Article ▸ Successful Optometric Vision Therapy with Patients on the Autistic Spectrum: Engaging Patients with Visual-Cognitive Therapy

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ABSTRACT

Approximately 1 in every 68 children is diagnosed with an autism spectrum disorder (ASD). It is one of the fastest growing disabilities in the United States, yet there is a shortage of optometrists who are able, and willing, to provide care for these patients. Visual-cognitive therapy (VCT) has been used for over 50 years to implement in-office vision therapy with challenging patients, including patients who have ASD. The following article presents the theory of VCT used with the DIR (Developmental, Individual differences, Relationship-based)/Floortime model to engage our patients with ASD. A brief discussion of visual-cognitive therapy and the DIR/Floortime model is presented along with examples of visual-cognitive therapy procedures.

Keywords: autism, Developmental delays, DIR (Developmental, Individual differences, Relationship-based), Floortime, Piaget, visual-cognitive therapy

Introduction

Vision is often synonymous with sight. Wachs and Furth argued that vision also involves using knowledge through visual experiences. They stated that effective and well-developed vision results in understanding what one sees and coordinating that knowledge with the body to conceptualize one's world.[1] The conceptual ability they described is closely tied to how well one understands a topic, problem, or experience. Wachs and Furth further asserted that the basic foundation of conceptual understanding differs significantly from content learning. They defined content learning as knowledge characterized by superficial information with minimum or no understanding of the underlying concept. In contrast, conceptual knowledge is the profound understanding that is necessary in order to fully appreciate the relationship between objects and ideas.[1] An article by Fuson, applying Piaget's theories to math instruction, reinforces the importance of conceptual understanding, especially for children with learning differences.[2] He found that children with learning difficulties were often not able to understand and to apply concepts when taught by an instructor who utilized lecture-style teaching with an emphasis on robotized repetition. This instructional approach based on rote memorization was referred to as "teaching without learning." Given this finding, it is not difficult to see how a similar pedagogical approach would be detrimental to a child with special needs in vision therapy.

Conceptual learning and understanding is the cornerstone of visual-cognitive therapy (VCT), a term coined by Dr. Harry Wachs that refers to his unique approach to optometric vision therapy. Visual-cognitive therapy is based on Jean Piaget's theories of development. Wachs' interpretation of Piaget's developmental theories emphasizes working with a child at his or her personal developmental level to develop in the following areas of thinking: Visually Guided Cognitive Movement (including reflex integration), Ocular Discrimination, Digital Discriminative Movement, Hand Thinking, Visual-Verbal Receptive and Expressive Language, Visual Thinking, Visual Logic, Visual-Auditory, Graphics (visual-motor), Representational Thought, and Visual Math.[1,3]

It has been found that developmentally-based instruction promotes gains in cognitive, social, and emotional functioning among children with autism spectrum disorders.[4] Wachs and Furth's interpretation of Piaget's developmental theories also emphasized working with a child at his or her personal developmental level.[1] A child's ability to progress developmentally is, to some extent, based on the ability to interact with objects and others in the environment, but such engagement is particularly difficult for a child with an ASD.[3] According to Piaget, this ability to understand, to control, and to interact with one's environment aids both cognitive development and self-regulation capacities.[5]

In order to understand how an intervention can be of assistance to children with cognitive, social, or emotional delays, one must first understand how development progresses in typically-functioning children. Piaget's theories of development were initially based on his observations of the developmental achievements of his own children and his research of children's responses to various logical tasks. His observations and research led him to divide intellectual development into two major periods of growth: the sensorimotor (action involved) and the operational (object

Table 1: Early Signs of ASD in Infants and Young Children[21, 22]

