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Drs Daniel & Davis Optometry Vision Development Research Paper

Introduction

Our eyes allow us to see the world that we are living in, without them it's like looking at a never ending blank canvas. The development of vision starts the moment a life is born and enters a world full of light. A child's early life stages are crucial to the development of their vision. A baby should learn to crawl and walk on his/her own because it's not about how fast they can complete the milestone, it's how they were able to figure it out themselves. The smallest things babies do affect how they see the world. Their fixation, accommodation, spatial orientation and other elements contribute to how the patient functions. When one of these first principles of vision is altered the patient's full potential is hindered. Vision therapy is meant to redevelop the skills of the lost element by starting at square one. Drs. Daniel and Davis Optometry is a small clinic where they are one of the very few places that offer vision therapy to patients. I wasn't familiar with many of the terms that were utilized in the office and during Thursday morning classes. Even though I felt out of place my mentor made sure that I understood the information she taught. I walked in on a Saturday morning to have a 3 hour long eye exam and that's when everything tied together. As a high school student, I have learned more



about vision development than I could ever imagine. From complex vocabulary to vision therapy activities, each lecture had embedded deeper and meaningful explanations.

In the past, I've been to an optometrist and an ophthalmologist but I have never heard about vision therapy until being apart of this internship. I was so intrigued about vision development that it peaked my interest in learning more about it. My main focus was the development in children and how it affects their vision. Between learning from the lectures and outside resources, there is a plentiful amount of information that parents should know about the development of their children. In our daily lives, there is not enough time in a day to be reading textbooks on how to raise your child properly. In addition, no one would want to be told what to do and not do considering he/she is their own child. However, all the information I have learned throughout the course of 13 weeks are crucial facts that every parent should know about. The issue is being able to convey this information out into the general public without giving them too much to the point where they wouldn't read it. This brought me to the question, how can technological advanced information be distilled into something that the general audience could understand?

Background

Drs Daniel and Davis Optometry (Drs D&D) provides optometric services to those in the North County area since 1992. Their experienced doctors and staff offers eye exams that ensures comprehensive results as they are trained to diagnose and treat eye diseases, conditions, and problems. Since it is a small office there are many patients that come back for an annual eye exam. Drs D&D focus on educating their patients and making sure they leave the office with



clearer and better vision. (About Daniel) Each doctor and staff member provides a unique attribute to their private practice. As members of “Vision Source” Network, they offer a wide range of optometric products from glasses to contact lens. Each patient is personally cared by an optician while choosing a new pair of glasses. In the office lab, opticians also take care of making sure the prescriptions of glasses and contacts are in quality condition. Not many optometry clinics in the north county area offer vision therapy sessions in comparison to Drs D&D. They don’t perceive vision therapy as “*do it and get it over with,*” it’s a practice where the patients learn how to do it and understand the process.

Vision Therapy is training the eye to improve vision skills which involve eye movement and coordination. When one experiences vision problems there are non-surgical approaches to fixing the issues. Many people who encounter problems such as lazy eye, double vision, crossed eyes and poor convergence abilities are likely to be referred to vision therapy. In some cases children with learning and reading disabilities will go through vision therapy, not to enhance their learning abilities but is directed towards resolving the child’s vision problems. (What is) The purpose of vision therapy is to “teach” the eyes how to correct themselves without having to go through surgery which alters the anatomy of the eye itself. It’s not just teaching the eyes, vision therapy also teaches parts of the brain that is connected to vision. The process isn’t just having more techniques in the bag, it’s all dependent on how engaged the doctor, vision therapist, and patient is to each individual activities. Vision Therapy sessions are personalized depending on the the individual. There could be prisms, different types of lenses, and filters involved in assisting the patient to achieve binocular vision. In some offices there are computer-assisted visual activities that record convergence, divergence, reading pace, and so



much more. The main goal of vision therapy is to treat vision problems that cannot be fixed with eyeglasses or surgery. (Heiting)

