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Determining changes in visual behavior resulting from visual training

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Determining changes in visual behavior resulting from visual training

Abstract

Determining changes in visual behavior resulting from visual training

Degree Type

Thesis

Degree Name

Master of Science in Vision Science

Committee Chair

Rocky Kaplan

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Optometry

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Determining Changes in Visual Behavior
Resulting From Visual Training

In partial fulfillment for the
Degree of Doctor of Optometry from
the College of Optometry, Pacific University.

March 1982

By

Steve C. Scruggs

Robert A. Monetta

Mike Hovander

Orthoptics *

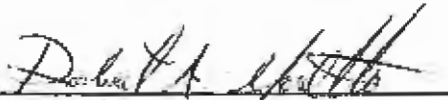
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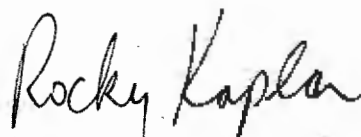
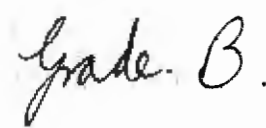
Steve C. Scruggs



Robert A. Monetta



Mike Hovander

Rocky Kaplan, O.D.
Advisor

Acknowledgements

We wish to extend our thanks and appreciation to all our subjects who participated in this study. We feel their cooperation and motivation helped us gain a further understanding of the field of visual therapy and we hope that they benefitted as much as we did.

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Introduction

Visual disorders can lead to many behavioral adaptations under nearpoint stress. Individuals may have normal visual acuity, but due to a binocular dysfunction they experience symptoms such as headaches, dizziness, nausea, blurred distance vision, and ocular fatigue after a short period of time when performing a nearpoint task. These symptoms categorize these individuals under the condition known as a General Binocular Dysfunction (GBD). A GBD can be a problem involving the convergence and accommodation facility's complex interactions resulting in unharmonious competition between the two systems or a decreased facility involving just one system which results in an uncomfortable near performance. This causes the person to adapt into various nearpoint behaviors or postures that further imbed their problem. Visual training attempts to break up these complex postures in order to alleviate the nearpoint stress. Visual training refers to a process whereby vision is improved through practice or visual learning. The process is implemented by arranging instrumental and environmental conditions which allow the patient to develop more efficient visual performance. In evaluating the success of a particular training technique, it is desirable to objectively and subjectively measure the change in performance over time. Consequently, criteria must be established to measure the degree to which a visual function was learned under training conditions. The level of performance achieved depends

upon such factors as the technique, test instructions, the subject's age, and motivation for improvement. Testing and training a visual function on the same task can be misleading because the performance change measured may be due only to the practice effect on that specific task. A requisite of a clinically valid training technique is the transference of practiced functions from the training situation to a different test condition. If we assume that behavioral symptoms change when objective findings change as a result of a visual training program, we can conclude that the training program was indeed valid. However, subjective behavioral conditions do not always change in accordance to changes in objective findings.

It is the purpose of this study to approach behavioral changes after a visual training program has been administered to a population showing a General Binocular Dysfunction. Objective findings before and after the training program will be taken into account, however, our procedure will determine if subjective asthenopic symptoms can be alleviated following a visual therapy program.

Methodology

A subjective sequencing survey will be given to a population known to have a General Binocular Dysfunction. The subjects will numerically rate themselves according to the survey list of behavioral anomalies. Each patient will receive the same sequence of visual therapy procedures. Following this therapy program, our patients will be administered the same sequencing survey list of behavioral characteristics. They will again numerically check off their symptoms in order of severity. A comparison of changes in their visual behaviors will determine whether or not our visual therapy program was effective.

Our subjects consisted of Pacific University student population and those in the surrounding area.

Patient criteria:

1. All subjects exhibited asthenopia at near.
2. All subjects were pre-presbyopic.
3. Habitual initial visual acuities 20/20 OD, OS, OU Far and Near.
4. Ophthalmoscopy unremarkable.

Sample Subjective Symptom Listing

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	Pre V.T.	Post V.T.
1. Blur at far after near work.	1) _ 2) _ 3) _ 4) _ 5) _	1) _ 2) _ 3) _ 4) _ 5) _
2. Can't sustain near work.	1) _ 2) _ 3) _ 4) _ 5) _	1) _ 2) _ 3) _ 4) _ 5) _
3. Hold reading material up close.	1) _ 2) _ 3) _ 4) _ 5) _	1) _ 2) _ 3) _ 4) _ 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) _ 2) _ 3) _ 4) _ 5) _	1) _ 2) _ 3) _ 4) _ 5) _
5. Read slowly.	1) _ 2) _ 3) _ 4) _ 5) _	1) _ 2) _ 3) _ 4) _ 5) _
6. Words run together.	1) _ 2) _ 3) _ 4) _ 5) _	1) _ 2) _ 3) _ 4) _ 5) _
7. Loses place while reading with poor concentration.	1) _ 2) _ 3) _ 4) _ 5) _	1) _ 2) _ 3) _ 4) _ 5) _

Visual Therapy Procedural Program

Our visual therapy program consisted of seven in office sessions ranging over a period of seven weeks. Each session lasted for one hour with one therapist per patient. Our visual therapy regimen was outlined in the following manner.

- Session 1 - Monocular Accommodative Rocks
 - Monocular Pursuits (Thumb Rotations)

- Session 2 - Review Session 1
 - Introduce Brock String with Red-Green
 - Loose Handheld Prism; 8 prism diopters, base-in and base-out, cover-uncover-recovery, and prism walkaways

- Session 3 - Biocular Accommodative Rocks
 - Brock String
 - Handheld 8 prism diopters, far-near jumps, base-in and base-out

- Session 4 - Review Biocular Accommodative Rocks
 - Brock String with \pm 2.00 flippers and/or 6 loose handheld prism diopters, base-in and base-out

- Session 5 - Introduce Biocular Accommodative Rocks
 - Review Brock String
 - Introduce Lifesaver Cards, base-in and base-out

- Session 6 - Lifesaver Cards, base-in and base-out
 - Introduce Aperture Rule, base-in and base-out

- Session 7 - Aperture Rule, base-in through minus lens flippers and base-out through plus lens flippers

