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The use of plus and visual training in low base out

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Abstract

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THE USE OF PLUS AND VISUAL TRAINING IN LOW BASE OUT

A CASE REPORT AS PRESENTED
TO THE
FACULTY OF THE COLLEGE OF OPTOMETRY,
PACIFIC UNIVERSITY

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF OPTOMETRY

BY

PAUL N. YOUNGDALE

April 9, 1953

FOREWARD

The following case concerns the clinical study of a thirty-nine year old man who presented himself to the clinic, seeking aid and advice. The subjective complaints are evidenced in the optometric study. Lenses and visual training were prescribed. The study herein covers a space of seven months with the case history, entrance tests, ophthalmoscopic findings, analytical findings, visual skills, analysis and diagnosis, as well as two progress reports.

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THE USE OF PLUS AND VISUAL TRAINING IN LOW BASE OUT

CASE HISTORY

Patient: R. L., age thirty-nine years, male, Forest Grove, Oregon.

The patient entered the clinic on September 21, 1952, for a complete visual examination. The subjective complaint - "Glasses bother at night, take them off when at home, but I can see farther with the glasses off than I can with them on". He is a butcher and reported an over-shooting or under-shooting when grasping for a knife on the block. He reported the complaint to be more prominent during periods of sinus attacks. The patient cannot remember when he first noticed the sinus trouble, but has recently been bothered with a sinus headache which usually lasts for two weeks. It was located above and behind the right eye, a number 3 headache,^{1.} and appeared more often in the afternoon than at any other time. Rest and aspirin appeared to give relief.

The patient reported a disturbing lack of confidence to pass another car while driving at night, lacking the ability to judge the distance of an on-coming car. He also noticed the same fact in the store, in that he realized there was depth between the counters but could not see it. The fluorescent lighting in his place of business was very disturbing and the lights of an on-coming car were quite dazzling.^{2.}

1. Dr. Raymond Roy, unpublished lectures as delivered to Student Optometric Association April 8, 1953 at Pacific University.
Headache Intensity -
 1. Very Mild (can be forgotten)
 2. Mild (cannot be forgotten)
 3. Average (Aspirin, Anacin, Empirin)
 4. Severe (Empirin, Codeine)
 5. Very Severe (bed) - Nausea and vomiting
2. Dazzling, excessive glare or light causing annoyance or a painless inability to see or to keep the eyes open. Symptoms and Case History - The Patient As a Person, by Robert E. Bannon, Monograph 132, American Journal of Optometry, June 1952, p. 5 and Archives of American Academy of Optometry, Foshay Tower, Minneapolis, Minnesota.

The last medical examination was given in 1945 when the patient was separated from the service.

The last dental examination was given January 1952; several cavities were filled, uses a partial plate.

The last visual examination was given in 1951 when his present prescription was dispensed. He has worn lenses for twenty-five years.

The patient experienced the following childhood diseases: measles, mumps, and whooping cough. There appeared to be no disturbing visual anomalies of his immediate family.

The patient does not read a great deal. He uses his spare time to bowl and participate in out-of-door activities. His near work consists of reading scales, cutting meat and reading the newspaper.

Rx upon entering the clinic: O.D. / .50 - 1.00 x 90
 O.S. / .25 - .25 x 90

PRELIMINARY FINDINGS

External Examination -

Position - Eyes symmetrically placed in orbits, level, and the visual axes apparently parallel. Depth of the two eyeballs appears equal, no displacement.

Cilia - No scales or crusts present; the follicles evenly distributed on the palpebrae.

Lid Margins and Caruncle - No congestion, discharge; not crusted, ulcerated or reddened. No evidence of present or past styes.

Conjunctiva and Puncta - No secretion manifest when pressure was placed upon the naso-lacrimal duct area. No congestion or any form of pathology present.

