

1-1-1953

# The value of the near point of binocularity in testing and home training

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## Recommended Citation

Stuebner, Ben E., "The value of the near point of binocularity in testing and home training" (1953). *College of Optometry*. 176.  
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# The value of the near point of binocularity in testing and home training

**Abstract**

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**Degree Type**

Thesis

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THE VALUE OF  
THE NEAR POINT OF BINOCULARITY  
IN TESTING AND HOME TRAINING

A THESIS PRESENTED TO  
THE FACULTY OF THE COLLEGE OF OPTOMETRY  
PACIFIC UNIVERSITY  
IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE  
DOCTOR OF OPTOMETRY

BY  
BEN E. STOEHRER  
JANUARY 1953

SECTION I  
CASE HISTORIES

CASE HISTORIES:

DATE: March 12, 1952 (Original Study).

PATIENT: Housewife, age 49, Gaston, Oregon.

"My eyes are getting worn, they aren't strong enough anymore", these were the original complaints of the patient. The patient has most of her difficulty at near, especially sewing. She reads quite a bit and does ironing; the intermediate distances do not trouble her.

Her last visual examination was three or four years ago by Dr. H., of Hillsboro. She has been wearing lenses for the last ten years, mostly for near work. Medical: Her last medical was in 1950 and her reason for seeing her physician was that she was feeling badly. At the present she takes a general vitamin tablet.

Dental: The patient wears dentures.

Her prescription upon entering the clinic was:

O.D.  $\text{+}.75$   
O.S.  $\text{+}.75$   
O.U. add:  $\text{+}.75$

DATE: November 17, 1952 (Progress Report).

The patient complained of smarting and burning of the right eye, it was noticeable at near and after doing a near task.

SECTION II  
PRELIMINARY FINDINGS

PRELIMINARY FINDINGS:

DATE: March 12, 1952.

ENTRANCE TESTS:

Dominant Hand	Right
Changes?	No
Dominant Eye	Right
Cover Test	No movement noted at far or near.
Rotations and Pursuits	Pass
Near Point of Binocularity	8" and doubling (taken through add)
Donders Amplitude (20/40)	
O.D.	16 inches.
O.S.	15 inches.
O.U.	15 inches.
Fixations	Observations indicated they were passable.
Saccadics	Observations indicated they were passable.

PATHOLOGICAL EXAMINATION (External):

Position	Normal to each other, straight.
Cilia and Palpebrae	Clear and straight.
Lid Margins and Caruncle	Clear.
Conjunctiva and Puncta	Clear.
Sclera	Clear.
Cornea	Clear.
Anterior Chamber	Normal depth to each other.
Iris	Brown pigment spots on both.
Crystalline Lens	No visible opacities.
Lacrimal Drainage	Adequate drainage.
Tension	Equal in both eyes by palpation.



**PUPILLARY REACTIONS:**

Direct	Present
Consensual	Present
Near Point	Present
Speed	Slow
Size	4mm in testing illumination
Stay contracted?	Slight oscillation.

**ENTRANCE TESTS:**

**DATE:** November 17, 1952 (Progress Report):

**Near Point of Binocularity:** 10 inches and doubles.  
(through far habitual)

**Donders Amplitude:** 20/40

O.D.	20 inches
O.S.	20 inches
O.U.	17 inches

**SECTION III**  
**OPHTHALMOSCOPIC EXAMINATION**

OPHTHALMOSCOPIC EXAMINATION: (Original study).

Cornea:	Clear.
Anterior Chamber:	Clear.
Iris:	Regular margins.
Crystalline Lens:	O.D. posterior polar cataract at 9 o'clock. O.S. Clear.
Vitreous:	Clear.
Fundus Coloration:	Pinkish-red.
Disc Margin:	Distinct in both.
Physiological Cupping:	Normal physiological cupping.
Vessel Ratio:	3/2.

OPHTHALMOSCOPIC EXAMINATION: (Progress Report).