Case #1

Female Age 20 - College Student
No Previous Rx

Pre Visual Therapy Findings			Post Visual Therapy Findings		
#3	1 exo		1 exo		
13A	5 exo		6 exo		
7A	plano -.25 x 120	20/20	+.25 DS		20/20
	plano	20/20	+.25 DS		20/20
8	1 exo		3 exo		
9	6		8		
10	10/3		30/27		
11	8/6		14/10		
12	∅		∅		
13B	6 exo		8 exo		
14B	plano -.25 x 120		plano		
	-.25 DS		plano		
15B	6 exo		8 exo		
16A	12	control	12		control
16B	12/0	7A	18/6		7A
17A	12		14		
17B	18/14		20/14		
18	∅		∅		
20	-4.50/-4.25	7 eso	-4.50/-4.25		7 eso
21	+3.25/+3.00	15 exo	+3.25/+3.00		15 exo

Case #1Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
2. Can't sustain near work.	1) 2) 3) 4) 5) <u>X</u>	1) 2) 3) <u>X</u> 4) 5) _
3. Hold reading material up close.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) 2) 3) 4) 5) <u>X</u>	1) 2) <u>X</u> 3) 4) 5) _
5. Read slowly.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
6. Words run together.	1) 2) <u>X</u> 3) 4) 5) _	1) 2) <u>X</u> 3) 4) 5) _
7. Loses place while reading with poor concentration.	1) 2) 3) <u>X</u> 4) 5) _	1) 2) 3) <u>X</u> 4) 5) _

Pre V.T.				Post V.T.			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR:		OD	OS	Fixating Eye		MONOCULAR:	
(use N or F for Near or Far)		1	1	Difference when occluded I-7		(use N or F for Near or Far)	
no	no	no	no	Shiny		no	no
no	no	no	no	Flickering		no	no
yes	yes	yes	yes	Clearer when occluded		yes	yes
BINOCULAR:		Through SBV		#7BL		BINOCULAR:	
Response		yes		yes		Response	
Difference with and without polaroids		no		no		Difference with and without polaroids	
Letters disappear		no		no		Letters disappear	
Letters move		no		no		Letters move	
Letters run into each other		no		no		Letters run into each other	
Other						Other	

Case #2

Male Age 22 - College Student
 Previous Rx
 -.75 DS -.75 DS

Pre Visual Therapy Findings			Post Visual Therapy Findings		
#3	3-1 exo		4/∅ exo		
13A	15 exo		13 exo		
7A	-1.25 20/15		-1.00 -.25 x 180 20/15		
	-1.00 -.25 x 170 20/15		-.75 -.25 x 180 20/15		
8	1 exo		3 exo		
9	8		9		
10	10/0		12/4		
11	6/2		10/4		
12	∅		∅		
13B	16-14 exo		14 exo		
14B	-1.00		-.75 -.25 x 180		
	-.50 -.25 x 170		-.50 -.25 x 180		
15B	16 exo		16 exo		
16A	8		8		
16B	8/-6	control	8/0	control	
17A	16	7A	16	7A	
17B	24/20		26/20		
18	∅		∅		
20	-2.75/-2.50 8/6 eso		-5.00/-4.75 8 eso		
21	-.50/-.25 12 exo		+2.00/+1.75 18 exo		

Case #2Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) _ 2) _ 3) _ 4) _ 5) X	1) _ 2) X 3) _ 4) _ 5) _
2. Can't sustain near work.	1) _ 2) _ 3) _ 4) X 5) _	1) _ 2) X 3) _ 4) _ 5) _
3. Hold reading material up close.	1) X 2) _ 3) _ 4) _ 5) _	1) X 2) _ 3) _ 4) _ 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) _ 2) _ 3) X 4) _ 5) _	1) _ 2) _ 3) X 4) _ 5) _
5. Read slowly.	1) X 2) _ 3) _ 4) _ 5) _	1) X 2) _ 3) _ 4) _ 5) _
6. Words run together.	1) _ 2) X 3) _ 4) _ 5) _	1) X 2) _ 3) _ 4) _ 5) _
7. Loses place while reading with poor concentration.	1) _ 2) _ 3) X 4) _ 5) _	1) _ 2) X 3) _ 4) _ 5) _

<u>Pre V.T.</u>				<u>Post V.T.</u>			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye	MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye
	6	4	Difference when occluded 1-7		5	4	Difference when occluded 1-7
	no	no	Shiny		no	no	Shiny
	no	no	Flickering		no	no	Flickering
	yes	yes	Clearer when occluded		yes	yes	Clearer when occluded
BINOCULAR: Response		Through SBV #7BL		BINOCULAR: Response		Through SBV #7BL	
Difference with and without polaroids		yes	no	Difference with and without polaroids		yes	no
Letters disappear		yes	yes	Letters disappear		yes	no
Letters move		yes	no	Letters move		yes	no
Letters run into each other		yes	no	Letters run into each other		no	no
Other				Other			

Case #3

Female Age 34 - Bank Teller
 Previous Rx
 OD +.50 -.50 x 10 OS +.50 -1.50 x 42

Pre Visual Therapy Findings		Post Visual Therapy Findings	
#3	2 exo	2 exo	
13A	12 exo	10 exo	
7A	+ .25 -.25 x 180 20/20 + .50 -1.25 x 45 20/20	+ .75 -.25 x 180 20/20 + .75 -1.25 x 45 20/20	
8	∅	∅	
9	4	10	
10	12/6	24/10	
11	8/2	15/8	
12	∅	∅	
13B	16 exo	4 exo	
14B	+1.75 -.25 x 180 +1.75 -1.25 x 45	+1.50 -.25 x 180 +1.50 -1.25 x 45	
15B	8 exo	4 exo	
16A	x	10	
16B	8/-4 control	30/12 control	
17A	x 7A	4 7A	
17B	20/10	18/8	
18	∅	∅	
20	-2.25/-1.75 8 exo	-3.00/-2.50 ∅	
21	+2.75/+2.25 13 exo	+3.25/+3.00 10 exo	

Case #3

Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1)X2) 3) 4) 5) _	1)X2) 3) 4) 5) _
2. Can't sustain near work.	1) 2) 3) 4) 5)X	1) 2) 3)X4) 5) _
3. Hold reading material up close.	1)X2) 3) 4) 5) _	1)X2) 3) 4) 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) 2) 3) 4) 5)X	1) 2) 3)X4) 5) _
5. Read slowly.	1)X2) 3) 4) 5) _	1)X2) 3) 4) 5) _
6. Words run together.	1) 2)X3) 4) 5) _	1) 2)X3) 4) 5) _
7. Loses place while reading with poor concentration.	1) 2) 3)X4) 5) _	1) 2) 3)X4) 5) _