When Traumatic Brain Injury (TBI) and Stroke patients are treated with vision therapy the activities are geared towards developing old skills that are usually made when they are babies. These types of skills are spatial orientation, fixation, eye coordination, focus, etc. . . . As doctors and vision therapists work with TBI and/or stroke patients they first figure out what skill the patient is missing and then work from there. Children who go through vision therapy are also developing skills that they lack or are missing because it wasn't well developed during infancy. (Dukes Lecture)

In a child's life there are multiple milestones in their life from the moment their mother holds them for the first time to the moment they turn two years old. Each one of those developmental milestones contributes to their vision skills. It's normal to be in awe of their first steps or when they say their first words. However, when has it been a big deal when they first grab an object? Or when they begin stretching their body from side to side? Each one is a crucial part in their developmental stages as they are instrumental to the growth of the child's vision skills. The question is how are parents getting the information? Are the ties of milestones to vision development widely known to the general population? This kind of information is all dependent on how it is released to the public that is easy to understand and accessible.

Information in such a technological advanced time period is passed on in multiple ways. With the small device that lives in one's pocket the whole world is just a click away. Most people receive information through the internet on various websites. News is transmitted through



social media and word of mouth. So how does one know exactly what is the best way to let others know about vision development?

Methods

In order to understand vision development, lectures were held on Thursday mornings at which observations and notes were made. In addition, outside resources were used in order to create a brochure with information geared towards parents. With assistance from Dr. Dukes, the pamphlet includes details about important milestones during the infancy period of one's life and how it contributes to their vision development.

The first section contains a brief timeline of the general development stages for a child. Following is another timeline that specifically focuses on the development of vision for a normally sighted child. The stages that provide a significant aspect to vision development would be expanded on throughout the brochure. The milestones that play a major role in how babies perceive things using sight are highlighted to make sure the point gets across. Multiple outside resources are used in the process of the compilation of the pamphlet. There are books about pediatric development and the rehab approach for TBI patients and websites from the American Optometric Association (AOA) that are utilized in the process. The sources are handpicked and read with an analytical mind.

There is an abundant amount of information that are equally important for everyone to know. The task at hand is to analyze and annotate each source, including notes and observations from lectures, and simplify the information into a single 8.5" by 11" sheet of paper front and back. The pamphlet is craftily created for an appealing look yet consists of understandable



information. Even the smallest change in the normal vision development could have an impact to the function of the eyes and/or learning abilities in the future. It's imperative that people understand that vision isn't something that just happens.

Analysis

During a child's infancy period, it's important to understand the vision developmental stages and how they contribute to their abilities. Since birth, babies are constantly developing their vision step by step. No child is born naturally with good eyesight. Once a baby is born their eyes are just beginning to open and adjusting to the world around them. Over a period of time, the baby begins to move their eyes together as a team and focus on objects near and far. Little do people know that before a baby begins to crawl, sit, and walk, their eyes are already providing the brain information about what's going on around them. The eyes are a form of stimulation for when a child starts to see the objects around them clearly they begin to explore. Language isn't just listening to words and phrases, it also involves sight and watching the mouth movements. That's how babies learn to speak. Of course by listening to the sound but also copying and connection how the mouth moves. Healthy eyes play a major role in a babies development which is why parents should keep a close watch to their children's eyes. Eye and vision problems may cause developmental delays in a child's life, where it could affect their learning and reading abilities. (Infant Vision)

When a baby is born, the section of their brain that controls vision isn't fully developed where they only see the world in black and white. Their focus range is closer to 8 to 10 inches from the face, so they aren't able to accommodate images. Knowing this is important when



going into vision therapy. Usually, when the therapist begins their sessions with a patient they start from step one which normally correlates to the first step in vision development. A child needs to know how to focus on objects in order to do anything. There are many activities that involve training the eyes to focus for example the Brock String. This activity is usually the first to complete because it can train the eye on multiple skills, accommodation being one of them.