Same as original examination.

SECTION IV

ANALYTICAL FINDINGS  
(Refer to Table I)

(TABLE I)

OPTOMETRIC FINDINGS*	3-12-52	11-17-52
2 Ophthalmometer: O.D.	-1.37 x 180	
O.S.	-1.37 x 180	
**3 Lat ph thru hab Rx	1 xo	ortho
13A Lat ph at 16" thru hab Rx	4 xo	4 xo
4 "Static" retinoscopy O.D.	+1.25	+1.25 -.75 x 135
O.S.	+1.75	+1.00 -.50 x 180
5 "Dynamic" retinoscopy O.D.	+2.00	+3.00 -.75 x 135
at 20" O.S.	+2.00	+2.75 -.50 x 180
6 "Dynamic" retinoscopy O.D.		
at 40" O.S.		
7 Subjective to 20/20 O.D.	+1.25-.50x65	+1.00-.25x75
O.S.	+1.00-.50x105	+1.00-.50x120
7A Subjective to best O.D.	+1.00-.50x65	+1.75-.25x75
visual acuity O.S.	+1.75-.50x105	+1.75-.50x120
8 Lat ph thru #7	2 xo	1/2 xo
9 B O blur thru #7	3	2
10 B O break & recover thru #7	8/6	5/0
11 B I break & recover thru #7	8/6	7/5
12 Vert ph thru #7	ortho	2 R. Hyper.
12 Vert ductions thru #7	2/1 2/1	2 1/2/1 1 1/2/1
13B Lat ph at 16" thru #7 (20/40)	4 xo	8 xo * - - thru +2.25
14A Diss cross O.D.	+2.75-.50x70	+2.75-.25x75
cylinder at 16" O.S.	+2.75-.50x105	+2.75-.50x120
15A Lat ph thru 14A	12 xo	9 xo
14B Binoc cross O.D.	+2.75-.50x70	+2.75-.25x75
cylinder at 16" O.S.	+2.75-.50x105	+2.75-.50x120
15B Lat ph thru #14B	12 xo	7 xo
16A B O blur out 16" thru #14B gr.	12	2 (first blur)
16B B O break and recover thru #14B gr.	15/12	7 1/2/2
17A B I blur out thru #14B gr.	16	4 (first blur)
17B B I break & recover 16" thru	26/22	22/15
18 Vert ph 16" thru #14B gr.	ortho	ortho
18 Vert ductions 16" thru #14B gr.	2/0 2/0	2 1/2/1 1 1/2/0
19 Minus to blur 13" O.D.	1.50	1.00
O.S.	1.50	1.00
O.U.	1.50	1.50
20 Minus to blur out 16"	-1.50	-1.00
20 Lat ph 16" thru -1.00	4 xo	4 1/2 xo thru -.75
21 Plus to blur out 16"	+1.25	+1.00
21 Lat ph 16" thru +1.25	13 xo	7 xo thru +.75

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

**ENTRANCE ACUITIES:**

DATE: March 12, 1952.

	Without Rx		With Rx	
	(far)	(near)	(far)	(near)
O.D.	30	120	25	40
O.S.	25	120	25	40
O.B.	25	120	25	40

DATE: November 17, 1952.

	Without Rx		With Rx	
	(far)	(near)	(far)	(near)
O.D.	30 <sup>-</sup>	200	25	40
O.S.	30 <sup>-</sup>	200	25	40
O.U.	30 <sup>-</sup>	200	25	40

(The numerator is 20 in all cases).

**RANGES:**

DATE: March 12, 1952.