Pre V.T.				Post V.T.			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye Difference when occluded 1-7	MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye Difference when occluded 1-7
	3	4			3	3	
	no	no	Shiny		no	no	Shiny
	no	no	Flickering		no	no	Flickering
	no	no	Clearer when occluded		no	no	Clearer when occluded
BINOCULAR: Response	Through SBV		#7BL	BINOCULAR: Response	Through SBV		#7BL
Difference with and without polaroids	yes	no		Difference with and without polaroids	yes	no	
Letters disappear	no	no		Letters disappear	no	no	
Letters move	no	no		Letters move	no	no	
Letters run into each other	no	no		Letters run into each other	no	no	
Other				Other			

Case #4

Male Age 16 - College Student

Previous Rx

OD -1.25 -2.00 x 165 OS -1.00 -1.00 x 60

Pre Visual Therapy Findings		Post Visual Therapy Findings	
#3	3 exo	3 exo	
13A	6 exo	6 exo	
7A	-0.75 -2.00 x 165 20/20 -0.75 -1.00 x 60 20/20	-0.75 -1.50 x 165 20/20 -0.75 -1.00 x 60 20/20	
8	∅	∅	
9	x	4	
10	21/10	24/12	
11	9/6	10/6	
12	∅	∅	
13B	8 exo	8 exo	
14B	+1.25 -2.00 x 165 +1.25 -1.00 x 60	+1.25 -1.50 x 165 +1.25 -1.00 x 60	
15B	8 exo	10 exo	
16A	20	15	
16B	34/8	40/24	
17A	16	14	
17B	18/10	18/12	
18	∅	∅	
20	-1.75/-1.00	-3.00/-2.50	
21	+2.00/+1.50	+1.75/+1.50	

Case #4

Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1)X2) 3) 4) 5) _	1)X2) 3) 4) 5) _
2. Can't sustain near work.	1) 2) 3) 4)X5) _	1) 2) 3) 4)X5) _
3. Hold reading material up close.	1) 2) 3) 4)X5) _	1) 2) 3)X4) 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) 2) 3) 4) 5)X _	1) 2) 3) 4) 5)X _
5. Read slowly.	1) 2)X3) 4) 5) _	1)X2) 3) 4) 5) _
6. Words run together.	1)X2) 3) 4) 5) _	1)X2) 3) 4) 5) _
7. Loses place while reading with poor concentration.	1) 2) 3)X4) 5) _	1) 2) 3)X4) 5) _

Pre V.T.			Post V.T.				
<u>Polaroid Response</u>			<u>Polaroid Response</u>				
MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye	MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye
	1	1	Difference when occluded 1-7		1	1	Difference when occluded 1-7
	no	no	Shiny		no	no	Shiny
	no	no	Flickering		no	no	Flickering
	no	no	Clearer when occluded		no	no	Clearer when occluded
BINOCULAR: Response	Through SBV #7BL			BINOCULAR: Response	Through SBV #7BL		
Difference with and without polaroids	yes	little or none		Difference with and without polaroids	yes	little or none	
Letters disappear	no	no		Letters disappear	no	no	
Letters move	no	no		Letters move	no	no	
Letters run into each other	no	no		Letters run into each other	no	no	
Other No F.D.				Other			

Case #5

Male Age 18 - College Student
No Previous Rx

Pre Visual Therapy Findings			Post Visual Therapy Findings		
#3	1 exo		1 exo		
13A	7 exo		6 exo		
7A	-.75 sph	20/20+	-.75 sph	20/20+	
	-.75 sph	20/20	-.75 sph	20/20	
8	1 exo		1 exo		
9	8		10		
10	8/5		18/12		
11	8/4		8/4		
12	∅		∅		
13B	7 exo		7 exo		
14B	+.75 DS		+.75 DS		
	+.75 DS		+.50 DS		
15B	13 exo		12 exo		
16A	16		16		
16B	16/8	control	24/20	control	
17A	12	7A	12	7A	
17B	24/20		26/22		
18	∅		∅		
20	-4.50/-4.00	4 eso	-4.50/-4.00	4/6 eso	
21	+2.25/+2.00	16 exo	+2.75/+2.25	18 exo	

Case #5Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
2. Can't sustain near work.	1) 2) 3) <u>X</u> 4) 5) _	1) 2) 3) <u>X</u> 4) 5) _
3. Hold reading material up close.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
5. Read slowly.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
6. Words run together.	1) 2) <u>X</u> 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
7. Loses place while reading with poor concentration.	1) 2) 3) 4) <u>X</u> 5) _	1) 2) 3) 4) <u>X</u> 5) _

Pre V.T.				Post V.T.			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye	MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye
	6	2	Difference when occluded 1-7		6	2	Difference when occluded 1-7
	no	no	Shiny		no	no	Shiny
	yes	no	Flickering		yes	no	Flickering
yes	yes	Clearer when occluded	yes	yes	Clearer when occluded		
BINOCULAR: Response		Through SBV #7BL		BINOCULAR: Response		Through SBV #7BL	
Difference with and without polaroids		no	no	Difference with and without polaroids		no	no
Letters disappear		OD yes	OD less	Letters disappear		OD yes	OD less
Letters move		yes	yes	Letters move		yes	yes
Letters run into each other		no	no	Letters run into each other		no	no
Other				Other			

Case #6

Male Age 22 - College Student
No Previous Rx

Pre Visual Therapy Findings			Post Visual Therapy Findings		
#3	2 exo		2 exo		
13A	10 exo		8 exo		
7A	+ .25 DS	20/20	+ .75 DS	20/20	
	+ .50 DS	20/20	+ .75 DS	20/20	
8	3 exo		∅		
9	20		13		
10	28/10		28/12		
11	8/6		8/6		
12	∅		∅		
13B	14 exo		8 exo		
14B	+ .50 DS		+1.50 DS		
	+ .75 DS		+1.50 DS		
15B	8 exo		8 exo		
16A	x		8		
16B	18/10	control	24/12	control	
17A	x	7A	6	7A	
17B	9/9		12/6		
18	∅		∅		
20	-2.00/-1.50	8 exo	-3.25/-2.75	∅	
21	+1.25/+ .75	12 exo	+3.00/+2.25	12 exo	

