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Modification of a visual examination for intellectually disadvantaged individuals

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Modification of a visual examination for intellectually disadvantaged individuals

Abstract

The purpose of this thesis was to determine if a visual examination using modified subjective tests would be more applicable to intellectually disadvantaged individuals who cannot respond to conventional means of subjective testing. An investigation was designed to determine if a modified subjective testing sequence combined with a home training program could be used to communicate clearly and effectively so that intellectually disadvantaged individuals could render more reliable subjective responses. Fourteen subjects were obtained to participate in the investigation. It was concluded that the modified subjective examination allowed the intellectually disadvantaged individuals to make better subjective judgements and more reliable responses, the data of which could be used together with objective findings to arrive at a more functionally acceptable compensation for refractive error.

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MODIFICATION OF A VISUAL EXAMINATION
FOR INTELLECTUALLY DISADVANTAGED
INDIVIDUALS

A Thesis presented to the Faculty of the
College of Optometry Pacific University
in Partial Fulfillment of the Requirements
for the Doctor of Optometry Degree

by

Paul D. Dunderland

and

James W. Santoro

Advisor: Dr. John M. Boyer

February 1983

MODIFICATION OF A VISUAL EXAMINATION
FOR INTELLECTUALLY DISADVANTAGED
INDIVIDUALS

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Final Grade

A

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ABSTRACT

The purpose of this thesis was to determine if a visual examination using modified subjective tests would be more applicable to intellectually disadvantaged individuals who cannot respond to conventional means of subjective testing.

An investigation was designed to determine if a modified subjective testing sequence combined with a home training program could be used to communicate clearly and effectively so that intellectually disadvantaged individuals could render more reliable subjective responses. Fourteen subjects were obtained to participate in the investigation.

It was concluded that the modified subjective examination allowed the intellectually disadvantaged individuals to make better subjective judgements and more reliable responses, the data of which could be used together with objective findings to arrive at a more functionally acceptable compensation for refractive error.

MODIFICATION OF A VISUAL EXAMINATION
FOR INTELLECTUALLY DISADVANTAGED
INDIVIDUALS

Introduction

There is an ever growing demand to provide vision care to intellectually disadvantaged patients. Many who once would have been institutionalized are now being included in the mainstream of community life through day care centers, sheltered workshops and foster home programs. Consequently, the vision care practitioner is increasingly more likely to be asked to examine mentally retarded or other intellectually handicapped patients. In addition, more vision consultants are being retained to care for those patients who are still institutionalized as a greater awareness of the need for proper vision is being recognized in providing the maximum potential for learning.

Although the mentally retarded are a small minority of the population, there is considerable evidence supporting the view that their need for vision care is much greater than that of the general population. Lawson and Schoofs⁷ found 72% of mentally retarded school children have significant refractive errors and/or ocular muscle imbalance. Courtney⁴ recorded 25-50% of the mentally retarded as having significant refractive error and noted that the degree of refractive error appears to increase as mental ability decreases. The population investigated in this study revealed 15 of 24, or

63%, who were wearing or could have benefited from wearing a corrective prescription. This, along with other sources in the literature,^{2,4,7} confirms the high incidence of refractive error in intellectually disadvantaged individuals and establishes the need for appropriate correction.

Many of the subjective tests employed in a conventional vision examination are complicated and confusing for such individuals, especially if speech and hearing handicaps are also present. This leads to unreliable and often contradictory data between objective and subjective tests, causing the practitioner to place heavy support on objective findings with little attention paid to subjective findings. The purpose of this study, therefore, is to determine if a visual examination using modified subjective tests will be easier for and more applicable to those individuals who cannot respond to conventional means of subjective testing. In conjunction with the modified testing procedures, a home training regimen will be used to help familiarize patients with tests and teach him/her to make appropriate responses. We hypothesize that a modified means of subjective testing will allow intellectually disadvantaged individuals to make better subjective judgements and more reliable responses, the data of which could be used together with objective findings to arrive at a more functionally acceptable correction of refractive error.

Method - Subjects

A population of intellectually disadvantaged individuals was obtained from two area group homes which provide a residence for mentally handicapped adults. Directors of the two homes selected a population of 24 individuals who were able to communicate by word or sign and capable of acting in a socially acceptable manner. A screening, or what shall be called a pre-exam, was conducted on all 24 individuals to separate those who showed good correlation and those who showed poor correlation between objective and subjective tests of refractive error. "Good" correlation was defined as subjective findings differing no more than ± 1.00 D sphere power, ± 1.00 D cylinder power or $\pm 20^\circ$ cylinder axis from objective findings; "poor" correlation represented subjective findings with greater differences.

Completion of the pre-exam resulted in ten patients who showed good correlation (or ocular pathology) and fourteen who showed poor correlation. The former were released from the study, while the latter continued as the subject group upon which our hypothesis was tested. Demographic statistics of the subject group consisted of: (a) ages ranging from 25 to 54 with a mean of 36; (b) seven males and seven females; (c) IQ based on W.A.I.S. tests ranging from 30 to 68 with a mean of 37. Refractive error ranged from 6.00 D myopia to 4.00 D hyperopia with a maximum corneal astigmatism of 3.50 D. Nearly all patients were on medication, many for epileptic conditions.

Method - Materials

The target population of 24 was screened with selected portions of a conventional optometric examination including both objective and subjective tests. This pre-exam consisted of five tests, two specific for subjective and three specific for objective evaluation. They were presented in the following sequence:

1. The Canon Auto-Refractor, utilizing computerized infrared sensors, provided an objective measurement of a lens prescription correcting the patient's ametropia. The best estimate of refractive correction was made by averaging 10-15 measurements taken on each eye.

2. Subjective evaluation of visual acuity was made by using the traditional approach of asking the patient to call letters/figures on a chart from left to right and recording the lowest line called for that eye. Patients capable of calling letters were shown Snellen charts, while those who did not know their letters or simply did not respond to Snellen charts were given the American Optical (A.O.) "Child's Project-O-Chart Slide # 11077" used at 6 meters for distance acuity and the A.O. "Child's Recognition and Nearpoint Test # 11078" used at 40 centimeters for near acuity. All measurements were taken through the patient's habitual status, whether corrected or not.

3. The third test administered was ophthalmometry which served as an objective measurement of corneal curvature, vital in the determination of corneal astigmatism. Instrumen-

tation for this test was the Bausch & Lomb Keratometer and an estimate of the total refractive astigmatism was made by applying Javal's Rule¹⁰ to the findings.

4. A second objective test used to measure refractive error was static retinoscopy. American Optical and Welch Allen streak retinoscopes were used in obtaining this measurement.

5. The last in our sequence of tests administered in the pre-exam is known as the subjective to best visual acuity at far (SBVA). Our goal was to determine the set of lenses in the phoropter which the subject preferred for distance viewing. This involves careful fogging techniques and a series of subjective comparisons; each test in the series presets the one following. The Bichrome Test began the series and allowed the examiner to choose a suitable spherical lens. The Jackson Cross Cylinder test followed and is a subjective refinement of both cylinder power and axis. A monocular subjective to best visual acuity (MSBVA) was administered to establish the best monocular correction and an acuity equalization was used so that the subject could indicate to the examiner the binocular balance between the eyes. Lastly, the binocular subjective to best visual acuity (BSBVA) or 7A was used to finalize the subject's response by acuity observations.

Upon completion of the pre-exam, a comparison was made between the subjective measurements of refractive error and the three objective measurements of refractive error. Individuals who showed differences between objective and sub-

jective findings greater than ± 1.00 D sphere power, ± 1.00 D cylinder power or $\pm 20^{\circ}$ cylinder axis were termed as having "poor" correlation and were asked to continue with the project. Individuals showing differences less than the above criteria were termed as having "good" correlation and were dismissed from the study. Additionally, any individual diagnosed as having ocular pathology was also dismissed from the study.

The investigators believe that individuals classed as having good correlation are understanding and correctly responding to the subjective tests. There is clear communication between the examiner and patient, allowing the patient to make appropriate subjective responses. Individuals classed as having poor correlation, however, either do not understand what is expected of them or simply do not have the capability of making such responses. We set out to determine if a modified subjective testing sequence combined with home training could be used to communicate clearly and effectively so that intellectually disadvantaged individuals could render more reliable subjective responses.

From the initial population of 24, fourteen were isolated who showed poor correlation between objective and subjective tests. In testing our hypothesis, this group was given a home training regimen developed to familiarize the subject with the modified subjective tests and teach him/her to make appropriate responses. The first area of training was designed to make visual acuity testing a simpler, easier task. Subjects were shown flash cards of enlarged, individual figures

(Figures 1 - 6) and asked to point to that same figure on a composite sheet having all six figures (Figure 7). The acuity figures are enlarged reproductions of the A.O. Slide # 11077 and Nearpoint Test # 11078 and were used to help familiarize the patient with these targets so that a correct matching response could be made during a vision examination.