- Sclera - Clear with no pathology observable.
- Cornea - Excellent reflection, no pathology observable, very sensitive.
- Anterior Chamber - No hemorrhages or exudates present. Depth appears to be $1\frac{1}{2}$ to 2 mm. in each eye.
- Iris - Blue green, small reddish lines present; steady, smooth, no tearing or adhesions. No discoloration.
- Crystalline Lens - Appears clear with no pathology.
- Lacrimal Drainage - Appears adequate, no epiphora. No pathology observable.
- Tension - Pressing downward the two eyeballs appear moderately hard and equal.
- Pupillary Reactions:
- Direct - Contracted with small amount of dilation, equal.
- Consensual - Contracted, stayed
- Near Point - Slight degree of contraction.
- Speed - Medium fast in each eye.
- Size - 3 mm. (contracts to 2 mm. each eye at near point)

OPHTHALMOSCOPIC EXAMINATION

- Cornea - Clear with no pathology or opacification
- Anterior Chamber - Appears equal in depth and free of hemorrhage and exudates.
- Iris - Blue green with no discoloration.
- Crystalline Lens - Clear and homogeneous with no signs of opacification.
- Vitreous - Clear with no degeneration or opacification apparent.
- Fundus Coloration - Pale

OPHTHALMOSCOPIC EXAMINATION (continued)

Disc Margin - Indistinct with slight pigmentation

Physiological
Cupping - Slight (less than one diopter)

Vessel Ratio - 3:2 with no apparent vascular anomalies

ANALYTICAL FINDINGS

The original visual examination was given on October 21, 1952. See Table I.

VISUAL SKILLS

See Table II.

ANALYSIS AND DIAGNOSIS

Upon admission -

	WITHOUT Rx		WITH Rx	
	FAR	NEAR	FAR	NEAR
O.D.	20/20	20/20	20/20	20/20
O.S.	20/20	20/20	20/20	20/20
O.U.	20/20	20/20	20/20	20/20

Rx - O.D. \neq .50 - 1.00 x 90
O.S. \neq .25 - .25 x 90

It was believed this study to be an optometric problem because of the nature of the complaint of the patient, the analytical picture and the visual skills.

The analytical findings show 10 - 16B with a reversal of the cross cylinder findings, plus a reversal of #16A, #17A, #20 and #21. The type

and degeneration was $B_1 - 6$ which called for a reduction of manifest plus at all points. #3 and #8 - the phoria of #8 moved toward the normal of $1/2$ exophoria from 2 exophoria, i.e., the plus of #7 was acceptable.

#13A and #13B - the plus of #7 moved the exophoria of #13B away from the norm of 6 exophoria.

#4 and #7 - a difference between #4 and #7 was evidenced as #4 indicated an anisometropia² and a lesser cylinder than did #7. The ophthalmometer finding indicated a $1/3$ to $1/2$ cylinder could be predicted.

#4 and #5 - the difference between the two was approximately $3/4$ diopter, both holding the anisometropia.

The relationship between #7 and #14 gross was small, but the phorias of the cross cylinder findings caused the near nets to project into minus, minus projector,³ and still maintain good acuity. Using the phoria of #13B the near nets would not have been in minus.

The phoric picture appeared to be flexible but the ductions were low at both far and near. The degree of organization, as evidenced in the skills, pointed to the problem of flexibility of base out and base in with an accompanying lack of orientation.

1. Norms, as established by the Optometric Extension Program, Introduction to Modern Analytical Optometry, by S. K. Lesser, O.D., F.A.A.O., January 1951, page 14.
2. "Anisometropia is defined as a condition in which the refractive status of one eye differs from that of the other." Clinical Refraction by Irvin M. Borish, Chicago, Professional Press, Inc. 1949, page 77.
3. Optometric Extension Program, Near Point Optometry, 1949 pp. 42 and 51.

Whenever the near nets are in minus, but the #7 is plano or plus, the maximum plus acceptable at near cannot be below plano. Therefore, the not over and not under for 16" are plano. Yet, if plus were prescribed over this amount and visual training elicited, a satisfactory situation could be expected.

In the skills, through plano the minus phase of rock was failed and fine visual discrimination at far was lacking. With the hand and eye coordination, using AN1, the patient voluntarily exclaimed, "Hey, this thing doesn't work!" He made many corrective movements, had to look with first one eye and then the other, and seemed unable to place the pointers on the top of the star. When AN5 was placed in the stereoscope the orientation of the surrounding parts seemed to aid him in placing the pointers on the corners of the box surrounding the numbers.