Case #6Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) <u>2</u>) 3) 4) 5) <u>X</u>	1) <u>2</u>) 3) <u>X</u> 4) 5) <u> </u>
2. Can't sustain near work.	1) <u>X</u> 2) 3) 4) 5) <u> </u>	1) <u>X</u> 2) 3) 4) 5) <u> </u>
3. Hold reading material up close.	1) <u>2</u>) 3) 4) <u>X</u> 5) <u> </u>	1) <u>2</u>) 3) 4) <u>X</u> 5) <u> </u>
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) <u>2</u>) <u>X</u> 3) 4) 5) <u> </u>	1) <u>2</u>) 3) <u>X</u> 4) 5) <u> </u>
5. Read slowly.	1) <u>2</u>) 3) 4) <u>X</u> 5) <u> </u>	1) <u>2</u>) 3) 4) 5) <u>X</u>
6. Words run together.	1) <u>X</u> 2) 3) 4) 5) <u> </u>	1) <u>X</u> 2) 3) 4) 5) <u> </u>
7. Loses place while reading with poor concentration.	1) <u>X</u> 2) 3) 4) 5) <u> </u>	1) <u>X</u> 2) 3) 4) 5) <u> </u>

<u>Pre V.T.</u>				<u>Post V.T.</u>			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye Difference when occluded 1-7	MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye Difference when occluded 1-7
	3	1			3	2	
	yes	yes	Shiny		yes	yes	Shiny
	yes	yes	Flickering		yes	yes	Flickering
	yes	no	Clearer when occluded		yes	no	Clearer when occluded
BINOCULAR: Response		Through SBV	#7BL	BINOCULAR: Response		Through SBV	#7BL
Difference with and without polaroids		yes	no	Difference with and without polaroids		yes	no
Letters disappear		no	no	Letters disappear		no*	no
Letters move		a little	no	Letters move		a little	a
Letters run into each other		yes	no	Letters run into each other		yes	no
Other				Other - *one letter hides behind another			

Case #7

Female Age 17 - College Student

Previous Rx

OD +1.00 DS

OS +1.00 DS

Pre Visual Therapy Findings			Post Visual Therapy Findings		
#3	10 eso		10 eso		
13A	6/4 eso		4/6 eso		
7A	+1.00 sph	20/20+	+1.50 sph	20/20+	
	+1.00 -.25 x 165	20/20+	+1.75 -.50 x 165	20/20+	
8	10/12 eso		∅/2 eso		
9	16		16		
10	48/8		40/26		
11	16/∅		9/6		
12	∅		∅		
13B	4 eso		∅		
14B	+2.00 sph		+2.00		
	+2.00 -.25 x 165		+2.25 -.25 x 165		
16A	20		20		
16B	24/8	control	24/18	control	
17A	8	7A	10	7A	
17B	12/-4		20/2		
18	∅		∅		
20	-5.00/-4.75	20 eso	-5.00/-4.50	18 eso	
21	+3.25/+2.75	2 exo	+3.50/+3.00	2 exo	

Case #7Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) <u>2</u>) <u>X3</u>) 4) 5) _	1) <u>2</u>) <u>X3</u>) 4) 5) _
2. Can't sustain near work.	1) <u>2</u>) <u>3</u>) 4) 5) <u>X</u>	1) <u>2</u>) <u>3</u>) 4) 5) <u>X</u>
3. Hold reading material up close.	1) <u>2</u>) <u>3</u>) 4) 5) <u>X</u>	1) <u>2</u>) <u>3</u>) <u>X4</u>) 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) <u>2</u>) <u>3</u>) 4) 5) <u>X</u>	1) <u>2</u>) <u>3</u>) 4) 5) <u>X</u>
5. Read slowly.	1) <u>X2</u>) <u>3</u>) 4) 5) _	1) <u>X2</u>) <u>3</u>) 4) 5) _
6. Words run together.	1) <u>X2</u>) <u>3</u>) 4) 5) _	1) <u>X2</u>) <u>3</u>) 4) 5) _
7. Loses place while reading with poor concentration.	1) <u>2</u>) <u>3</u>) <u>X4</u>) 5) _	1) <u>2</u>) <u>3</u>) <u>X4</u>) 5) _

Pre V.T.				Post V.T.			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye	MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye
	2	1	Difference when occluded 1-7		2	1	Difference when occluded 1-7
	no	no	Shiny		no	no	Shiny
	yes	no	Flickering		yes	no	Flickering
yes	no	Clearer when occluded	yes	no	Clearer when occluded		
BINOCULAR: Response		Through SBV #7BL		BINOCULAR: Response		Through SBV #7BL	
Difference with and without polaroids		yes	yes	Difference with and without polaroids		yes	yes
Letters disappear		no	no	Letters disappear		no	no
Letters move		yes	no	Letters move		yes	no
Letters run into each other		no	no	Letters run into each other		no	no
Other				Other			

Case #8

Female Age 28 - Dental Hygentist
No Previous Rx

Pre Visual Therapy Findings			Post Visual Therapy Findings		
#3	∅		∅		
13A	2 exo		3 exo		
7A	+ .25 DS	20/20	+ .50 DS	20/20	
	p1 -.25 x 165	20/20	+ .50 -.25 x 165	20/20	
8	∅		2 exo		
9	⊗		x		
10	8/4		10/4		
11	6/2		6/2		
12	∅		∅		
13B	4 exo		4 exo		
14B	+1.00 DS		+1.00 DS		
	+1.25 -.25 x 165		+1.25 -.25 x 165		
15B	4 exo		6 exo		
16A	12		12		
16B	18/6	control	18/8	control	
17A	8	7A	6	7A	
17B	12/8		12/8		
18	∅		∅		
20	-1.75/-1.50	2 eso	-1.75/-1.50	∅	
21	+3.25/+2.75	7 exo	+3.00/+2.50	8 exo	

Case #8Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
2. Can't sustain near work.	1) 2) 3) <u>X</u> 4) 5) _	1) 2) 3) <u>X</u> 4) 5) _
3. Hold reading material up close.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
5. Read slowly.	1) 2) 3) 4) 5) <u>X</u>	1) 2) <u>X</u> 3) 4) 5) _
6. Words run together.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
7. Loses place while reading with poor concentration.	1) 2) 3) 4) <u>X</u> 5) _	1) 2) <u>X</u> 3) 4) 5) _

Pre V.T.				Post V.T.			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye Difference when occluded 1-7	MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye Difference when occluded 1-7
	6	5			6	5	
	yes	yes	Shiny		yes	yes	Shiny
	yes	yes	Flickering		yes	yes	Flickering
	yes	yes	Clearer when occluded		yes	yes	Clearer when occluded
BINOCULAR: Response	Through SBV #7BL			BINOCULAR: Response	Through SBV #7BL		
Difference with and without polaroids	yes	yes		Difference with and without polaroids	yes	yes	
Letters disappear	yes	no		Letters disappear	yes	no	
Letters move	yes	no		Letters move	yes	no	
Letters run into each other	no	no		Letters run into each other	no	no	
Other				Other			

