

# Article ▶ Optometric Visual Motor Therapy in a Second Grader

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## ABSTRACT

The following is a case report of the efficacy of optometric visual-motor-perceptual therapy in treating a second grader with a learning disorder. It details the testing protocol and specifies the length of treatment along with the details of what specific treatment exercises were used to remediate the problem. The change in findings on a standardized test and the subjective changes in school performance are also included. The therapy was judged to be completely successful.

**Keywords:** learning disorder, optometric visual-motor-perceptual therapy, remediation

## Introduction

This case report deals with the optometric visual-motor-perceptual for a second grader referred with learning difficulties. While there may be a limit as to what can be learned from a single case report, it is our feeling that the detailed pre- and post-testing, along with a complete report of the training methods used, can be of considerable value. Often these cases are reported without the proper detailed analysis of the specific problems, and even more often, the treatment is described in vague terms. In this paper we will specify all of these details. As a whole, the use of optometric vision therapy in the treatment of visual perceptual and visual-motor deficits remains controversial even within the optometric profession. Even more so, the effects of this treatment on the learning abilities of the patient have also been cast in doubt.<sup>1-16</sup> While double-masked prospective studies are considered the “gold standard” of evidence-based medicine, without these studies, there is considerable weight given to expert opinion and individual case reports.

## Case Report

A 6.2-year-old female patient (TF) was referred for a complete visual analysis, including the areas of both binocular vision and visual perception. The young girl, having had significant difficulties in first grade, was continuing to flounder at the beginning of second grade, and the parents were concerned that she might be dyslexic. The initial visit consisted of a complete visual analysis, including a thorough binocular vision work-up. The testing included a non-dilated fundus evaluation, monocular and binocular refraction, complete testing of ocular motility (including the Developmental Eye Movement test), phorias, vergences (both amount and facility), and accommodation. The testing included both in-phoropter and real-space test modules. The findings of this visit were unremarkable, and therefore a second visit was scheduled to perform a visual-perceptual-motor evaluation.

## Table 1: Visual-Motor Testing Battery

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Standing Angels  
3:3 Hopping  
Chalkboard Circles  
Gesell Copy Forms  
Monroe Visual III Visual Memory Test  
Test of Visual Perceptual Skills (non-motor) Revised  
Piaget Test of Left and Right Concepts

## Table 2: Therapy Procedures

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Walking Exercises  
Chalkboard Circles/Windshield Wipers  
Kirschner Arrows  
Standing Angels (Appendix A)  
Piano Fingers  
Large/Small Parquetry Blocks  
Inch Cubes and Inch Cubes in Perspective  
Alphabet Code  
Pegboard  
Tachistoscopic Training (Tachette)  
100 Squares (Appendix B)  
GeoBoard  
Computer Orthoptics Visual Memory  
Pictograms

The battery of tests used in the second visit is described in Table 1. Motor testing revealed adequate gross and fine motor control; however, segmentation of simultaneous body movements was noted on all testing. The Gesell Copy Form test showed poor visual organization with age level form perception. In addition, there was below-age bimanual integration. The TVPS results can be seen in Figure 1, with significant deficits in the areas of Visual Memory, Visual Spatial Relations, and Visual Closure. The Monroe III Visual Memory test, which allows for motor performance, was closer to age norm, with only a mild lag. Based on the test results, along with the child's lack of school progress, it was decided to enroll the patient in a program of vision therapy.

Referred by: \_\_\_\_\_

Reason for Referral: \_\_\_\_\_

Description of Subject's Behavior: \_\_\_\_\_

### TEST OF VISUAL-PERCEPTUAL SKILLS (non-motor)

### REVISED

Morrison F. Gardner

### Individual Record Form

Name \_\_\_\_\_ Sex: \_\_\_\_\_ Grade: \_\_\_\_\_

School: \_\_\_\_\_ Examiner: \_\_\_\_\_

Date of Test: 2007 / 10 / 31 \*If the number of days exceeds 15, consider as a full month and increase the months by one.