The lateral phorias at both far and near were not steady. At near he could not see the white cross of the Near-Point Central Suppression card, and he could not distinguish clearly the circles that contained the dots of the Near-Point Visual Discrimination test.

The conclusion of the analysis and diagnosis was, if plus with visual training were given the complaint would vanish and the patient would once again have the ability to judge distances.

Prescribed Therapy:

	Lenses	Visual Training
O.D.	/ .25 - .50 x 90	See Table III
O.S.	/ .25 - .50 x 90	

Instructions to the patient; Wear the prescribed Rx at all times.

VISUAL TRAINING

Training commenced November 12, 1952 and terminated January 16, 1953, with a total of sixteen sessions.

Principal reasons for visual training: 1. Base Out Training
 2. Discomfort
 3. Skill Enhancement

Areas Covered -

Visual Fields - Fields were taken; motion, form, color fields, and blind spot plotted. No irregularities were noted. November 12, 1952.

Eye Movements - Visual Fields completed November 14, 1952. Monocular and binocular rotations, saccadics and pursuit fixations were started. The movements were fair with small amounts of irregularities manifest frequently.

Eye movements were enhanced on the following dates, November 14, 17 and 19, where the area was concluded owing to smooth movements.

Accommodative Facility:

At the third session rock training was started on the telebinocular. The shaft setting was 1.25 and the ANI-L transparencies rocked in .25 Diopter increments, \nearrow .25 - .25 - .25 \nearrow .25. The type of rock was a combination plus (\nearrow) and minus (-) rock.

At \nearrow .50 D (O.D.) the picture was not as clear as O.S. After practice of alternate illumination the patient reported a distinct improvement.

The same response was given when \nearrow .75 D was rocked. He reported the picture clear after several minutes of practice. Before the training

session was completed the patient rocked $\neq 1.00 - 1.00 - 1.00 \neq 1.00$.
 When the patient had the ability to rock a $\neq 1.25 - 1.25 - 1.25 \neq 1.25$
 at a shaft setting of 1.25, the training was moved to the Omnitainer where
 the shaft was set at infinity.

Hand and Eye:

At the fourth training session the AN series was presented to the patient where Hand and Eye training were to be enhanced. A total of five sessions was spent on the AN1 through 6. His coordination of placing the pointers easily and together was poor in the beginning but soon improved. Noticeable improvement was noted with AN5 to AN10 where he had the many field factors for orientation and localization.

Base Out Training:

Base Out training was started on the ninth session with AN11. With an 85 mm. separation (6^\wedge B.O.) and a 95 mm. separation (11^\wedge B.O.) of #6 and #5 respectively, he could look between the two numbers easily. The patient was instructed to be especially observant of the surrounding figures - the child, dog, ball and the parents. He worked on AN11, 13, 15 and 17 where he met with immediate difficulty. With AN17 the #1 had a separation of 83 mm. or 6^\wedge B.O., and #6 had a separation of 54 mm. or $20\frac{1}{2}^\wedge$ B.O. At the first session with the AN series he reported seeing two sixes and two fives.

During the eleventh session the patient returned to the AN series, specifically AN13 and AN15. The patient reported the ability to see one #10 on AN15, having previously seen two.

The final two sessions of base out training consisted of AN11 - 17, 47 - 56, 19 - 31. The patient handled all of the cards equally well, seeing

no doubling. Each card was seen clearly, although he did have difficulty seeing a perfect cross. The response to the total binocular field with adequate depth was the goal.

Far Point Stereopsis:

The seventh session AN47 through 56 was introduced, with constant illumination, and each new card was presented only after the preceding card was seen clearly and easily. The globes appeared to be hanging in space and the patient could easily look from a tree in the distance to a blade of grass in the foreground. He passed through this series with little effort, and only two sessions were spent with stereopsis.

Vectographs:

A total of six sessions was utilized to master the vectographs.

Michigan Boulevard Scene - The picture was seen clearly. The #2 through #21 were each seen singly and as each was clear the patient rocked forward and backward to observe the effect. He had little difficulty clearing the letters, and after several minutes work he was able to jump to any point on the vectograph and see it clearly and singly.

Mill Scene - The first session the patient worked on this card he could pass to E and J above the scene. A total of three sessions was used for the patient to work the scene back and forth.

