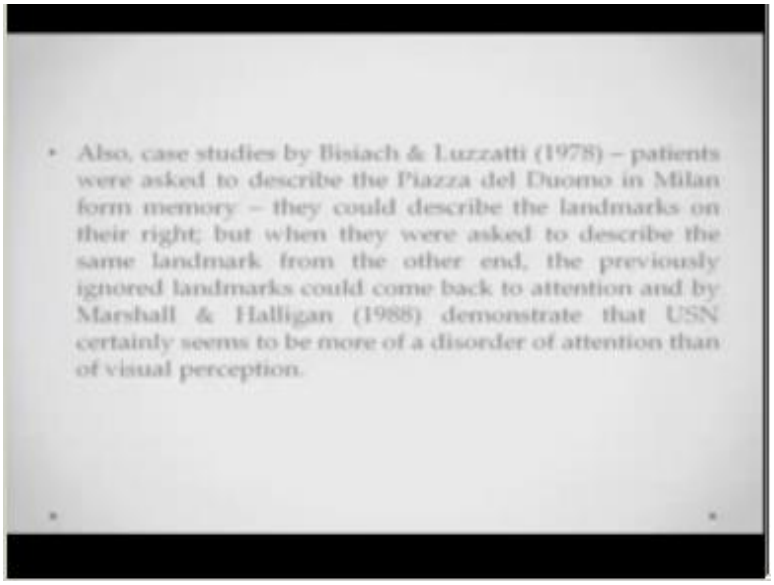

Case studies by BCI and gazette in 1978 they what they did was they asked the patients to describe safer and describe the piazzadel doom which is a famous landmark in Milan and they basically were asked to describe these things or draw these things from memory now interesting thing was they would they could describe the landmarks on their right but when they were asked to describe the same landmark from the other and.

So say for example the situation was stand on the North's corner and explain and describe all the land ma so these people will describe everything on the right from the north once they had given

all of these descriptions they were said change the ends go to the south end and again describe whatever you see this time whatever landmarks they had left in the previous description came to the Census and they could actually describe the entire thing so this is again a demonstration of this being more a matter of attention than perception it is due to something that is wrong with

The plane that these of these objects to this contra lateral hemi field is completely ignored or completely missed and cannot even be accessed by memory Marshall Hooligan they also did a very similar demonstration with the US in patience wherein basically they say that this seems to be having similar findings that this seems to be more of a disorder of attention than visual perception what could be.

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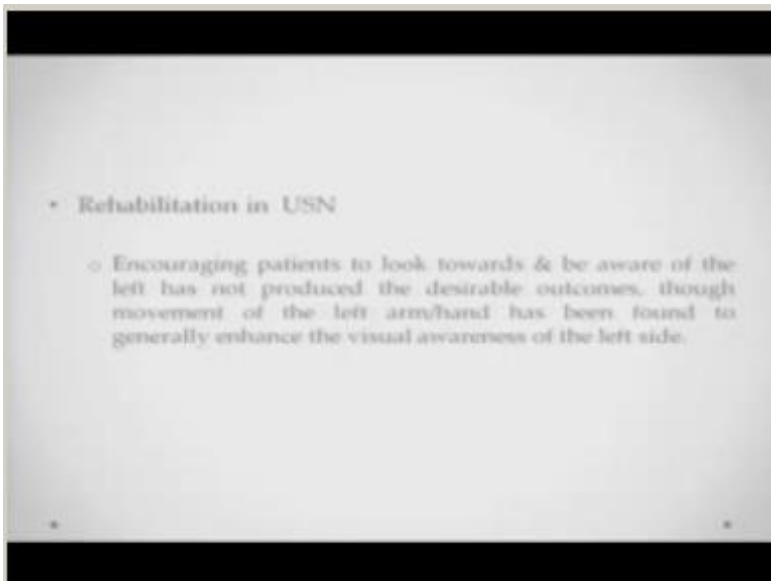

The possible rehabilitation process in US n so Anker we could encourage patients to look towards and be aware of the left side and that has basically you know not really been able to produce a lot of outcomes though how are the movement of the left arm or some kind of moment the left visual field has led to participants being able to attain through things in the neglected we should feel as well.