Through:	Range (20/20)
O.D. $\nearrow 1.75 \text{ } -.50 \times 70^\circ$ O.S. $\nearrow 1.75 \text{ } -.50 \times 105^\circ$	15" to 26"
O.D. $\nearrow 2.00 \text{ } -.50 \times 70^\circ$ O.S. $\nearrow 2.00 \text{ } -.50 \times 105^\circ$	14" to 22"
O.D. $\nearrow 2.25 \text{ } -.50 \times 70^\circ$ O.S. $\nearrow 2.25 \text{ } -.50 \times 105^\circ$	12" to 23"
O.D. $\nearrow 2.50 \text{ } -.50 \times 70^\circ$ O.S. $\nearrow 2.50 \text{ } -.50 \times 105^\circ$	12" to 21"

DATE: November 17, 1952.

	(20/20)			(20/40)
	In	best	Out	
O.D. $\nearrow 2.25 \text{ } -.25 \times 75^\circ$ O.S. $\nearrow 2.25 \text{ } -.50 \times 120^\circ$	11 $\frac{1}{2}$ "	13"	18 $\frac{1}{2}$ "	9 to 23"
O.D. $\nearrow 2.25 \text{ } -.25 \times 75^\circ$ O.S. $\nearrow 2.25 \text{ } -.50 \times 120^\circ$	14 $\frac{1}{2}$ "	15 $\frac{1}{2}$ "	17"	12" —
O.D. $\nearrow 3.00 \text{ } -.25 \times 75^\circ$ O.S. $\nearrow 3.00 \text{ } -.50 \times 120^\circ$	12"	14"	16"	10" to 22"

SECTION V

VISUAL SKILLS  
(Refer to Table II)





SECTION VI  
ANALYSIS AND DIAGNOSIS

ANALYSIS AND DIAGNOSIS:

DATE: March 12, 1952.

In the original analysis and diagnosis the patient was not considered much more than a person in a more advanced stage of presbyopia with the need of additional plus at the near point. Due to an oversight on the part of the clinician the all important Near Point of Binocularity was not considered in the analysis of the first prescription.

The cylindrical component was prescribed because it improved her acuity at far from 20/25 to 20/18 at the time of the testing. The patient had no complaint of her far vision upon entering.

The additional plus at near was evidenced as being needed from (1) the patient's subjective complaints, (2) entrance acuity, (3) her calculated lens requirements at the near point, (4) the ranges taken through varying spherical powers, and (5) the near point visual discrimination which was failed.

The lens therapy prescribed at this time was:

O.D.  $\cancel{+1.00} \text{ } -.50 \times 70^\circ$   
O.S.  $\cancel{+.75} \text{ } -.50 \times 105^\circ$   
O.U. add:  $\cancel{+1.25}$

The reasons for prescribing this lens therapy are: (1) It was within the calculated lens requirements, (2) It allowed the patient one-half of her amplitude of accommodation, (3) It improved her near point binocularity and near point visual discrimination on the skills battery without causing any detriment to her other skills, and (4) allowed her a suitable range at near with the 20/20 Snellen.

ANALYSIS AND DIAGNOSIS:

DATE: November 17, 1952.

With the patients complaint of the "drawing" of her right eye the clinician thought that the reason for this could be one of two, namely, the cylindrical component which hadn't been worn before may be the hindrance, and secondly, that sufficient plus hadn't been administered originally. Upon testing it was found that the near point of binocularity was now at 10 inches, a very undesirous area for a housewife in the habit of doing sewing and patchwork. More bearing was taken on this test and a home training program was started. (The training program and results will be found in another section).

The lens therapy was changed at the time of the progress report although ~~the~~ the analytical picture was similar to that of the original. The entrance acuity at near was down which warranted a change. The below lens therapy was prescribed along with the home training:

O.D.  $f.75$   $-.25$  x  $75^{\circ}$   
O.S.  $f.75$   $-.50$  x  $120^{\circ}$   
O.U. add:  $f1.75$

SECTION VII

PRESCRIBED TREATMENT  
(Refer to Table III)

**PRESCRIBED TREATMENT:**

**DATE:** November 20, 1952 (Consultation).

During the consultation the patient was told that different lenses were to be prescribed but that a change of lenses alone would not rid her of her present complaints. The significance of the near point of binocularity was explained to her, upon testing for this she readily saw that if she doubled on a gross object at 10 inches she would be expected to experience difficulty while working with some near task as sewing for it<sup>5</sup> around this region that this type of work is done. To insure the patient that what I had told her was a hoax I preformed the test on myself and had her observe that the near point of binocularity should lie closer to the bridge of the nose than hers.

