From the Meeting • The Memphis Meeting (CCVC) in Review 2018 – Space Perception: Connecting Testing, Training, and the World We Experience

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ABSTRACT

The most amazing meeting takes place every summer in Memphis; it is like no other. Sandy Tran, the OEP Resident Liaison in 2016, wrote an amazing review of that meeting, which should be called out here and read in order to understand the upcoming article better. In essence, the small group of 30-40 doctors, residents, and students tackles a specific topic and dissects and builds answers for three questions on that topic. What you will be reading is one doctor's (Mark Dean) interpretation of the topic and another's (Eric Weigel) notes from the meeting based on the presentations made. The neat thing about this meeting is that the topic changes every year; a new opportunity arises to explore a visual assumption or paradigm. I hope you enjoy the work product from the 2018 meeting.

Space perception is unique to the individual, and it changes over time through our multisensory exploration and experiences. All multisensory information gathered adds to our ability to perceive space. Space perception can be defined as a dynamic, evolving, individualized, cognitive representation of self and that which is beyond, external to, or includes the body in order to act. Space perception is unique to the individual in establishing one's own view of the world around them. However, through shared experiences, there likely is common ground for humans to have similar perceptions of space, or a "true" space perception common to humans, based on the fact that as members of the human race, we experience similar human interactions with the world around us (e.g., birth, crawling, walking, eating, etc.). Humans use feedback and experience from their explorations of the world to change space perception.

We use our space perception to direct action in order to navigate through the world around us. Multisensory experiences add to our understanding of how to use the visual process as the most efficient way to perceive the space. Our awareness of space perception may lead to behavioral changes that may be observed in conditions of the visual process. Conditions of the visual process allow a doctor to understand where the patient has been and where the patient may be headed. Both the doctor's and the patient's awareness of space perception can influence how the patient is treated and how well the patient responds to treatment.

While treating a patient, the doctor's knowledge of space perception allows the practitioner to help the patient expand their space perception or interact with their space perception more efficiently. Everything done in a 'good' vision training program is designed to enhance the patient's space perception. The 'good' VT program should have activities that are at an appropriate level for the patient's current needs, are open-ended, and are designed to allow the patient to discover their location with regard to Skeffington's four circles and the patient's space perception. A good procedure will allow the patient to

explore their space world and will allow the vision therapist to gather insight into the patient's space perception.

Question 1

How can we define and/or describe space perception so that it provides both a foundation and a direction for understanding the role of the visual process in human behavior?

- Space perception is most often a discussion about 3-D space, depth perception, or stereopsis. Part of our goal as clinicians is to quantify this throughout our evaluations and consults. However, if we consider the "totality" of space, then we can have a much broader and deeper interpretation of space perception.

The foundation of space perception is the visual process: to derive meaning and direct action in light of the world (outward space) and in light of the mind (inward space).

The visual process provides the most robust information of the large volume of space that is processed regarding distance, direction, orientation, prediction of movement, identification, visual discrimination, and manipulation of objects in both real and imagined space worlds.

Space perception is unique to every individual and is influenced by time, a consistent variable. It is integrating the constructs of the outward space sphere with the inner space sphere along the x, y, and z space axes. For efficient and optimal development of space perception, these two spheres have to be in agreement.

- Outward space sphere: the external world, that which lies beyond our skin. Within the sphere, there are points of reference: allocentric and egocentric localization.
- Inward space sphere: the internal world, that which exists inside our skin.

Our space perception is a dynamic, evolving, individualized, cognitive representation of self and that which is beyond, external to, or includes the body (or the body as extended by tools) in order to act. There is a continually active exploratory and reciprocal process between these spheres (outward and inward), which are constantly being shaped and molded and developed through feedback of exploration by:

- The physical changes our body makes as we grow, beginning in the fetal stage and continuing through adult life;
- The social, cultural, and physical environments in which we live;
- Movements within our personal space (purposeful, non-purposeful, and lack of movement);
- The physical health of our body, which is affected by the food we eat;
- Sensory inputs from sight, sound, smell, touch, vestibular, and proprioceptive sensory systems;
- Our visual posture (i.e., hyperopia, myopia, strabismus, amblyopia, binocular status) and the visual information process, (i.e., visual discrimination, size constancy, visualization, etc);
- TBI and ABI from concussion injuries, stroke, and other neurological modifying disease processes such as MS.