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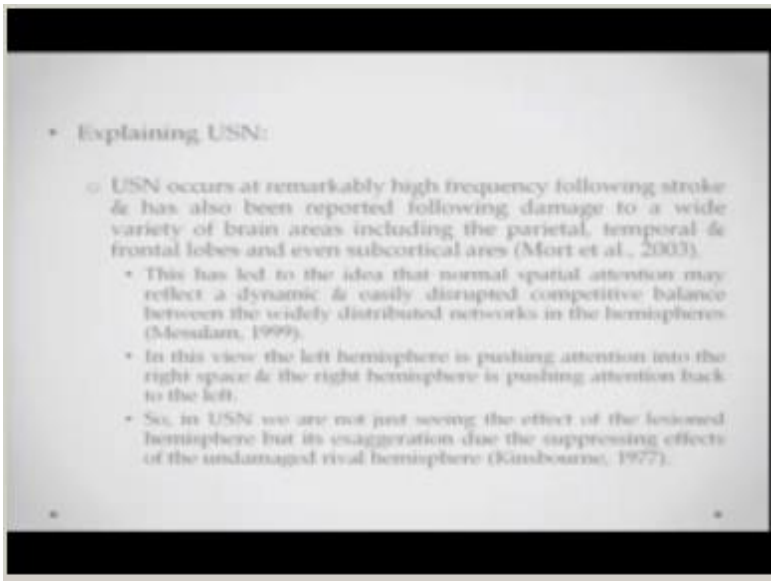

Let us try and explain what USNS about so USN basically occurs at are mark ably high frequency following stroke and has also been reported following damage to a wide variety of brain areas including the parietal temporal and frontal lobes even also sub cortical, sub cortical areas now this has led to the idea that normal spatial attention may reflect a dynamic and easily disruptive competitive balance between the widely distributed network in the hemisphere so it says that all of these areas of visual processing perceptual processing and memory they are competing within the two hemispheres.

So in this view what they say is that the left hemisphere is put pushing attention towards the right space whereas the right hemisphere is pushing attention towards the left space and in a normal individual this is balanced so that you get to attend both the spaces in unilateral spatial neglect what happens is we are not really just seeing the effect of the lesion right hemisphere or the lesion left hemisphere but also its exaggeration due to the fact that the good he is where the you know intact hemisphere is kind of suppressing everything out of that particular visual field so it is exaggeration due to the suppressing effects of the undamaged hemisphere is basically probably leading to this kind of neglect of this particular hemi field now let us come to a third disorder .

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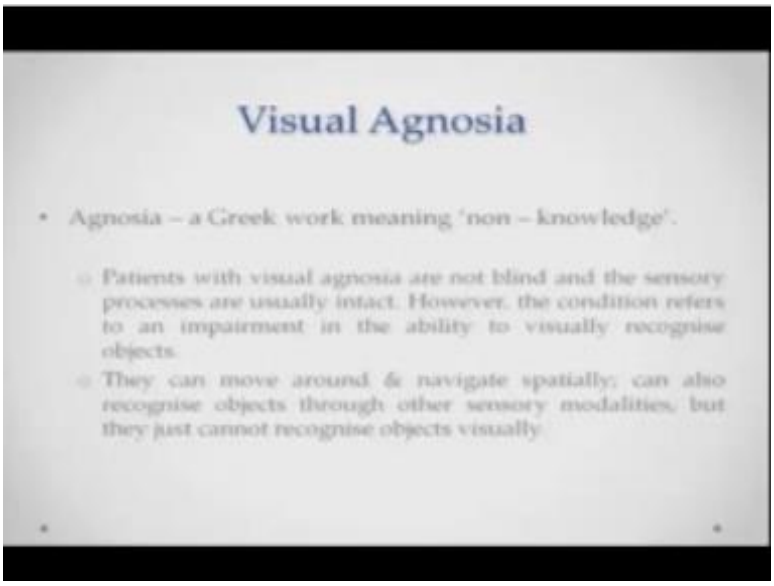

Visual agnosia basically comes from a Greek word at nausea means no knowledge so visual is no knowledge visually of something now patients with visual agnosia are not really blind and the sensory processes are usually intact however the condition refers to an impairment in the ability to visually recognize walking this might also be you know coming out as a disorder of attention and perception now they can move around and navigate especially everything is fine they can also recognize objects via other modalities say.

For example there is a patient when she was asked to look at a candle and tell what this is named the object she was not being able to do that but if there she was asked to take the candle in the hand touch it and tell what this candle is she could do it perfectly well so these people just cannot recognize objects visually that is why the disorder is termed as visual agnosia now two kinds are proposed a perceptive and nausea and associated with nausea someone suffering from a perceptive with nausea can be thought

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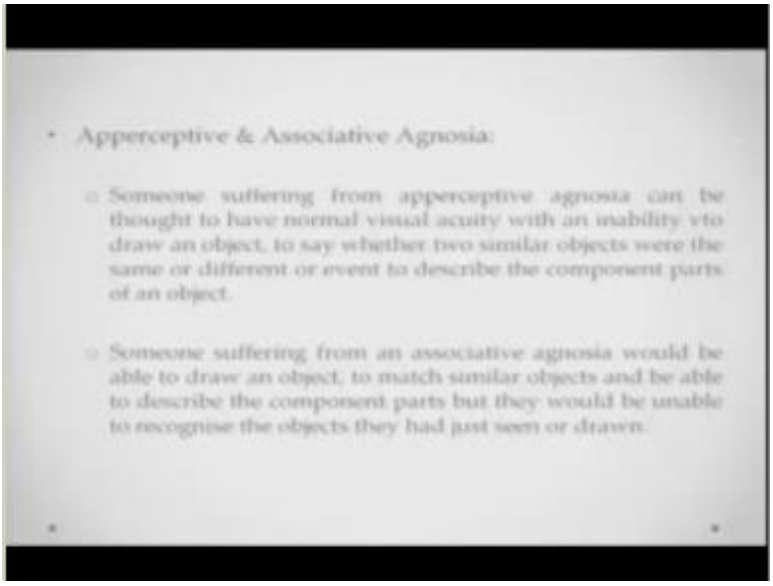