Case #9

Female Age 23 - Secretary
No Previous Rx

Pre Visual Therapy Findings			Post Visual Therapy Findings		
#3	2 eso		2 eso		
13A	∅		∅ -1 eso		
7A	+1.75 -.25 x 80	20/15-	+1.00 -.25 x 85	20/20+	
	+1.00 -.25 x 95	20/15-	+1.25 -.25 x 95	20/20+	
8	1 exo		4 exo		
9	16		14		
10	16/8		24/14		
11	6/3		8/4		
12	∅		∅		
13B	8 exo		10 exo		
14B	+1.50 -.25 x 80		+2.00 -.25 x 85		
	+1.75 -.25 x 95		+2.50 -.25 x 95		
15B	8 exo		12 exo		
16A	16		14		
16B	16/12	control	38/22		control
17A	8	7A	10		7A
17B	8/4		18/16		
18	∅		∅		
20	-.25/plano	1 exo	-3.00/-2.75		18 eso
21	+3.00/+2.50	10 exo	+4.00/+3.50		14 exo

Case #9

Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
2. Can't sustain near work.	1) 2) 3) 4) 5) <u>X</u>	1) 2) 3) <u>X</u> 4) 5) _
3. Hold reading material up close.	1) 2) 3) <u>X</u> 4) 5) _	1) 2) 3) <u>X</u> 4) 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) 2) 3) 4) 5) <u>X</u>	1) 2) 3) <u>X</u> 4) 5) _
5. Read slowly.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
6. Words run together.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
7. Loses place while reading with poor concentration.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _

<u>Pre V.T.</u>				<u>Post V.T.</u>			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye Difference when occluded 1-7	MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye Difference when occluded 1-7
	2	2			3	2	
	yes	yes	Shiny		yes	yes	Shiny
	no	no	Flickering		no	no	Flickering
	yes	yes	Clearer when occluded		yes	yes	Clearer when occluded
BINOCULAR: Response				BINOCULAR: Response			
		Through SBV #7BL				Through SBV #7BL	
Difference with and without polaroids		yes	no	Difference with and without polaroids		yes	no
Letters disappear		no	no	Letters disappear		no	no
Letters move		yes	no	Letters move		yes	no
Letters run into each other		yes	no	Letters run into each other		yes	no
Other				Other			

Case #10

Female Age 30 - Secretary

Previous Rx

OD +.50 -.75 x 180

OS +.50 -2.00 x 180

Pre Visual Therapy Findings		Post Visual Therapy Findings	
#3	6 exo	6 exo	
13A	8 exo	6 exo	
7A	+ .75 -1.00 x 180 20/20 + .75 -2.25 x 160 20/20	+ .75 -1.00 x 180 20/20 + .75 -2.25 x 160 20/20	
8	∅	∅	
9	20	20	
10	24/10	24/10	
11	10/4	10/4	
12	∅	∅	
13B	8 exo	4 exo	
14B	+1.75 -1.00 x 180 +1.25 -2.25 x 160	+1.75 -1.00 x 180 +1.50 -2.25 x 160	
15B	12 exo	8 exo	
16A	x	x	
16B	16/∅ control	24/8 control	
17A	x 7A	x 7A	
17B	20/8	22/8	
18	∅	∅	
20	-1.75/-1.00 6 exo	-2.00/-1.50 3 exo	
21	+3.00/+2.50 10 exo	+3.00/+2.50 12 exo	

Case #10Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) _ 2) _ 3) _ 4) <u>X</u> 5) _	1) _ 2) _ 3) _ 4) <u>X</u> 5) _
2. Can't sustain near work.	1) _ 2) _ 3) _ 4) _ 5) <u>X</u>	1) _ 2) <u>X</u> 3) _ 4) _ 5) _
3. Hold reading material up close.	1) <u>X</u> 2) _ 3) _ 4) _ 5) _	1) <u>X</u> 2) _ 3) _ 4) _ 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) _ 2) _ 3) _ 4) _ 5) <u>X</u>	1) _ 2) <u>X</u> 3) _ 4) _ 5) _
5. Read slowly.	1) <u>X</u> 2) _ 3) _ 4) _ 5) _	1) <u>X</u> 2) _ 3) _ 4) _ 5) _
6. Words run together.	1) <u>X</u> 2) _ 3) _ 4) _ 5) _	1) <u>X</u> 2) _ 3) _ 4) _ 5) _
7. Loses place while reading with poor concentration.	1) <u>X</u> 2) _ 3) _ 4) _ 5) _	1) <u>X</u> 2) _ 3) _ 4) _ 5) _

Pre V.T.				Post V.T.			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR: (use N or F for Near or Far)		OD	OS	Fixating Eye		Difference when occluded 1-7	
	1	1					
	no	no			Shiny		
	yes	no			Flickering		
	yes	yes			Clearer when occluded		
BINOCULAR: Response		Through SBV #7BL		BINOCULAR: Response		Through SBV #7BL	
Difference with and without polaroids		yes	yes	Difference with and without polaroids		yes	yes
Letters disappear		no	no	Letters disappear		no	no
Letters move		no	no	Letters move		no	no
Letters run into each other		no	no	Letters run into each other		no	no
Other				Other			

Case #11

Female Age 22 - College Student
No Previous Rx

Pre Visual Therapy Findings			Post Visual Therapy Findings		
3	8 eso		8 eso		
13A	6/4 eso		4 eso		
7A	+1.00 sph	20/15	+1.25 sph	20/20+	
	+1.00 sph	20/15	+1.50 sph	20/20+	
8	4/8 eso		2/4 eso		
9	12		10		
10	12/1		16/4		
11	3/-3		4/2		
12	∅		∅		
13B	4 eso		2 eso		
14B	+1.25 sph		+2.00 sph		
	+1.75 sph		+2.25 sph		
15B	2/3 eso		∅/1 eso		
16A	12		16		
16B	18/4	control	40/24	control	
17A	4	7A	10	7A	
17B	4/-3		18/16		
18	∅		∅		
20	-1.50/-1.25	15 eso	-2.50/-2.25	20 eso	
21	+3.00/+2.75	2 exo/2 eso	+4.25/+4.00	6 exo/4 eso	

