

THE SENSORY LEARNING PROGRAM
IN THE WORLD OF OPTOMETRY

By

Fredric Dean Kapteyn

This paper is submitted in partial fulfillment
of the requirements for the degree of

Doctorate in Optometry

Ferris State University
Michigan College of Optometry

April 2007

ABSTRACT

Background: This research study evaluates the effectiveness of combining the (relatively recent and unheard of) “Sensory Learning Program,” to conventional Vision Therapy that is practiced and used by today’s optometrists in treating patients with various binocular dysfunctions. The initial purpose of the SLP was to aid in the development of particular individuals with learning disabilities such as Autism, ADHD, ADD, etc... Recently, this program has been used in combination with conventional vision therapy in the goal to further maximize results with one’s learning and binocular control, maintenance, and capacity. Some practitioners of this combination program claim that patients “graduate” from vision therapy earlier than patients who do not also participate in SL. *Methods:* The following retrospective study examined the results of 10 patients who went through only vision therapy, and 10 other patients who went through both therapies, (SLP and vision therapy), combined. The two groups included mostly children, ages 5-24.

Results: Through comparing and contrasting retrospective data of these two populations, there is quite an interesting difference between the expected and actual outcomes of these patients. Children with underlying learning disabilities were found to be on the same level as “normal” developed children by the end of the combined therapies. *Conclusion:* Patients will “graduate” from vision therapy at earlier rates when the SLP is used in combination with VT, and patients with underlying learning disorders will be on similar learning levels as their peers when these two therapies are combined.

TABLE OF CONTENTS

	Page
LIST OF TABLES AND FIGURES.....	5
INTRODUCTION.....	6
MECHANISM.....	7
SLP MODULE.....	9
ADMINISTRATIVE REQUIREMENTS.....	10
OPTOMETRIC RELATION.....	10
METHODS.....	12
RESULTS.....	13
DISCUSSION.....	16

List of Tables

Table		Page
1	Bolls' Sensory Learning Method.....	8
2	BI/BO Ranges at 40cm.....	13
3	Visual Memory, Visualization, and Stereo Acuity.....	14
4	Total weeks of VT.....	15

List of Figures

Figure		Page
1	The SLP Module.....	9

Introduction

The Sensory Learning Program (SLP) was invented in Carlsbad, CA in 1997 by a Mary Bolles.¹ Her background includes a B.A. in liberal arts from Bowling Green University. By the time her 2nd child was 3 years old, she noticed that he seemed slower compared to her 3 other kids. At age 3, he was still not talking, and he evidently had coordination, anxiety, and anger issues. As a good mother would be, she became very concerned about this and started to do research on human learning and behavioral problems.¹

Over time she discovered that learning problems reached beyond only individual troubles such as reversal of letters, a language delay, hyperactive behavior, or an attention deficit disorder. She believed “these problems involve all the dimensions in a child, and every child has its own individual mosaic which can be best addressed by a comprehensive approach.”² She became certain and determined to develop a therapy that could be delivered in a manner that felt supportive and safe so that the patient could maintain receptivity and openness.²

After much research, she became fond of three different medical interventions that were already being practiced. The three included **syntonic, acoustic, and vestibular** sensory integrations. Each of these different areas had their own panel of experts: the area of **syntonics** was pioneered by Dr. Harry Riley Spitler. He believed that you could balance the autonomic nervous system and endocrine system with different frequencies of light stimulation to the eye. Dr. Guy Berard was a strong leader in the field of **acoustic** stimulation. He believed everything that shapes one’s behavior is largely influenced by the manner of what one hears. Dr. Jean Ayers was an occupational therapist and had a

theory that dealt with the belief that **vestibular** stimulation seemed to prime the nervous system to function more effectively.² Mary took these 3 Doctor's beliefs and instituted them in her own research and therapy development. She discovered that combining these three individual modalities into one multi-sensory experience was capable of providing the positive results she had been seeking for her son. Ultimately, the Sensory Learning Program was born.

