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Opportunity Development Association (ODA) Center for Advanced Vision Care: A Structured Approach Towards Remediation of Visual Dysfunction

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Abstract: This paper presents the development and the on-going mission of The Center for Advanced Vision Care, a Vision Therapy Center established within ODA (Opportunity Development Association) Primary Health Care Network. The Center is designed to remediate visual dysfunction with an emphasis on therapeutic lenses, prisms and vision therapy. A structured approach towards Vision Therapy will be introduced highlighting the way in which remediation of visual dysfunction can occur without regression. The Center for Advanced Vision Care was founded with the primary goal of improving vision care for the children of Williamsburg, NY and the surrounding areas. The providers at this Center utilize therapeutic lenses and prisms in conjunction with vision therapy in order to achieve remediation of visual dysfunction, without regression. This unique program provides an opportunity for children to attain a higher level of self-esteem, thereby enabling them to reach their fullest potential. Working alongside other professionals comprising ODA's exceptional multidisciplinary therapy service, ODA's Vision Center is redefining the standard for which pediatric behavioral vision care is rendered. A Vision Therapy program, as part of a distinct multidiscipline therapy center, will be presented as a unique facility utilizing therapeutic lenses and prisms, in conjunction with vision therapy, in a way that serves to remediate visual dysfunction, as part of an interdisciplinary approach.

Keywords: Vision Therapy, Behavior, Therapeutic Lenses, Prisms, Health Care Network, Interdisciplinary, Multidisciplinary

1. Introduction

In October of 2016, ODA Primary Health Care Network established The Center for Advanced Vision Care with the central purpose of providing Vision Therapy for the children of Williamsburg, NY and the surrounding areas. Visual dysfunction, or visual impairment (VI), can have a significant impact on a child's educational achievement, career choices and social life initiatives [1]. Approximately 6.8% of children who are younger than 18 years have been diagnosed with a condition affecting the eye or vision [2]. More than 85% of a child's learning ability is through their visual presentation; therefore, a child's visual dysfunction can ultimately affect their reading and learning ability. Thus, how a child visually perceives information will affect how they optimally perform both academically and in everyday life. The American Optometric Association estimates that one in four school age children may have vision problems that can affect their learning [3]. This paper outlines the structured format utilized at The Center for Advanced Vision Care to affect visual performance. This is accomplished through a combination of therapeutic lenses, prisms and Vision Therapy. This structured program represents a 'how to' presentation redeveloping the visual system in a way that remediates visual dysfunction without regression thus enabling children to approach their potential in academic learning and ultimately improving self-esteem. The intent of this manuscript is to promote Optometrists to add Vision Therapy as a service to their existing patient population and to be efficient and effective in utilizing this format for a successful program.

2. Vision Philosophy

The Center for Advanced Vision Care, resulted from the belief that basic visual skill dysfunction can be remediated, as if it had never occurred, through the use of therapeutic lenses,

prisms and vision therapy.

The structure of this program is based on the premise that convergence insufficiency (CI) is the progenitor of all basic skill visual dysfunction. Specific commonly utilized binocular, accommodative and oculomotor diagnosis are considered adaptations directed towards various modes of visual compensations [4].

Consider the following sequence: a motivated child who is adapting to a convergence insufficiency condition may often over accommodate to restore dual visual alignment creating an adaptive accommodative excess (AE) or spasm (AS), ultimately leading to an accommodative insufficiency (AI). If this process is continued, a divergence insufficiency (DI) diagnosis may result from the excessive stress on the accommodative convergence relationship. Taking this one step further, an end stage convergence excess (CE) may be established through this overly excessive dynamic interaction. An adapted convergence insufficiency, transformed into what might look like a convergence excess can be differentiated from a true convergence excess that had developed on its own. This is done by evaluating the base out vergence function at near. An adapted CI will have a high break and abnormal low recovery while a true CE will have a high break and a relatively high recovery.