Case #11Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) 2) 3) <u>X</u> 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
2. Can't sustain near work.	1) 2) 3) 4) 5) <u>X</u>	1) 2) 3) <u>X</u> 4) 5) _
3. Hold reading material up close.	1) 2) 3) <u>X</u> 4) 5) _	1) 2) 3) <u>X</u> 4) 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) 2) 3) 4) 5) <u>X</u>	1) 2) 3) <u>X</u> 4) 5) _
5. Read slowly.	1) <u>X</u> 2) 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _
6. Words run together.	1) 2) 3) <u>X</u> 4) 5) _	1) 2) <u>X</u> 3) 4) 5) _
7. Loses place while reading with poor concentration.	1) 2) <u>X</u> 3) 4) 5) _	1) <u>X</u> 2) 3) 4) 5) _

Pre V.T.				Post V.T.			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR: (use N or F for Near or Far)		OD	OS	Fixating Eye		Difference when occluded 1-7	
	3	3					
	no	no					Shiny
	no	no					Flickering
	yes	yes					Clearer when occluded
BINOCULAR: Response		Through SBV	Through #7BL	BINOCULAR: Response		Through SBV	Through #7BL
Difference with and without polaroids		yes	no	Difference with and without polaroids		yes	no
Letters disappear		no	no	Letters disappear		no	no
Letters move		yes	no	Letters move		yes	no
Letters run into each other		yes	no	Letters run into each other		yes	no
Other				Other			

Case #12

Male Age 22 - College Student

Previous Rx

OD -1.00 -.75 x 90

OS -1.00 -.75 x 100

Pre Visual Therapy Findings		Post Visual Therapy Findings	
#3	∅	∅	
13A	3-4 eso	3 eso	
7A	-1.00 -.75 x 90 20/20 -1.00 -.75 x 100 20/20	-1.00 -.75 x 90 20/20 -1.00 -.75 x 100 20/20	
8	∅	∅	
9	6	10	
10	12/4	12/8	
11	10/4	10/4	
12	∅	∅	
13B	4 eso	2 eso	
14B	-.50 -.75 x 90 -.50 -.75 x 100	p1 -.75 x 90 p1 -.75 x 100	
15B	∅	2 exo	
16A	12	14	
16B	20/14	22/18	control
17A	6	12	7A
17B	12/6	20/10	
18	∅	∅	
20	-1.75/-1.50 4 eso	-2.50/-2.00 8 eso	
21	+.75/+.25 10 exo	+.75/+.25 8 exo	

Case #12Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) <u>2</u>) 3) 4) 5) <u>X</u>	1) <u>2</u>) 3) 4) 5) <u>X</u>
2. Can't sustain near work.	1) <u>2</u>) 3) 4) 5) <u>X</u>	1) <u>2</u>) 3) <u>X</u> 4) 5) <u> </u>
3. Hold reading material up close.	1) <u>X</u> 2) 3) 4) 5) <u> </u>	1) <u>X</u> 2) 3) 4) 5) <u> </u>
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) <u>2</u>) 3) 4) <u>X</u> 5) <u> </u>	1) <u>2</u>) 3) 4) <u>X</u> 5) <u> </u>
5. Read slowly.	1) <u>X</u> 2) 3) 4) 5) <u> </u>	1) <u>X</u> 2) 3) 4) 5) <u> </u>
6. Words run together.	1) <u>X</u> 2) 3) 4) 5) <u> </u>	1) <u>X</u> 2) 3) 4) 5) <u> </u>
7. Loses place while reading with poor concentration.	1) <u>X</u> 2) 3) 4) 5) <u> </u>	1) <u>X</u> 2) 3) 4) 5) <u> </u>

Pre V.T.				Post V.T.			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR: (use N or F for Near or Far)		OD	OS	Fixating Eye		Difference when occluded 1-7	
	1	1					
	no	no					Shiny
	yes	no					Flickering
	yes	yes					Clearer when occluded
BINOCULAR: Response		Through SBV	Through #7BL	BINOCULAR: Response		Through SBV	Through #7BL
Difference with and without polaroids		yes	yes	Difference with and without polaroids		yes	yes
Letters disappear		no	no	Letters disappear		no	no
Letters move		no	no	Letters move		no	no
Letters run into each other		no	no	Letters run into each other		no	no
Other				Other			

Case #13

Female Age 33 - College Student
No Previous Rx

Pre Visual Therapy Findings			Post Visual Therapy Findings		
#3	4 exo		4 exo		
13A	2 exo/2 eso		2 exo/2 eso		
7A	+1.00 -.50 x 175 20/20+		+1.00 -.50 x 175 15 ⁻²		
	+1.00 -.50 x 175 20/20+		+1.00 -.50 x 175 15 ⁻²		
8	3-2 exo		4 exo		
9	8		10		
10	22/12		24/16		
11	8/2		12/6		
12	∅		∅		
13B	13 exo		14 exo		
14B	+1.25 -.50 x 175		+1.25 -.50 x 175		
	+1.25 -.50 x 175		+1.25 -.50 x 175		
15B	10/12 exo		12 exo		
16A	12		12		
16B	14/6	control	24/16	control	
17A	6	7A	6	7A	
17B	24/18		24/18		
18	∅		∅		
20	-2.25/-1.75	2 eso	-3.00/-2.75	4 eso	
21	+3.50/+3.00	20 exo	+3.50/+3.25	20 exo	

Case #13Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) <u>2</u>) <u>X3</u>) 4) 5) _	1) <u>X2</u>) 3) 4) 5) _
2. Can't sustain near work.	1) 2) 3) 4) 5) <u>X</u>	1) 2) <u>X3</u>) 4) 5) _
3. Hold reading material up close.	1) <u>X2</u>) 3) 4) 5) _	1) <u>X2</u>) 3) 4) 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) 2) 3) 4) 5) <u>X</u>	1) 2) <u>X3</u>) 4) 5) _
5. Read slowly.	1) 2) 3) 4) 5) <u>X</u>	1) 2) 3) 4) 5) <u>X</u>
6. Words run together.	1) 2) <u>X3</u>) 4) 5) _	1) 2) <u>X3</u>) 4) 5) _
7. Loses place while reading with poor concentration.	1) 2) 3) 4) <u>X5</u>) _	1) 2) <u>X3</u>) 4) 5) _

