A feasibility study of a binocular modification of the standard OEP 21 point exam

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Abstract
In order to evaluate the feasibility of a binocular modification of the standard OEP 21 point examination sequence, nineteen fourth year clinicians from Pacific University College of Optometry were exposed to the proposed exam routine. The binocularity is obtained by using a +1.00 "occluder" lens rather than an opaque occluder on any of the tests which are normally done monocularly. The clinicians were asked to respond to a questionnaire when they felt they could adequately evaluate the binocular exam routine. The responses were extremely favorable. The subjects indicated that the routine would be useful for examining many different types of patients. Some of the subjects indicated that this routine could replace the Polaroid binocular system now used. The routine requires no special equipment and is readily adapted to current exam sequenses. This monocular fogging technique shows promise as a possible binocular refraction routine.

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A FEASIBILITY STUDY OF A
BINOCULAR MODIFICATION OF THE
STANDARD OEP 21 POINT EXAM

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Lynn J. Coon, O.D., Advisor

Spring 1981
Pacific University
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Midterm Grade
Final Grade B [Lynn J. Coon, O.D.]

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We would like to thank Dr. Coon for the help, guidance, and consideration he gave to us during the course of this project.
ABSTRACT

In order to evaluate the feasibility of a binocular modification of the standard OEP 21 point examination sequence, nineteen fourth year clinicians from Pacific University College of Optometry were exposed to the proposed exam routine. The binocularity is obtained by using a +1.00 "occluder" lens rather than an opaque occluder on any of the tests which are normally done monocularly. The clinicians were asked to respond to a questionnaire when they felt they could adequately evaluate the binocular exam routine. The responses were extremely favorable. The subjects indicated that the routine would be useful for examining many different types of patients. Some of the subjects indicated that this routine could replace the Polaroid binocular system now used. The routine requires no special equipment and is readily adapted to current exam sequences. This monocular fogging technique shows promise as a possible binocular refraction routine.
INTRODUCTION

Historically, eye-care practitioners have examined eyes monocularly, first occluding one eye, and then the other. However, this monocular condition does not exist when the eyes are in normal, everyday use. Ideally, the refractive status of each eye should be determined under normal seeing conditions, that is, with both eyes functioning together. A technique that engages the simultaneous use of both eyes would seemingly yield a more functional and therefore practical correction than the traditional monocular refraction.

There are many advantages when utilizing a binocular refraction procedure, Eskridge (1971), Cogen (1975), and Smith (1979) outlined the most significant:

1. More accurate measurement of the farpoint spherical element. It has been shown (Norman, 1953) that measurement of the spherical element of the refractive error differs when measured under monocular and binocular viewing conditions, and that it is most accurate when measured binocularly.

2. Under binocular viewing conditions, farpoint accommodative activity is minimized or replaced and therefore more stable (Grolman, 1966 and Smith, 1979).

3. More accurate determination of spherical balance. Since the stimulus to accommodation can be more accurately equalized under binocular conditions (Fry, 1941), a better balance can be achieved.

4. More accurate measurement of the cylindrical element. At Grolman (1966), and Miles (1948) reported a change in axes
averaging about eight degrees when comparing monocular and binocular viewing conditions. This change is due to a cyclophoria which may be present monocularly, but not binocularly.

5. More accurate measurement of both spherical and cylindrical elements at near (40 cm.). It is well known that the eyes undergo excyclovergence during accommodation. This causes the axis as well as the power of the cylindrical correction to change. In addition, Smith (1979) noted that under typical monocular testing procedures the tendency will be to assume a habitual phoric posture when one eye is occluded. This change in vergence could have a highly significant influence upon the accommodative posture and consequently the refractive status, especially if a moderate to high lateral phoria exists in conjunction with a significant interaction between convergence and accommodation. Also, any anatomical or physiological accommodative imbalances are more easily detected under binocular conditions (Smith, 1979).

6. The pupil sizes remain more constant under binocular conditions. There is a typical pupil enlargement when one eye is occluded under monocular conditions. Humphriss (1971) and Grolman (1966) noted that this "erroneously" induced pupil size increase could lead to significant errors in refraction, "especially if the refractive elements of the eye are progressively asymmetrical toward the periphery."
7. Blur detection is often enhanced since the accommodative and convergence systems are more closely controlled (Smith 1979).

8. When each eye is occluded during a monocular refraction routine it is essentially required to suppress. If this eye is strongly dominant, it is often difficult for the patient to maintain attention on the chart (Humphriss, 1963).