Mechanism

As previously stated, the SLP combines the theory of syntonic (color frequencies), acoustic (language/sound), and vestibular (movement/balance) stimulations. All three of these sensory stimulatory therapies are simultaneously presented to the patient. Before the SLP was developed, each therapy was administered separately. When Mary had the idea of combining these three therapies into one, it was initially controversial. Many thought that it would overwhelm the patient. Mary, however, believed that by simultaneously stimulating three sensory components of an individual, the stronger components would support and promote the weaker ones.²

For example, if an individual has a weak vestibular component, that individual would be highly challenged and easily frustrated if he/she was only going through vestibular rehab therapy. This could be quite frustrating for both the patient and the therapist. With sensory learning, this patient would simultaneously experience visual and auditory stimulation (the patient's stronger sensory components). By doing this, the other two systems support and (subconsciously) strengthen the patient's vestibular integration in the

brainstem. The patient does not become frustrated as easily because he/she is “reassured” and “comforted” by the stimulation of the other familiar sensory modalities.

Below is a flow chart of each sensory modality, and which faculties the SLP actually strengthens during therapy.

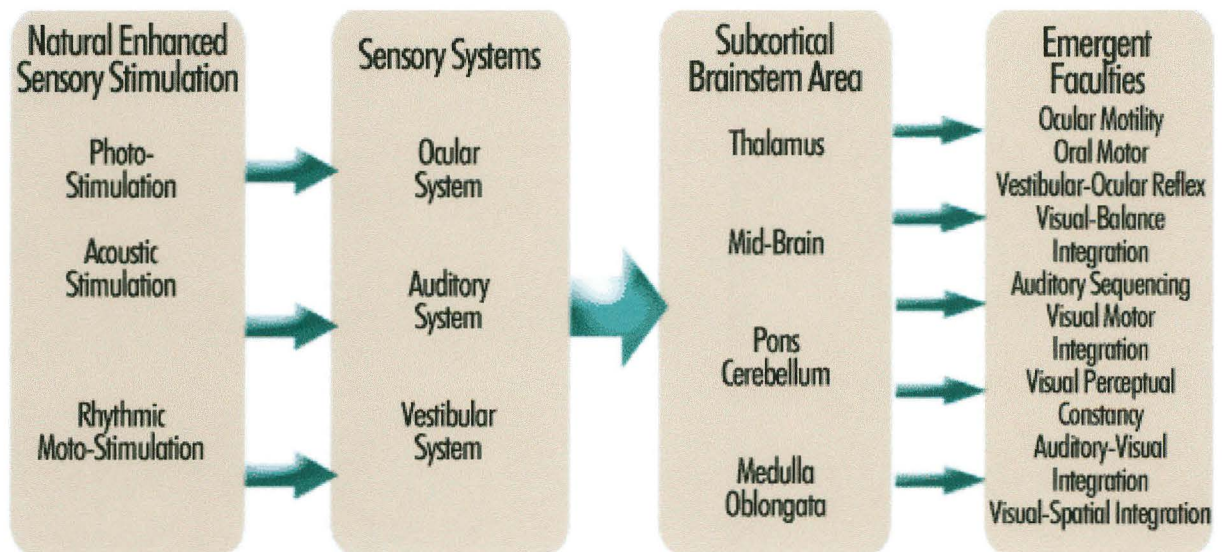


Table 1: Bolles' Sensory Learning Method²

As you can see from the table 1, the ocular, auditory, and vestibular systems are integrated by the thalamus and the brainstem (sub-cortical areas), before they are made conscious in the brain's outer cortex. Each of these sub-cortical areas, (the thalamus, mid-brain, pons, and medulla), are directly responsible for certain aspects of sensory integration. These include ocular motility, oral motor, vestibular-ocular reflex, visual balance integration, auditory sequencing, visual motor integration, visual perceptual constancy, auditory-visual integration, and visual-spatial integration.

Notice that many of these sub-conscious integrations that take place in the sub-cortical areas of the brain also involve many aspects and concepts that are shaped during conventional vision therapy (VT) training; Ocular-motility, visual-motor integration, visual-perceptual constancy, auditory-visual integration, and visual spatial integration also represent a great majority of what conventional VT focuses on improving.

SLP Module

The sensory learning “contraption” itself consists of a motion table, a computerized light instrument, and a set of headphones that all connect to a computer.