To have normal visual equity with an inability to draw an object two saws to say whether two similar objects are the same or different or even to describe the components of the Soviet so they are not being able to build the percept in the first place someone on the other hands are suffering from associated with nausea would be able to draw an objector match similar objects to this particular object.

And would also be able to describe the components of this particular object but they would be unable to recognize the objects that they had just seen or Torn so in that in these people the con the problem is not with creating percept but the problem is with associating the percept to whatever knowledge that the person already has so hearing you can see the drawings of a perceptive egg nausea patient.

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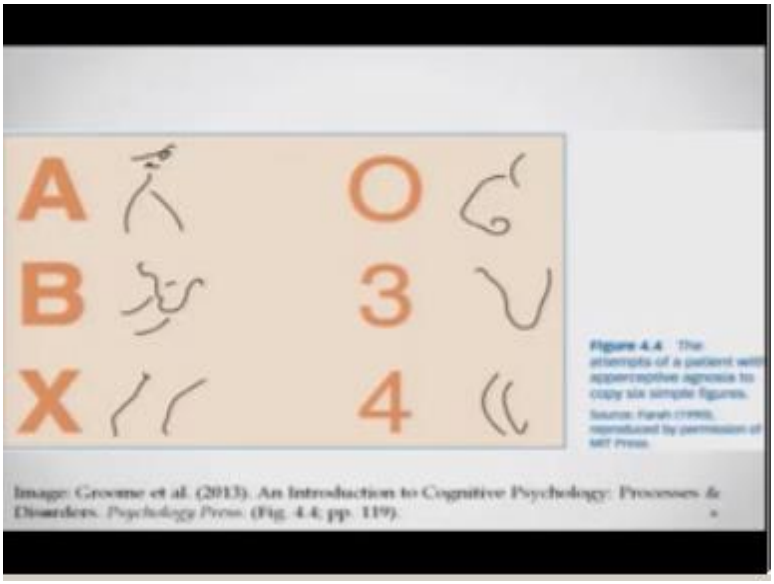

So they are not really even being able to draw these very simple figures that would be otherwise a rather easy to do you know from the perspective of normal individuals.

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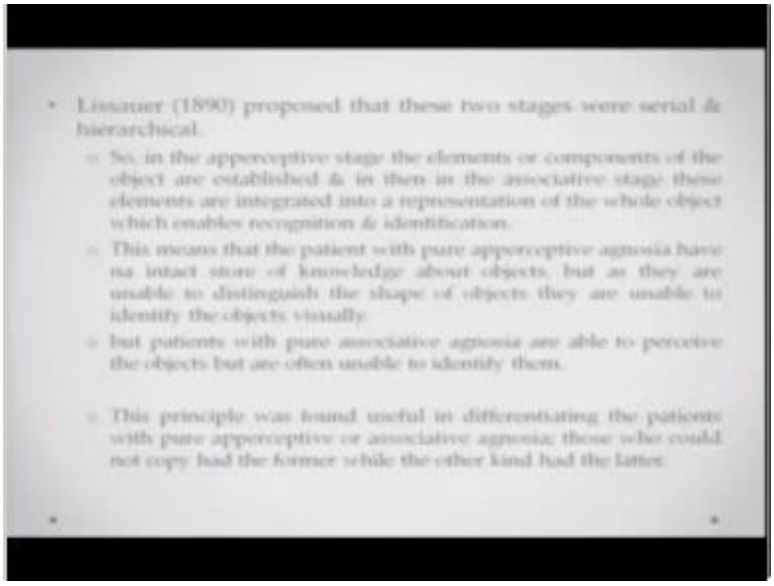

Now lizard in 1890 proposed that these two stages are perceptive and associated with nausea are rather you know hierarchical and sequential in the first place so he says that in the perceptive stage of perception the elements or the components of the objects are established and in then in the associative stage these are integrated to form particular objects and then linked to the knowledge which will help you identify.

And recognize these objects this would mean that the patients with pure a perceptive agnosia have an intact store of knowledge about objects but they are unable to distinguish the shape of the objects because they are unable to identify the objects visually they are not being able to create that percept to link to that knowledge but patients with pure associative witness here are rather able to perceive.