Date of Birth: 2001 / 8 / 28

Chronological Age: 6 / 2 / day\*

#### TVPS Profile Chart (Scaled Scores)

% tile Rank	VD	VM	VSR	VFC	VSM	VFG	VC	% tile Rank
99.9	19	19	19	19	19	19	19	99.9
99.6	18	18	18	18	18	18	18	99.6
99	17	17	17	17	17	17	17	99
98	16	16	16	16	16	16	16	98
95	15	15	15	15	15	15	15	95
91	14	14	14	14	14	14	14	91
84	13	13	13	13	13	13	13	84
75	12	12	12	12	12	12	12	75
63	<u>11</u>	11	11	11	11	11	11	63
<b>50</b>	<b>10</b>	<b>50</b>						
37	9	9	9	9	9	9	9	37
25	8	<u>8</u>	8	8	8	8	8	25
16	7	7	<u>7</u>	7	7	7	7	16
9	6	6	6	6	6	6	6	9
5	5	5	5	5	5	5	5	5
2	4	4	4	4	4	4	4	2
1	3	3	3	3	3	3	3	1
0.4	2	2	2	2	2	2	2	0.4
0.1	1	1	1	1	1	1	1	0.1

Use for charting a subject's visual-perceptual areas of functioning based on scaled scores.

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#### TEST RESULTS:

	Raw Scores	Vis-Perc. ages	Standard Scores	Scaled Scores	T Score	Percentile Ranks	Stanine
Vis Discrimination	9	6 <sup>2</sup>	—	11	—	—	—
Vis Memory	3	5 <sup>1</sup>	—	8	—	—	—
Vis Spatial-Relationships	4	4 <sup>1</sup>	—	7	—	—	—
Vis Form-Constancy	5	5 <sup>1</sup>	—	10	—	—	—
Vis Sequential-Memory	4	5 <sup>10</sup>	—	9	—	—	—
Vis Figure Ground	8	6 <sup>11</sup>	—	12	—	—	—
Vis Closure	4	5 <sup>2</sup>	—	9	—	—	—
Sum of Scaled Scores	66					Percentile Rank: <b>40</b>	
Vis. Perceptual Quotient	96					Median Vis. Perceptual Age: —	

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Figure 1. Pre-treatment evaluation (TVPS)

Description of Subject's Behavior: \_\_\_\_\_

#### TVPS Profile Chart (Scaled Scores)

% tile Rank	VD	VM	VSR	VFC	VSM	VFG	VC	% tile Rank
99.9	19	19	19	19	19	19	19	99.9
99.6	18	18	18	18	18	18	18	99.6
99	17	17	17	17	17	17	17	99
98	16	16	16	16	16	16	16	98
95	15	15	15	15	15	15	15	95
91	14	14	<u>13</u>	14	14	14	14	91
84	<u>13</u>	13	13	<u>13</u>	13	13	13	84
75	12	12	12	12	12	<u>12</u>	12	75
63	11	11	11	11	11	11	<u>11</u>	63
<b>50</b>	<b>10</b>	<b>50</b>						
37	9	9	9	9	9	9	9	37
25	8	8	8	8	8	8	8	25
16	7	7	7	7	7	7	7	16
9	6	6	6	6	6	6	6	9
5	5	5	5	5	5	5	5	5
2	4	4	4	4	4	4	4	2
1	3	3	3	3	3	3	3	1
0.4	2	2	2	2	2	2	2	0.4
0.1	1	1	1	1	1	1	1	0.1

Use for charting a subject's visual-perceptual areas of functioning based on scaled scores.

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Name \_\_\_\_\_ Sex: \_\_\_\_\_ Grade: \_\_\_\_\_

School: \_\_\_\_\_ Examiner: \_\_\_\_\_

Date of Test: 2008 / 8 / 27 \*If the number of days exceeds 15, consider as a full month and increase the months by one.