The training material was not prepared at this time so the patient was instructed to practise with the top of a pen or pencil at home until her lenses arrived for fitting. The procedure of this training was explained and demonstrated at this time.

**DATE:** December 5, 1952 (Fitting).

The patient was asked whether she had performed the simple training technique at home and she reported that she had and that she felt it had helped some already. The patient was not asked to keep a record of progress so we must rely entirely upon the subjective statement of the patient.

The home training prescribed was a simple yet effective type of training program. As the near point of binocularity was believed to be the cause of the discomfort the objective of the training was to move the near point of binocularity to an area nearer the to the bridge of the nose, and nearer to the expected of four to six inches.

The training material consisted of a plain white card with  $\frac{1}{4}$ " x  $\frac{5}{8}$ " dimensions. One side marked (A) had two parallel lines  $\frac{1}{2}$ " apart, the lines were bold and about  $\frac{1}{4}$ " in length, the other side marked side (B) had two parallel lines  $\frac{1}{4}$ " apart, the lines were not as bold as side (A) but were of the same length. Midway between the center of the parallel lines a small hole was placed to allow a string to pass through. The string was about three feet in length and permitted the card to be slid along it at varying distances. The procedure of training with this is; the patient fastens one end of the string at a height straight ahead of the patient, the other end of the string is held on the bridge of the nose between the eyes. The card is held at a distance at which the two parallel lines are seen, then it slowly drawn toward the face until doubling occurs and the person sees four lines, when this occurs and the person sees four lines the card is slid along the string away from the face until two parallel lines are seen, this is repeated 10 to 15 minutes a day. The expected of this training is for the near point of binocularity to move closer to the bridge of the nose.\*

\* Haynes, Dr. H., Lecture in Fall 1952.

The purpose of the side (A) and (B) was having one bold, gross target to begin with side (A), and one side which required more attention on the part of the patient as it entailed a less gross target with the fine lines and smaller distance between the two lines.

The home training was demonstrated to the patient at this time and also what was expected with repeated training, she was explained the different sides and instructed to begin with side (A) until she could hold it to five or six inches, then side (B) was to be used until the same results were obtained.

A TYPEWRITEN sheet along with the training materials was given to the patient again explaining the training procedure, this also included the importance and significance of the near point of binocularity. The patient was told to keep a record of her daily progress.

TABLE III

## REPORT OF THE PATIENT'S DAILY PROTOCOL:

(Preceding done on side A):

Date	Doubling:	
	At Start	At End
December 7	11 <sup>3</sup> / <sub>4</sub> "	9"
December 8	10"	7"
December 9	10"	5"
December 10	10 <sup>1</sup> / <sub>2</sub> "	5"
December 11	10"	4 <sup>1</sup> / <sub>2</sub> "
December 12	10 <sup>1</sup> / <sub>2</sub> "	4"
December 13	8"	4"

(Preceding done on side B):

