Dr. Barry -- the optometric -- document Director of the noon without -- Africans and a professor at the New England College of optometry. In 2004 he was appointed chief of the individual with disabilities service of the New England eye Institute also known as [Indiscernible]. Next I'm is a dark right with court nadir of the New England eye low vision clinic at Perkins. Is also adjunct faculty at -- and adjunct assistant professor of vision rehabilitation at the New England College of optometry. Dr. -- is a vision scientist and an internationally recognized expert in visual field testing of children and individuals with multiple impairments. Before to New England I though vision clinic of Perkins Dr. Mir was in practice that Boston Children's Hospital and currently on faculty at noon lunch College of optometry and New England eye Institute.

Nemechek with my technical Director to make sure we are recording. We are. To get our panel will present today's topic cortical cerebral visual impairment , what is and can they coexist with other impairments. This is part one of a two-part series which continues next month on April 8. Obtain the panel over now to Dr. [Indiscernible] who can take it from your. Thank you.

Thank you. Good afternoon, everyone and welcome to our first of two parts where we will be talking about cortical and cerebral but impairment. They are several textbooks published on this topic at this point in time and there are several book chapters on this. The point of our session with you over the next couple despite the point of our sessions is to provide you with our background and how we approach a patient with cortical cerebral visual impairment. Is it one or several entities and can it coexist with other ocular impairments?

Our objectives are to increase in the sting of the diversity of signs and symptoms of vision impairment secondary to pediatric rain damage or mell development. To understand the difference between praying related or non-brain related classification of vision loss.

A prominent pediatric ophthalmologist in the Boston area has said about preemie with ROP all right not the immaturity but not blinding? And maybe a little brain injury but not a devastating brain. Some to be I say truly important for them to know if a child's poor vision is due to the brain or DI, the I, retina because they would teach them differently.

The brain develops the route gestation and develops remarkably so in the final trimester of birth. So not only are the nerves themselves, the axons developing but the support cells

that go along with the development of the axons as well as the vascular system so these cells are extremely fragile as they are developing. As such are the most sensitive to trauma of any type when that occurs. In the last -- from 24 weeks to return each cortical neuron establishes 1000 synaptic connections. The last trimester, several hundred million synapses are created every minute. You can imagine the impact that any type of trauma or mail development will have. In those highly developing areas.

Here we see some pictures of some brain abnormalities secondary that one would find with preterm brain injury. We will seek localized and generalized white matter damage also called -- subject of which is called. Tubular look omens I shepherd what that means is English is rather ventricles and the cells right along they ventricles are these openings in the brain that have fluid that beat the brain and take away some waste and supply some nutrition. Here the developing new runs in the developing vascular -- arts drama prone to early insults and damage and it those areas that are involved. So we can ultimately impaired can have impaired cortical folding, reduced gray and white matter and reduced growth of the development of the posterior colostrum and its connections and it is the posterior corpus callosum connects the secondary visionary in the brain between the left and right hemisphere and is often associated with cerebral visual impairment as opposed to cortical visual impairment.

Here we see picture of the brain and you can see -- looking for the arrow and I'm not seeing it appear. Let's try grabbing it again. Okay, here we will see the white area here is the white matter of the brain and here were the axons or at the gray matter is and I'm clicking right there. We have the white mat are here and the gray matter there. And this would be the front of the brain or the frontal lobe and so you get the hint of some ventricles here and here and here you see the occipital cortex on either side here.

Associated with preterm injury are as cerebral palsy, growth poor and fine motor skills, poor adaptive functioning, lower intelligence quotient, behavioral and emotional problems, asthma for those preemies who have now developed respiratory systems and visual pathway abnormalities all along the visual pathway from the I although way back attentively through and to the occipital cortex and into the secondary visual areas that will lead to the perhaps dissociation of not only ROP but cortical and/or cerebral visual impairment.