Date of Birth: 2001 / 8 / 28

Chronological Age: 7 / 0 / day\*

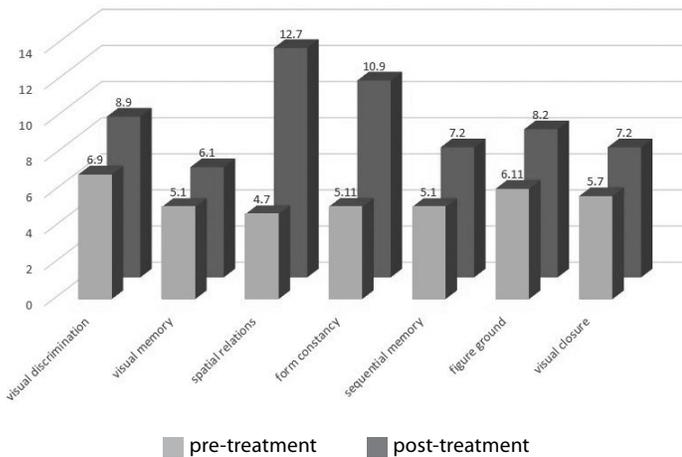
#### TEST RESULTS:

	Raw Scores	Vis-Perc. ages	Standard Scores	Scaled Scores	T Score	Percentile Ranks	Stanine
Vis Discrimination	13	8 <sup>2</sup>	—	13	—	—	—
Vis Memory	10	6 <sup>10</sup>	—	10	—	—	—
Vis Spatial-Relationships	14	12 <sup>3</sup>	—	14	—	—	—
Vis Form-Constancy	12	10 <sup>9</sup>	—	13	—	—	—
Vis Sequential-Memory	9	7 <sup>2</sup>	—	10	—	—	—
Vis Figure Ground	11	8 <sup>2</sup>	—	12	—	—	—
Vis Closure	9	7 <sup>2</sup>	—	11	—	—	—
Sum of Scaled Scores	83					Percentile Rank: <b>80</b>	
Vis. Perceptual Quotient	113					Median Vis. Perceptual Age: —	

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Figure 2. Post-treatment evaluation (TVPS)



**Figure 3.** Comparison of Visual Perceptual Abilities on the TVPS Before and After Treatment

## Treatment

The treatment consisted of 30-minute weekly office sessions, with the addition of approximately 30 minutes of daily home therapy exercises. In this section, we will describe the office-based and home treatment schedules as they were performed over the six-month course of therapy, with additional details and references given in Table 2

The treatment began on a two-pronged level, with both motor integration exercises and visual perceptual exercises. At the start, form copying on the page was performed using both the inch cubes and the large parquetry blocks. This was accompanied by various visual motor exercises, such as heel/toe walking, crossover walking, whiteboard circles, and windshield wiper whiteboard work. The motor aspect of the training continued with Kirschner arrows, standing angels, and later on piano fingers. As progress was made, the office treatment continued with off-page copying of the parquetry blocks and inch cubes. This was accompanied by pegboard work, which enabled the use of more complex forms and tachistoscopic flashing of number sequences. The Tachette was added to the home therapy schedule.

The next addition to the office therapy was the introduction of the 100-square exercise at its easiest level, while the parquetry blocks and inch cubes techniques were changed by the addition of building the shape as it would appear after 1/4 or 1/2 turns. At this point, alphabet coding was added to both the home and office therapy. At first, with the code present at the top of the page while working and as the patient progressed, parts of the code were eliminated from view and committed to memory.

Throughout the course of treatment, the various visual-motor exercises (standing angels, Kirschner arrows, 100 squares) were changed from primarily motor activities to primarily visual perceptual activities. This was achieved by a process often referred to as loading. In this process, while the patient is using the same therapy task, the type of problem solving changes from highly motor to highly visual. This can

easily be seen in the instructions accompanying the 100-square procedure (Appendix A). The technique starts off on a visual-motor level, but by the end of the procedure, the motor element is eliminated, and the entire exercise is on a visual-perceptual level. Additionally, one can see the “loading” philosophy in the stages of the standing angels exercise (Appendix B).