The second area of training was designed to allow patients to make more reliable subjective responses in determination of sphere power, cylinder power and cylinder axis. Enlarged targets simulating the optical blur found in cross cylinder tests were shown to the subjects and they were taught to move their fingers in the direction of the darker, more distinct set of lines. Cross cylinder targets were oriented at both $90^{\circ}/180^{\circ}$ and $45^{\circ}/135^{\circ}$ meridians and three degrees of difficulty were presented at each meridian set (easy, moderate, difficult). Two other flash cards whose cross cylinder lines were equally dark were used and in this case subjects were taught to move their fingers in the direction of both lines when either of these cards was presented. Training began with the easier cards, progressed to those more difficult and later were presented in a random sequence; see figures 8-- 15.

The home training regimen attempted to accomplish three objectives: (1) reduce apprehension during a subsequent post-exam by using targets with which the subject could become familiar; (2) reduce the complexity of tests which often brings about confusion and frustration during conventional subjective testing; and (3) develop an easier mode of communication between

examiner and patient. A sample of the instructions provided with the home training regimen may be found on page 47 .

Following 7-10 days of the home training, the second or post-examination was administered. The objective tests were identical to those conducted in the pre-examination (Canon Auto-Refractometer, ophthalmometry and retinoscopy) with the subjective tests being modified in the following ways.

Measurement of habitual visual acuity at far was done by isolating a single figure from A.O.'s Slide # 11077 and having the subject point to the matching figure from the composite sheet held in close proximity. Near visual acuity measurement was similarly accomplished by having the examiner point to a figure on the A.O. Nearpoint Test # 11078 and having the subject point to the matching figure on the composite sheet held adjacent to the acuity card. The same composite sheet used in training was also used in testing.

Determination of the subjective to best visual acuity (SBVA) in the post-exam was done at near (40 cm.) and utilized a form of astigmatic testing called the Pratt Near Cylinder.⁹ Also a near form of cross cylinder testing (14B) to determine a spherical lens, was used. Following static retinoscopy, +2.00 D were added to the phoropter insuring sufficient plus blur or "fog" to begin the near cylinder testing.

The cylinder component of the retinoscopic findings was reduced by 1.00 D and if retinoscopy indicated with the rule (WTR) or against the rule (ATR) astigmatism, the 90°/180° cross cylinder target was placed at 40 cm. The axis of the

minus cylinder was rotated until it was perpendicular to the lines indicated by the subject's pointing to be in better focus. The power of the cylinder was increased until the patient's response reversed to the lines oriented 90° to the initial response.

Next, the $45^{\circ}/135^{\circ}$ target was shown to the subject and the minus cylinder axis rotated away from the darker and more distinct lines until reversal of the tracing response occurred. This procedure was repeated in alternating succession in order to bracket the range and the axis of the final cylinder correction.

The $90^{\circ}/180^{\circ}$ target was again shown to the subject. The cylinder power was reduced until the tracing response was reversed and then increased until another response reversal was elicited. When the cylinder power had been bracketed using this technique, a final cylinder power correction was chosen at the midpoint of the range.

The order of target presentation for the above procedures was reversed for patients with oblique astigmatism. The $45^{\circ}/135^{\circ}$ oriented stimulus was used for determining magnitude and the $90^{\circ}/180^{\circ}$ stimulus for determining axis. Whenever cylinder power was changed, the spherical power was adjusted to maintain spherical equivalency. All of the above testing sequence was done monocularly and used cross cylinder targets identical in size to those used in training.

The final portion of the post-exam provided a subjective determination of a near binocular spherical correction.

The $90^{\circ}/180^{\circ}$ cross cylinder target was placed before both eyes at 40 cm., cross cylinder lenses were inserted at 90° and the subject asked to point to the darker, more distinct lines. If the initial tracing response was not to the 90° lines, plus was added binocularly until they appeared darkest to the subject. Plus was then reduced until a response reversal was elicited. The procedure was repeated until a minimal range was achieved and the midpoint of that range was selected as the best subjective measure of a near spherical correction.

The investigators' hypothesis is that a modified form of subjective testing will allow intellectually disadvantaged individuals to make better subjective judgements.

If post-exam visual acuities are better than pre-exam acuities, our hypothesis is, at least in part, confirmed and we may say that our modified form of subjective acuity measurement is more applicable to intellectually disadvantaged individuals than conventional means of lens prescription determination. If post-exam acuities show no change or are less than those found in the pre-exam, we may state that part of the hypothesis is rejected.

If a subject had poor correlation between objective and subjective tests in the pre-exam but was found to have good correlation between these tests in the post-exam, the modified form of subjective testing for refractive error may be considered to give more reliable results than more conventional means of determining refractive error. In the pre-exam,

cylindrical correction was obtained with testing at far (6 m.) while in the post-exam it was obtained at near (40 cm.). The investigators realize the changes in cylinder axis and power which may occur when going from far to near testing situations yet these are generally minor variations and will be neglected in this study. Pascal, Hofstetter, Bannon and Walsh (Borish 778³) have all investigated these changes reporting that axis changes may occasionally vary 5-10 degrees while cylindrical power changes may increase up to a maximum of approximately .50 D.

Both objective and subjective evaluation of refractive error was done at 6 m. in the pre-exam yet in the post-exam subjective evaluations were done at near and objective evaluations at far. In attempting to compare the spherical component of objective and subjective measurements completed at two distances, one must certainly expect more plus to be found in the near measurement. If one is aware of this higher plus and maintains consideration of the patient's age, it is still possible to determine if objective and subjective findings correlate good or poorly.

Methods - Results

Group 1 - "Success"

Subject's Name: B. H.

Age: 43 Sex: M

PRE-EXAM 7/27/82

POST-EXAM 8/9/82

Objective:

- 1) AR OD: -2.25 -0.50 X 127
OS: -2.62 -0.62 X 24
(-0.12 X 145)
- 2) Ks OD: 44.12 @ 145 44.25 @ 55
OS: 43.87 @ 175 44.75 @ 85
(-0.62 X 175)
- 3) #4 OD: -2.25 -1.00 X 150
OS: -2.75 -0.25 X 10

Objective:

- 1) AR OD: -2.25 -0.50 X 120
OS: -2.50 -0.37 X 36
(-0.50 X 140)
- 2) Ks OD: 43.50 @ 140 43.87 @ 60
OS: 44.12 @ 175 45.00 @ 175
(-0.62 X 175)
- 3) #4 OD: -3.00 -0.25 X 170
OS: -2.50 -0.50 X 180

Subjective:

- 1) VA OD: 20/60 OD: 20/30
OS: 20/60 OS: 20/30
OU: 20/60⁺ OU: 20/30
FAR NEAR
- 2) 7A OD: ???
OS: ???

Subjective:

- 1) VA OD: 20/30 OD: 20/30
OS: 20/30 OS: 20/30
OU: 20/30 OU: 20/30
FAR NEAR
- 2) NS OD: -1.50 SPH +0.50
OS: -1.00^{+0.50} -0.50^{+0.50} X 180^{+30°}

Comments:

During subjective testing of the 7A in the pre-exam, B.H. consistently chose the second lens as the preferred lens.

Habitual OD: -2.25 -0.50 X 133
OS: -2.50 -1.00 X 24

Key to abbreviations:

- 1) AR: Canon Auto-Refraction
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Subject's Name: L. M.

Age: 54 Sex: M

PRE-EXAM 7/27/82

POST-EXAM 8/5/82

Objective:

- 1) AR OD: +.50 -.62 X 180
OS: +.37 -1.50 X 166
(-.87 X 175)
- 2) Ks OD: 42.87 @ 175 44.00 @ 85
OS: 42.87 @ 175 44.50 @ 85
(-1.50 X 175)
- 3) #4 OD: +.50 -.50 X 175
OS: +.25 -1.25 X 180

Objective:

- 1) AR OD: +.50 -.75 X 15
OS: +.50 -1.50 X 170
(-1.00 X 172)
- 2) Ks OD: 42.75 @ 178 44.00 @ 88
OS: 42.75 @ 180 44.75 @ 90
(-2.00 X 180)
- 3) #4 OD: +.75 -1.50 X 175
OS: +.50 -1.75 X 165

Subjective:

- 1) VA OD: 20/30 OD: 20/60
OS: 20/30 OS: 20/40
OU: 20/30 OU: 20/40
FAR NEAR
- 2) 7A OD: ???
OS: ???

Subjective:

- 1) VA OD: 20/30 OD: 20/40
OS: 20/30 OS: 20/40
OU: 20/30 OU: 20/40
FAR NEAR
- 2) NS OD: +2.25^{+.25} -.75^{+.25} X 180^{+5°}
OS: +2.00^{+.25} -1.50^{+.25} X 175^{+7.5°}

Comments:

L.M. provided no consistency in responses made during the 7A.

Key to abbreviations:

- 1) AR: Canon Auto-Refracton
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Subject's Name: J. N.