Foundations for Relating, Communication, and Thinking	Signs of ASD (Core Deficits)	Associated Symptoms
Shared attention and regulation (0-3 months) Calm interest in and purposeful responses to sights, sound, touch, movement, and other sensory experiences (e.g. turning to look toward sounds)	Lack of sustained attention to different sights or sounds	Aimless or self-stimulatory behavior
Engagement and relating (2-5 months) Growing expressions of intimacy and relatedness (e.g. joyful smiles initiated and sustained)	No engagement or fleeting expressions of joy, lack of sustained engagement	Self-absorption or withdrawal
Purposeful emotional interactions (begins at 4-6 months) Back and forth interactions with emotional expressions, sounds, gestures, etc.	No interactions or only brief back-and-forth interactions with little initiative (i.e. mostly responding)	Random or impulsive behavior
Long chains of back-and-forth emotional signaling and shared problem-solving (begins at 10-18 months) Many social and emotional interactions in a row used for problem-solving (e.g. showing Dad a toy)	No words or rote use of words (e.g. mostly repeats what is heard)	Echolalia and other forms of repetition of what is heard or seen
Creating Ideas (begins at 18-30 months) Meaningful use of words or phrases and interactive pretend play with caregivers or peers	No words or rote use of words (e.g. mostly repeats what is heard)	Echolalia and other forms of repetition of what is heard or seen
Building bridges between ideas: logical thinking (begins at 30-42 months) Logical connections between meaningful ideas ("Want to go outside because I want to play")	No words, or memorized scripts, coupled with seemingly random, rather than logical, use of ideas	Irrational behavior or illogical or unrealistic use of ideas

involved) phases. Visual-cognitive therapy encourages hierarchical growth in both sensorimotor and operational knowledge within the patient.[1,3]

Piaget theorized that sensorimotor knowledge typically develops from birth to two years of age and involves understanding the world through movement and spatial awareness.[1] During the sensorimotor period, infants progress from reflex activities to more systematic and organized behavior. Early sensory exploration of the world by the infant and toddler leads to the formation of concepts. In order to be meaningful, these concepts must be based on prior sensory experiences. Piaget asserted that the most important cognitive milestones during the sensorimotor period, which typically occurs between eight and twelve months of age, involve the development of some understanding of causality and the initiation of goal-directed behavior. Other major developmental milestones of this period include object permanence and the child's ability to manipulate a mental image in order to reason and problem-solve.

Using Piaget's object permanence task, one study found that the most significant difference among children with ASD was their difficulty demonstrating adequate understanding of the task—a difference the study attributed to regulatory difficulties.[6] In other words, emotional stability and sensory regulation facilitate the visual interest needed to attend to, to comprehend, and to complete a new task.

An essential component in VCT is the commitment to working with each patient at his or her developmental level. By assessing a patient's emotional and biological differences, a visual-cognitive therapist can provide a meaningful experience (therapy procedure) that is challenging yet developmentally appropriate. To develop visual-cognitive skills, patients must be well-regulated and have the desire to learn from the therapy. Providing a meaningful experience can be very challenging when working with autistic patients. It requires a very delicate balance between encouraging persistence through a challenging task and attending to the patient's emotional state.[3]

DIR Model

The DSM IV-TR criteria describe the triad of deficits for children with ASD: qualitative impairments in social interactions and communication, as well as restrictive patterns of behavior, interests, and activities.[7] Children with ASD differ in the ways they engage, relate, and communicate and in the ways they respond to their environment.[8] The Developmental, Individual differences, Relationship-based (DIR) model addresses the core ASD deficits in a way that is unique to the child.[9-11] There is a plethora of research and literature that supports developmentally appropriate, spontaneous, individualized therapy promoting emotional connections for patients with ASD, like DIR.[12-20]

Developed by Drs. Stanley Greenspan and Serena Wieder, the DIR model is an interdisciplinary approach that focuses on the social-emotional development of the child and greatly informs the practice of VCT. When using the DIR model in conjunction with VCT, the therapist tailors procedures to

Table 2: Biologically Based Individual Differences[21,22]