Pre V.T.				Post V.T.							
<u>Polaroid Response</u>				<u>Polaroid Response</u>							
MONOCULAR: (use N or F for Near or Far)		OD	OS	Fixating Eye Difference when occluded 1-7		MONOCULAR: (use N or F for Near or Far)	OD	OS	Fixating Eye Difference when occluded 1-7		
	5	3					3	2			
	yes	yes			Shiny		yes	yes		Shiny	
	yes	yes			Flickering		no	no		Flickering	
	yes	lit			Clearer when occluded		yes	no		Clearer when occluded	
BINOCULAR: Response		Through SBV #7BL		BINOCULAR: Response		Through SBV #7BL					
Difference with and without polaroids		no no		Difference with and without polaroids		no no					
Letters disappear		no no		Letters disappear		no no					
Letters move		yes no		Letters move		yes no					
Letters run into each other		yes no		Letters run into each other		yes no					
Other				Other							

Case #14

Male Age 29 - Attorney
No Previous Rx

Pre Visual Therapy Findings		Post Visual Therapy Findings	
#3	∅	∅	
13A	2 exo	2 exo	
7A	+ .75 - .25 x 90 20/20 + .50 D.S. 20/20	+ .75 - .25 x 90 20/20 + .50 D.S. 20/20	
8	2 exo	2 exo	
9	6	6	
10	14/8	14/10	
11	12/6	12/6	
12	∅	∅	
13B	2 exo	2 exo	
14B	+1.25 - .25 x 90 +1.00 D.S.	+1.25 - .25 x 90 +1.00 D.S.	
15B	8 exo	8 exo	
16A	8	8	
16B	16/12 control	24/12 control	
17A	6 7A	8 7A	
17B	18/14	20/16	
18	∅	∅	
20	- .75 / - .25 ∅	-1.25 / -1.00 ∅	
21	+1.25 / +1.00 8 exo	+1.50 / +1.00 8 exo	

Case #14Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) _ 2) _ 3) _ 4) <u>X</u> 5) _	1) _ 2) _ 3) _ 4) <u>X</u> 5) _
2. Can't sustain near work.	1) <u>X</u> 2) _ 3) _ 4) _ 5) _	1) <u>X</u> 2) _ 3) _ 4) _ 5) _
3. Hold reading material up close.	1) <u>X</u> 2) _ 3) _ 4) _ 5) _	1) <u>X</u> 2) _ 3) _ 4) _ 5) _
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) _ 2) _ 3) _ 4) <u>X</u> 5) _	1) _ 2) _ 3) <u>X</u> 4) _ 5) _
5. Read slowly.	1) <u>X</u> 2) _ 3) _ 4) _ 5) _	1) <u>X</u> 2) _ 3) _ 4) _ 5) _
6. Words run together.	1) <u>X</u> 2) _ 3) _ 4) _ 5) _	1) <u>X</u> 2) _ 3) _ 4) _ 5) _
7. Loses place while reading with poor concentration.	1) _ 2) <u>X</u> 3) _ 4) _ 5) _	1) _ 2) <u>X</u> 3) _ 4) _ 5) _

Pre V.T.				Post V.T.			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR: (use N or F for Near or Far)		OD	OS	Fixating Eye		Difference when occluded 1-7	
	4		2				
	no		no				Shiny
	yes		no				Flickering
	yes		yes				Clearer when occluded
BINOCULAR: Response		Through SBV #7BL		BINOCULAR: Response		Through SBV #7BL	
Difference with and without polaroids		yes	no	Difference with and without polaroids		yes	no
Letters disappear		no	no	Letters disappear		no	no
Letters move		yes	no	Letters move		yes	no
Letters run into each other		no	no	Letters run into each other		no	no
Other				Other			

Case #15

Subjective Symptoms

Answer the following questions according to how often they occur, (1) being never and (5) being always.

	<u>Pre V.T.</u>	<u>Post V.T.</u>
1. Blur at far after near work.	1) <u>2</u>) <u>X3</u>) <u>4</u>) <u>5</u>)	1) <u>2</u>) <u>X3</u>) <u>4</u>) <u>5</u>)
2. Can't sustain near work.	1) <u>2</u>) <u>3</u>) <u>4</u>) <u>5</u>) <u>X</u>	1) <u>2</u>) <u>3</u>) <u>X4</u>) <u>5</u>)
3. Hold reading material up close.	1) <u>2</u>) <u>3</u>) <u>4</u>) <u>5</u>) <u>X</u>	1) <u>2</u>) <u>3</u>) <u>X4</u>) <u>5</u>)
4. Unusual fatigue or restlessness after maintaining visual concentration.	1) <u>2</u>) <u>3</u>) <u>4</u>) <u>5</u>) <u>X</u>	1) <u>2</u>) <u>3</u>) <u>X4</u>) <u>5</u>)
5. Read slowly.	1) <u>2</u>) <u>3</u>) <u>4</u>) <u>5</u>) <u>X</u>	1) <u>2</u>) <u>3</u>) <u>4</u>) <u>5</u>) <u>X</u>
6. Words run together.	1) <u>2</u>) <u>3</u>) <u>4</u>) <u>X5</u>)	1) <u>X2</u>) <u>3</u>) <u>4</u>) <u>5</u>)
7. Loses place while reading with poor concentration.	1) <u>2</u>) <u>3</u>) <u>4</u>) <u>X5</u>)	1) <u>2</u>) <u>3</u>) <u>X4</u>) <u>5</u>)

Pre V.T.				Post V.T.			
<u>Polaroid Response</u>				<u>Polaroid Response</u>			
MONOCULAR: (use N or F for Near or Far)		OD	OS	Fixating Eye		MONOCULAR: (use N or F for Near or Far)	
		5	4	Difference when occluded 1-7		-	-
no	no			Shiny		no	no
yes	yes			Flickering		no	no
yes	yes			Clearer when occluded		no	no
BINOCULAR: Response		Through SBV #7BL		BINOCULAR: Response		Through SBV #7BL	
Difference with and without polaroids		yes	yes	Difference with and without polaroids		yes	no
Letters disappear		yes	no	Letters disappear		yes	no
Letters move		yes	no	Letters move		yes	no
Letters run into each other		yes	no	Letters run into each other		yes	no
Other				Other			