In the remaining phases of the treatment, techniques involving visual imagery, alphabet code, map coordinates, and others were used in order to bring the patient to the highest level of visual abilities that she could achieve.

## Results

As can be seen in Figure 2, the results showed improvement in all areas that were tested. This was true both for those skills that were below age level and for those that were not. In all cases, the improvement exceeded that of simple maturation during the time between the first and the final evaluations. Figure 3 shows the comparison age-level scores of the pre- and post-testing with the TVPS. In the skills most targeted for treatment, the improvement was as follows:

- Visual memory: 1 year
- Visual spatial relations: 5 years
- Visual sequential memory: 2 years
- Visual closure: 1.5 years

The other tests used (Monroe Visual III, Gesell Copy Forms) also showed gains that either reached or exceeded age norms. While test data is an important measure of success, it is also important to include the fact that the apparent learning problem was eliminated, and the patient has gone on to continued academic success.

## Conclusions

Using a structured series of accepted optometric vision therapy techniques, the various visual perceptual lags from which this patient suffered were remediated within the course of 6 months. No other treatment intervention modes were added during this time period. The impressive change in the test findings was accompanied by the elimination of any signs of a learning difficulty in the school, whereas significant difficulties had been encountered previously. It is reasonable to assume that the treatment modality employed here was the sole cause for the remediation of the problem. The gains made far outstripped those that could be attributed to simple maturation.

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Koslowe K, Frohlich T. Optometric visual motor therapy in a second grader. *Optom Vis Perf* 2018;6(4):145-9.

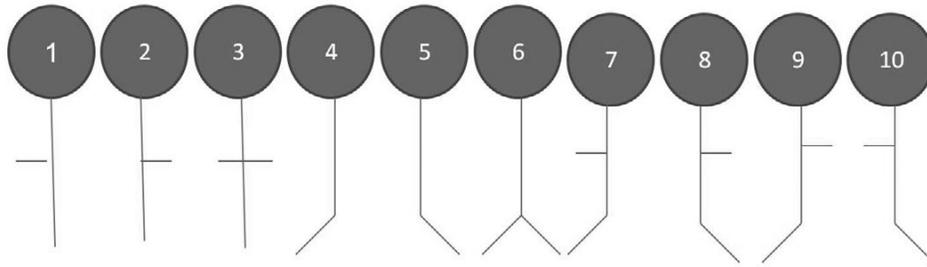
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## Appendix A. Standing Angels

### Standing Angels Stages:

1. Accurately reproduce the arm/leg positions of the figures in order
2. As the therapist calls out a number or series of numbers, the patient performs the appropriate action or series of actions
3. The same is done using number flash cards
4. The chart is taken away, and the patient goes through the first three steps without the chart.



## Appendix B. 100 Squares

**Materials: 100 square chart, floor area marked off in 20cm X 20cm squares**

### Instructions:

1. The chart is hung on the wall facing the child while the number relationships are explained (consecutive horizontal steps change by one integer, vertical steps cause a change by 10, while oblique movements change by either 11 or 9)
2. In the first stage the child stands on square number 1 while a coin is tossed onto the “field”. The child’s task is to walk (or jump) to the coin while calling out the number of each square they have stepped on. At this stage looking at the chart is encouraged.
3. In the second stage the child must call out the number of the square where the coin has fallen before walking to the square. He then walks to the coin to check his answer.
4. In the third stage, the child repeats the first two stages, however the chart has already been removed.
5. In the fourth stage the child has to imagine that the small chart has been rotated ( $1/4$ ,  $1/2$ ,  $3/4$  turns) and repeat the previous stages.

91	92	93	94	95	96	97	98	99	100
81	82	83	84	85	86	87	88	89	90
71	72	73	74	75	76	77	78	79	80
61	62	63	64	65	66	67	68	69	70
51	52	53	54	55	56	57	58	59	60
41	42	43	44	45	46	47	48	49	50
31	32	33	34	35	36	37	38	39	40
21	22	23	24	25	26	27	28	29	30
11	12	13	14	15	16	17	18	19	20
1	2	3	4	5	6	7	8	9	10