9. Studies have shown that patient comfort and ease when having a visual examination, as well as patient confidence in the examination procedures themselves, are "enhanced" when given under binocular conditions (Humphriss and Woodruff, 1962).

10. Since both eyes are aware of the target, the patient is often unaware that only one eye is being tested at a time. This factor may be used effectively to foil the malingerer (Cohen, 1975).

11. For most binocular examination routines, there is no loss of time or efficiency. Often such routines are more efficient or take less time. Depending on the examiner's discretion as to how thorough an examination is needed, the various fogging techniques take approximately the same amount of time as the usual monocular routine.

In recent years the concept of refracting under binocular conditions has gained the attention of many researchers and clinicians alike. Yet, the vast majority of optometrists still continue to practice a monocular refraction system in spite of research
data that shows significant inaccuracies can be introduced under these conditions.

Reasons for this lack of acceptance probably vary with each individual vision care practitioner. Eskridge (1971) summarized a few of the possible reasons:

1. A need for new equipment (often relatively expensive);
2. Present success with traditional monocular methods;
3. A lack of understanding or proper channels of continuing education about binocular techniques;
4. Or, binocular methods that in themselves don't completely fulfill the needs of the particular refractionist.

All of the above reasons, however superficial they may appear, must be dealt with when proposing any new or modified binocular refraction technique.

Grolman (1966) also proposed three criteria for a desirable binocular refraction technique:

1. It should enable the practitioner to observe and determine the performance of each eye as it actually contributes to the binocular act.
2. The efficiency, motor and sensory, with which the two eyes function together should be evaluated.
3. The test's demands on the patient and its environment should minimally influence or derange the patient's normal binocular posture.

Many binocular refraction methods have been recently proposed or developed. Most of these fall into four categories:

1) Haploscopic or Stigmatoscopic techniques
2) Septum techniques
3) Polarizing techniques
4) Blur techniques

Each technique has advantages but all so far have failed to deal with one or more of the above reasons for lack of generalized acceptance.

The idea of a low plus lens to substitute for an opaque occluder is not a new technique. Smith (1930) proposed the use of a +1.50D lens for his technique of "Cyclodamia." This involved reducing the plus sphere bilaterally to best visual acuity. Copeland (1942) suggested using a +2.00D sphere over the retinoscopic finding instead of an occluder for the determination of the astigmatic correction needed.

In the late 1950's Deryck Humphriss invented and patented the "Humphriss Immediate Contrast" technique. This method utilizes the theory that normal people do not need to be refracted with a septum (as in the Turville Infinity Balance method) because they have an "adjustable and highly selective septum built into their higher visual centers (Humphriss, 1962)." Bishop (1975) suggested that central and peripheral fusion processes use somewhat different mechanisms and can function independently. Central or foveal processes require highly similar retinal images, but peripheral mechanisms can operate on visual images quite dissimilar in form, luminance, and contrast. Humphriss (1971) stated that fusion to maintain binocular vision is much stronger if the stimulus to the two eyes is peripheral. In fact, "very little fusional reserve can be measured from small targets which only stimulate the macular area."
This "psychological" septum is set up by replacing the normal opaque occluder with a +.75D sphere to suspend the foveal performance of one eye (Humphriss, 1963). This is made possible when the image that is slightly blurred is physiologically superimposed with the clear image. Now the background is fused but the more blurred foveal image is suppressed and the clearest one is "seen." Therefore, the need for a septum, occluder, or polarizers is eliminated.

Humphriss (1962) chose a +.75D fogging lens because he found that powers greater than +1.00D had too great of an effect on the fusional reserve. He also found that +.50D elicited a report of some loss of "binocular brightness" indicating the start of foveal suppression, but that +.75D was more effective over a large number of cases.

The limitations of the HIC technique are rather obvious. Humphriss intended that this technique be used only as:

1. An endpoint refinement of a monocular examination or of retinoscopy,
2. A trial frame type examination,
3. A farpoint technique.

Therefore in the late 1970's C. M. Smith at the Pacific University College of Optometry modified the HIC technique and called it the "Monocular under Binocular conditions" (MB) technique. This method (Smith 1979) takes advantage of standard refracting equipment and requires "mechanical skills and manipulations similar to existing monocular routines." A summary of the modifications is listed below:

1. Smith advocates the use of a +1.00D sphere because he found that this power was a "much more effective foveal suspension lens," and yet did not induce suppression.
2. The MB routine is a "complete binocular refraction" utilizing both near and far tests.