(Dukes Lecture)

Parents shouldn't be alarmed if their child can't seem to focus on their face, it just takes time. As the baby adjusts their accommodation, parents, especially mothers, should maintain the same haircut and style, that way the baby would be able to recognize the person. This encourages visual stimulation to the baby's eye, as they would be able to make out what's in front of them. After about a week, that's when the baby begins to see different colours. Decorating the room with bright colours would stimulate the baby's vision to see the colours. It's important for parents to watch the baby's eye movement as they begin to track moving objects around 2 months of age. A baby's eye movement at birth may have misalignment however if there is a constant significant amount of difference in alignment then the child should get checked. At a young age it is known as "Strabismus," and if it's not treated as the child grows older it could potentially lead to "Amblyopia" otherwise known as "lazy eye." (Heiting) Vision therapy can help improve misalignment with the eyes by using prisms. (See appendix)

The baby begins to develop eye-body coordination and starts to control the movement of their eyes. They start to move their eyes as a team and a lot quicker. This leads to reaching out and grabbing objects in their vicinity. At 6 months the baby should have his/her first eye exam. In a 2011 survey conducted by the American Optometric Association, "18 percent of parents



reported that their infant had received a comprehensive eye exam before age 1.” Most parents out of the 1,000 surveyed had already knew that lazy eye and crossed eye could be found in infants. However, a comprehensive eye exam looks for everything that could potentially cause vision problems that lead to developmental delays. The exam has the ability to find any signs of cancer, farsightedness, and nearsightedness which if found early in life could be treated. (Heiting)

By the time the baby reaches 8 months, they are able to “localize auditory sounds by directing visual fixation on sound source.” (Padula 18) Dr. Padula is stating that when a child hears a sound they are able to connect to noise to where it’s coming from. Earlier mentioned, language is a great example. It’s hard to teach a language without being able to connect the sound from the mouth movement. One may tell someone else to say a phrase in different language without showing their mouth however by just relying on sound it may not be the same. It’s important to talk to the baby as one walks around the room so they are able to follow the sound of the voice. However, once the baby develops depth perception and can focus on objects parents should talk to the child directly. By 10 months, the baby should be creeping and crawling on the ground. Just because they are now crawling does not mean the baby is ready to walk. The child should be able to get up on their own two feet when they have developed the skills to. “Forcing the baby to walk in a walker is like parking a car at 100mph.” (Dukes Lecture) The baby should be able to find their balance on their own at 10 months along with dealing the world as a whole. (Padula 18)

As they begin to walk, a baby starts to understand and interpret the three-dimensional domain. The child’s perception of space shifts as he/she notices objects moving sideways. “This is a method of exploiting and reorganizing his/her perception of space.” (Padula 21) At this age



parents should be giving their child building blocks and allowing the child to roam around exploring the area. They are more likely to be in harm's way for they are easily able to hit their heads or fall from losing balance. It's good to keep a watchful eye. All this information is typically summarized by the physician and some important parts are either forgotten or just never said. There is a whole lot more and in more complex terms. There are multiple websites where parents can find this information, however would someone take the time to go through those websites. The purpose of creating pamphlet is to distill the information so that it's easy to read and understand. The point gets across to the reader and isn't a lengthy website page. The pamphlet engages the reader to grasp the idea that there are more milestones during infancy than just walking and talking.

Conclusion/Action Plan

As a result from collecting information through lectures and outside resources, the pamphlet is a short, concise, and understandable for those of a general audience. Pulling facts from different resources and compiling the information was a difficult process deciding what's most crucial for parents to know about. By creating analogies and easy to understand phrases makes the pamphlet more inviting to read. As there are probably many books and resources on general vision development, the main focus on this paper was towards vision development during infancy. These stages are important for parents to know about so that can support their child to develop vision properly. This pamphlet would serve as guide for parents without them having to research all the information on their own. It's a cheat sheet for the important milestones and tips to keep their child on the right track. Now there are children who are faster or



slower than the specific timeline, so as long as the baby is within the range they should be developing their vision normally.

If given an extra semester, the follow up question would be, “How will parents respond to this kind of information? What’s their prior knowledge about vision development in children and how does it differ if given insightful information about the topic?” Next steps would include surveys and interviews specifically about how helpful the pamphlet was to parents. Were there any parts that could’ve been more clearer or is there too much information. This data would ensure that the information on infancy vision development is 1) getting out there and 2) understood by parents how important it is to support their child and vision progression during their first few months of life.