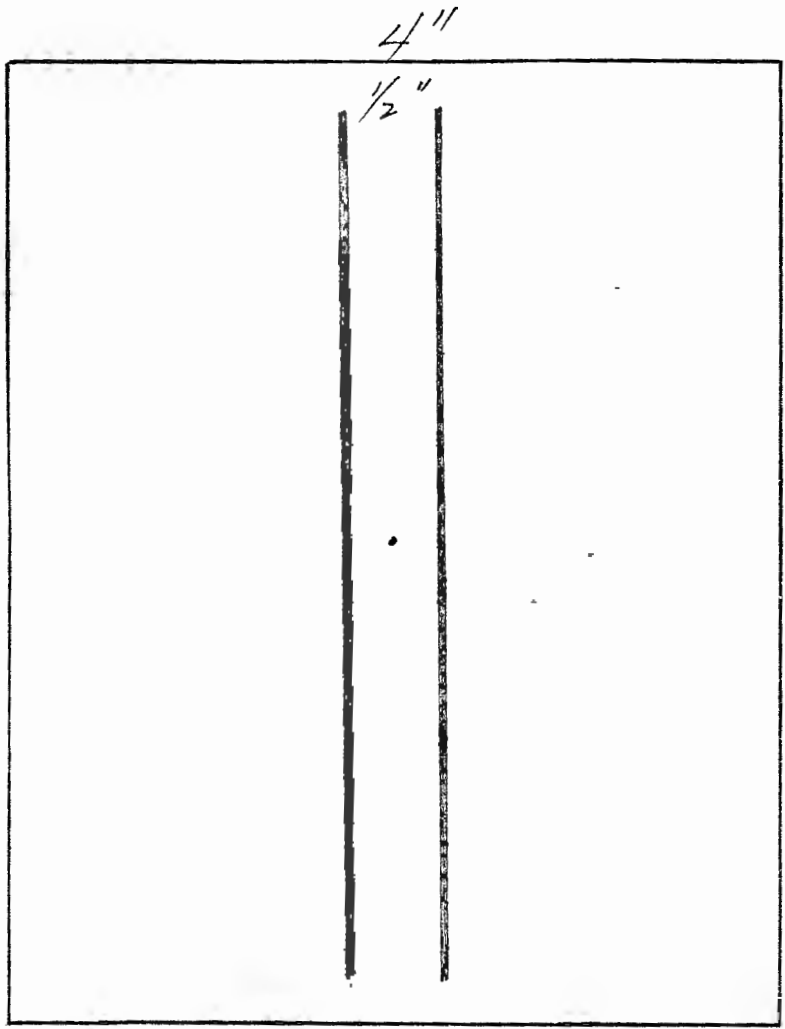
Date	Doubling:	
	At Start	At End
December 14	9 <sup>1</sup> / <sub>2</sub> "	2"
December 15	8 <sup>1</sup> / <sub>2</sub> "	1 <sup>1</sup> / <sub>2</sub> "
December 16	9 <sup>1</sup> / <sub>2</sub> "	1 <sup>1</sup> / <sub>2</sub> "
December 17	8 <sup>1</sup> / <sub>2</sub> "	2"
December 18	9"	2"
December 19	7 <sup>1</sup> / <sub>2</sub> "	2"
December 20	9"	2"
December 21	6"	2"
December 23	6 <sup>1</sup> / <sub>2</sub> "	2"
December 24	6 <sup>1</sup> / <sub>2</sub> "	2"

At the conclusion of my visit to the patient's home the near point of binocularity was taken with the top of a pen, the same type of object as was used in previous testing, and the near point was found to be 6".