The integration of these spheres, cognitive or subconscious, assists in directing action and the manipulation of space in order to accomplish needs, desires, and self-preservation—the development of space perception. Observation of these behaviors reflects the progression of development.

Question 2

Describe how specific features or elements of our space perception affect the choice, orientation, and direction of our testing?

The doctor's own space perception, derived from personal and professional experience and visual condition, both positively and negatively affect the choice, direction, orientation, administration, and ultimately the observations made during patient encounters.

The patient's performance and interaction with the probes and tests that they are asked to do help us to understand how they manage their space perception and assist us in understanding our patient's symptoms, complaints, and unmet needs. We have expectations for optimal performance and continually look for differences, red flags, or mismatches that indicate less than optimal performance.

Our initial observation of the patient's movements through physical space and the patient's history begin to enlighten us as to how they have constructed their space volume. Our experience then guides us on how we choose tests, test protocols and sequences, the length of testing, and other probes to evaluate their management of spatial volume. It is based on how the patient responds over time to our tests and probes that we are able to make presumptions about how they have assembled or structured their own space perception or personal space volume. We attempt to quantify and measure their performance, but it is not always the figural description of the test as being the important information. It is more important to find the why: why do they say what they say or act how they act and perform the way they do to solve problems and to organize their space perception? We demonstrate a flexibility in our probes based on how productive the process is. The more sophisticated our understanding of space perception, the more subtle will be our observations of their performance, and this helps us to glean a better understanding of their ability to process and organize their personal space volume. What at first may seem like "noise" takes on significance.

For example, when using the copy form test (and other paper/pencil tests), there are age-level norms that can be considered to assess an age-level performance number, but how the patient organizes the drawings and where and how they place their name on the test sheet provides information regarding their organization of their visual space volume.

It is very important that we, as observers, remain as neutral as possible so as not to influence or direct the patient in a particular direction of performance. Of equal importance is that we ask the patient to solve tests and probes in language they understand, which is reflected in the language we use (i.e., tone, inflection, and asking open-ended questions, etc.) while making our observations. Attention is given to the environment where the tests and probes are presented: e.g., lighting, temperature, odors, and background noise. In this manner, we establish a rapport that helps them feel comfortable during the testing situation and allows them to be more of their "natural self" in order for us to draw out of them how they have assembled their space perception.

Question 3

What principles guide how you manipulate the spatial aspects of the environment to enhance, expand, and improve your patients' space perception in VT?

The primary goal with vision therapy is to arrange conditions to develop, enhance, or restore the visual process by developing the flexibility to expand or to compress the volume of space to which the patient can attend in order to meet their needs.

We have to create a safe place, a rapport with the patient, in order for them to allow us access to their personal space.

We begin where the patient is in their space perception development, which is presumed form our observations of their performance, in order to help them to engage, explore, predict, and manipulate their visual space.

Any and all activities have the potential to allow the patient to manipulate their visual space volume through their awareness of their ability to expand or shrink their volume of space and enhance development of their space perception. Each activity or procedure also has the potential to be both a therapeutic and an evaluation tool. The patient's performance is an indication of their progress.

It is our responsibility to begin where the patient is in their development and appropriately design activities that will guide the patient to discover their own way of thinking and problem-solving instead of dictating or duplicating someone else's. This directs them toward a more efficient interpretation of their visual space in order to maximize development of their space perception.