If you heavily weigh the therapy program for what looks like a CE condition with divergent activities and the child in reality has an adapted CI condition, the over-convergent adapting response can be exacerbated. This may result in a more inward posture due to the need to compensate for the under-convergent posture associated with the underlying CI condition that has been overly stimulated by the divergent activity. A motivated patient will simply over adapt, stimulating a further increase in the accommodative vergence response creating a further increase in an esophoric shift. If convergent activities are utilized, addressing the true underlying CI, a relaxing of the adaptation will result in a decrease in compensation of accommodation for convergence resulting in an exophoric shift.

Figures 1-6 below demonstrate before and after Cheiroscopic tracings for three patients who presented after 8 initial sessions of vision therapy demonstrating an exophoric shift as well as improved organization and stability through the use of convergent activities.

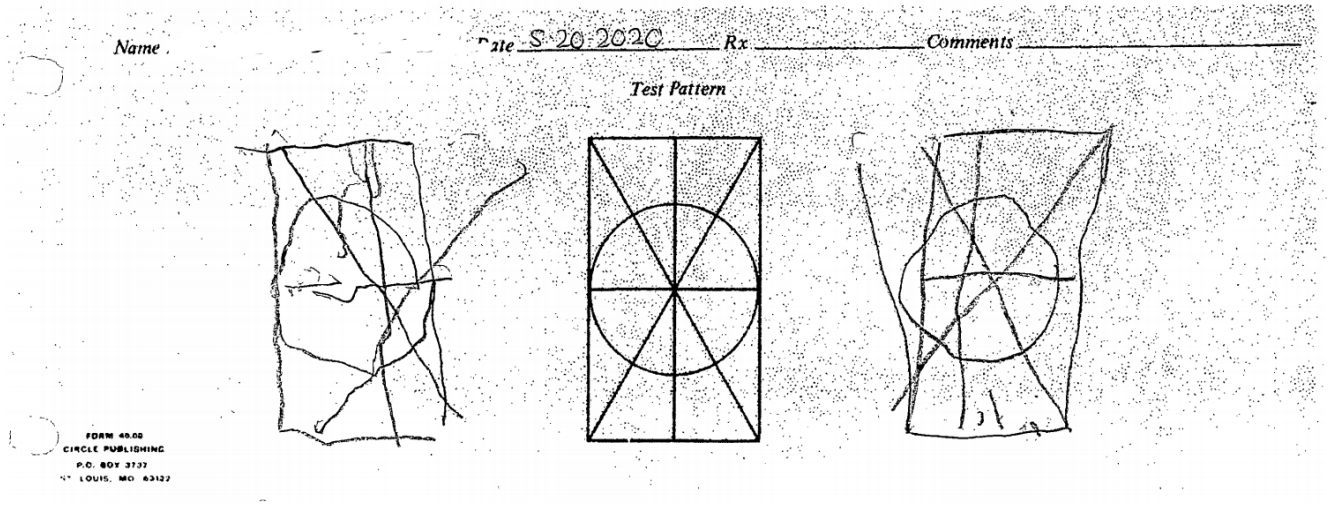

Figure 1. *Patient 1: Cheiroscopic Tracing Before Vision Therapy.*

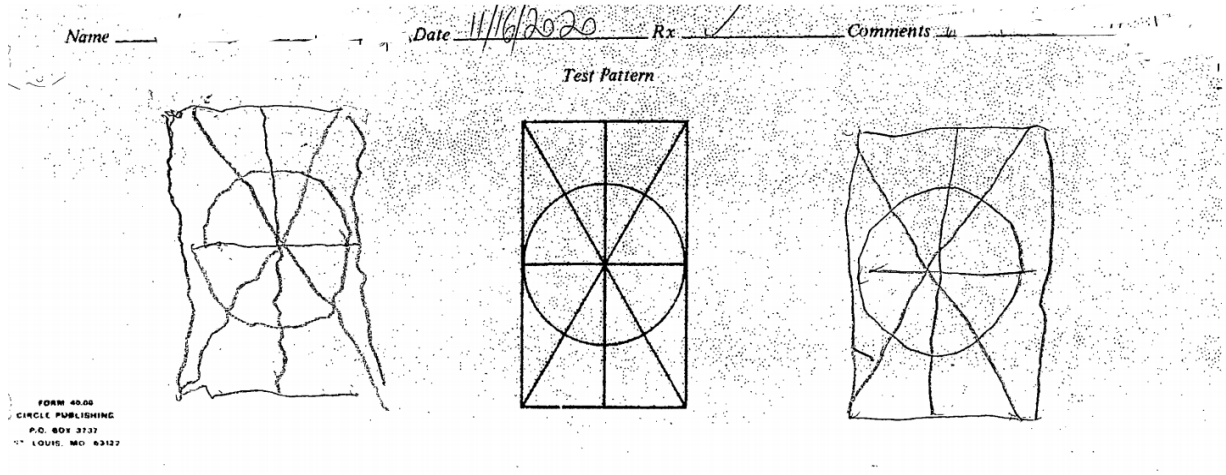

Figure 2. *Patient 1: Cheiroscopic Tracing After Vision Therapy.*

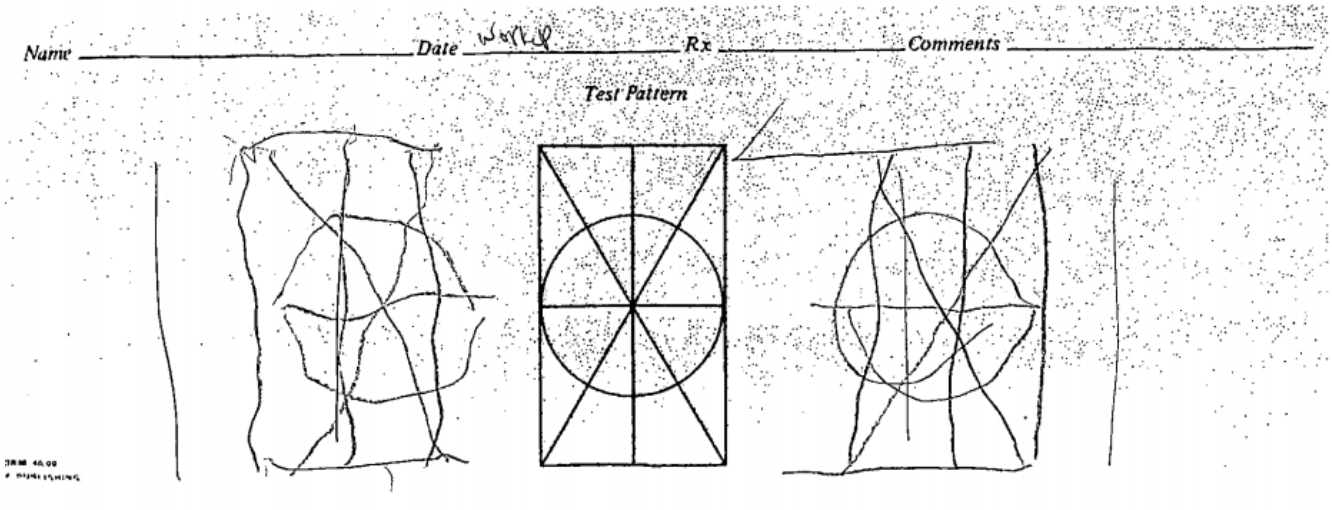

Figure 3. *Patient 2: Cheiroscopic Tracing Before Vision Therapy.*

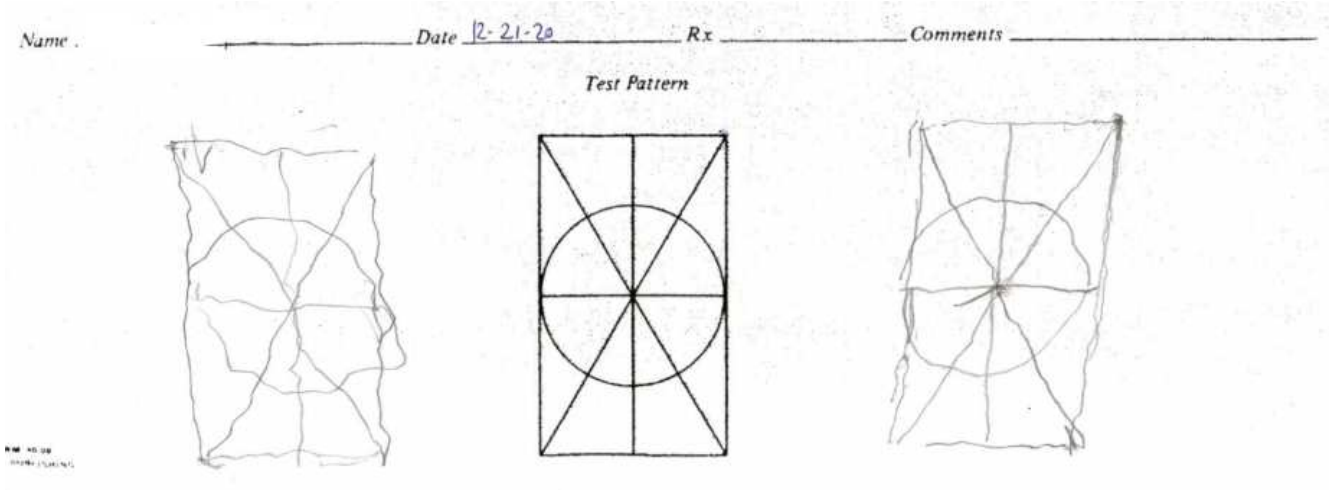

Figure 4. *Patient 2: Cheiroscopic Tracing After Vision Therapy.*

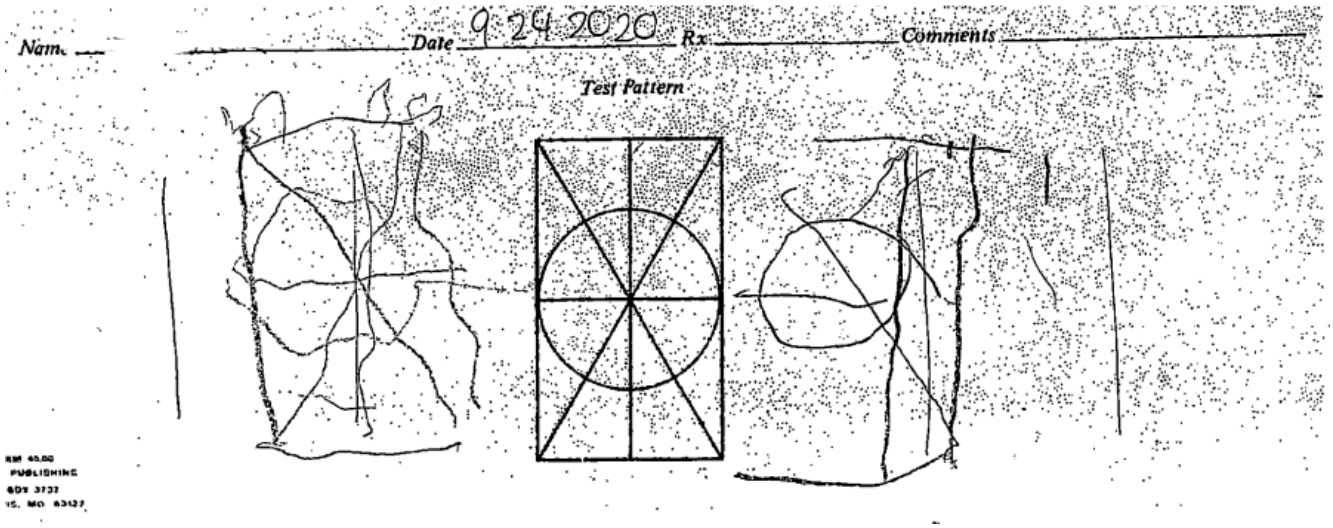

Figure 5. *Patient 3: Cheiroscopic Tracing before Vision Therapy.*