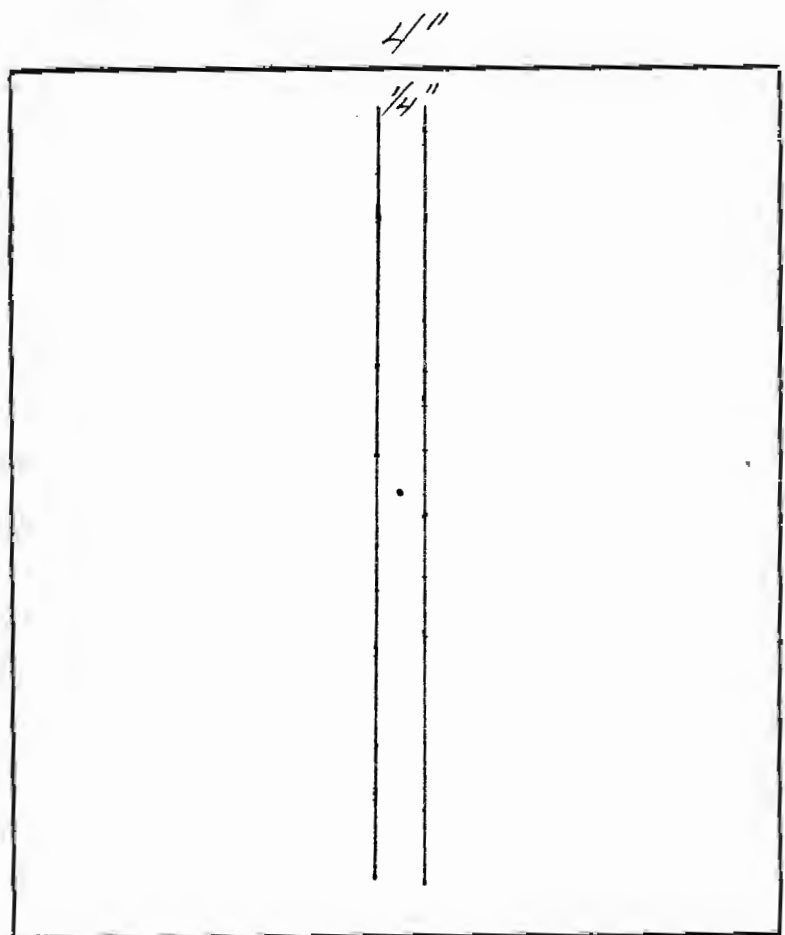


TARGETS:

(SIDE A)