Our professional challenge is finding a fun game to play that can be played at an appropriate level of intensity where the patient is able to perform activities with ease and comfort with about 70% to 75% proficiency. This allows them to manipulate and to integrate their volume of space in a manner that it is not so hard that they consistently fail and lose confidence but not so easy that they get bored.

We observe the quality of their effort to solve problems and to manage their volume of space (internal and external) to answer questions such as: can they do it, how did they do it, and was it what I expected? Observations such as how the patient walks, how they balance, how they move their eyes are important. Are they confident or hesitant in their actions? Based on their response, we adjust the activity in order to expand their ability to attend to and manipulate their volume of space.

It is also important that we provide sufficient room for the patient physically to move through space. They should not solely be limited to the confines of instrumental space and internal space (time) to process, change how they attend, react, and adapt to the problem(s) presented. This allows the patient to investigate, to manipulate, to discover, and to integrate their volume of space freely while solving the problem(s).

Language plays a very important role in the development of space perception. It is important for the doctor (therapist) to communicate using open-ended questions about their visual experiences without being judgmental or condescending. This verbal interchange allows the patient to relate to and to express in words their experience, which provides feedback to the patient and assists the doctor (therapist) in getting an idea about the progression of development.

Having a proper environment is essential to the development and expression of the integration of the space volume and space perception.

Physical Space: Having proper lighting and luminance is important because some patients require more and some less. Attention is also given to other sensory issues such as décor, temperature, and scents/odors.

Working in physical space is critical in developing the visual space volume. Ample space is required for walking and moving as well as tossing and catching.

It also integral in developing the relationship between central and peripheral processing as well as the manipulation of near and far visual space.

Lenses and Prisms: Lenses and prisms have optical spatial transformational properties that require the patient to manipulate their spatial perception in anticipated, predictable, and prescribed directions.

Knowing these spatial transformational properties and understanding that each patient's response is unique provides the doctor or therapist feedback regarding the how the patient utilizes and manipulates their volume of space.

This information helps the doctor and patient to negotiate a lens prescription for the patient and determine when it is to be worn and for which daily activities it will be most useful.

This also helps the doctor (therapist) during the therapy treatment session to select a lens to further the patient's development of their visual space volume. For example:

- Accommodative rock, monocular and binocular;
- Mental minus—asking the patient about what they feel, not only in their eyes or head but in any other areas of their body;
- Dissociating prism—horizontal with squinchel, vertical with tracking;
- Yoked prism—walking through space or tossing and catching objects;
- Monocular prism;
- Filters—colors and foils.

Targets and Charts: A variety of targets and objects for the patient to look at helps the patient to maintain attention to a specific place in space or in multiple places. These are used to manipulate space in all of the axis planes, the near-to-far z axis, and the central/peripheral x and y axes.

Rhythm and Timing: Manipulating rhythm and timing affects internal space processing. Sometimes there is benefit to working and moving with fast, ballistic-type movements, and other times there is benefit to a much slower pace. Using a metronome during a procedure provides an auditory marker of time with which to interact.

Sensory Integration: Incorporating information with tactile feedback by touching and feeling; vestibular input with walking, general body movement, jumping, and hopping.

General Movement: Controlled movements with activities and procedures associated with primitive reflexes or motor equivalents and other chalkboard procedures, or laterality and directionality activities or other general motor procedures all assist the patient to manipulate their volume of space and space perception. Specific examples include:

- Walking rail
- Infinity walk
- Tossing and catching

Vergence: Manipulating far and near space with vergence activities to help develop spatial localization such as:

- Brock string
- Vectograms: projected or hand-held
- Overlaping circles and pictures
- Life saver cards
- Aperture rule

Visualization/Visual Memory:

- Touch and tactile input with mystery bag activities
- Tachistoscope
- Parquetry blocks

Expansion and Compression: Some examples given were:

- Look hard – look soft
- CP saccades
- Mental minus (SILO) awareness

The conclusion was that any and all procedures can be designed and modified to develop the flexibility to manipulate the visual space volume and spatial perception.