The objects but are often able to unidentified them and this principle was found useful in differentiating the patients with pure perceptive or associated with nausea and those who could say for example the idea could be that those who could not copy had the perceptive agnosia those who could at least copy but could not name had associative inverse.

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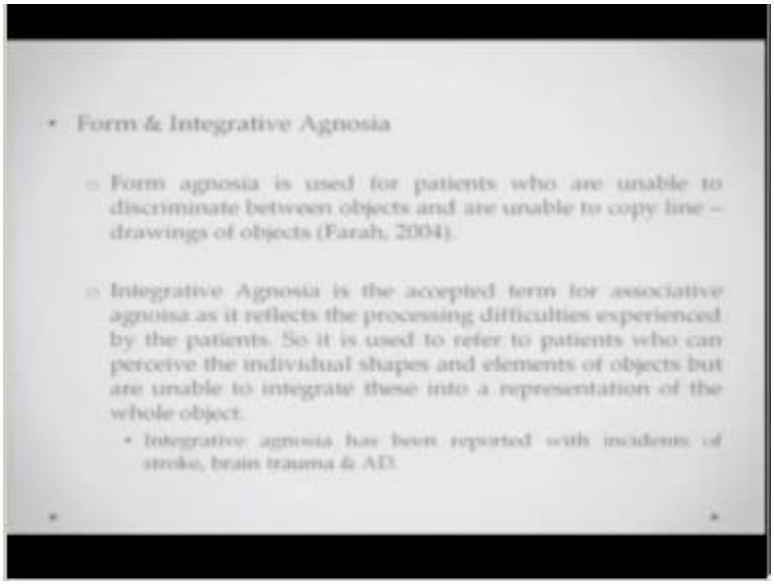

There now they could also be related forms form in nausea integrative and nausea form as nausea is basically very similar to what a perceptive agnosia is like so it is used for patients who are unable to discriminate between objects who are unable to copy line drawings of objects again it comes out of the research for fare 99 2004 integrative el nausea is basically the term which is you know use nowadays for associative egg nausea at this term it reflects the actual difficulty is the processing difficulties are these patients are facing.

So it is used with effort to patients who can perceive the individual shapes who can kind of create the percept but they cannot integrate these shapes into a representation of a whole object say for example if you are showing this person particular let us say television he might be able to get this rectangle shape and the square shape and those kind of things.

But will not be able to integrate these shapes to form the particular object and hence he will not be able to name that object now how would be a life with visual agnosia patients say for example like ajar which was reported by Humphreys in relock with visual for madness actually experience a very confused and a distorted visual world.

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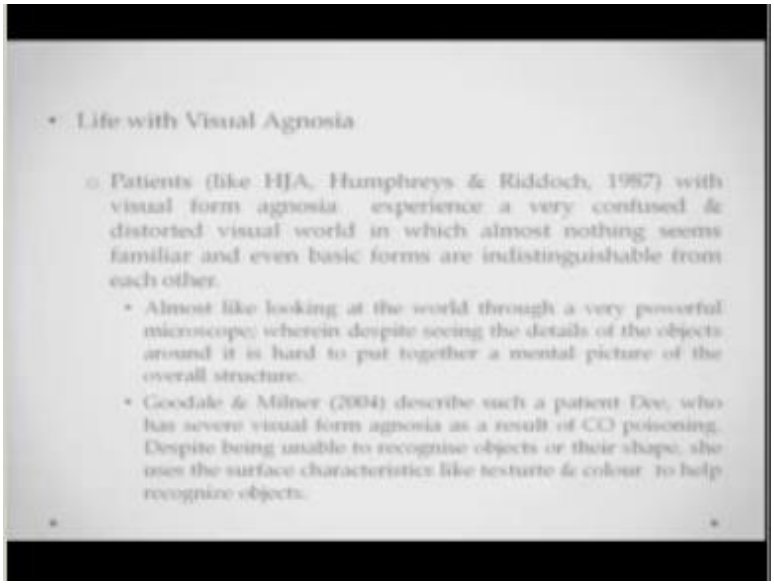

In which almost everything feels distorted nothing seems to eerily familiar and even basic forms are indistinguishable from each other because they are just geometric shapes line drawings lines and you know forms all mixed up into each other nothing really identifying itself as a unique object it is almost like looking at the world through a very powerful microscope wherein despite seeing all the details of everything that is around you it is hard to put together a mental picture of these objects.

Now Gödel and Milner are they describe such a patient miss D who had severe visual format nausea as a result of carbon monoxide poisoning now despite being unable to recognize visual objects from their shape she could use the surface characteristics like texture and color to help recognize objects so other modalities are working completely fine it says that they are not being able to associate or integrate this information visually also it there could be a difference in perception between animate versus inanimate objects.