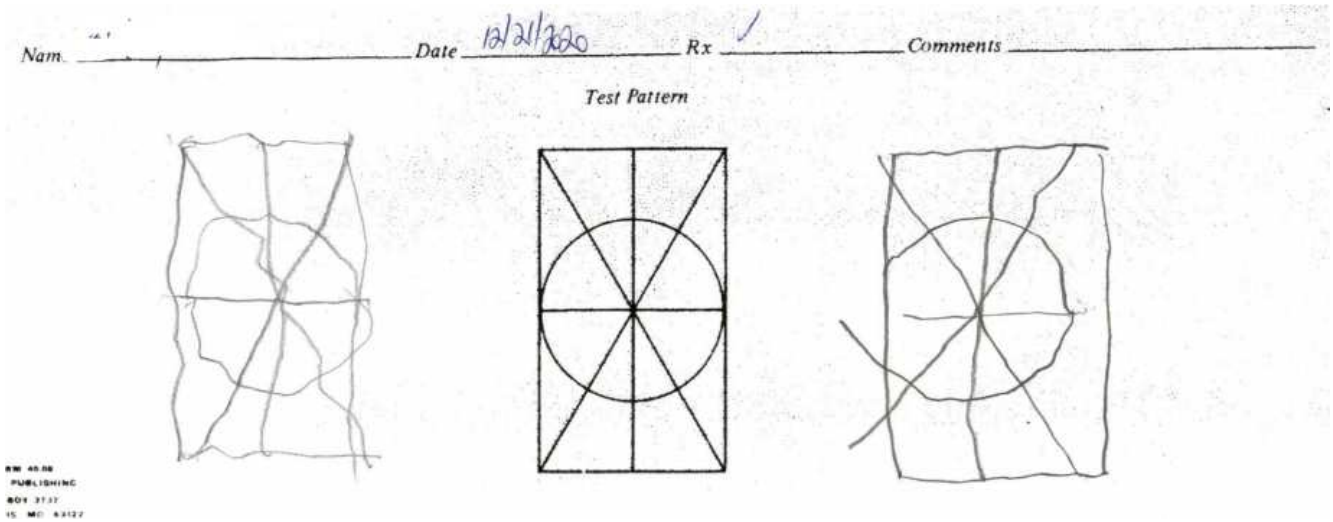

Figure 6. *Patient 3: Cheiroscopic Tracing after Vision Therapy.*

Based on the aforementioned philosophy, I believe that binocular dysfunction and various accommodative disorders are developed through an incomplete accommodative convergence interaction determined by an individual's mode of compensation. Therefore, addressing all basic skill visual dysfunction (other than a true convergence excess) as an inherent underlying convergence insufficiency has merit towards the ultimate and complete remediation of these visual conditions, without regression. This can occur because treatment is focused on the patient's true underlying dysfunction. Recognize that all visual perceptual, developmental, strabismic and amblyopic conditions of our patients do not apply to this theoretical way of thinking.

3. Vision Therapy Philosophy

The Center's Vision Therapy procedures are based on a combined sequential and directional approach as presented by Richard Apell OD [5].

At the 1967 Skeffington Conference in Washington DC, R J Apell, OD from the Gesell Institute in New Haven, Connecticut, spoke about Optometric Vision Therapy [5]. Dick, as he was known, made the point that Vision Therapy was uniquely different from orthoptics, yet within our group, he said there will be different schools of thought. What he discussed was separate from the therapeutic effects of gross motor coordination therapy. He spoke about the option of sequential (organizational) therapy as opposed to directional therapy.