Age: 42 Sex: F

PRE-EXAM 8/2/82

POST-EXAM 8/9/82

Objective:

1) AR OD: +1.62 -3.50 X 54
OS: -2.00 -4.12 X 166 (*1 reading)
(-.75 X 180)

2) Ks OD: 44.50 @ 180 45.50 @ 90
OS: ???

3) #4 OD: +2.25 -2.50 X 120
OS: ???

Objective:

1) AR OD: +1.25 -3.62 X 55
OS: ??? (-.62 X 10)

2) Ks OD: 44.50 X 10 45.25 @ 100
OS: ???

3) #4 OD: +2.00 -2.25 X 120
OS: ???

Subjective:

1) VA OD: 20/60 OD: 20.30
OS: 20/-- OS: 20/--
OU: 20/60 OU: 20/30
FAR NEAR

2) 7A OD: -.50 SPH
OS: -.50 SPH

Subjective:

1) VA OD: 20/40⁻ OD: 20/30
OS: 20/-- OS: 20/--
OU: 20/40⁻ OU: 20/30
FAR NEAR

2) NS OD: +2.75^{+.50} -2.25^{+.25} X 115^{+20°}
OS: ???

Comments:

J.N. had a trauma - induced corneal ectasia - which prevented most measurements attempted on her left eye. Her subjective response in the pre-exam was to call out the letters of the alphabet rather than choose a preferred lens.

Key to abbreviations:

- 1) AR: Canon Auto-Refractometer
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Subject's Name: S. B.

Age: 31 Sex: F

PRE-EXAM 8/2/82

POST-EXAM 8/9/82

Objective:

- 1) AR OD: P1 - 1.87 X 90
OS: -.25 -1.75 X 82
(-1.25 X 90)
- 2) Ks OD: 37.12 @ 180 36.50 @ 90
OS: 37.00 @ 170 36.75 @ 80
(-.75 X 80)
- 3) #4 OD: -.25 -1.75 X 90
OS: -.50 -1.75 X 90

Objective:

- 1) AR OD: -.25 -1.62 X 93
OS: -.12 -1.75 X 90
(-1.25 X 90)
- 2) Ks OD: 37.12 @ 180 36.50 @ 90
OS: 37.00 @ 170 36.75 @ 80
(-.75 X 80)
- 3) #4 OD: +.25 -2.00 X 90
OS: -.50 -2.00 X 90

Subjective:

- 1) VA OD: 20/30⁻² OD: 20/40
OS: 20/40 OS: 20/40
OU: 20/30⁻² OU: 20/40
FAR NEAR
- 2) 7A OD: +1.50 SPH
OS: +1.75 SPH

Subjective:

- 1) VA OD: 20/30 OD: 20/30
OS: 20/30⁻² OS: 20/40
OU: 20/30 OU: 20/30
FAR NEAR
- 2) NS OD: +1.25⁺⁵⁰ -2.00⁺⁵⁰ X 120^{+20°}
OS: +1.50⁺⁵⁰ -2.25⁺²⁵ X 90^{+5°}

Comments:

Alternating esotrope

Key to abbreviations:

- 1) AR: Canon Auto-Refraction
2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
3) #4: Static retinoscopy at 6 meters
4) VA: Visual acuity
5) 7A: Conventional subjective to best visual acuity at distance
6) NS: Modified subjective done at 40 centimeters

Subject's Name: B. T.

Age: 33 Sex: M

PRE-EXAM 7/29/82

POST-EXAM 8/18/82

Objective:

- 1) AR OD: +.25 -3.62 X 30
OS: +.37 -4.50 X 164
(-5.37 X 9)
- 2) Ks OD: 41.00 @ 8 45.75 @ 98
OS: 41.62 @ 172 46.00 @ 82
(-5.00 X 72)
- 3) #4 OD: P1 -4.00 X 20
OS: +.75 -5.00 X 175

Objective:

- 1) AR OD: -.25 -3.87 X 32
OS: +.25 -4.00 X 165
(-8.00 X 25)
- 2) Ks OD: 46.50 X 110 39.75 X 25
OS: 42.37 @ 178 45.12 @ 88
(-3.00 X 178)
- 2) #4 OD: +.25 -3.25 X 20
OS: +.75 -4.50 X 170

Subjective:

- 1) VA OD: 20/40 OD: 20/40
OS: 20/40 OS: 20/40
OU: 20/40 OU: 20/40
FAR NEAR
- 2) 7A OD: ???
OS: ???

Subjective:

- 1) VA OD: 20/30⁻ OD: 20/40
OS: 20/30⁻ OS: 20/30
OU: 20/30 OU: 20/30
FAR NEAR
- 2) NS OD: +.75^{+.50} -3.25^{+.37} X 30^{+10°}
OS: +1.25^{+.25} -3.50^{+.50} X 182^{+10°}

Comments:

B.T. gave no subjective response in the pre-exam; he talked about everything except which was the better lens.

Key to abbreviations:

- 1) AR: Canon Auto-Refracton
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Group 2 - "Moderate Success"

Subject's Name: S. M.

Age: 37 Sex: F

PRE-EXAM 7/27/82

POST-EXAM 8/9/82

Objective:

- 1) AR OD: +3.75 -1.37 X 175
OS: +3.87 -1.37 X 38
(-.50 X 170)
- 2) Ks OD: 43.75 @ 170 44.50 @ 80
OS: 44.75 @ 150 44.62 @ 40
(-.25 X 40)
- 3) #4 OD: +3.00 -.25 X 160
OS: +3.75 -.75 X 45

Objective:

- 1) AR OD: +3.62 -1.62 X 180
OS: +4.25 -1.37 X 35
(-1.37 X 172)
- 2) Ks OD: 43.75 @ 172 45.25 @ 82
OS: 44.00 @ 20 44.87 @ 110
(-.62 X 20)
- 3) #4 OD: +4.00 -1.75 X 170
OS: +4.50 -1.50 X 25

Subjective:

- 1) VA OD: 20/60 OD: 20/40
OS: 20/60 OS: 20/40
OU: 20/60 OU: 20/40
FAR NEAR
- 2) 7A OD: ???
OS: ???

Subjective:

- 1) VA OD: 20/40 OD: 20/30
OS: 20/40 OS: 20/30
OU: 20/40⁺² OU: 20/30
FAR NEAR
- 2) NS OD: +5.50^{+5.0} -1.75^{+7.5} X 5^{+5.0}
OS: +6.00^{+5.0} -1.50^{+7.5} X 25^{+7.5.0}

Comments:

S.M. repeated everything the examiner said during the pre-exam or else she would just respond by saying "I get glasses now."

Key to abbreviations:

- 1) AR: Canon Auto-Refraction
2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
3) #4: Static retinoscopy at 6 meters
4) VA: Visual acuity
5) 7A: Conventional subjective to best visual acuity at distance
6) NS: Modified subjective done at 40 centimeters

Subject's Name: E. H.

Age: 31 Sex: F

PRE-EXAM 7/27/82

POST-EXAM 8/5/82

Objective:

- 1) AR OD: +1.00 -1.62 X 136
OS: +1.00 -.87 X 86
(-1.00 X 150)
- 2) Ks OD: 46.37 @ 150 47.62 @ 60
OS: 47.00 @ 25 48.37 @ 115
(-1.25 X 25)
- 3) #4 OD: +.50 -1.25 X 160
OS: +1.00 -1.00 X 75

Objective:

- 1) AR OD: +.37 -1.00 X 133
OS: +.37 -.75 X 61
(-1.37 X 150)
- 2) Ks OD: 46.50 @ 150 48.00 @ 60
OS: 48.50 @ 20 47.37 @ 110
(-1.12 X 110)
- 3) #4 OD: +1.25 -1.25 X 175
OS: +1.00 -.75 X 90

Subjective:

- 1) VA OD: 20/60⁺² OD: 20/40
OS: 20/60⁺² OS: 20/60⁺¹
OU: 20/60⁺³ OU: 20/40
FAR NEAR
- 2) 7A OD: -.25 -1.00 X 105
OS: .25 -1.00 X 90

Subjective

- 1) VA OD: 20/40 OD: 20/30⁻¹
OS: 20/40⁻¹ OS: 20/40
OU: 20/40 OU: 20/30
FAR NEAR
- 2) NS OD: +2.50⁺²⁵ -2.00⁺²⁵ X 180^{+5°}
OS: +2.25⁺⁵⁰ -.25⁺⁵⁰ X 75^{+7.5°}

Comments:

Habitual: OD: +1.75 -.50 X 94
OS: +1.25 -.50 X 87

Key to abbreviations:

- 1) AR: Canon Auto-Refracton
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Subject's Name: C. F.

Age: 35 Sex: F

PRE-EXAM 8/4/82

POST-EXAM 8/18/82

Objective:

- 1) AR OD: ???
OS: ???
2) Ks OD: ???
OS: ???
3) #4 OD: ???
OS: ???

Objective:

- 1) AR OD: -12.50 -1.00 X 160
OS: ???
2) Ks OD: ???
OS: ???
3) #4 OD: ???
OS: ???