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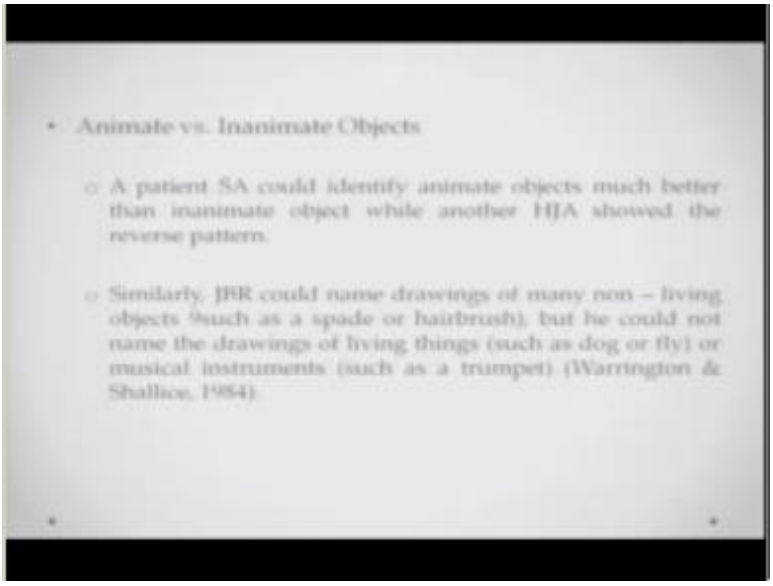

So a patient was named saw who could identify animate objects much better than the inanimate objects why another patient AJ could identify inanimate objects much better than the animator so these kind of dissociations have also been reported similarly other patient could name the line drawings of many nonliving objects such as speed or a hairbrush or you know hammers things like that but you could not name the line drawings of living things say for example such as a dog or a fly or musical instrument such as trumpet and this is reported by the studies of Morning ton and chalice in1984.

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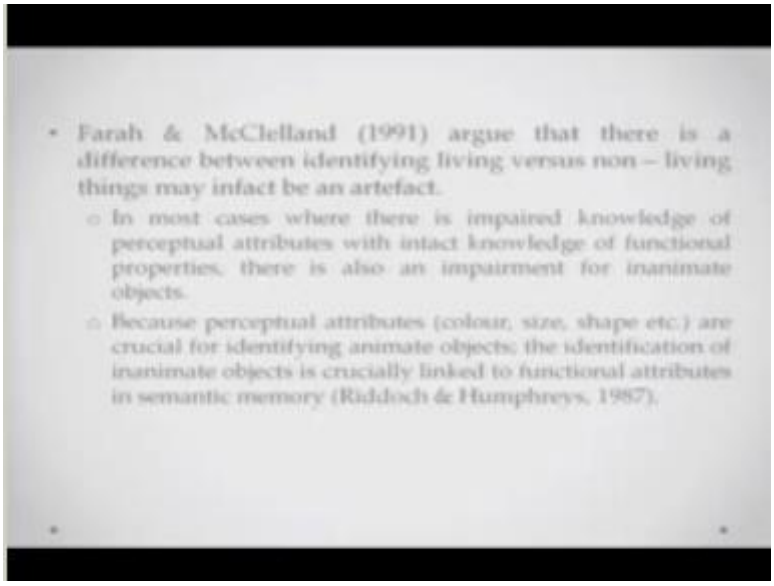

Now foreign McClelland in 1991argued that there is a difference between identifying a living person versus a non living person and this difference basically this difference which is being coming out is might just be an artifact so I say in most cases whenever there is impaired knowledge of perceptual attributes within tact knowledge of functional attributes there's also an impairment for inanimate objects.

So this impairment in recognizing inanimate objects is not really a perceptual impairment or attention impairment is basically an impairment that you do not know about the perceptual attributes but you at least know about the function part now because perceptual attributes are crucial for identifying in animate, animate objects the identification of animate inanimate objects is crucially linked to the functional attributes in semantic memory

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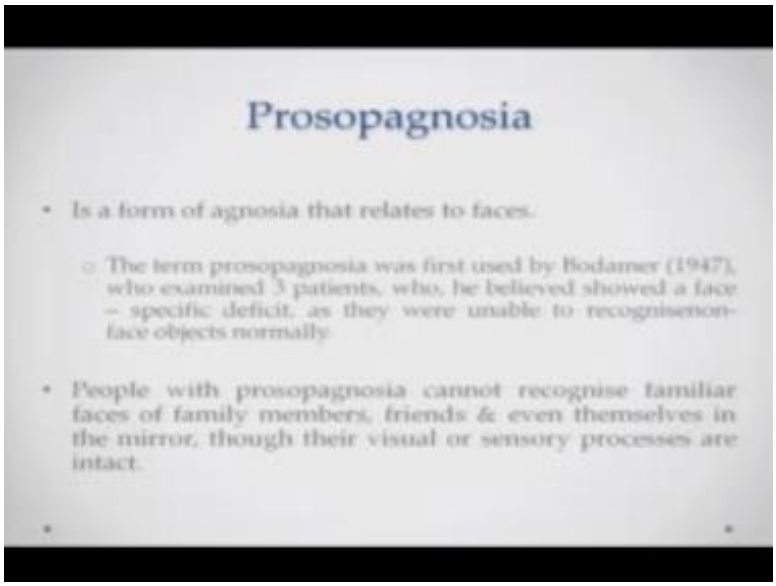