Sequential therapy follows the sequential ideas of child development as well as sensory motor development. It's premise, is to fill in the gaps or steps missed during normal development. It is basically a step by step direction driven therapy striving to redevelop the visual system back to a normal sequence. In other words, before you take step C, steps A and B must preceed.

The directional approach aligns itself with more of a cybernetic approach [6]. It's course, is to complete an immediate goal with a future goal in mind. Therapists using this approach use fewer techniques, yet each technique can have multiple effects. Their techniques are unique in that both the Optometrist and patient gain insight into the patient themselves, the direction they need to develop and the visual difficulties that need to be resolved.

As will be discussed later in this article, a sequential approach is used to initiate the Vision Therapy program. If a child has difficulty in any particular sequence, a directional approach will be utilized to resolve the visual difficulty and then the sequential strategy will be established.

4. Behavioral Vision Assessment

Children at the Center are initially seen for a modified comprehensive 21-point visual analysis, which is scheduled for one hour [7]. I believe in the consistency of phorometric testing combined with free space testing when appropriate and necessary. Phorometric testing relies on reproducibility, in a way that no other testing of its kind can [7]. All pertinent associated clinical therapy reports from ODA's multidiscipline therapy (including OT, PT and Speech) are made available at that appointment. At the conclusion of the initial examination, a prescription is written, most often including a progressive bifocal and prism. The lenses prescribed would be behavioral in nature and the most common prism utilized would be a vertical base-up yoked prism, consistent with the philosophy of convergence insufficiency previously stated. The result of the prism prescribed is to cause downgaze and subsequent induced convergence as well as an effect on proprioception and vestibular function [8].

The guidelines used for prescribing vertical prism are outlined in Table 1. The most typical range of this type of prism prescribed is 0.5 to 3.0 prism diopters. Other types of prism may be utilized, depending on the analytical presentation and history, such as an underlying strabismus [8]. Progressive lenses are chosen because the lens itself has the nature of an hourglass design of usable vision, wide top and bottom and narrower intermediate. This design can potentiate

a source of temporal occlusion, again consistent with the treatment of a presenting convergence insufficiency philosophy. The progressive lens also serves as a continuous lens adjusting accommodative effort based on the level of subject demand, stress on the child and where on the lens the child's eyes are aligned. If stressed, the child can go high on the lens and if fatigued, the child can go low on the lens. I believe that the child will go to the point of the lens that is most comfortable and advantageous at the moment. Recognize that the primary goal of the bifocal and prism is to substitute for effort to accommodate and converge the two eyes. The primary purpose of Vision Therapy is to reframe the cortical message to the extraocular muscles, enhancing control of convergence.

Because the Center is a problem-oriented and a referral-based practice, the preponderance of patients come with an identifiable visual dysfunction in need of treatment. Few patients come for a well visit evaluation. Therefore, there is a high probability and percentage that therapeutic lenses, prisms and vision therapy will be recommended.

Once a prescription is completed by an outside optical, the glasses are brought to the Center to be evaluated for accuracy. Checking each and every prescription accentuates the effectiveness of the prescription and therefore can optimize a patient's perception, performance and ability to problem solve, directing action and deriving meaning. The percentage of incorrect prescriptions dramatically reduced once opticians knew we were analyzing each prescription for accuracy. When the eyeglass prescription is found to be accurate, either a vision therapy workup or a follow-up appointment is scheduled based on the needs of the patient. Each patient receives a phone call 2 weeks after wearing their eyeglass prescription inquiring about how they feel with their prescriptive lenses.