Full-term birth where the brain is now more uniformly developing will have perhaps bored diffuse damage located throughout the brain as in this example here with the diffuse hypoxic sex yeah encephalopathy. Over here if one area of the brain that by blood vessel if there is a stroke there than one would predict damage just on the outside and that could result with loss of motor function or vision function relative to the damage on that side of the brain. You could also have problems as well here with motor control, cognition, emotions in the morning and can also be associated with the depend upon the impact and where the lesions are of cortical and the cerebral visual impairment.

Here we see then an outline of the eye which is part of the brain and -- anatomically and the brain itself and when we talk about the ocular structures what we mean by that are the eyes themselves and the beginning of the nerve fibers coming back where the optic nerves. They meet your at this spot called -- were fibers cross and what happens here is an this right visual field you will see that the fibers from the nasal area of the right -- retina of the right Iowan the Temple fibers of the left eye was would've me and join and come back to the left side of the brain and vice versa happened on the other side of the brain and here you see the optic radiation coming back from the elegy in federal -- nucleus back to the occipital cortex. Central and peripheral visual information fibers come back here where information is received acuity is gained, peripheral field information is obtained and then secondary processing comes out from there among other areas the temporal lobe in the quiet although

When we think about the patients that we work with here there's a hierarchy that we look at a vision loss. It is just ocular, does someone's potential refractive error or cataract explain what's happening? With their entire visual function and use a vision or functional vision? Is it an oculomotor issue that the primary or secondary orators here he caused? Is a cortical? Cortical visual impairment sometimes or classically has been defined sort of as good eyes but bad brain but specifically occipital cortex. Also you think about cortical blindness from back in the beginning of the 20th century were soldiers with gunshot wounds to the occipital cortex presented with otherwise healthy ocular structures but extremely poor central acuity and poor powerful vision.

Or do they have cerebral visual impairment which is post occipital so this a problem with processing afterwards or at least in part afterwards -- after the occipital cortex so then is the result of bilateral damage to both sides of the hemispheres or connections between them.

In a little more detail here again ocular visual impairment Mr. -- with about ocular median, the retina and the optic nerve to the ISM. Here in this picture in the area for those -- and the area in red here is in fact just what we showed on the previous picture, that eye, the retina come to optic nerve all the way back to the chiasm. Is it significant uncorrected refractive error that's the problem? -- such as a cataract, are there retinal lesions, [Indiscernible] that can be of a cause of the problem, is there retinal degeneration or dystrophy and is there Frank optic nerve damage?

Further examples of ocular visual impairment would include but not the a prematurity. You can see here and with optic nerve hypoplasia we have the asterisk here and we could also have brain related visual difficulties that can be -- that can go along with these issues. In review here for a second the top three leading causes of -- one is in the developed world include the number one being cortical/cerebral visual cerebral visual impairment followed by retinopathy of prematurity as well as optic nerve hypoplasia. We have seen a lot of patience in our clinic that have not only retinopathy of prematurity and only a significant refractive error but also have signs and symptoms that can be easily associated to Oracle or cerebral visual impairment but by the same token can be easily overlooked if one is thinking too much about simply ocular causes or ocular motor causes to vision impairment. And our second session we will have examples, case examples of many of these bubbles that you are seen here in this and today's presentation where this will be highlighted even further.

We also talk about it, topsy which is and absence of caller vision, labors congenital Ambrose as which is and hereditary loss of retinal function early in life associated with also an ocular motor problem -- bystanders also found in individuals with a woman is him and reduced acuity and perhaps infield issues as well.