Now coming towards the end talking about prosopagnosia, is basically a form of agnosia that relates to faces the term prosopagnosia was first used by polymeric 1947 who examined ten patients who he believed showed a face specific deficit so these people were not able to recognize the non face you know faces but they were able to recognize non-face objects completely normally people with prosopagnosia cannot even recognize familiar faces of family members friends or even themselves in a mirror though their visual and sensory processes otherwise for all other classes of objects are working completely fine.

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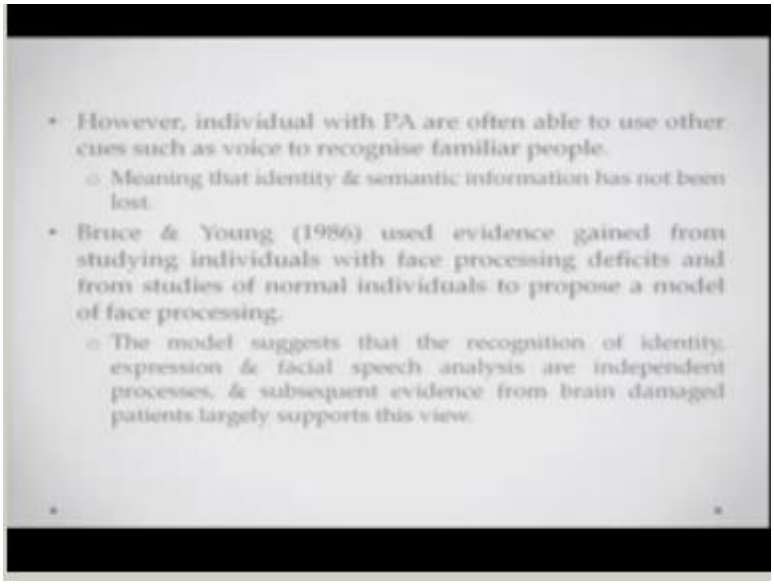

However individuals which was very noisy are often able to use other cues such as voice recognition to recognize a familiar people it just means that the identity and the semantic information has not been lost it is just that the visual Association of the face is gone loosing young did a lot of work with prosopagnosia and they use this evidence gained from studying individuals and from studies of normal individuals as well to produce a model of face person the model suggests that the recognition of identity and expression facial speech analysis are independent processes and subsequent evidence from different brain damage their patients have actually supported this particularly.

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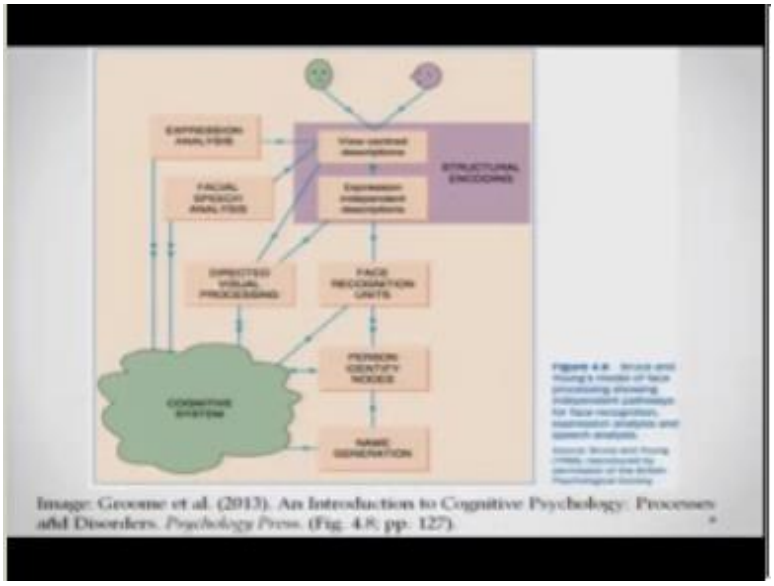

So this is the model here it shows that expression analysis facial speech analysis or face recognition unit or say for example viewer centered descriptions of faces are all independent things identity is an independent process and all of these kind of operate in cooperation with each other to get you the overall percept of somebody's face though they are functionally or other independent of each.