Image 1: The SLP Module⁷

The computerized light instrument presents a visual evoked stimulus to the patient, receiving all colors throughout the visual spectrum.³ The light slowly shines on and off, repeating in a cycle fashion about 5 times per half-hour. This part of the program helps restore the visual system’s receptivity for each part of the color spectrum. After a listening profile is performed on the patient, they will receive a modulated music package based on their individual needs. This music is transferred to the patient by a set of headphones, which are designed so that the patient hears nothing else in the room.⁴

Finally, the vestibular stimulation is produced by a motion table that moves in a similar fashion as image 2 portrays. It is designed to allow the patient to experience a relaxing movement in a reclined position.⁴

The SLP consists of 12 in-office sessions, and 18 in-home sessions. Each in-office session lasts for one full hour, and is administered in 12 consecutive days. Most children aged 16 and under have the 1-hour session broken up into 2-half-hour sessions, separated by 3-4 hours. The remaining 18-days involve the use of a portable light that is used at home.⁵

Administrative Requirements

Many different types of professionals are able to adopt the SLP into their practice.

Specific types of these professionals include MD's, pediatricians, osteopaths, optometrists, occupational therapists, physical therapists, and speech and language pathologists. There are three steps in becoming a certified SLP provider. You must be one of the previously mentioned professionals, purchase sensory learning equipment and software, and take part in a 6-day training program. With these three tools, you may notice that it is not difficult to become a SLP provider, provided you have the necessary education and money.⁶

Optometric Relation

As previously stated, the SLP works by re-establishing sensory integrations within the brain. (Think of it like "re-wiring" the brain, attempting to improve efficiency). This consequently improves sensory-motor skills such as ocular-motility, visual-motor

integration, visual-perceptual constancy, auditory-visual integration, and visual spatial integration. As previously mentioned, conventional VT also offers improvement in many of the same areas. Since both of these therapies generally attempt to achieve similar results, is there a “better” therapy? Can these two therapies work together to create a “mega” “binocular-sensory” therapy? Can the SLP synergize VT? If a patient went through the SLP first, would their chance of success with vision therapy increase? This study is designed to answer most of these questions in attempt to further understand the implementation of the SLP in today’s world of Optometry practice. First, let’s try and get a better understanding of how these two therapies work.

Comparing these two therapies to one another is a tough task. First of all, they are two very different types of therapies in regards to how they are administered. Also, each has different responsibilities regarding what they exactly wish to accomplish. The SLP practices by a bottom-up method, meaning that the patient really doesn’t have to do anything but lay there. They are not asked to perform any tasks or take hours out of their free-time to practice. No concentration is really required. Once the program is through, the patient is re-tested, which is compared to their pre-test scores to determine success. The overall goal for the SLP is to improve speech, perception, understanding, social interaction, coordinated movement, and the ability to learn²

Vision therapy, on the other hand, practices a top-down method. This means the patient must do a lot more work for the therapy to be considered successful. Each session, they are required to do certain tasks and eye movements in order to improve their visual

function and coordination. Time must be taken out of their day (for practice) in order to keep up on their weekly goals. They too have pre- and post-test scores, but compared to the SLP, vision therapy requires MUCH more on the patient's part. The goals for vision therapy include improving conscious eye movements, increase positive and negative fusional vergences, improve accommodative efficiency and accuracy, improving visual memory, visualization, and also improve the ability to learn.^{2,4}

Methods

For the sake of this study, binocular dysfunction problems will include patients with convergence excess (CE), convergence insufficiency (CI), low-angle exotropia (XOT) and esotropia (ESOT), accommodative ESOT, and accommodative excess/insufficiency. All patients in this study were randomly selected and had at least one of these conditions.

This was a retrospective study that went through the collected data of 20, randomly selected patients. 10 of these patients went through the sensory learning program AND vision therapy (combined both therapies), while the other 10 patients went through ONLY vision therapy. The mean age of these patients was 11.2 years with a standard deviation (sd) of 3.93. (Included in the mean age was a 25 year-old (female) college student who wanted to improve her study habits. Her data was used in the VT group). If you kick out this outlier, the average age in this study was 10.5 years with a 2.4 standard deviation. There were 11 males and 9 females.

It is important to take note that most patients who had gone through both programs (SLP and VT) not only had binocular dysfunction problems, but were also diagnosed with

some sort of behavioral learning problem such as autism, ADD, and ADHD. All patients who only went through VT had no such behavioral learning label.