Card Picture - This was one of the hardest for the patient to control. He could see each card singly and clearly to 0, where he lost the picture and saw two. Three sessions were utilized to control the card and at the end he could look at any one card and was conscious of the rest being single or double.

The plate with the train and smoke, with acuity E's, and the crossing circles was handled easily. The patient had difficulty for a few minutes in looking first at the top end of the circles and then the bottom end.

Checked Board - This particular plate was the most difficult for the patient to control, working this plate for four sessions. The first session he found it impossible to see one checker board with depth. The following instructions were given, "Place your finger before your fact at a distance of approximately one foot. Concentrate on your finger and be conscious of things around you. Now look at your finger and try to see the one checker board beyond your finger." Prior to these instructions the patient had thought it quite impossible to see anything but the two checker boards. By the end of the second session with this plate he could see one checker board and was happy to realize he could see the depth. He now felt he had concrete evidence of advancement.

A total of six sessions was spent on the vectographs, the main concentration of work being the ability to rock back and forth over any point in each scene at any distance.

Conclusion of Training:

A very important factor of the base out training was the spacial orientation. In the half views disparity and orientation were stressed. The two progressed hand in hand.

The striking success of the training may be seen with ANL5. When the patient first saw the half views during the eighth session he reported seeing two #10's, which was $14\frac{1}{2}^{\Delta}$ B.O. During the eleventh session ANL5 was again

explored and the patient reported but one #10.

The patient requested training be ended on January 12, so a progress report was made to determine the influence of the training upon the analytical findings as well as the visual skills.

FIRST PROGRESS REPORT

The first progress report was given January 16, 1953, following the cessation of visual training.

Case History:

No additional information was reported other than the patient felt he had accomplished all of the factors for which visual training was given. He reported efficient, comfortable vision and confidence while driving at night.

Analytical Findings:

See Table I, First Progress Report.

Visual Skills:

See Table II, First Progress Report.

Analysis and Diagnosis:

The clinician reported a noticeable rise of #4 and #5 with a change of cylinder power. #7 and #7A manifested a .25D anisometropia. The phoria of #8 went into esophoria, which, according to the norm, was being driven in the wrong direction.

A noticeable change could be seen in the base out findings at far. #9 had risen from 4[~] to 14[^] and #10 had gone from 8/4 to 20/16. The base

in ductions evidenced very little change.

Once again the plus of the subjective drove the induced phoria in #13B away from the norm of 6 exophoria to 1 exophoria.

The cross cylinder findings were approximately 1 diopter higher with a drop of the phoria of #15A and #15B.

At near the base out ductions also manifested a noticeable increase, while there was a small decrease in the base in ductions.

#19 increased .25 diopters. #20 and #21 had reached a closer equilibrium.

The skills evidenced the greatest change through:

O.D. \nearrow .25 - .50 x 90
O.S. \nearrow .25 - .50 x 90 after the visual training.

The rock was passed without any hesitancy, both plus and minus phases. The Simultaneous Perception, Far-Point Binocularity, Far-Point Stereopsis, Far-Point Pericentral and Central Suppression were all passed originally, and in the first progress report passed with equally efficient skill. The Far-Point Visual Discrimination was passed. A change for the better was noted in the Hand and Eye Coordination - equality in skill, smoothness and grace was evidenced during the testing situation.

The Far and Near-Point Lateral Phorias were stable and within the expected. The remainder of the near skills was all passed with a noticeable improvement in the Near-Point Central Suppression and Visual Discrimination. The patient reported an almost perfect cross with alternating legs as he looked at the sphere.

Prescribed Therapy:

No additional therapy given at that time.

SECOND PROGRESS REPORT

The second progress report was given March 9, 1953.

Case History:

No complaint. The patient voluntarily stated he had noticed a change for the better visually. He stated it was easy for him to pass cars while driving at night. He also reported there appeared to be more depth between the counters, the lack of depth having originally brought him to the clinic. The patient was very satisfied with the lenses and visual training.

Analytical Findings:

See Table I. Second Progress Report

Visual Skills:

See Table II. Second Progress Report.