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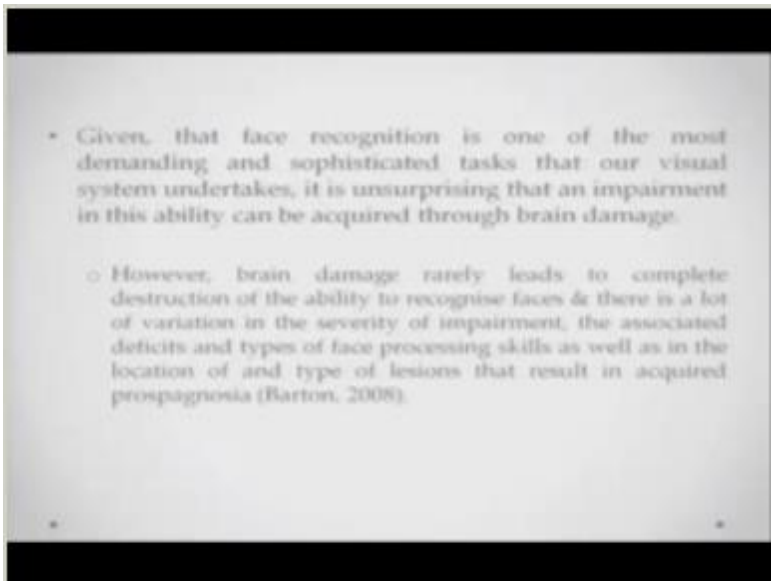

Now given that face recognition is one the most demanding and sophisticated tasks that our visual system undertake sit is completely unsurprising that an impairment in this ability can be acquired through brain damage there has to be something wrong with the brain for this kind of deficit to image our brain damage rarely leads to complete destruction of the ability to recognize faces there is a lot of variation in the severity of impairment into the kind of experience that these patients of prosopagnosia are having also they might have different levels of preserved skills for facial processing as well.

And it is not completely gone now living with prosopagnosia so data from imaging studies has also demonstrated that most cases of prosopagnosia have you know found they have damaged in the fuse form and the lingual gyros although there are face cases of damage in the more anterior temporal yet the face recognition is also being shown as a key and the fusil form area has also been shown as a key structure in face.

And object processing in numerous other studies and it has been shown that an area in the fuse form gyros typically now known as the fuse form face area is a critical region in recognizing faces there is this variability however in the location of the uniform face area in individuals and

this may help to explain why prosopagnosia sometimes seems to occur with damage only in one of the hemispheres.

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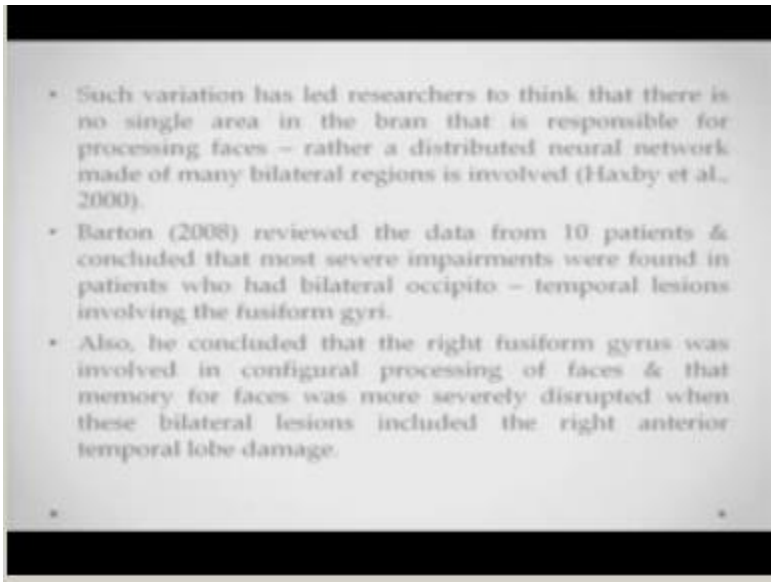

Such variation has led researchers to think that there is no single area in the brain that is responsible for crossing faces rather a distributed neural network of areas composed of many bilateral regions is involved in perceiving faces Barton 2008 reviewed data from ten patients and they concluded that severe impairments were found in patients with the you know in the bilateral occipital temporal lesions involving.

The fusiform gyros which had led to a prosopagnosia also he concluded that the right uniform gyros was involved in the configure processing of faces and that memory for faces were more severely disrupted when these bilateral lesions also included the right anterior temporal lobe so again you can see that these different areas are involved in different ways in processing of faces because face generally is a slightly complex percept now is prosopagnosia a face a specific disorder red rocking colleagues in 2008they studied the patient me.