Results

The data that was collected from the pre and post-therapy files included the following tests: Base-In (BI)/Base-Out (BO) ranges, visual memory scores (VM), visualization scores, stereo acuity, and the total number of weeks to complete (“graduate”) VT. The BI and BO range averages are shown below. Patients who underwent both therapies (VT and SLP) are represented by the “pre combined” and “post combined” columns.

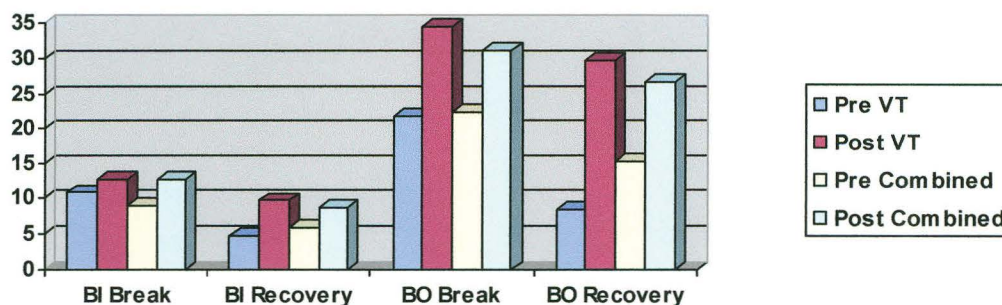


Table 2: BI/BO Ranges at 40cm

The target BI ranges are 10-15 for break and 5-10 for recovery. BO ranges are targeted for 25-30 for break and 20 for recovery. As you can see from the table above, BO ranges were most improved for both populations. The VT group had a BI break/recovery average of 10.8/4.8 before VT, and improved to 12.7/9.7 after (18% and 102% increase). The combined group had BI averages of 9.0/5.8 before therapy and 12.6/8.6 after (40% And 48% increase). BO range averages for the VT group started at 21.7/8.5, and finished with averages of 34.5/29.8 (59% and 250% improvement). The BO range averages for

the combined group were 22.4/15.3 before therapy, and 31.1/26.7 post-therapy (39% and 74% increase).

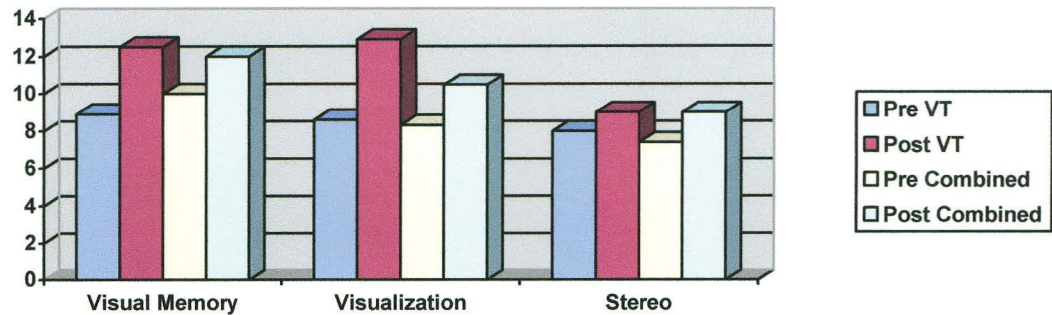


Table 3: Visual Memory, Visualization, and Stereo Acuity

Table 3 above represents the age levels of visual memory scores and visualization scores. Both tests were administered using Gibson's methods. The VT group had a pre-VT average of 8.9 (sd = 5.2) for visual memory and finished with a mean of 12.5 (sd = 3.62), which was a 40% (+3.6 years) improvement. The combined group had a pre-therapy visual memory average of 10.0 (sd = 5.5) and finished with an average of 12.00 (sd = 3.11), a 19.6% (+2.0 years) improvement. These numbers are based on age-related normalizations.

Visualization averages for the VT group averaged an 8.6 age-level before VT, and resulted in a 12.9 (sd = 2.03) age-level post-VT. This showed a 50% (+4.3 years) improvement. Averages for visualization age-related norms for the combined group began at 8.32 years (sd = 2.33) and finished at a 10.5 (sd = 3.57) age-level, showing a 26% (+2.18 years) improvement.