Subjective:

- 1) VA OD: 20/60 OD: 20/40
OS: 20/60 OS: 20/40
OU: 20/60 OU: 20/40
FAR NEAR
2) 7A OD: -3.00 SPH
OS: -3.50 SPH

Subjective:

- 1) VA OD: 20/60 OD: 20/30
OS: 20/40⁻ OS: 20/30
OU: 20/40⁻ OU: 20/30
FAR NEAR
2) NS OD: -6.50 -1.25 X 170
OS: -8.50 -.50 X 165

Comments:

Steady fixation was nearly impossible for C.F. so it was difficult to obtain a great portion of the data.

Habitual OD: -10.50 -1.50 X 180

OS: -9.25 -1.00 X 160

Key to abbreviations:

- 1) AR: Canon Auto-Refracton
2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
3) #4: Static retinoscopy at 6 meters
4) VA: Visual acuity
5) 7A: Conventional subjective to best visual acuity at distance
6) NS: Modified subjective done at 40 centimeters

Subject's Name: L. H. ...

Age: 26 Sex: F

PRE-EXAM 8/4/82

POST-EXAM 8/18/82

Objective:

- 1) AR OD: -2.37 -3.50 X ???
OS: -2.62 -1.37 X 15
(-2.00 X 180)
- 2) Ks OD: 46.25 @ 180 48.25 @ 90
OS: 47.50 @ 10 48.00 X 100
(-.12 X 10)
- 3) #4 OD: -2.50 SPH
OS: -3.50 -1.50 X 135

Objective:

- 1) AR OD: -1.87 -2.12 X 171
OS: -2.50 -1.87 X 10
(-1.37 X 180)
- 2) Ks OD: 47.00 @ 180 48.50 @ 90
OS: 47.00 @ 180 49.00 @ 90
(-2.00 X 180)
- 3) #4 OD: -2.50 -.75 X 50
OS: -3.25 SPH

Subjective:

- 1) VA OD: 20/80 OD: 20/40
OS: 20/80 OS: 20/40
OU: 20/80 OU: 20/40
FAR NEAR
- 2) 7A OD: -2.50 SPH
OS: -3.50 SPH

Subjective:

- 1) VA OD: 20/60⁻ OD: 20/30
OS: 20/60 OS: 20/40⁻
OU: 20/60 OU: 20/30
FAR NEAR
- 2) NS OD: -2.00^{+.50} -1.75^{+.25} X 130^{+30°}
OS: -2.00^{+.50} -1.00^{+.25} X 90^{+7.5°}

Comments:

Key to abbreviations:

- 1) AR: Canon Auto-Refractometer
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Group 3 - "Failure"

Subject's Name: D. K.

Age: 33 Sex: M

PRE-EXAM 7/29/82

POST-EXAM 8/13/82

Objective:

- 1) AR OD: +1.75 -2.00 X 20
OS: -7.12 -2.75 X 156
(-.62 X 16)
- 2) Ks OD: 43.50 @ 16 44.37 @ 116
OS: 39.50 @ 148 42.25 @ 58
(-4.00 X 148)
- 3) #4 OD: ???
OS: ???

Objective:

- 1) AR OD: +1.75 -2.75 X 45
OS: -7.50 -3.50 X 170
(-.50 X 10)
- 2) Ks OD: 42.00 @ 10 42.75 @ 100
OS: 42.75 @ 10 43.25 @ 100
(-.12 X 10)
- 3) #4 OD: +3.00 -2.00 X 60
OS: -6.00 -2.75 X 175

Subjective:

- 1) VA OD: 20/60 OD: 20/40
OS: 20/60 OS: 20/40
OU: 20/60 OU: 20/40
FAR NEAR
- 2) 7A OD: ???
OS: ???

Subjective:

- 1) VA OD: 20.60 OD: 20/30
OS: 20/60 OS: 20/30
OU: 20/60 OU: 20/30
FAR NEAR
- 2) NS OD: +2.50^{+1.00} -1.25^{+2.00} X 120⁺⁶⁰
OS: -1.00^{+3.00} -2.50^{+1.00} X 50⁺⁴⁰

Comments:

D.K. could not maintain fixation or would not keep his eyes open during retinoscopy in the pre-exam; absolutely no response to the subjective in the pre-exam; little response in the post-exam.

Habitual OD: +3.50 -2.50 X 55

OS: -2.00 -2.50 X 148

Key to abbreviations:

- 1) AR: Canon Auto-Refracton
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Subject's Name: R. A.

Age: 53

Sex: M

PRE-EXAM 7/29/82

POST-EXAM 8/18.82

Objective:

- 1) AR OD: +1.50 -0.87 X 165
OS: +1.37 -1.00 X 180
(-0.50 X 172)
- 2) Ks OD: 43.25 @ 172 44.00 @ 82
OS: 43.25 @ 180 44.12 @ 90
(-0.62 X 180)
- 3) #4 OD: +2.25 -1.00 X 5
OS: +2.00 -0.75 X 5

Objective:

- 1) AR OD: +1.62 -0.37 X 153
OS: +1.62 -1.37 X 171
(-1.00 X 160)
- 2) Ks OD: 43.00 @ 160 44.12 @ 170
OS: 42.87 @ 180 44.12 @ 90
(-1.00 X 180)
- 3) #4 OD: +1.50 -1.50 X 175
OS: +1.75 -1.00 X 170

Subjective:

- 1) VA OD: 20/30 OD: 20/80
OS: 20/30 OS: 20/80
OU: 20/30 OU: 20/80
FAR NEAR
- 2) 7A OD: ???
OS: ???

Subjective:

- 1) VA OD: 20/30 OD: 20/40⁻²
OS: 20/30 OS: 20/40
OU: 20/30 OU: 20/40
FAR NEAR
- 2) NS OD: +2.25 -1.50 X 175
OS: +2.50 -1.00 X 180

Comments:

R.A. responded to the subjective testing in the pre-exam by simply repeating everything the examiner said.

Habitual OD: +1.25 SPH

OS: +1.25 SPH

Key to abbreviations:

- 1) AR: Canon Auto-Refraction
2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
3) #4: Static retinoscopy at 6 meters
4) VA: Visual acuity
5) 7A: Conventional subjective to best visual acuity at distance
6) NS: Modified subjective done at 40 centimeters

Subject's Name: M. S.

Age: 27 Sex: M

PRE-EXAM 7/29/82

POST-EXAM 8/18/82

Objective:

- 1) AR OD: -.25 -2.00 X 14
OS: -.12 -1.37 X 180
(-1.87 X 108)
- 2) Ks OD: 44.62 @ 18 43.50 @ 108
OS: 44.00 @ 180 44.25 @ 90
(-2.25 X 180)
- 3) #4 OD: P1 -.50 X 170
OS: +.50 -.50 X 180

Objective:

- 1) AR OD: -.50 -1.75 X 20
OS: -.50 -1.00 X 175
(SPH)
- 2) Ks OD: 43.00 @ 45 43.00 @ 45
OS: 40.25 @ 165 43.00 @ 75
(-3.00 X 165)
- 3) #4 OD: -.75 -1.50 X 180
OS: P1 -1.00 X 170

Subjective:

- 1) VA OD: 20/20 OD: 20/20
OS: 20/20 OS: 20/20
OU: 20/20 OU: 20/20
FAR NEAR
- 2) 7A OD: ???
OS: ???

Subjective:

- 1) VA OD: 20/20 OD: 20/20
OS: 20/20 OS: 20/20
OU: 20/20 OU: 20/20
FAR MEAR
- 2) NS OD: ???
OS: ???

Comments:

M.S. always chose the first lens as the one he preferred when conducting the subjective in the pre-exam. There was no consistency of subjective responses presented in the post-exam either.

Key to abbreviations:

- 1) AR: Canon Auto-Refraction
2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
3) #4: Static retinoscopy at 6 meters
4) VA: Visual acuity
5) 7A: Conventional subjective to best visual acuity at distance
6) NS: Modified subjective done at 40 centimeters

Subject's Name: R.R.

Age: 25

Sex: F

PRE-EXAM 7/27/82

POST-EXAM 8/9/82

Objective:

- 1) AR OD: $-.50 \ - .37 \ X \ 27$
OS: $-.25 \ -.62 \ X \ 177$
($-.50 \ X \ 170$)
- 2) Ks OD: $41.50 \ @ \ 170 \ 42.25 \ @ \ 80$
OS: $42.12 \ @ \ 180 \ 42.50 \ @ \ 90$
(SPH)
- 3) #4 OD: $-.25 \ -1.00 \ X \ 175$
OS: $-.25 \ -.50 \ X \ 165$

Objective:

- 1) AR OD: $-.50 \ -.37 \ X \ 30$
OS: $-.25 \ -.50 \ X \ 155$
($-.25 \ X \ 157$)
- 2) Ks OD: $41.37 \ @ \ 157 \ 42.00 \ @ \ 67$
OS: $42.50 \ @ \ 90 \ 42.37 \ @ \ 75$
(SPH)
- 3) #4 OD: $-.75 \ -1.25 \ X \ 5$
OS: $+ .25 \ -.50 \ X \ 175$

Subjective:

- 1) VA OD: 20/60 OD: 20/30
OS: 20/40 OS: 20/30
OU: 20/40 OU: 20/30
FAR NEAR
- 2) 7A OD: ???
OS: ???