The secondary we will touch on briefly today is our ocular motor causes for visual impairment. These can be associated in the brain, the brain stem throughout the brain actually. One fighting here would be nice deadness as we talk about just before that you see in individuals for example with albinism. Patients tend to develop initially you will see are very rapid movement of the eyes arrhythmic to them from Ocean for example of the eye so they can also be Rhoda Tori was sometimes a vertical but typically horizontal in nature. The individual learns over time how to know or reduce that jerkiness of the eyes in order to maximize acuity and improve the visual image that they are receiving. Sometimes individuals will adopt an over convergence of the eyes where the ice will cross and that will quell or reduce the -- of the times that my haven't aberrant head/eye posture adaptation that they will utilize in order to know that I stand Ms.. Functionally though that could lead to a misdiagnosis of a field lost or even the behavioral associated with CVI in that they are not good Skinners with their eyes but rather had movers rather than I Skinners and so we can be folded unless we pay careful attention to not only their I position but how they are using their eyes along with their head. Ideomotor apraxia is another issue of oculomotor control problems that's associated with the inability to make or is on tour -- saccadic eye movements are movements that one makes from one object of regard to another for example a Farber Farber to look from Director to Louisa my area fine vision phobia in each I would fixate on direct than I would pick succession from Derek and fist my gaze over to Louisa. As a result then that would be a -- if I could do that if I needed to go from Derek to Louisa what I would do instead is perhaps shifted my head beyond Louisa and then come back and we fixate on her. You typically see in the literature comments about hit the rust and I think I know for myself I certainly thought when I saw it for the first time it would be extremely obvious and sometimes it is but sometimes it can be subtle especially as they become accustomed to making those movements were subtly in order to fixate orbiters themselves effectively in an environment where those thruster not quite as obvious. Look carefully for those and next time we will have a video showing you an individual with ocular [Indiscernible]

My last topic for this afternoon is cortical visual impairment. Which is post chiasm to -- straight or occipital cortex. Here we see the structures of the brain, this is the front of the brain, the frontal lobe, there are some odor control areas here and attention and attention not just visual attention about attention promotable senses and parietal lobe, occipital load, -- and the temporal lobe and then we have the Cervone over here in the brainstem right here.

Cortical visual impairment we alluded to a little earlier is right here in the occipital cortex.

Some of the characteristics associated with cortical visual impairment include post -- post chiasmus to the occipital lobe include light gazing or with drawl and you can see one or the other. Better visual attention in general for moving versus static objects from Miller versus novel objects, simple versus Kump Lex environments. So as we work with our patients in the clinic we will sometimes adjust or often adjust the environment to see both how the visual function or their functional vision is maximized into also see how it can be interfered with. We also will look at sometimes we see with our patients difficulty integrating gays with reach and you might very well and fact I think have a very excellent video for next line to demonstrate just that, difficulty integrating looking with listening, poor social gaze and delayed visual and other risk this. Many of you already know that Dr. Roman Lansky has codified many of these observations in the schema that looks at both diagnosis and skimming the level of visual impairment Oracle visual impairment as well as then providing a concept around the theoretical approach towards working with individuals with cortical visual impairment. What we find is that as one progresses along that scale to where the very little signs of cortical visual impairment remaining under optimal conditions we might then see some signs that Derek will next talk about the cerebral visual impairment though they can also occur in the absence of cortical visual impairment. I'm going to turn it over to Garrick now.

If I can -- there we go.

I'm going to talk now about the last category which is cerebral and you can see in the title slide that Dr. Mir put it for us and we are talking about after the occipital lobe year, I think actually keep. So back to our picture or image of the brain here, we talk about us Rubel visual impairment were really talking about some other portions of the brain that are involved which included the temporal lobe and frontal lobe so long with the mortar cortices.

After information is received in process by the exit the loop than their relative to these other portions of the brain for additional processing. Or to be paired with I or the body movements. When there is damage to other portions of the brain that CDs input -- occipital lobe, this can result and what we called complex brain processing problems. The rest of the body is really unsure of how to take the visual information and process it in use and make it optional. Dr. Gordon Dutton calls this dorsal ventral stream dysfunctions or Dr. August, greater cause it process cognitive dysfunction so you may be hearing some of these two terms that are kind of at least Reneau I think we believe mean the same sort of thing. Any impairment and these other portions of the brain might be considered what we are now calling cerebral visual impairment.

Here's another great diagram we like to use by Dr. Gordon Dutton and it shows the dorsal ventral stream pathways. What lookslike they are all very separate and very specific, I'm going to tell you right now that it all kind of works together in terms -- they are all communicating with each other and all happening rather simultaneously but for the sake of our discussion today I'm going to separate them out into two discrete systems.