Stereo acuity was measured using the conventional stereo fly test with a maximum score of 9 possible circles (out of 9). The VT group began with a mean of 8.0 out of 9, and the Combo group began with a mean of 7.4 out of 9. Only one patient in the combined group was measured at 8 out of 9 at the end of therapy. All other patients correctly identified 9 out of 9 circles by the end of their therapies.

Overall it took an average of 34.0 weeks (sd = 7.78) for the VT group to complete their vision therapy training. The combined group averaged 31 weeks (sd = 7.92) to complete their VT. Although the SLP itself takes 30 days to complete, once VT is started, these patients tend to “catch on” at quicker rates and “graduate” vision therapy on an average of 3 weeks earlier than non-SLP participants.

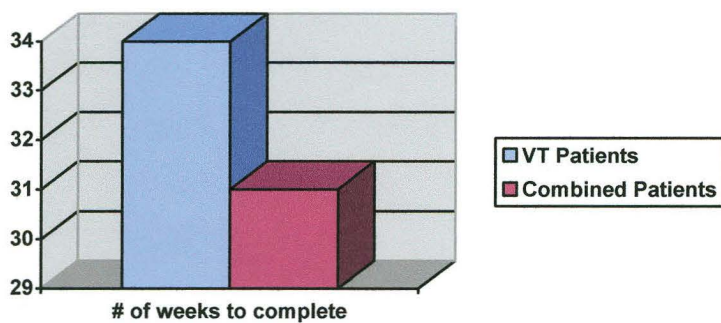


Table 4: Total weeks of VT

Discussion

Taken as a whole, improvements were made in each testing category with each group.

The VT group showed significant improvements in BI recovery (+102% improvement) and BO recoveries (+250% improvement). This group also displayed large improvements in the Visual-Motor scores (+40%) and Visualization scores (50%). This study certainly supports the fact that conventional VT is very helpful for children with binocular dysfunction and symptoms when reading at closer distances.

The combined group (underwent the SLP before VT) also had very significant results. The largest improvements were found with the BI break/recovery (+40%/+48%), and BO recovery (+74%). Although most categories did not show statistically as great of improvements as the VT group, they still matched their respectable targets in most categories. It is also very important to realize that even though these children all had moderate to severe behavioral learning problems, they actually came out of this combined therapy program AHEAD of their age-related norms in the VM area, and just missed the age-related norm in the visualization area. These patient's binocular control (positive and negative fusional vergences) and stereo acuity all met the "target ranges" described earlier.

This study has shown that by combining these two therapies, efficiency will improve in all of the 5 previous areas discussed. Children who experience sensory learning first seem to catch on quicker during their VT training. Ultimately, this program helps give these children the desire and motivational tools that are required for successful VT training.

This study has also demonstrated that Sensory Learning can be a successful program for children with learning and attention disabilities. This program is not a “cure” for these conditions; however it can be a powerful therapeutic technique that offers the ability for patients to speed up their sensory developmental process that is hindered early in their lives. The SLP seems to “jump-start” these children in the positive direction toward the learning process.

This program is just beginning to become well-known as an accepted form of therapy for autistic and AD(H)D labeled patients. With further research and reporting in the future, I believe that it will not be long before the Sensory Learning Program is widely accepted for binocular dysfunction treatment in Optometry practice.

References

1. "About the Founder." Sensory Learning Center International. 27 Mar 2007 <<http://www.sensorylearning.com/founder.php>>.
2. Bolles, Mary. "Bolles Sensory Learning Method." PositiveHealth.com. 2002. Positive Health Magazine. 27 Mar 2007 <http://www.positivehealth.com/permit/Articles/Mind_Matters/bolles62.htm>.
3. "Overview." Sensory Learning Center of Vancouver Washington. 27 Mar 2007 <<http://www.sensorylearning-vancouver.com/overview.html>>.
4. "What is the Sensory Learning Program?." Sensory Learning Center. Sensory Learning Center of Encinitas, CA. 27 Mar 2007 <<http://sensorylrng.com/>>.
5. "Sensory Learning Program." Sensory Learning Center International. 27 Mar 2007 <<http://www.sensorylearning.com/program.php>>.
6. "For Professionals." Sensory Learning Center International. 27 Mar 2007 <<http://www.sensorylearning.com/professionals.php>>.

7. "For Parents." Sensory Learning Center International. 27 Mar 2007
<<http://www.sensorylearning.com/parents.php>>.