Subjective:

- 1) VA OD: 20/30 OD: 20/30
OS: 20/30 OS: 20/30
OU: 20/30 OU: 20/30
FAR NEAR
- 2) NS OD: ???
OS: ???

Comments:

R.R. responded to the subjective to BVA at far in the pre-exam by saying "ya" to every question. In the near subjective she alternated line tracing after each lens change.

Key to abbreviations:

- 1) AR: Canon Auto-Refraction
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Subject's Name: D. B.

Age: 27 Sex: M

PRE-EXAM 7/27/82

POST-EXAM 8/9/82

Objective:

- 1) AR OD: -5.37 -1.25 X 9
OS: -5.12 -1.37 X 160
(-1.37 X 180)
- 2) Ks OD: 46.50 @ 180 48.00 @ 90
OS: 47.00 @ 170 49.00 @ 80
(-2.00 X 170)
- 3) #4 OD: -6.00 -1.50 X 170
OS: -6.25 -1.50 X 170

Objective:

- 1) AR OD: -5.62 -1.50 X 24
OS: -4.25 -2.12 X 154
(-.25 X 170)
- 2) Ks OD: 46.87 @ 170 47.50 @ 80
OS: 46.87 @ 175 47.75 @ 85
(-.62 X 175)
- 3) #4 OD: -6.00 -.75 X 175
OS: -5.75 -1.25 X 170

Subjective:

- 1) VA OD: 20/60⁻³ OD: 20/30⁻²
OS: 20/60⁻³ OS: 20/30⁻²
OU: 20/60⁻² OU: 20/30⁻²
FAR NEAR
- 2) 7A OD: -4.75 -1.25 X 150
OS: -6.25 -1.50 X 70

Subjective:

- 1) VA OD: 20/40 OD: 20/30
OS: 20/40 OS: 20/30
OU: 20/40 OU: 20/30
FAR NEAR
- 2) NS OD: ???
OS: ???

Comments:

Very little consistency in responses was found on the 7A; D.B. alternated responses every time when using the cross cylinder targets.

Habitual OD: -5.50 -1.00 X 4
OS: -5.50 -1.25 X 171

Key to Abbreviations:

- 1) AR: Canon Auto-Refraction
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Subjects released following Pre-exam

Subject's name: P. L. Age: 26 Sex: F

PRE-EXAM: 7/30/82

POST-EXAM

Objective

- 1) AR OD: +.37 -.87 X 5
OS: +.75 -1.12 X 175
(-1.25 X 180)
- 2) Ks OD: 45.12 @ 180 46.50 @ 90
OS: 44.50 @ 175 46.00 @ 85
(-1.37 X 175)
- 3) #4 OD: +.50 -.50 X 180
OS: +1.25 -1.25 X 175

Objective

- 1) AR OD:
OS:
- 2) Ks OD:
OS:
- 3) #4 OD:
OS:

Subjective

- 1) VA OD: 20/25 OD: 20/40
OS: 20/30 OS: 20/60
OU: 20/25 OU: 20/40
FAR NEAR

- 2) 7A OD: +.50 -.50 X 5
OS: +.50 -.75 X 177

Subjective

- 1) VA OD: 20/ OD: 20/
OS: 20/ OS: 20/
OU: 20/ OU: 20/
FAR NEAR

- 2) NS OD:
OS:

Comments:

Good correlation shown so P.L. was dismissed from further study.

Key to abbreviations:

- 1) AR: Cannon Auto-Refraction
2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
3) #4: Static retinoscopy at 6 meters
4) VA: Visual acuity
5) 7A: Conventional subjective to best visual acuity at distance
6) NS: Modified subjective done at 40 centimeters

Subject's name: S. O. Age: 28 Sex: F

PRE-EXAM 7/29/82

Objective

- 1) AR OD: -.12 -.50 X 174
OS: +.50 -.75 X 175
(-.12 X 177)
- 2) Ks OD: 49.37 @ 137 43.87 @ 87
OS: 43.12 @ 178 44.00 @ 88
(-.62 X 178)
- 3) #4 OD: +.25 -.50 X 180
OS: +.25 SPH
-

Subjective

- 1) VA OD: 20/20 OD: 20/20
OS: 20/20 OS: 20/20
OU: 20/20 OU: 20/20
FAR NEAR
- 2) 7A OD: +.25 -.25 X 175
OS: +.25 SPH
-

Comments:

Good correlation was shown so S.O. was dismissed from further study.

Key to abbreviations:

- 1) AR: Canon Auto-Refraction
2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
3) #4: Static retinoscopy at 6 meters
4) VA: Visual acuity
5) 7A: Conventional subjective to best visual acuity at distance
6) NS: Modified subjective done at 40 centimeters

Subject's name: M. B.

Age: 58 Sex: F

PRE-EXAM 7/27/82

Objective

- 1) AR OD: +5.25 -2.75 X 112
 OS: ERROR/Cataract
 (-2.75 X 130)
- 2) Ks OD: 46.00 @ 130 48.25 @ 40
 OS: -----Cataract
- 3) #4 OD: +5.50 SPH
 OS: -----Cataract
-

Subjective:

- 1) VA OD: 20/40 OD: 20/40
 OS: 20/40 OS: 20/40
 OU: 20/40 OU: 20/40
 FAR NEAR
- 2) 7A OD: +4.75 SPH
 OS: -----Cataract
-

Comments:

M.B. was dismissed from further study because of a dense cataract in the left eye.

Habitual OD: +4.00 SPH +2.50 add

OS: +4.00 -1.50 X 180

Key to abbreviations:

- 1) AR: Canon Auto-Refractometer
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Subject's Name: C. I.

Age: 35 Sex: F

PRE-EXAM 7/27/82

Objective:

- 1) AR OD: -2.25 -.62 X 124
OS: -2.12 -.50 X 37
(-.12 X 90)
- 2) Ks OD: 49.00 @ 160 49.25 @ 90
OS: 48.25 @ 180 49.00 @ 90
(-.50 X 180)
- 3) #4 OD: -2.25 -.50 X 165
OS: -2.25 -.50 X 180
-

Subjective:

- 1) VA OD: 20/30 OD: 20/30
OS: 20/25 OS: 20/30
OU: 20/25 OU: 20/20⁻²
FAR NEAR
- 2) 7A OD: -2.50 -.50 X 135
OS: -2.50 -.50 X 45
-

Comments:

Good correlation was shown so C.I. was dismissed from further study.

Habitual OD: -2.50 SPH

OS: -2.50 SPH

Key to abbreviations:

- 1) AR: Canon Auto-Refraction
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Subject's name: C. S.

Age: 25 Sex: F

PRE-EXAM 7/27/82

Objective:

- 1) AR OD: +1.50 -2.00 X 122
OS: +1.50 - 1.12 X 117
(-1.25 X 135)
- 2) Ks OD: 45.00 @ 135 46.00 @ 45
OS: 44.75 @ 10 44.87 @ 100
(-.37 @ 100)
- 3) #4 OD: +1.75 -1.75 X 135
OS: +2.50 -.75 X 85
-

Subjective:

- 1) VA OD: 20/40⁺² OD: 20/40⁺²
OS: 20/30 OS: 20/30⁻¹
OU: 20/30 OU: 20/30
FAR NEAR
- 2) 7A OD: +2.00 -1.50 X 135
OS: +2.00 -.25 X 90
-

Comments:

Good correlation was shown so C.S. was dismissed from further study; intermittant exotropia.

Key to abbreviations:

- 1) AR: Canon Auto-Refractometer
2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
3) #4: Static retinoscopy at 6 meters
4) VA: Visual acuity
5) 7A: Conventional subjective to best visual acuity at distance
6) NS: Modified subjective done at 40 centimeters

Subject's Name: J. M.

Age: 23

Sex: M

PRE-EXAM 7/27/82

Objective:

- 1) AR OD: +.12 -1.12 X 10
OS: +.12 - 1.12 X 177
(-.87 X 170)
- 2) Ks OD: 42.37 @ 170 43.50 @ 80
OS: 42.37 @ 170 43.75 @ 80
(-1.25 X 170)
- 3) #4 OD: +.50 -1.75 X 170
OS: +.75 -.75 X 180

Subjective

- 1) VA OD: 20/20 OD: 20/20
OS: 20/30 OS: 20/20
OU: 20/20 OU: 20/20
FAR NEAR
- 2) 7A OD: P1 -.50 X 165
OS: +.50 -.25 X 95

Comments:

Good correlation was shown so J.M. was dismissed from further study.