We talk about the ventral stream, salsa known as the what is a system, helps us with recognition of objects and one of the reasons that it is because it involves the temporal lobe. Within the temporal lobes have it houses are visual library. It is where after images information is collected by Jacksonville open a squid to the temporal lobes where it is compared with other images based on our experiences and so forth and this is where words, numbers, shapes, landmarks, faces and names and colors are stored and recognized. That's the ventral stream.

Here's another graphic that shows the location of the occipital and temporal lobes. This example I'm about to show it this little animation is an example of ventral stream function, this is what happens within the brain to hear you say on the left-hand side this right red Apple. That image images going to be received by as was said earlier, the ocular system, the eyes and it is going to be transported by the visual pathway to the occipital lobe in the back of the brain. There it is decodedand then it sent to the ventral system to the temporal lobes and the library is accessed and where were it is finally identified as a red Apple. You can see the animation here. There we have it.

Now when dysfunction individual system or ventral stream occurs than the person may be able to perceive the image with the occipital lobe but they are unable to label or recognize the image even if they have visually acuity and you probably have seen a lot of students that are in the situation where if you look at the visual acuity itself it looks for the good. Butyou are seeing a difference in function so this may be one possible explanation is the ventral stream system is not working properly. Depending on the specific location of the damage within the brain or within the system the person may experience difficulty with only certain images such as faces, numbers or landmarks so I'm a show you my animation. Here goes the Apple through the ocular system, visual pathway received in the occipital lobe to get the some dysfunction now working in the ventral stream. Don't know what that thing is.

Moving onto the dorsal stream of images been sent along the ventral stream this is whole other system that's actually occurring simultaneously at the same time and is called the dorsal stream. The dorsal stream consist of the posterior parietal lobe, the motor trucks and -- were text of damage to the system is probably we think is more common than what's ventral stream dysfunction. Sounlike the ventral stream which is the what is it the dorsal stream is the where is it, this is where vision where action occurs, visually guided movements. So again, after the information is received within the occipital lobe than the posterior portion of the parietal lobe begins to integrate in manages all of this century input and helps with since retention and management of visual complexity. And the motor court treads controls motor movement and body coordination and also the frontal cortex provides -- feedback to the other structures and other system within the dorsal stream to control the head and I movements to go motor planning, visual guidance of movement and visual attention and see if it is very, very complex and all of the systems, all the portions of the brain are working together.

Here's another animation of dorsal stream function, everything is working well, this is supposed to be how it goes. You can see our red apple is embedded with a bunch of other foods, bananas, strawberries and a pair that information is going to be in collected by the ocular system this method by the visual pathways which received with the occipital lobe go remember with Struble visual impairment we are talking about after the occipital lobe so next what's going would happen is the posterior parietal lobe and it is all this complex sensory information and it made work together with the other systems, the frontal cortex and motor cortex than to make a decision about what is it I want to attend to. There's that red apple again. The motor cortex and frontal cortex work together to direct and control the eye movements, the side make a decision that we want it or not wanted in the then work with the body to motor plan and reach out and grasp the apple from the group of fruits. Here we go, take a look here. Here we go into the occipital has said the posterior part a lobe is saying okay, I want to pay attention, apple, work together with the other portions of the dorsal stream and to say I want that, I'm going to be allowed to move my eyes and ultimately reach out and grab the apple.

In this next animation I'm going to illustrate what it might be like and again the animation really doesn't convey how things happen interconnectivity and simultaneously but this is going to be an example of how both systems may work together, about the ventral and dorsal stream work together. Again on the left we have our red apple but this time it is embedded within the montage of people's faces. When the information has been received by the occipital lobe you can see in her diagram words already back there with the occipital low, then the two below Bisquick chicken, the ventral stream and it is going to record highs start looking for things and comparing with individual librarians say red apple. Than the posterior parietal lobe is going to manage the century complex and three input provides accurate spatial information about the apple's location, it is in front of me, for example, then the motor or Texas frontal cortex are going to continue to work together and make some decisions about what to do with the information. Establish and maintain the eye movements and then make a decision if we are going to move the body. You can see here this this management of the century information directed eye movements, labeling and identification , decision-making, motor planning and execution so here's my animation.