Analysis and Diagnosis:

The phorias of #3 and #8 had moved a small amount toward the norm since the first progress report. The phorias of #13A and #13B had remained about the norm. #4 and #5 had dropped .50D but had increased the anisometropia, as well as the power of the cylinder of O.S. dropping to $-.25 \times 90$. #7 and #7A remained the same.

On the base out ductions the blur was 1^{Δ} above the expected of 7 but the break of #10 had risen, indicating the learned relation between accommodation and convergence was well fixed and recovery was expected

to rise.^{1.} The ratio of #10 was not high as the recovery was not high, but it can be expected to rise. Although #10 was low due to the ratio, #11 was the lower of the two.

The cross cylinder findings had dropped, which could be indicative of the need for further training to make the relationship firm so that it can not slide back.

The base out ductions at near had remained approximately the same as had #19, #20 and #21.

The skills were all passed with no peculiarities. No regressions were found and the patient was delighted with the fact he could perform efficiently.

Prescribed Therapy:

No further therapy was prescribed. The patient was informed of the necessity of continued visual care, and instructions as to succeeding examinations were given.

COMMENT:

An extensive clinical history, involving optometric therapy directed toward enhancement of special orientation through base out training, comprises this case report. The patient was cognizant of a lack of comfortable and efficient vision. The complaints, such as the lack of passing ability while driving at night, made up the total behavior, which, states Goldstein, "An impairment in one function of the organism will spread to the entire organism." As the base out ductions were enhanced the cross cylinder findings were expected to rise, and if the cross cylinder findings should fall after a period following

1. Optometric Extension Program, Near Point of Optometry, 1949, p. 12

cessation of training, a repeated study should be made which would include further training. If a retrogression is found, plus and base out training should be increased over and beyond that given previously. By so doing, the plus would change accommodation as though the plane of regard were moved away from the egocentric locus, and the base out prisms would cause convergence to move toward the egocentric locus, or as though the plane of regard were nearer. Thus, a range of greater flexibility is developed for the maintenance of comfortable vision.

SUMMARY

The case of a thirty-nine year old man is reported. His clinical history began years ago when he first patronized a commercial establishment. He was given a fifteen minute examination and sold a pair of glasses with no therapy as to his visual behavior. He entered the clinic in October 1952. Lenses and visual training were prescribed and two progress reports confirmed the successful therapy. The training consisted of basically two areas - base out and spatial orientation and localization. The ductions, plus the cross cylinder findings, open the way for the clinician to observe improvements or retrograde changes. The patient has been requested to return for further analysis and study.