Key to abbreviations:

- 1) AR: Canon Auto-Refraction
2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
3) #4: Static retinoscopy at 6 meters
4) VA: Visual acuity
5) 7A Conventional subjective to best visual acuity at distance
6) NS: Modified subjective done at 40 centimeters

Subject's Name: K. F.
PRE-EXAM 8/4/82

Age: 34 Sex: F

Objective:

- 1) AR OD: -5.50 -1.87 X 128
OS: +.50 -1.25 X 50
- 2) Ks OD: ???
OS: ???
- 3) #4 OD: -2.50 SPH
OS: -1.50 SPH

Subjective:

- 1) VA OD: 20/100 OD: 20/80
OS: 20/100 OS: 20/80
OU: 20/100 OU: 20/80
 FAR NEAR
- 2) 7A OD: ???
OS: ???

Comments:

K. F. had microcorneas which prevented accurate keratometry. In addition, subjective evaluation was extremely difficult so she was dismissed from further study.

Key to abbreviations:

- 1) AR: Canon Auto-Refractometer
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Subject's Name: K. L.

Age: 29

Sex: F

PRE-EXAM 8/4/82

Objective:

- 1) AR OD: +3.75 -3.50 X 164
OS: +6.32 -3.75 X 84
(-1.75 X 90)
- 2) Ks OD: 46.00 @ 180 45.00 @ 90
OS: 46.00 @ 180 46.50 @ 90
(-.12 X 180)
- 3) #4 OD: +4.25 -.75 X 60
OS: +3.25 SPH

Subjective:

- 1) VA OD: 20/400 OD: 20/400
OS: 20/400 OS: 20/400
OU: 20/400 OU: 20/400
FAR NEAR
- 2) 7A OD: ???
OS: ???

Comments:

K.L. had marked nystagmus combined with esotropia so she was dismissed from further study; no response on the subjective to BVA.

Key to abbreviations:

- 1) AR: Canon Auto-Refraction
2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
3) #4: Static retinoscopy at 6 meters
4) VA: Visual acuity
5) 7A: Conventional subjective to best visual acuity at distance
6) NS: Modified subjective done at 40 centimeters

Subject's Name: D. S.

Age: 20

Sex M

PRE-EXAM 7/30/82

Objective:

- 1) AR OD: +1.62 -1.12 X 79
OS: +1.62 -1.12 X 107
- 2) Ks OD: 42.12 @ 15 (-2.00 X 105)
40.87 @ 105
OS: 42.00 @ 180 40.50 @ 90
(-2.37 X 90)
- 3) #4 OD: +.50 -1.75 X 80
OS: +.50 -1.25 X 95
-

Subjective:

- 1) VA OD: 20/40⁻² OD: 20/30
OS: 20/40⁻² OS: 20/30
OU: 20/40⁻¹ OU: 20/20⁻²
FAR NEAR
- 2) 7A OD: +1.50 -1.75 X 75
OS: +1.00 -1.25 X 105
-

Comments:

D.S. showed good correlation between objective and subjective findings so he was dismissed from further study.

Habitual OD: +1.50 -1.25 X 86

OS: +1.50 -1.25 X 90

Key to abbreviations:

- 1) AR: Canon Auto-Refractometer
- 2) Ks: Ophthalmometry given in corneal power and with Javal's Rule
- 3) #4: Static retinoscopy at 6 meters
- 4) VA: Visual acuity
- 5) 7A: Conventional subjective to best visual acuity at distance
- 6) NS: Modified subjective done at 40 centimeters

Discussion

Many of the subjective tests employed in a conventional optometric examination are both complicated and confusing for intellectually disadvantaged individuals, especially if handicaps of speech and hearing are also present. This leads to unreliable and often contradictory data between objective and subjective tests, causing the practitioner to place heavy support on objective findings, with little attention to subjective findings.

Fourteen individuals were isolated from a screening/pre-exam who gave confusing or contradictory subjective data. This group was given a home training program for 7-10 days which familiarized the subject with methods and procedures to be used in a modified testing sequence. It was the investigators' hypothesis that this home training program, combined with a modified means of subjective testing, would allow intellectually disadvantaged individuals to make better subjective judgements and more reliable responses, the data of which could be used, together with objective findings, to arrive at a more functionally acceptable correction of refractive error.

The results show that twelve of fourteen (86%) subjects attained greater levels of acuity when the modified form of visual acuity testing was used. Out of the twelve showing improvement, seven (58%) showed improvement at both far and near distances, with increases of up to two lines; five (42%) showed little improvement at far, with moderate

increases at near. The two (1.6%) remaining subjects had acuities which were unchanged from pre- to post-exam. In light of these findings, we may say that our hypothesis is confirmed and the modified form of subjective acuity measurement is a better means of evaluating acuity in intellectually disadvantaged individuals. The home training familiarizes the patient with acuity figures to be used in testing, reduces apprehension by presenting no new tasks in the testing sequence, and reduces acuity measurement to a simple matching task.

Results of subjective refraction in the post-exam appear to be split into three categories: one-third showed marked improvement in subjective responses; one-third gave moderate improvement; and one-third showed little or no change. The first category, which shall be termed successful, had five (36%) subjects whose subjective findings showed good correlation to objective findings. They were well within the criteria of differing less than ± 1.00 D sphere power, ± 1.00 cylinder power, or $\pm 20^\circ$ cylinder axis. Two had subjective findings almost identical to the objective information and were noted by the examiners as responding like completely different people in the post-exam.

The second category, termed moderately successful, was comprised of four (35%) individuals whose subjective findings fell within the criteria established as being in good correlation with the objective findings but were not as significant as in the first group. Some showed better correlation with cylinder axis while others showed better corre-

lation with sphere power; cylinder power seemed to maintain the largest JND (just noticeable difference) in subjective responses.

The third group, termed failure, showed little or no change in subjective response from pre- to post-exam. Three of the five in this group persisted in alternating their tracing response no matter what lens change was made. If they first pointed to the 180° lines as being darker and .50 D was added, making the 180° lines even darker, they would reverse responses and now point to the 90° lines as being darker, etc. etc. Their initial response when the cross cylinder target was first presented was correct but then they began alternating as testing proceeded.

These results indicate that our hypothesis is, at least in part, confirmed. We certainly could not state that this form of modified subjective refraction will be a success with every mentally handicapped patient. We could say, however, that it may provide a very good option to vision care practitioners who are having difficulty in obtaining reliable subjective data on such patients and may act as a prototype from which a better means of subjective refraction could be developed. Communication barriers were reduced, familiarization with methods and materials lowered patient apprehension, and a simplification of most procedures was made. We hope that all of these will be improved upon in the future by other clinicians and researchers.

BIBLIOGRAPHY

1. Amos, C.S.; "Refractive error distribution in a profoundly retarded population", American Journal Optometry and Physiological Optics, 54 (4): 235-238, 1977.
2. Blackhurst, R.T., Radke, E.; "Testing retarded children for defects in vision", Digest of the Mentally Retarded, 4 (1): 63-64, 1967.
3. Borish, Irvin M.; Clinical Refraction; The Professional Press, Inc.; 1975: 639, 778.
4. Courtney, G.R.; "Refractive Errors in Institutionalized Mentally Retarded and Emotionally Disturbed Children", American Journal Optometry and Archives American Academy Optometry, 48 (6): 492-496, 1971.
5. Grosvenor, T.; "Refractive State, Intelligence Scores, and Academic Ability", American Journal Optometry and Archives American Academy Optometry, 47 (5): 355-361, 1970.
6. Kern, K.C.; "Adapting Optometric Testing and Training to Children with Low Education Potential", The Oregon Optometrist, 36: 4-7, 23-30, 1969.
7. Lawson, J.L.; Schoofs, G.; "A Technique for Visual Appraisal of Mentally Retarded Children", American Journal Ophthalmology, 72 (3): 622-624, 1971.
8. Manley, Joseph N.; Schuldt, John; "The Refractive State of the Eye and Mental Retardation", American Journal Optometry and Archives American Academy Optometry, 47 (3): 236-241, 1970.
9. Personal notes taken from lecture at Pacific University College of Optometry, entitled Optometry IV by Harold Haynes.
10. Riegler, H.L.; Prince, S.M.; "A Subjective Refraction Procedure for Intellectually Disadvantaged Patients", Senior Thesis at Pacific University College of Optometry, pp 1-10, 1979.
11. Young, F.A.; "Reading Measures of Intelligence and Refractive Errors", American Journal Optometry and Archives American Academy Optometry, 40 (5): 257-264, 1963.

APPENDIX

INSTRUCTIONS

The enclosed materials are designed to familiarize the patient with our testing procedures and to help him/her respond correctly to the tests when he/she comes into the clinic. It is important that a few simple procedures be followed consistently; please use the following methods in the order given.