Is going to the occipital lobe, temporal up and says there's a apple, it is in front of me, I want that and I'm going to reach out with my right hand. If this is a rudimentary example of how both of these ventral and dorsal streams may work together.

Now let's talk about what happens with the diss -- when dysfunction occurs. If there's dysfunction within the dorsal stream than the ability, the person may experience a variety of difficulties with that. For example, the posterior parietal lobe may not be able to adequately manage all of the sensory information, it is too much put the motor cortex may not be able to generate an appropriate or accurate moment and may not know how to communicate with the rest of the body to move properly. The frontal cortex minute be able to establish or maintain smooth accurate I movements or might not understand where to direct the eye to move so take a look at what happens in this animation with our group of fruits and our red apple.

Here goes. The posterior -- too much information, I cannot process all the stuff, how Twyman, where do I look, I don't know what to do. That becomes very confusing. Another thing that may happen as a person may ultimately get to the appropriate conclusion but it may take a very long time for the system to work so that can be another type of whistle a stream dysfunction. I'm going to look to Dr. -- to spot me on some of the stuff because they are much better at it than I am.

Lastly to some of this up it here we have a picture of where is Waldo. Based on what you've been learning so far by the different categories of visual impairment that we've been talking about and certainly including dorsal ventral stream dysfunction, want you to think about what the process required to complete this task to find Waldo. Which involved with that? How important is the ability to detect fine details or how important is visual acuity and this process? What portion of the brain is being used to recognize and label various individual images and again label should be a real queue here with the two below and is important to first know what Waldo looks like? If it is not my visual library then am I going to be able to click the task or not, what other skills do I have to help support back? Or what happen if could number of your eyes in an organized way across the page with you cannot manage all of the visual information prevented simultaneously, what happens if you look at this, too much? What you think would happen so I'm going to a think about that for a moment and maybe compare some of the behaviors with what you may have noticed with what disruptive students and if I haven't taken too much time here Dr. Mir is going to provide another way of thinking, another illustration of how we might think about all of the systems and provide a summary for us.

So what do we have here? This is going to be to take a message from this first part goes from last slides but most important. I have to tell you I tilt my head up so I can see with my bifocal. If it looks appending a snob with my nose may air it is not really true. This is a schematic of the visual pathway from the visual scene all the way to the complex processing areas of the brain. You can see -- I hope you can All-City Green arrow because I want to move it to helpful -- so what this is is a concept that we have the trunk of the tree and the branches of the tree and the smaller branches of the tree showing the process of visual processing essentially. We start in the bottom part with the visual scene, the visual field, you can see here for the right visual field is in the yellow dashed area and the less visual field is the pinkish area. We just lost the image.

Did we get caught off? Did we run out of time?

We have no screen -- new paragraph.

-- no PowerPoint. I will just tell you about the tree which you may be seeing their it is. I will say say this is nonpublic and version, Dr. Patton had one earlier that was a little simple and this is quite nice and competent it. In any case, the visual scene is constitute is my visual acuity right at -- and visual field. As Barry mentioned, there is a crossover of the pathways from is a build -- digital pathway such that the right visual field projects both to the right eye and the left eye and those -- correspond to the field crossover to the left brained from the right field and vice versa. That visual field, fibers from both eyes crossover and mind together to go back towards the cortex. What we have tried to differentiate between his vision disorders that are due to ocular disorders and include all the eye structures going back to the optic chiasm and then we start with more complex disorders from the optic tract -- radiation up to the occipital lobe were now we are talking about visual acuity can be quite impaired, [Indiscernible] visual fields and caller vision when there is damage in the optic radiation to the occipital lobes. This game and now shows a separation of these two pathways that Derek has been talking about, the dorsal pathway which is the top part of the brain going from decks of the lobe toward the frontal cortex and the lower part of the brain or the eventual stream which corresponds to the temporal lobe, underneath part . I'm going to show that the dorsal stream first and talk about that. The dorsal stream is where is it and how do I act in it kind of processing. One of the most important parts is the visual evidence of movement of the arms, hands, legs and feet and the whole body. We often see children who have difficulty reaching for something using their vision. They may reach a fairly using peripheral vision off to the side, now looking at the object they are reaching for, there are children having difficulty with the dorsal processing, dorsal pathway assessing and another important aspect of the dorsal pathway dysfunction is difficulty seeing in crowded situations. Or where there's patterning and an object is on a patterned background and cannot be discriminated against the background or the multiple objects and when object is not found in the clutter. Another difficulty is spotting a target distance. Seeing one's parents and the group of people so that can be difficult for children who have dorsal processing problems. I don't want to discredit the fact that moving around in space can be quite difficult for children who wet dorsal pathway problems in particular, judging depth, services, walking over rough terrain anticipating obstacles below and so forth. The way that terminology that after detonates using is one that is easy to think about is the dorsal system covers visual search, visual attention and guidance of movement, the visual guidance of movement.