OPTOMETRIC FINDINGS*	ORIGINAL 10/21/52	PROGRESS REPORT 1/16/52	PROGRESS REPORT 3/9/53
2 Ophthalmometer: O.D.	- 1.00 x 2	- 1.00 x 2	- 1.00 x 2
O.S.	- .12 x 180	- .12 x 180	- .12 x 180
**3 Lat ph thru hab Rx	2XO \neq .50/cyl	Ortho \neq .25/cyl	1/2XO \neq .25/cyl
13A Lat ph at 16" thru hab Rx	7XO \neq .50/cyl	8XO \neq .25/cyl	8XO \neq .25/cyl
4 "Static" retinoscopy O.D.	\neq .25-.50x90	\neq 1.00-.50x90	\neq .50-.50x90
O.S.	pl \neq .25x90	\neq .50-.50x90	pl \neq .25x90
5 "Dynamic" retinoscopy O.D.	\neq 1.00-.50x90	\neq 2.00-.50x90	\neq 1.50-.50x90
at 20" O.S.	\neq .75-.25x90	\neq 1.75-.50x90	\neq 1.25-.25x90
6 "Dynamic" retinoscopy O.D.			\neq .75-.50x90
at 40" O.S.	x x	x	\neq .50-.25x90
7 Subjective to 20/20 O.D.	\neq .75-.50x90	\neq 1.00-.50x100	\neq 1.00-.50x90
O.S.	\neq .75-.50x90	\neq .75-.25x90	\neq .75-.50x90
7A Subjective to best O.D.	\neq .25-.50x90	\neq .50-.50x100	\neq .50-.50x90
visual acuity O.S.	\neq .25-.50x90	\neq .25-.25x90	\neq .25-.50x90
8 Lat ph thru #7	1 XO	2 Eso	1 Eso
9 B O to blur thru #7	4	14	8
10 B O break & recover thru #7	8/4	20/16	28/8
11 B I break & recover thru #7	4/2	4/0	9/2
12 Vert ph thru #7	Ortho	Ortho	Ortho
12 Vert ductions thru #7	2/1 2/1	2/0 4/2	3/1 2/0
13B Lat ph at 16" thru \neq .75 (#7)	8 XO	1 XO	7 XO
14A Diss cross O.D.	\neq 1.25-.50x90	\neq 2.00-.50x100	\neq 1.25-.50x90
cylinder at 16" O.S.	\neq 1.25-.50x90	\neq 1.75-.25x90	\neq 1.00-.50x90
15A Lat ph thru 14A	11 XO	5 XO	11 XO
14B Binoc cross O.D.	\neq 1.00-.50x90	\neq 2.00-.50x100	\neq 1.25-.50x90
cylinder at 16" O.S.	\neq 1.00-.50x90	\neq 1.75-.25x90	\neq 1.00-.50x90
15B Lat ph thru #14B	10 XO	8 XO	8 XO
16A B O blur out 16" thru #7	X	X	X
16B B O break and recover thru #7	12/2	28/10	24/9
		17	X
17A B I blur out thru #7	12		
17B B I break & recover 16" thru #7	22/12	18/3	20/8
18 Vert ph 16" thru #7	1/2 Rt Hyper	Ortho	Ortho
18 Vert ductions 16" thru #7	3/1 3/1	4/2 3/1	4/1 4/1
19 Minus to blur 13" O.D.	5.50	6.00	
O.S.	6.00	6.50	
O.U.	5.25	5.50	5.50
20 Minus to blur out 16"	-3.00	-2.50	-2.25
20 Lat ph 16" thru	1 XO -2.25	4 Eso -2.25	Ortho -2.00
21 Plus to blur out 16"	\neq .75	\neq 2.50	\neq 2.25
21 Lat ph 16" thru	12 $\frac{1}{2}$ XO \neq .50	10 XO \neq 2.00	12 XO \neq 2.00

* The numbers shown are the numerical designations for the indicated tests as adopted by the Optometric Extension Program.

TABLE II
 SUMMARY OF Manipulatory and Perceptual Skills

Techniques or Skills	Dates Given					
	10/21/52		1/16/53		3/9/53	
	P	F	P	F	P	F
MANIPULATORY SKILLS:						
Monocular Rotations	x		x		x	
Binocular Rotations	x		x		x	
Saccadic Fixations		x	x		x	
Accommodative Facil.		x	x		x	
PERCEPTUAL SKILLS:						
Simultaneous Perception	x		x		x	
Far Binocularity	x		x		x	
Far Stereopsis	x		x		x	
Far Pericentral Suppression	x		x		x	
Far Central Suppression	x		x		x	
Far Visual Discrimination		x	x		x	
Hand and Eye Coordination		x	x		x	
Color Vision	x		x		x	
Far Lateral Phoria		x	x		x	
Far Vertical Phoria	x		x		x	
Near Vertical Phoria	x		x		x	
Near Binocularity	x		x		x	
Near Stereopsis	x		x		x	
Near Lateral Phoria		x	x		x	
Near Pericentral Supp.	x		x		x	
Near Central Suppression		x	x		x	
Near Visual Discrimination		x		x	x	

A double ruling indicates a progress report was taken at this point. See Table I.

TABLE
SUMMARY OF

Techniques or Skills	Dates			
	12	14	17	19
VISUAL FIELDS	x			
MONOCULAR ROTATION		x	x	x
BINOCULAR ROTATION		x	x	x
SACCADIC FIXATIONS		x	x	x
COMBINED MONOCULAR AND SACCADICS		x	x	x
ACCOMODATIVE ROCK			x	x
HAND & EYE COORDINATION				x
BASE OUT TRAINING				
BASE IN TRAINING				
FAR POINT STEROGRAMS				
INTERMEDIATE STEROGRAMS				
Near point STEROGRAMS				
VECTOGRAPHS				
PROGRESS REPORT				

A double ruling indicates a progress r

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