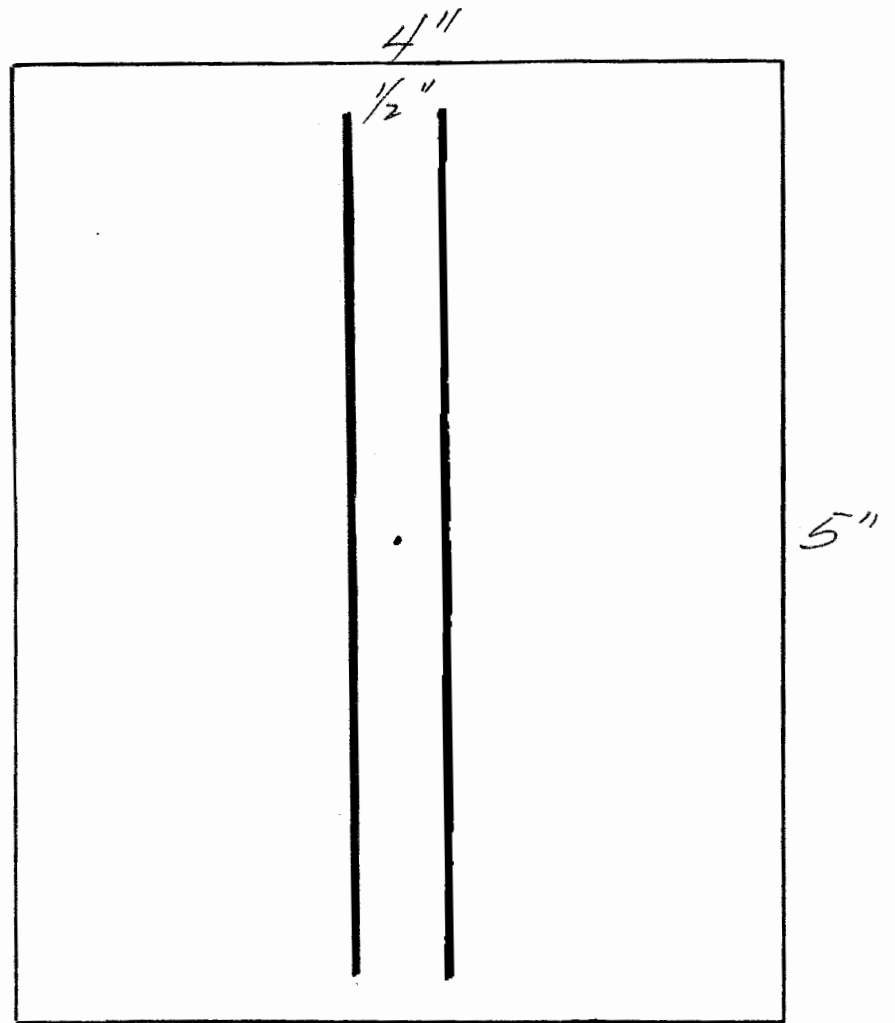


(SIDE B)



TARGETS:

(SIDE A)



(SIDE B)

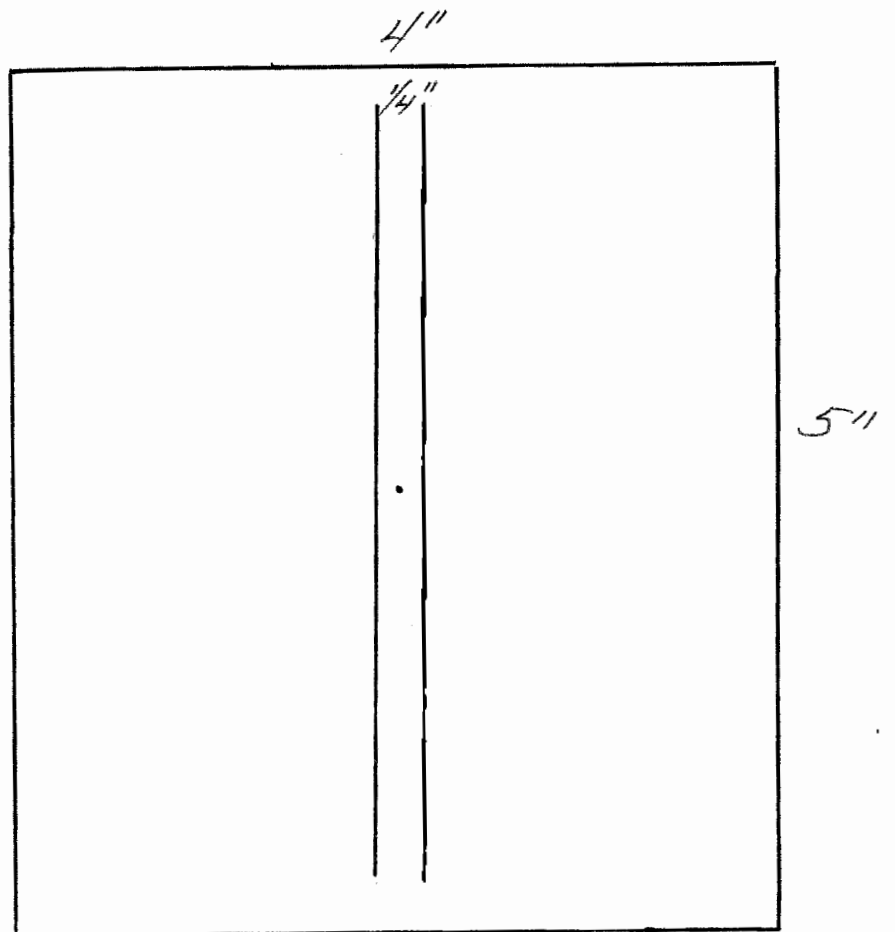


TABLE III

## REPORT OF THE PATIENT'S DAILY PROTOCOL:

(Preceding done on side A):