The other pathway, this parallel pathway although as Eric pointed out there interacting in normal life of course all the time but eventual pathway is responsible for the pathway that goes to the temporal lobes responsible for recognizing objects of all sorts including words, letters, numbers, shapes, objects, people, animals recognizing facial expressions although that may have some connection to the dorsal pathway. And we think of this eventual system is being one involving conscious processes. We have a big about what we are looking at and how to name them. Maybe very fast thinking but we do have to think about it whereas with the dorsal pathway problems this is much more automated, automatic behaviors. Leavers that we don't think about unless we get into a situation where we don't have an automatic pogrom to do this and giving example come up the snow in Boston,? Nope encumber -- covered my when I came off the street to try to get to the sidewalk it was this big snowbank and I had to stop and think about where was my foot going to go in that snowbank in order to safely get over it. Clearly that's conscious process but normally I would continue to walk and I wouldn't think about it at all. We don't think about when we're going downstairs usually are when we are reaching for something. And we can talk about that were in our second session.

Jurors a summary slide -- what we have try to get across at first is that brain damage that occurs in the preterm brain is different the damage that occurs in the full-term brain and causes different patterns of visual impairment. Visual loss can be classified based upon the location of the damage within the visual pathway. Ocular I structures, retinal optic nerve also -- media [Indiscernible--Audio cutting out]

we've -- as damage to the earlier processing center of and causes very pervasive visual impairment and then -- visual impairment just as we talked about affects the higher picture higher visual processing center.

So the visual [Indiscernible] of pediatric brain damage is a complex combination of abnormal visual behaviors -- due to brain damage. In subcategories I would say definitely in some categories some people would argue about this but we believe there subcategories as we described for cortically impairment in subcategories within scribble as well. Pencil, dorsal and probably combinations of those and not only can they coexist but they do coexist with ocular and ocular motor disorders and the categories as we define them.

So is directly and currently many people not everybody but a lot of people defined cortical visual impairment as being a condition that is associated just with the visual pathway up to the optic though Google optic lobes. Where as big differentiation between Coukell visual impairment and Struble visual impairment in that image in cerebral visual impairment involves other portions of the brain that process complex visual behaviors.

Here's a set of images that are in these links and some of them in publications as well that you may find useful. And our final slide I will answer our questions, isn't one or several entities? Several, yes. Can they coexist with ocular motor and ocular impairments? Yes, of course. Thanks very much.

Thank you very much. I'm going to turn it over [Indiscernible--Low volume]

Thank you all a very much. We had a couple questions come in. Encourage people to bring in more, a lot to think about and really interesting to watch those thoughts travel to the brain from the object to the eye to their hand to back, really interesting. One of the questions that came in from the participants is we are working with the person who has a critical Struble visual impairment is it better to work with them using actual objects or pictures of objects or do you find that there's in response to that?

I would say it depends upon the child is development lead in terms of their ability to understand -- think about it for the young child what do they first do with their vision, with their body, they interact with objects. They play with things and manipulate things. I think it really depends upon where the child is, but certainly if child has difficulties with holding, touching, reaching objects and they may only be able to function [Indiscernible--Low volume]

Not only I would agree -- developmentally [Overlapping/Multiple speakers]

Wetzel added element also don't forget this until difficulty processing and integrating all of this information so shortly in my early training we talk about a total sensory approach makes sense for a lot of our students but I will just say for some of the children were very complex don't forget that their system, dorsal system may not manage all that sensory input so they may not be able to be tactile and habitual all at the same time.