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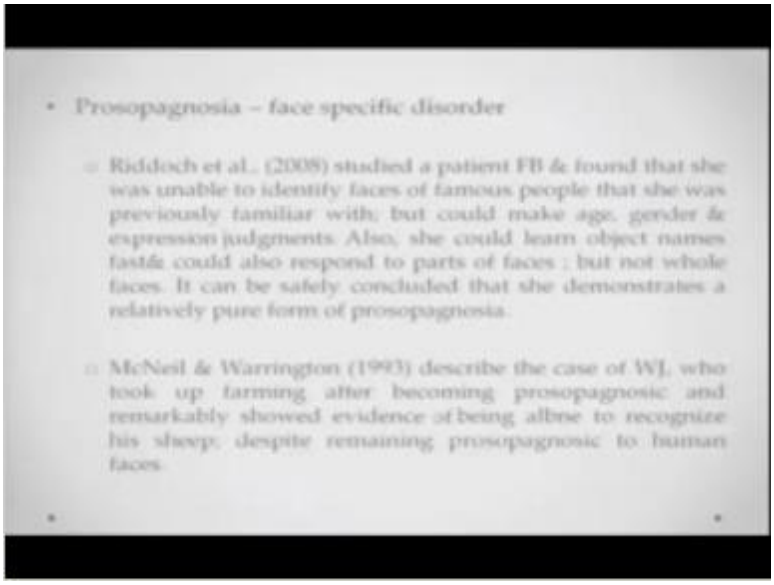

And they found that she was unable to identify faces of famous people and those she was actually previously familiar with but could make age gender and expressionist judgments also she could learn object names almost as fast as other controls so it could be safely concluded from you know the studies on FB that she demonstrates a relatively pure form of prosopagnosia everything else is intact.

All other I will it is her intact only the ability of recognizing faces is suffering so that is why this was regarded as a pure form of prosopagnosia now McNeill in Warrington in 1993 they receive a case of an WJ who took a farming and became prosopagnosia and remarkably showed the evidence of being able to recognize his sheep despite being a remaining prosopagnosia to human faces as I will also describe.

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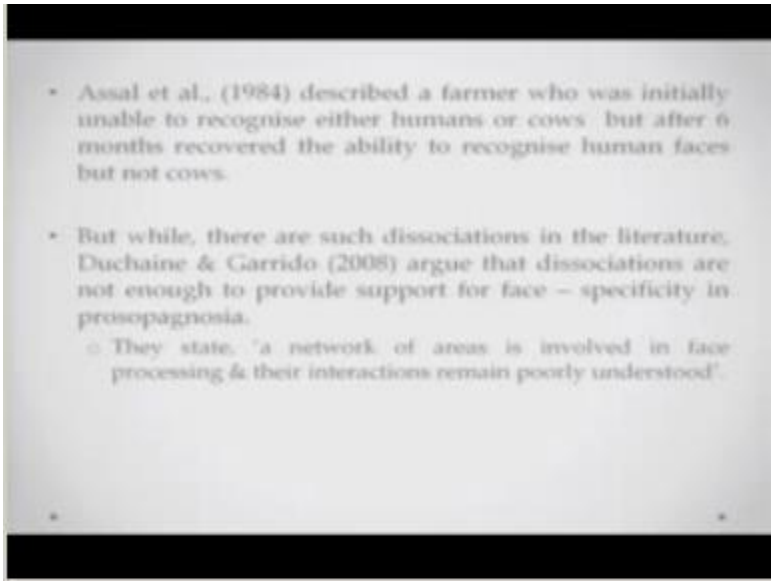

A farmer was initially unable to recognize either humans or cows but after six months he gained the ability to recognize humans but not cows Duchene and Garrison also report that dissociate these kind of dissociations are not really enough to provide the support for face specificity for prosopagnosia.

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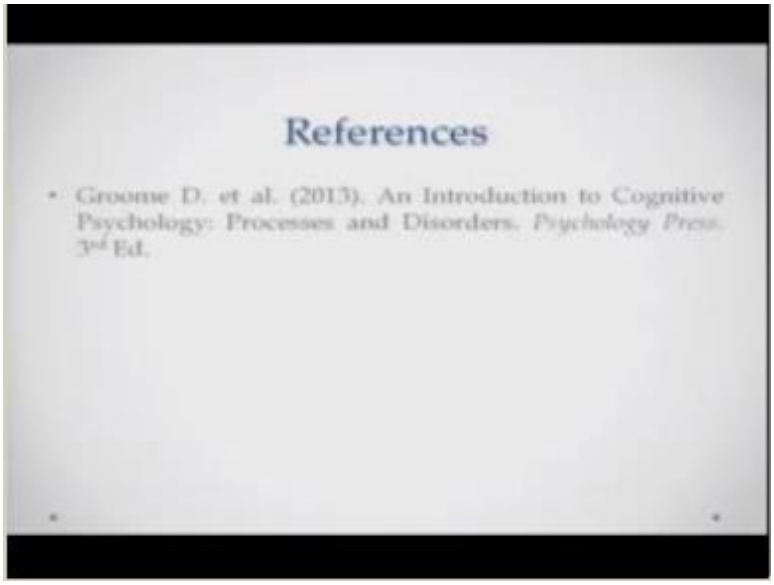

So this is all about disorders we have covered quite a few disorders both of attention and perception in the study I hope this would help you gain some insight into the theories that we have studied earlier and try and link those and you could try to link those theories the kind of experience that these disorders have described thank you.

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