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“What is Vision therapy? FAQs, Links, references, learning disabilities, LDs, scientific studies, research, vision training, visual therapy, visual training, orthoptics, eye exercises.”
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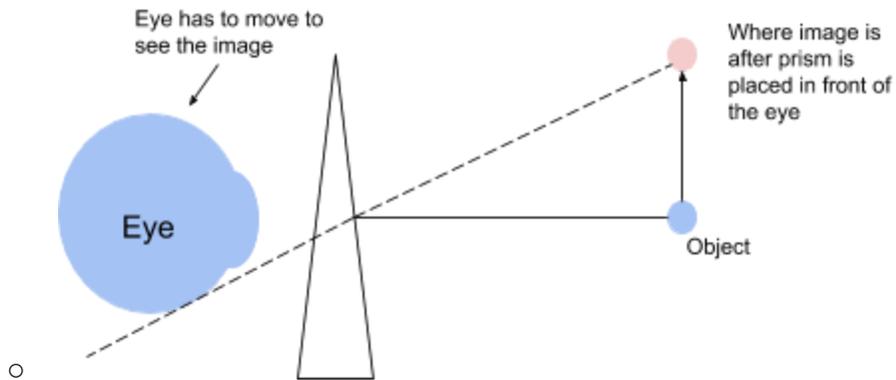
Appendix

Every Thursday morning Dr. Dukes hold a class for the Vision Therapists and Externs. The main focus for these classes is to develop a deeper understanding of the certain activities that are done with patients. During my internship I was able to sit in most of the education lessons and get more information about vision that I didn't know before. So I was able to record and observe my most recent class, and since there were no externs we were able to focus on something the VTs needed more help with. So I recorded a part of it where Dr. Dukes was talking about Prisms.

What I noticed with how Dr. Dukes teaches is she always asks us open ended questions, making us do the thinking. It helps to understand what's going on if the VTs are the ones figuring it all out. Most of the time all of us are confused the first time she says it, but the more she repeats the concepts we start to understand it.

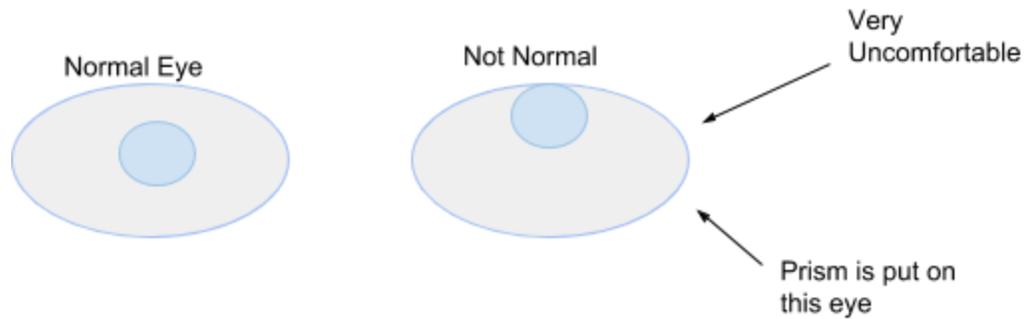
Notes:

- What to work on?
 - Prisms → convergence & divergence vs. correction
- Optics
 - Prisms bend light towards the base



➤ Correction --> GLASSES!!!

- How can we move the image clear into the patient's range?



○

- Symptoms: Double vision, Dizzy, Nausea, Spatial Disorientation
 - Patients are usually brought up to make connections. . . How to use what we're being taught with a patient.
 - We all used Prisms to feel understand what patients feel like
- Base Down Prism is put on the Right eye so that the image moves up into the range of the patient's eye
 - This is the same for Base Up/Base In/Base Out