Reaction to sensations	Difficulty modulating information received from the senses (i.e. child may be under- or over-reactive or mixed)
Ability to understand sensory information	Difficulty making sense of the information from the different senses
Creating and sequencing or planning movement responses	Difficulty moving his body the way he wants

the unique profile of the patient, uses appropriate affect, and works on developing a strong rapport with the patient.[3] This allows the patient actively to engage in the therapy, makes the experience more meaningful, and allows the patient to learn and grow from the experience. In the DIR model, "Developmental" refers to the child's developmental level of emotional and intellectual functioning, as defined in the stages of the Functional Emotional Developmental Capacities (FEDCs). Table 1 shows these six primary stages in young children. "Individual differences" refers to the unique ways a child understands his or her internal and external world. Table 2 shows how these differences influence the child's interactions with others. "Relationship-based" refers to the learning relationships that enable a child to grow developmentally. These are the child's relationships and interactions with caregivers, family members, and others. Interactive tendencies, many innate, others acquired through culture, influence relationships. By being aware of interactive tendencies, one can alter their style to work with each child's unique sensitivities.

DIR is often referred to as the DIR/Floortime model.[21,22] Floortime is the primary treatment method within the DIR approach. In Floortime, the parent/therapist literally gets down on the floor to join in the child's world. The play is initiated by the child; while following the child's interests, the parent/therapist challenges the child toward greater and greater mastery of the social, emotional, and intellectual capacities, all the while respecting the child's individual differences in sensory regulation and processing. DIR is a comprehensive model that often includes, in addition to Floortime, various problem-solving semi-structured therapies including visual-cognitive therapy, speech therapy, occupational therapy, educational programs, mental intervention, and when appropriate, augmentative and biomedical intervention. What is common with all of the therapies using the DIR model is that they involve working with a child at his or her developmental level and building upon each child's strengths by creating emotionally meaningful experiences. Following the child's lead, engaging his or her attention, and paying attention to individual interests and desires allows one to enter the child's world and encourage the child to enter into a shared environment. We can help these children construct relationships in a meaningful, spontaneous, and flexible way with the world around them.

Table 3: Floortime Strategies Frequently used in Visual-Cognitive Therapy

* DO NOT TREAT AVOIDANCE OR "NO" AS REJECTION!!
* Position yourself in front of the patient
* Insist on a response
* Play dumb-have the patient explain what they mean
* Make the wrong move and have him correct you
* Do what the patient tells you to do; take turns being in charge
* Allow frequent sensory-motor breaks or incorporate them into therapeutic activities such as bouncing, swinging, rolling, spinning, deep pressure, etc.
* Use gestures, tone of voice, and body language that are familiar to the patient to accentuate what you say and do
* Problem-solve to deal with anxiety (separation, fear, aggression, etc.)
* Provide visual cues, such as picture schedules, to help them stay regulated and on track
* When they perseverate, join in and make it interactive
* Encourage self-regulation
* Identify and praise appropriate behavior
* Set limits, but make sure they understand the rules
* Be empathetic and ready to listen; children can't always leave their problems at the door
* Be flexible in your approach; sometimes there is more than one way to get the job done
* Be ready to take on a role or use a motivating theme or idea; it never hurts to be well-researched

Visual-Cognitive Therapy

When performing VCT, one uses facial expressions, tone of voice, gestures, and body language as dictated by the socio-emotional stage and individual differences of the child to engage and internally motivate the patient. Engagement is crucial. The child cannot be going through the motions during therapy. To truly grow developmentally, the patient must be motivated, engaged, and aware. This can be challenging with patients with ASD because of their limited verbal ability and difficulty with sensory regulation. By understanding the patient's social-emotional and regulatory profile, one can alter the activity and approach to meet the child's needs (Table 3).

Visual-Cognitive Therapy in Action

Working with children who are on the autistic spectrum can be challenging. Visual-cognitive therapy requires patients to be engaged in therapy procedures, to stay focused, and to be internally motivated to grow from the experience. One of the ways that DIR has influenced VCT is in the use of the patient's interests to build desire during therapy. Patients guide the doctor and therapist in creating the optimal visual-cognitive environment for them.