Table 1. *Guidelines for Prescribing Vertical Yoked Prism.*

Base Up (BU) Prism	
0.5 BU	Psudo Convergence Insufficiency (CI)
1.0 BU	CI without hypotonicity or hyperactivity
2.0 BU	CI with hypotonicity or hyperactivity
2.5 BU	CI with hypotonicity and hyperactivity and/or an intermittent exotropia
3.0 BU	Constant Exotropia
Base Down (BD) Prism	
1.0 BD	Intermittent Accommodative Esotropia
2.0 BD	Intermittent Fusional Esotropia
3.0 BD	Constant Esotropia

4.1. Vision Therapy Assessment

Subsequent to the initial optometric evaluation, a Vision therapy work-up is scheduled for one hour and performed by an Associate Optometrist. The basic workup is designed with the following tests: Accommodative facility testing with +/- 2.00 flippers, Worth four dot with +/-2.00 flippers, cover test in 9 positions of gaze, bilateral Cheiroscope, Keystone Visual Skills, Developmental Eye Movement test, Wold sentence copy, Winterhaven copy forms, Birch Belmont auditory visual integration and Standing Angels. Alternative testing can be added when and if deemed necessary.

From this workup, a prognosis is defined as the approximate number of visits needed to remediate the visual dysfunction being addressed. I believe that the number of visits is a better prognostic indicator for the duration of the program as opposed to time. The typical prognosis is 40 to 48 sessions +/- 8 sessions dependent on a child's development, behavior and visual condition. Once the workup is completed, the patient is scheduled for therapy. Note that the prognosis is in multiples of 8, because every 8 sessions requires a reevaluation with one of our Associate Optometrists.

4.2. Vision Therapy Program

All vision therapy patients at the center are seen on a 1:1 basis, there is no group therapy at the Center. I believe that individual attention to each child is efficacious in attaining the intended results. Children are scheduled either with an Assistant Therapist or an Associate Optometrist, depending on the needs of the child. Assistant Therapists are trained and supervised by the Center's Associate Optometrists. The training program for assistant therapists takes about 6 months and has increased levels of responsibility throughout the training period. The Center's lead therapist, who coordinates scheduling and maintaining day to day efficiency of the Vision Therapy, is in the process for certification as a COVD vision therapist.

The first session of therapy is scheduled for a period of 45 minutes, allowing some extra time for orientation to the program. Once therapy begins, children are seen for one to two ½ hour sessions per week in the office. Patients are required to do home therapy 4 to 5 times a week to reinforce the skills that they have developed through the in-office procedures. Parent supervised home therapy should take about 10 to 15 minutes per day. Home therapy reinforces repetition, a step towards enabling remediation without regression. Repetition of a motor activity has been shown to enhance the function of the neuron activating the intended muscle [9].

4.3. Vision Therapy Protocol

All vision therapy charts are preprogramed at the start of each day by the Director of Vision Therapy. Associate Optometrists will program the charts of their own patients. An Assistant Therapist follows through with techniques prescribed and then records how each patient accomplished the techniques associated with the program for that day.

Programing typically begins with a Sequential approach and can divert into a Directional approach when patients are not seen to be progressing as expected. Patients will be seen by an Associate Optometrist when a directional approach is required. Once the sequence has been restored through Directional care, the child will then be placed back into a sequential flow with an Assistant Therapist. If it is determined that a child is not progressing with an assistant therapist, that

child will be referred to one of the Center's Associate Optometrists for management. That Optometrist will evaluate the child and determine how to proceed. Many of these children will be going through some sought of a critical empathy experience [10]. Consideration of that experience will be assessed with each child.

Table 2. *Normative Values for Binocular Testing.*

	Classical Norms (Morgan's Norms)	Office Norms
Distance Base Out	9/19/10	x/30/30
Distance Base In	x/7/4	x/8/6
Near Base Out	17/21/11	x/30/30
Near Base In	13/21/13	x/20/18

Vision Therapy procedures will typically begin with a Brock string and associated sequential chiastopic techniques, eye movement techniques as well as sequential accommodative techniques, starting with accommodative monocular rock [11]. The first phase of therapy is to established voluntary convergence [12]. This is initially developed with an opaque Warshowsky Stop 'n Go Free Space Fusion Trainer [13] and is followed by voluntary convergence with an opaque Hendrickson Life Saver card. Once voluntary convergence is recognized, divergence techniques are introduced followed by jump ductions and ultimately Base in Minus and Base out Plus (BIM/BOP) techniques are utilized.