Individual Case Results

- Case #1 - This patient listed a lack of nearpoint sustainment and fatigue with visual concentration as occurring always. After our visual therapy program, these visual behaviors decreased moderately. This patient also listed a losing of place with poor concentration as being moderate before and after our visual therapy program. This particular behavior did not change.
- Case #2 - Patient showed a moderate change in blurring at far after near work. An inability to sustain near work also changed moderately after visual therapy. These changes, we feel, are a result from loosening accommodation and increasing accommodative facility. Less rivalry occurred between right and left eyes at far and more stability was noted when dissociated.
- Case #3 - Patient showed moderate improvement in nearpoint sustainment and also visual concentration. These changes were due to increased fusional ranges far and near. No subjective change was reported during polaroid response.
- Case #4 - Although this patient showed increased accommodative facility, his accommodative posture remained unchanged as seen in the cross cylinder. This, we believe, led to his unchanged subjective symptoms. Thus, our visual therapy did not improve this patient's symptoms. We feel that this in itself is a very important finding. This patient has taught us that visual therapy may not always change findings and more importantly may not change behaviors.
- Case #5 - Patient exhibited lack of nearpoint sustainment and a loss of place while reading with poor concentration. Objective and subjective findings did not change after our visual therapy administration. Polaroid response of intermittent right eye suppression continued after therapy.
- Case #6 - There was a moderate change in blur at far after near work after therapy. Patient also gave a subjective score of four on read slowly category prior to therapy and a five on post visual therapy. We do not believe there is significance to this finding since lack of motivation played a large role in this patient's progress. This patient has taught us that motivation can be a stronger prognostic sign than therapy itself.
- Case #7 - Patient showed a change on objective findings through visual therapy; however, subjective findings did not change. Patient still listed holding reading material up close as occurring though to a lesser degree. Unusual fatigue after maintaining visual concentration still occurred always. We expected subjective findings to change in accordance with.

- Case #7 - objective findings, yet this is not always the case as (cont.) exhibited here.
- Case #8 - Categories "read slowly" and "loses place while reading with poor concentration" both improved moderately with visual therapy. Polaroid response slowed suppressions which after visual therapy remained. This case illustrates the importance and the need for a binocular refraction using polaroid responses.
- Case #9 - Patient reported a "lack of nearpoint sustainment" along with "unusual fatigue after maintaining visual concentration" as occurring always. Both these behaviors changed with therapy. Objective findings also changed after therapy which we expected.
- Case #10 - This patient exhibited lack of nearpoint sustainment along with unusual fatigue after maintaining visual concentration prior to therapy. These visual disorders drastically changed with therapy. This patient was highly motivated and we believe that her desire to improve visual behavior was a great asset.
- Case #11 - Results show that near asthenopic symptoms have decreased with therapy. Objective findings such as ductions showed great improvement; however, behaviors only changed moderately. Objective and subjective findings indicate a need for more plus at near.
- Case #12 - Patient reported blurring at far after near work both before and after therapy. Unusual fatigue with visual concentration also remained after visual therapy. An inability to sustain nearpoint work improved with therapy. This case illustrates that visual therapy can improve some visual disorders more rapidly than others. Again this is highly individualistic.
- Case #13 - This patient exhibited many subjective complaints all which have changed after visual therapy except for "reads slowly". This patient was an uncorrected hyperope and we feel that by putting plus on for the hyperopia the behaviors changed.
- Case #14 - Objective findings pre and post visual therapy indicate a very rigid accommodative visual system. Subjective findings did not change due to visual therapy. An uncorrected hyperopia is shown and this we feel attributed to the unchanged visual behavior.
- Case #15 - This patient demonstrated improvement in accommodative and convergence facilities on objective findings. Subjective behaviors have not changed as one would expect. Unchanged reading speed indicates a need for further tests to determine vocabulary level and eye-tracking skills.

Case #15 - Also shown in this case is a dramatic improvement on
(cont.) polaroid responses which leaves questions in our minds.

Discussion and Conclusion

The term General Binocular Dysfunction (GBD) covers a large area of the more common symptoms in this study. All subjects were given the same questionnaire before and after therapy to identify those visual behaviors that were changed by therapy. All therapy was administered in weekly intervals so that time between visits was held constant for all patients.

The regiment of visual therapy was chosen to start the patient off gradually in order to keep motivation. Our first therapy procedure was monocular accommodative rocks. This involved having patients clear letters through maximum minus power. Our goal was to increase the accommodative facility at a monocular level to ensure equality between the two eyes. At the same time monocular pursuits were trained in order to balance the two eyes' tracking ability. Brock String was introduced next to demonstrate physiological diplopia and to increase near to far and far to near convergence speed. Prism jumps were then introduced to compliment Brock String in further reinforcement in convergence speed and facility. We then advanced accommodative demands from a monocular level to a binocular level. This was intended to bring about a more accurate accommodative system by utilizing voluntary control. Brock String was reviewed and difficulty increased to a higher level using plus and minus flippers. This brought about changes in accommodation while holding convergence constant. By combining Brock String with loose prisms, convergence was trained while holding accommodation constant. The importance of this higher level of training is to break up the rigid accommodative and convergence interactions and have

them exist in a more harmonious nature. We then trained accommodation in a binocular made along with loose prisms to further enhance voluntary visual skills. The next phase of therapy was extending fusional ranges by fusing lifesaver card circles with different divergent or convergent demands. Once fusion is obtained, using this procedure, patients must be able to voluntarily relax accommodation when building base out fusional ranges and voluntarily accommodate when building base in ranges. Lastly we introduced Aperture Rule to further reinforce voluntary control of accommodation and convergence. By increasing target separation, convergence or divergence demand was increased while accommodative demand remained constant. Adding plus and minus lenses to this procedure held convergence constant while accommodative demand changed.

Improvements in objective findings verse subjective findings indicate there is no direct correlation between visual behaviors and the routine exam. By increasing one's accommodative and convergent facilities, we might conclude that subjective symptoms should improve proportionately. This however was not found to be true in our study. We did find that 90 percent of our subjects showed some degree of visual improvement from our therapy program. The amount of improvement was dependent on patient motivation, therapist variability, time of day administered, and individual understanding of task instruction. Variability could also be due to patient's understanding of the subjective symptoms rating questionnaire in their ability to accurately rate their own degree of visual difficulty. Since this study dealt largely with a subjective rating scale, we must accept the possibility of placebo in drawing results and conclusions. The placebo effect is real and we believe

it exists in visual therapy. We cannot accurately determine how much is due to placebo but we feel it is worthy of mention.

When we take these variables into account, we must conclude that visual therapy is highly individualistic in that each person is his own unique entity. If we were training a pair of eyes only, we could more accurately predict the outcome from visual therapy; however, this is not the case. We are teaching and training the whole person. Many variables that do exist, would not, if visual therapy was eye therapy. The fact that we are training people and their individual behaviors demonstrates that we cannot accurately predict an exact outcome from visual therapy. Nonetheless, we can hypothesize and make statements as to achievements and benefits to be derived from visual therapy.

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