- 1) Teach the individual to identify the figures on the separate cards by having him point to the matching figure on the composite sheet that has all the figures on it. It is not important that the individual be able to name the figures but to match them up only. When all figures can be matched correctly move on to step 2.
- 2) Teach the individual to identify the darkest or blackest arm of the grid cards (x,+) by tracing that arm with his finger on the card. Two of the grids have arms that are equally dark and the remaining have one arm that is darker than the other.

Start training with the cards that have the most obvious difference between the two arms and rotate the cards (out of view) so that the darkest arm is in a different position each time the card is shown. Continue training by increasing the difficulty with which the individual must discriminate between blackness or darkness of the grid arms. Next show the cards with equally black arms, pointing out that the arms are the same and when these are shown you want both arms of the grid traced on the card. Finally, mix up the cards in random order making sure the individual is responding correctly as outlined above.

Make the training a "game" working 15-30 minutes at a time allowing for test periods. Try to use good lighting as this makes distinction of the darker arm easier.

- 3) Please contact the investigators (Paul Dunderland and James Santoro) if you have any questions on these exercises; thank you. Phone: 359-4817 or 640-1732.

FIGURES

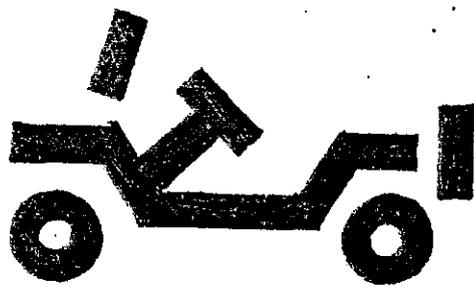


Figure 1

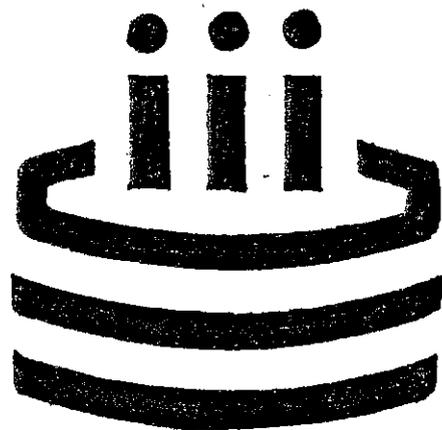


Figure 2



Figure 3



Figure 4

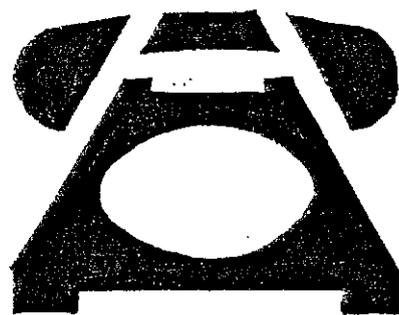


Figure 5

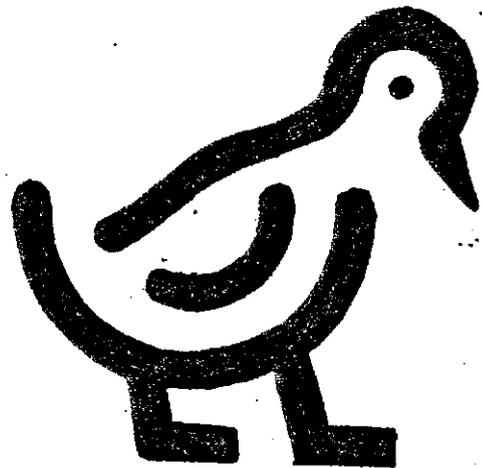


Figure 6

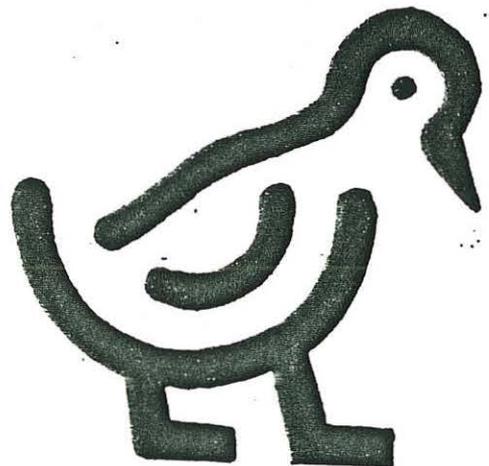
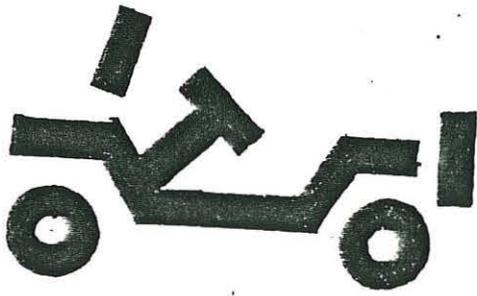