That's one of the goals that we feel is really important in working with the child the Struble or Coukell vision impairment is integrating teaching them how come helping them to integrate vision and manipulate -- manipulation of objects.

That's really interesting sentence you just said where the idea that this can be learned, this is not necessarily do something we have to adapt or accommodate that children particularly can be taught these skills that may be a child with a different brain development is just what you naturally come upon. It also at was thinking when we were showing this tree and the different points along the tree which probably reintegrate that a child. -- an individual can have any combination of those areas affected so for example maybe the child can make sense of a Isle of objects but oddly when you spit them out on that pattern that ground than 70 there confused so it is not that the tree is meant to show all the different places where --

It turns out that a lot of those difficulties do clustered together. Visual impairment movement or impairment of visually guided movement tends to affect not just the chamber also living around and typical

Complex -- often involve reading, quoted text, finding an item. I know children who claimed -- tell them get your shoes and they don't have a clue where their shoes are. They are in the closet or on the floor somewhere but they cannot find them because they are in a very convex apartment and they don't have a good memory before they left them last. Spin up I think we've gotten better certainly in the metal community has gotten better and a lot of work by Christine Roman were getting better at understanding or labeling this is what's going on within the brain. We still try to figure out know what we do about it. We believe that these children can learn but how do we take them, what's that methodology is the next challenge and we will talk more about that in the next session

Would have a couple questions about that. I want to bring up Jing is asking a follow-up question to what we are speaking about right now so a person could have both a cortical visual impairment and do some other cerebral visual impairment at the same time. Is she understanding that correctly?

Is probably some debate about that within the medical community certainly. And ÷-division-sign-division sign's community. If summons of summons acuities so so poor that any kind of real perception is difficult that it is hard to say that having difficulty receiving the image or even recognizing this and perceiving the image that alone recognize what it is with the ticket and gate the community have some level of acuities so you could have asthma you can be a high functional cortical vision and someone beside function cortical visual impairment and have some signs of cerebral visual impairment but is not likely that if you have full-blown Cortical Vision Impairment also have cerebral visual impairment.

No, I would actually disagree because I feel that often children we see that we call Cortical Vision Impairment Web per se fifth brain damage, they don't recognize many of them have CP and they aren't able to move around so we don't know about their -- pathway but they have difficulty reaching out so I think they have everything. I think that got cerebral and cortical that's why the/b ecause -- that's --

I'm not saying they don't -- they cannot have both, I'm saying it you need to have some level of formed vision in order to have both.

All right

[Overlapping/Multiple speakers]

That's good stuff. Another participant asked the child have OM a intermittently? Can you say more about that?

I saw the question. We see children who have green damage and brain related visual impairment, definitely do -- and movements. Sometimesintermittently they sometimes you will see it and then other doctors won't see it. The parent won't notice or parent will notice it and I think it is probably a function of the circumstances, what they are looking that.

That map.

What they are looking at also where it is, how fatigued they are. And their is something called partial ocular motor Praxis praxis so it is not like it is full-blown sometimes it could be asymmetrical, only in one direction [Indiscernible]. The rain is really complex and the ocular Medsystem automotive system is particular the.

[Overlapping/Multiple speakers]

What are some good home-based activities for infants in particular that have been diagnosed with a CVI?

Cerebral or cortical?

Escort teachers who are visually impaired. That's a question from the parent. That parent -- lap Mac.

To expand on that it is very tempting to come up with this sort of laundry list of is this -- and that's comforting in some ways. On the other hand the danger to that is it so prescriptive, it is so generic that we don't individualize to the particular child so that's what makes it think all of us --

A little squeamish.

Way back to what [Coughing] about the person who was done the then the most probably in the area of defining what Cortical Vision Impairment is, behaviors and establishing a scale and then establishing interventions to work with is Dr. Christine Roman-Lantzy and she has a book, --

I have that book.