4.4. Vision Therapy Re-evaluation

Prior to scheduling a reevaluation after the 8th vision therapy session, a Keystone Visual Skills test and Cheiroscopic tracing is performed by an Assistant Vision Therapist. Additionally, parents are asked to fill out a reevaluation questionnaire, identifying changes that they have noted since their child's last reevaluation. Reevaluations are scheduled for 30 minutes and performed by an Associate Optometrist or the Director. Improved performance is noted and corroborated with changes in visual function identified from the reevaluation. Change in prescription or modification of the program is presented if warranted at that visit. As vergence skill is developed, the amount of prism prescribed may be reduced, consistent with maintaining efficient, effective and effortless vision.

4.5. Completion of Vision Therapy Program

There are five factors that contribute to deciding when it is appropriate for a patient to discontinue vision therapy, with the idea that regression is not an option.

Factor One: recognizes achieved adjusted norms for vergence functions at distance and near as outlined in Table 2. These norms were developed over my many years of clinical practice.

Factor Two: recognizes achieved adjusted norms for a bilateral cheiroscopic trace and keystone visual skills.

Factor Three: recognizes achieved levels of accommodative and vergence function measuring maximum base out and base in function with BOP/BIM up to +2.50/-3.00.

Factor Four: recognizes that all symptoms identified as being visual in nature and consequential behavioral overlays have been resolved.

Factor Five: reinforces these four basic criteria, for 8 additional sessions, creating an automaticity through loading techniques [14]. An example of a loading technique is extending eccentric circles through jump ductions while walking heel-to-toe on a walk-rail and synchronized with a metronome.

4.6. Retainer Vision Therapy

Once vision therapy has been discontinued, retainer vision therapy is implemented. Patients will continue home vision therapy 4-5 times per week for the first month. Reevaluations will be scheduled once a month. Home vision therapy is reduced by one day each month as long as their progress has been maintained. Once home vision therapy is discontinued, follow up appointments would be scheduled for 3 months, 6 months and then yearly.

If a patient has a refractive error that's warranted to be worn, a prescription typically inclusive of a progressive bifocal and prism will continue to be worn. If there is no refractive error presented, a plano top progressive bifocal and prism may be utilized during visually demanding activities, as a prevention.

5. Interdisciplinary Philosophy

When a child receives therapies from multiple treatment strategies, it becomes incumbent for therapists to work together to seamlessly capture complex consequences of each therapeutic approach, transcending disciplinary boundaries. Interdisciplinary care represents a sharing of knowledge, skills and decision-making capabilities from multiple discipline-specific perspectives for each child [15].

ODA's Multidisciplinary Therapy Center, Social Work Department and Vision services recognize and have responded to this type of treatment strategy by implementing a program entitled Grand Rounds. Once a month, through Grand Rounds, the three departments meet to discuss children who are not progressing as they were thought to be able to progress by their therapist. Children are identified by individual therapists and brought to the attention of the assistant to the Director of Vision Therapy, who will then schedule the therapists for those children to be discussed at the Grand Rounds meeting. During Grand Rounds, therapists will discuss each child presented from their individual therapeutic perspective creating a clinical clarity for these children. New integrated strategies are developed and implemented for these children from this collaboration.

6. Conclusion

ODA Primary Health Care Network established the Center for Advance Vision Care in 2016 for the purpose of redeveloping the visual skills for children of Williamsburg

and surrounding areas. This structured program is unique as lenses, prisms and Vision Therapy are utilized resulting in enhanced educational achievement, career choice and the social life initiatives for these children. The program highlights the efficacy of Vision Therapy with children who have leaning issues and associated visual dysfunction [16]. It combines a creative philosophical and a clinical approach that is repeatable in establishing higher levels of success and self-esteem in our patients, approaching their true potential.

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