Date	Doubling:	
	At Start	At End
December 7	11 <sup>1/2</sup> "	9"
December 8	10"	7"
December 9	10"	5"
December 10	10 <sup>1/2</sup> "	5"
December 11	10"	4 <sup>1/2</sup> "
December 12	10 <sup>1/2</sup> "	4"
December 13	8"	4"

(Preceding done on side B):

Date	Doubling:	
	At Start	At End
December 14	9 <sup>1/2</sup> "	2"
December 15	8 <sup>1/2</sup> "	1 <sup>1/2</sup> "
December 16	9 <sup>1/2</sup> "	1 <sup>1/2</sup> "
December 17	8 <sup>1/2</sup> "	2"
December 18	9"	2"
December 19	7 <sup>1/2</sup> "	2"
December 20	9"	2"
December 21	6"	2"
December 23	6 <sup>1/2</sup> "	2"
December 24	6 <sup>1/2</sup> "	2"

At the conclusion of my visit to the patient's home the near point of binocularity was taken with the top of a pen, the same type of object as was used in previous testing, and the near point was found to be 6".

RESULTS OF PRESCRIBED TREATMENT:

DATE: December 29, 1952 (Personal interview at patient's home).

"I have less trouble now than I had before, before doing the training at home it seemed that both my eyes weren't working together, the right one seemed to draw, now they seem to be working together again."

Further interviewing was done with the patient and she related that she experienced the difficulty in the morning but that it was gone after she had done some task requiring the use of her vision at near. The patient's complaint of the drawing on her right eye was noticed after she had received her lenses from the clinic in March, 1952.

At the present time the patient is able to do knitting without the difficulty for some time, she especially notices that the patch work and sewing which require finer discrimination are done more easily now where before she was able to do them only for a short time. When asked if she thought that the training had helped her she replied that she had noticed the improvement and that it has helped her. She stated that after reading for a time the print remained clear, before the training she had difficulty with clarity after reading for some time. The near point of binocularity was taken at this time and found to be at 6 inches.

The patient was told to continue the home training, especially when the complaint renewed itself.

(Since this interview there has been no progress report and so there is no knowledge of the improvement in binocular skills, if there is any).

SECTION VIII

COMMENT

COMMENT:

Perhaps if the value of the near point of binocularity had not been overlooked in the original study a change of lenses would not have been necessary. This case has shown that all areas of the testing should be studied completely before prescribing.

Why should a presbyope have discomfort through the additional plus which was indicated throughout the analytical picture?, this question is what must be answered in order for the patient to have adequate visual performance. Before the near point of binocularity was questioned there were only two other plausible answers, it may be the cylinder which wasn't worn before or it may be the mechanics of fitting the bifocals. The latter was checked and found not to be the reason for the discomfort. Further study of the case showed the near point of binocularity to be far from the expected, this seemed to be a more reasonable cause than the cylindrical factor. If the patient hadn't experienced the discomfort with her previous lenses why would she have them through the increased plus? Before, with her previous lenses, the patient possibly was in the habit of moving her near work to a distance further from her to an area of clearer vision due to insufficient plus, after, with her original lens therapy, the increase in plus allowed her to move her near work closer to her habitual working distance and thus closer to her danger area—to an area where she lost her near point of binocularity and thus causing the discomfort.

This case has shown that lenses alone as a method of therapy would have proved unsuccessful; the value of the near point of binocularity in testing and in training is justifiable in the opinion of the clinician. As there has been no progress report after the home training we must rely on the subjective statements of the patient. The objective of the home training was to alter the near point of binocularity toward the expected distance, with this being accomplished it was believed that the discomfort would be alleviated. The discomfort is less evidenced since the training was begun, this fact comes from the patient's statements. The altering of the near point of binocularity is shown in the patient's daily protocol.

SECTION IX

SUMMARY



SUMMARY:

When a simple preliminary test and a simple method of home training can insure a patient of visual comfort that could not be attained with the prescribing of lenses alone it is too important to be withheld from the routine examination, this is the case of the near point of binocularity, both in testing and in training.