Figures 1 and 2 show a tracking activity done as a fairy princess game with a young patient (4 years) who is interested in princesses. By dressing up and working with the child to create the game, she is fully engaged in the procedure. In this activity the fairy princess must watch the magic mirror

Figure 1: *Tracking activity done as a fairy princess game*

Figure 2: *Tracking activity done as a fairy princess game*

Figure 3: *Parquetry block rotations along the Z-axis as a "rainbow stone" adventure game*

Figure 4: *Parquetry block rotations along the Z-axis as a "rainbow stone" adventure game.*

on the wand with only her eyes as it moves to break the evil witch's spell so she may live happily ever after with her prince. The crown easily falls off her head if it moves and serves as an indicator for the child of head movements while tracking. The therapist creates an evil cackle if she loses fixation. Not only has her fixation and tracking improved significantly, she is having fun and loves the therapy.

Figures 3 and 4 show a patient working on parquetry block rotations along the Z-axis as a "rainbow stone" adventure game. Since this 10-year-old patient enjoys movement, it is incorporated into the activity, transforming a "boring block game" into an adventure: he is the brave hero, chased by an evil villain. To save the earth he must crawl through the dangerous tunnel and break the code of the "rainbow stones" (by rotating the block design 90 degrees). Dr. Green is sitting on the floor across from the patient working with him on his adventure. Being down on the floor at eye level is crucial in keeping him engaged in the procedure, rather than just playing around.

Video 1, which can be found at http://bit.ly/OVPvid1 shows a patient working on a visual schedule. Initially this 4-year-old patient had a very hard time staying on task during vision therapy. Picture lists help children stay organized, help with sequencing, and are often used with kids with ASD, but for many children like this patient there is often little understanding of what the pictures represent because of weak visual thinking skills. During this video, Dr. Green is working on connecting meaning to the picture (image to the activity). She is asking the patient to visualize and come up with ideas of what the pictures mean. The patient comes up with an idea of adding a picture of a building. Visual motor skills are extremely difficult for this patient. To avoid frustration, Dr. Green draws for him and asks him for ideas. She is using Floortime techniques to tap into his affect to keep him engaged and to sustain his attention.

Video 2, http://bit.ly/OVPvisual shows an evaluation of a non-verbal ASD child. This patient is 4 years old and is unable to sit in an exam chair for a routine evaluation. The exam is performed in the therapy room. There is limited attention and many avoidance behaviors. Through observation it is seen that he moves his body through space to scan/track rather than his eyes. He displays an intermittent eye turn out at near, alternating eyes. Tracking is difficult because fixation is limited, but when he does track there are significant head movements and ocular jerks. Tracking and convergence improves significantly with touch. He is hypo-reactive to sensory stimuli; this is seen with his frequent falling, moving around, and singing. Dr. Green supports this by using the therapy ball for support, drawing him in with her change in vocal tones and trying to engage him in back and forth interactions, including singing. She uses high affect but tries not to over stimulate the patient. Because of the avoidance behaviors, she wants to engage him in interacting with her.

Conclusions

It can be a challenge to help patients with ASD engage and benefit fully from vision therapy. A failure to attend to

the patient's social-emotional needs and to build internal motivation often prevents success and growth in the vision therapy room. It is essential to meet patients where they are and to apply the appropriate affect in order for any therapy to be most effective. Visual-cognitive therapy is a unique type of individualized optometric vision therapy; based on Piaget's developmental theories, it places the patient in developmentally appropriate, problem-solving situations. Piaget's theories do not take the role of affect into account, yet emotional interactions have been shown to lead development. Using the DIR model in conjunction with visual-cognitive therapy allows patients to engage in the therapy procedures. This allows patients with autism better to understand, to learn from, and to react to their worlds. This in turn allows patients with ASD to engage in a meaningful therapeutic process that encourages their social, emotional, and intellectual growth.

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