Figure 7



Figure 8

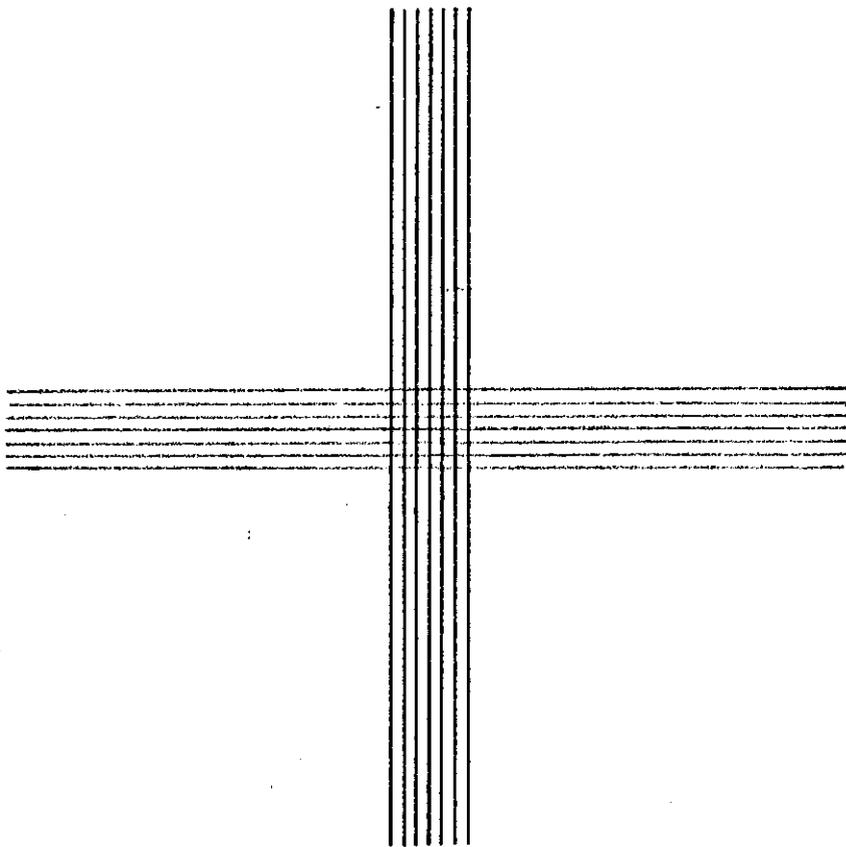


Figure 9

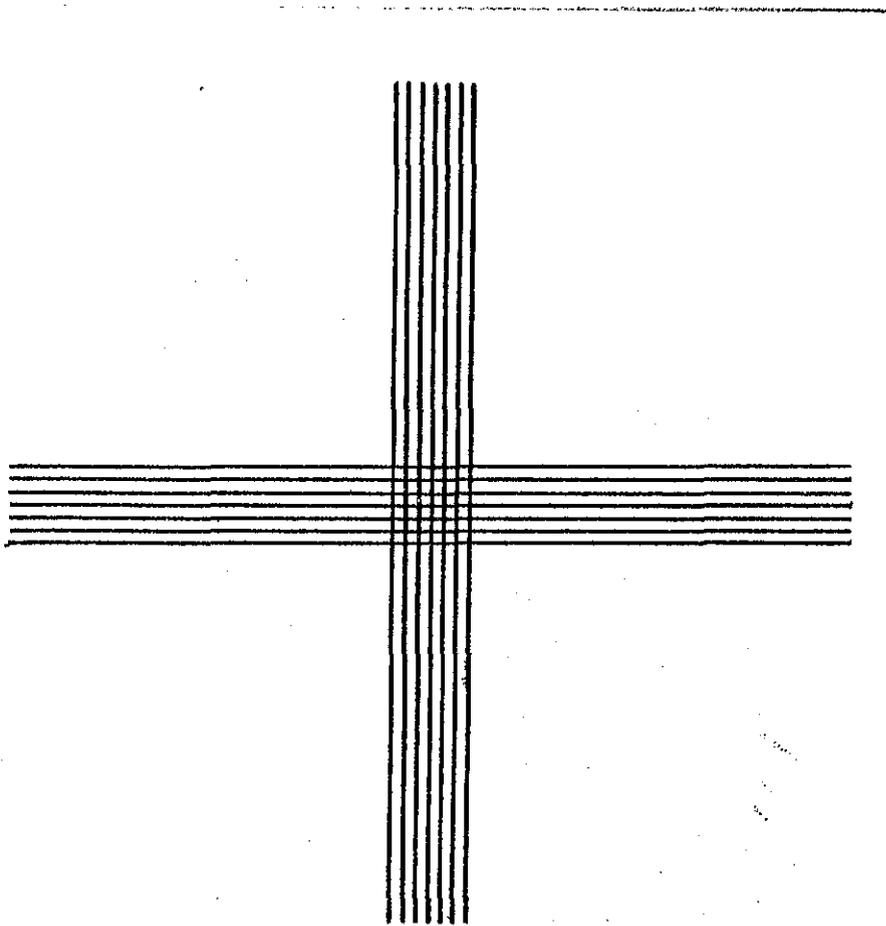


Figure 10

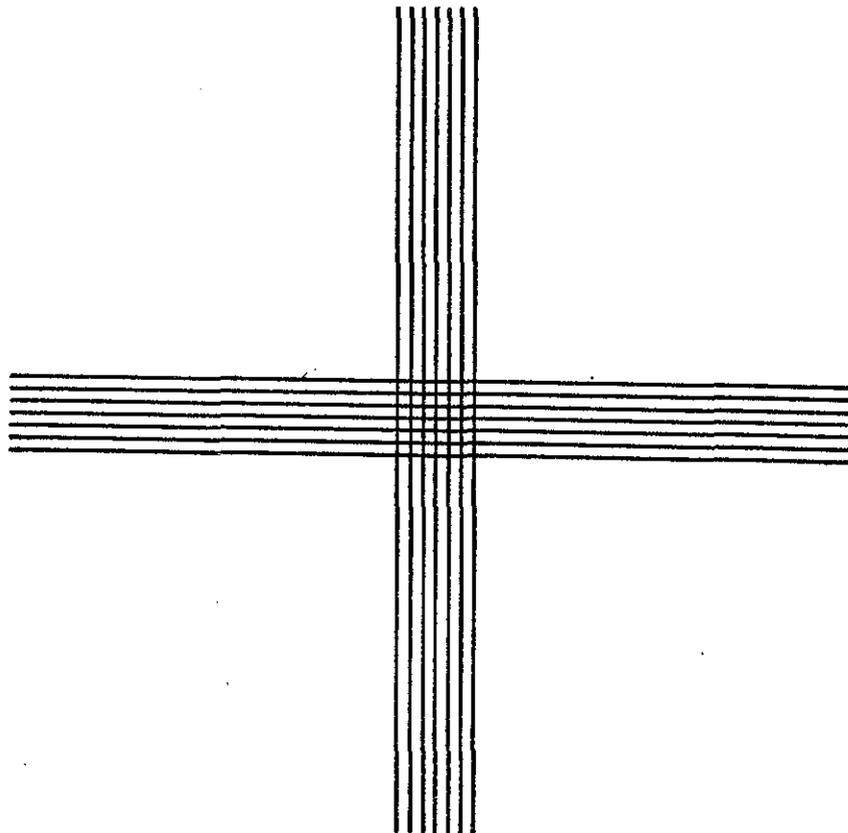


Figure 11

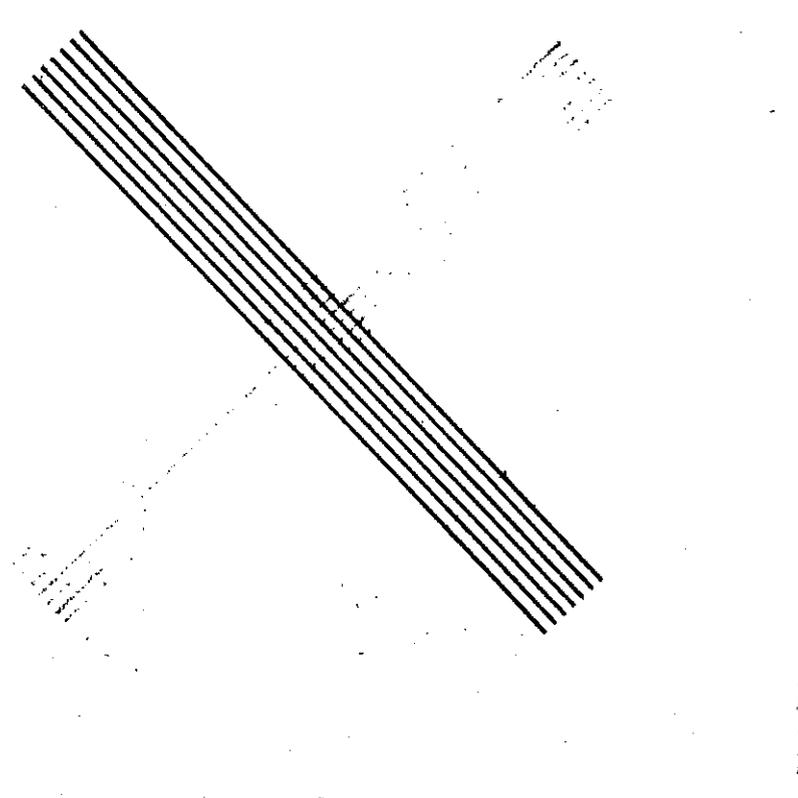


Figure 12

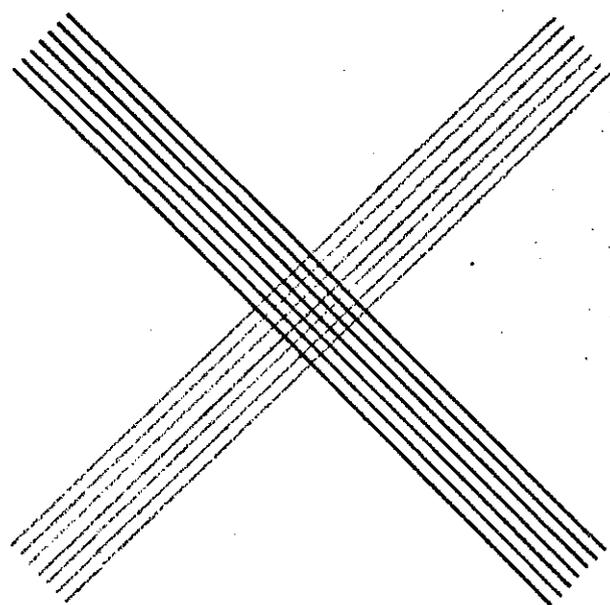


Figure 13

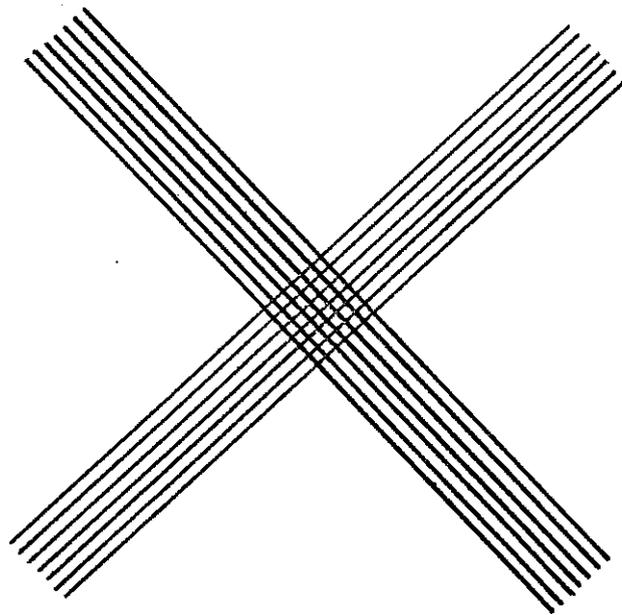


Figure 14

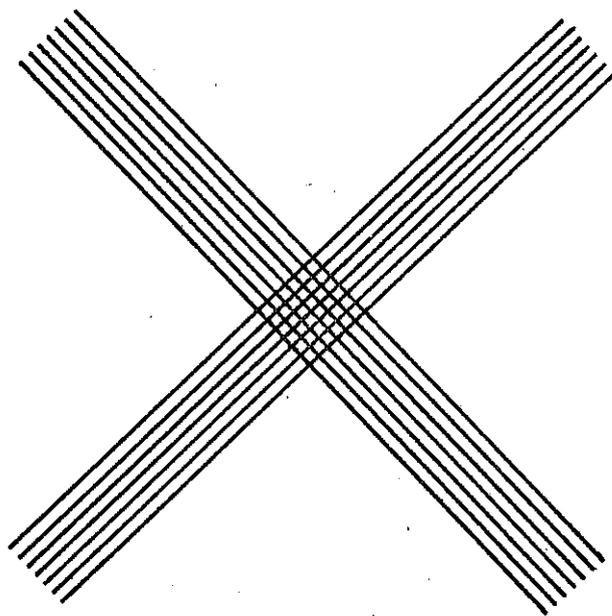


Figure 15