There are so we so we think Snape looked up to be very useful, I think, for people to review

[Overlapping/Multiple speakers]

We will mention that in our follow-up because that's a definitive text on that. One more question, QCD symptoms in children with delayed my nation often that fall under cerebral versus cortical the iPods I've --

[Overlapping/Multiple speakers]

Myelination is why meta- so that's the connection between the [Indiscernible] brain. I think it would depend on the causes [Indiscernible--Low volume] that's just a comment minus finding a neurologist says such and such we might as not see full-blown CVI type behavior. And it would depend on their obtusely and infant -- I don't know.

We see some variable things. It seemed patients were the uncategorized also I think which might've been alluding to the delayed visual maturation as well and is some overlap and that. I think probably 10, 15 years ago people two, three, four years after birth were still given a diagnosis of delayed visual maturation and part of that maturation is developing and are increasing mullah nation of the optic pathways. -- so at what point does a no wonder become delayed but is there and then the diagnosis of cortical or cerebral visual impairment is made. Sue really thanks to Dr. Roman Lansky I think most of us now are getting away from caring that diagnosis for an extended period of time and more readily making it diagnosis in a shorter period of time . We've seen folks of change and overall function as their mullah nation has increased not just in the visual function of the overall pathways were as involved. It is hard to say since that such a global diagnosis to know how any given individual is going to mature as their brain matures and myelination occurs will be the final outcome.

Thank you. We've had a couple of people ask about any difference lights, we're going to provide the slide deck back to all of you who are registered because there's a lot of complex information that people are asking about so we will do a follow-up with that and then of course the session is -- has being recorded in still being recorded will be available tomorrow at this website. We have a cop four minutes Glaxo one of going to do is possibly suck and see if there's any new questions that come in. And while we're waiting for that I wanted to plug our two up this session which is April 8 at this time which is 2:00 PM --

I believe it is in the morning.

This is recorded but -- check our website port that Schroepfer that is not for that go to the same registration is teacher is a thing all of our speakers have mentioned there will be some video as well, some cased any information that helps put this to up to go individual so many people as questions were the answer really is it depends on the individual, it depends on the child and with something this complex it is hard to make a blanket statement but we may see those children in action it can really I be eye-opening.

Anymore questions?

Just wondering how treatment, that's in quotes, by TBI might to be I might differ for child with Oracle visual impairment versus cerebral visual impairment

It depends on the child.

Partly is relying on the DBI still looking at other things we've been talking about today is being able to understand these categories and how they often do -- they can coexist with each other so understand the difference between an ocular impairment and a cortical and cortical and three both selecting first getting on the same page with that. Settable using the resources available out there serving terms of article visual impairment for us as educators and Dr. Christine Roman-Lantzy these work isn't significant so in terms of circles of that's unknown territory for all of us. My background is way too orientation mobility and there's a lot we need to learn in that area.

Just as a point of that the dorsal stream connected treat of vision the dorsal stream is being so important for visual guidance of moment and was he a child that shows that pattern and has pretty good ventral assisting. Third in a fight objects, there may be reading but they are having a lot of difficulty booking around in space be totally overwhelmed in crowded situations and often those people I recommend for on them [Indiscernible]

I think more often than not that is my recommendation.

Attempts down to understanding the hallmarks of each of the areas and then looking at what's going on with that particular student or child and making some sort of determination where do they fit. I wouldn't necessarily being making eight diagnosis but -- letting the behaviors be the guide and developing some sort of intervention or educational plan.

One of Dr. Dutton's and collects publications that there's a table of the whole host of visual symptoms and potential workarounds that some I find helpful in order to not treat but at least adapt --

A starting point --

To adapt to some of these issues that funks with Struble visual impairment have.

This has really been very enlightening and fascinating.

Great questions.

Great questions and we will be following up with [Indiscernible] we hope you are able to join us for part two but that will also be recorded. We know that some people were joining us late and so look for that recorded version tomorrow so thanks again to the team, and we will see he next time.

Thank you.

Thank you.

Thanks.

[Event concluded]