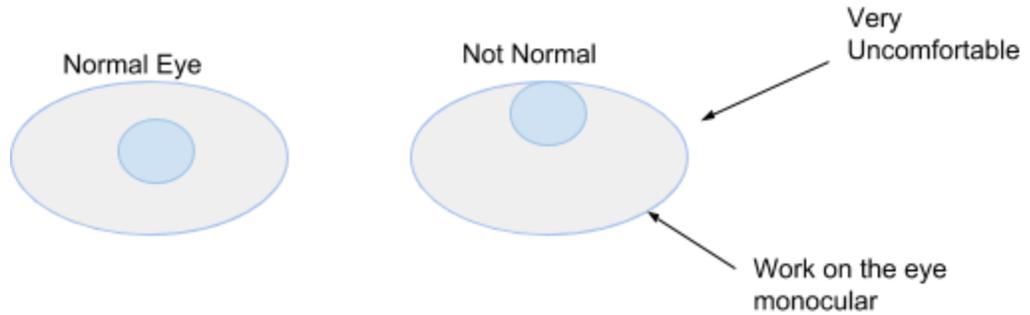
➤ Harington's Law



- If one eye pulls X amount, the other eye will pull the same X amount → They move together

- Analogy → Wheels on a car

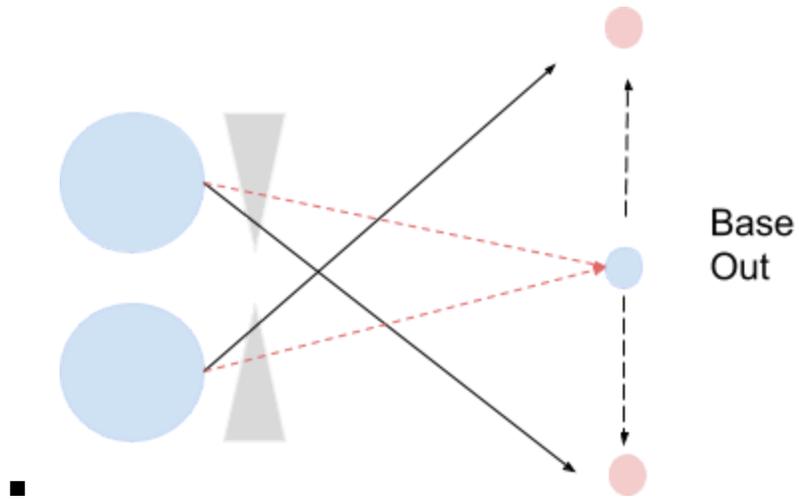
➤ Training the eye (Vision Therapy)

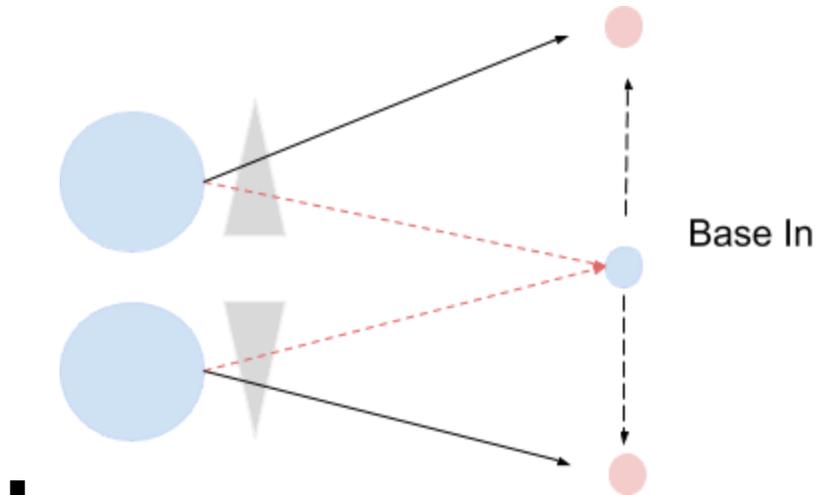


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- Working on train the eye to go down → Use Base Up Prisms!

- Base In/Base Out Prisms → Correcting Images





- Moving the image
- The prisms make it so that the images are in the range of the eyes
however to the patient it looks as if it were straight and in front.

After having been to several lectures and read multiple books on Vision development, I will be condensing all the information into a brochure.