3. He uses a totally different testing sequence, doing most of the nearpoint tests first.

4. The MB refraction system utilizes "recovery" instead of "immediate contrast" type testing.

5. The MB refraction is used with a phoropter instead of a trial frame.

6. The MB routine utilizes standard testing equipment. It does not require the purchase of any other devices such as a "clover lens" or a hand-held cross cylinders.

One of the disadvantages of the MB refraction system is that the clinician must learn a "totally different testing sequence." As noted above, most near-point tests are done before the farpoint tests. Therefore, utilizing the principles developed by Humphriss and Smith, a subsequent modification is proposed.

It is possible to modify the widely used "OEP 21 points" refraction routine into a binocular routine by utilizing a +1.00 "occluder lens" in the appropriate tests. A manual describing this "Binocular 21 points" routine has been developed. By distributing this manual and demonstrating the routine to fourth year clinicians at PUCCO it will be determined if this is a feasible and/or useful binocular examination sequence. After their initial exposure to the routine the clinicians were asked to utilize the Binocular 21 points routine in some of their examinations, then respond to a questionnaire when they felt they could fairly evaluate the Binocular 21 points routine.
METHODS

Subjects:
The subjects were selected from the fourth year Optometry clinicians at PUCO. It was necessary that the subjects be enrolled in a clinical setting so that it would be possible for them to utilize the Binocular 21 points (B-21) routine. Thirty-four subjects participated in the study, however, only nineteen questionnaires were returned.

Procedure and Materials:
The B-21 exam routine was explained to the subjects individually and in small groups. When possible they experienced parts of the routine from behind the refractor. The manual they received described the necessary modifications of the OEP 21 points routine. The subjects were then asked to use the B-21 exam on patients in the clinic. This is possible because the B-21 exam procedure is very easily adapted to the standard OEP 21 points exam which is routinely used by interns at PUCO clinics. The subjects then answered a questionnaire to aid in the evaluation of the B-21 exam routine.

The questionnaire consisted of seven questions requiring a yes or no response, and four short answer questions. Evaluation of the B-21 exam routine was based on the subjects' responses to these questions.

No special equipment is utilized in the B-21 routine, only the same equipment required to perform the standard monocular exam.
Results:

The responses to the questionnaire are outlined below.

1. Do you feel that this procedure will give more stable findings on certain patients than a non-modified OEP "21 Points" routine?
   YES: 19 (100%)         NO: zero

2. Do you feel you will get more repeatable findings on certain patients with this method?
   YES: 17 (89%)         NO: 2 (11%)

3. Does this method allow for a more comfortable exam for the patient?
   YES: 13 (68%)         NO: 6 (32%)

4. Did you find the endpoints were easy to identify as a patient?
   YES: 16 (94%)         NO: 1 (6%)
   As the refractionist?
   YES: 19 (100%)         NO: zero

5. Was balance or equalization more easily obtained?
   YES: 13 (72%)         NO: 5 (28%)

6. Are the conditions experienced with this method more "natural" than with other examination methods?
   YES: 17 (94%)         NO: 1 (6%)
7. What type of patient would benefit with this examination method?

- High phoria-7*
- Children-4
- Hyperopes-3
- All patients-2
- Anisometropes-2
- Cyclo phoria-2
- Poor Red-Green test responder-1
- Habitually uncorrected-1
- Latent hyperopes-1
- Binocular patients-1
- High astigmat-1
- Binocular dysfunction-1

8. What advantages are obtained by using this examination method?

- More natural or real-7
- Binocular testing conditions-6
- Better balance-3
- Stability-2
- Better for patients with small JND-2
- Cheap binocular refraction routine-1
- Better endpoints-1
- Less accommodative fluctuations-2
- Easily adapted to current exam-1
- Better acuity than polaroid method-1
- Binocular conditions at near and far-1
- Cylinder power and axis determined under binocular conditions-1
- Faster procedure-1

*indicates frequency of this response
9. Do you have any suggestions that would improve this examination routine?

No-6

Incorporate +1.00 lens in the refractor-2
Increase amount of fog for cylinder testing-1

10. Do you feel that this method will give Optometrists an adequate binocular refraction method?

Yes-18

Would like polaroid system for some patients-2
Is confusing to some patients-2
DISCUSSION

The questionnaires reveal a very favorable evaluation of the Binocular 21 point (B-21) examination routine. All of the subjects indicated that they felt the routine would be an adequate binocular refraction technique. Although there were a few who felt that a Polaroid binocular system may be needed for some patients, because they felt that they would have better means of detecting suppression. It may be true that the degree of binocularity of the Polaroid system is more equal, it is also true that the proposed B-21 exam routine allows much more fusion and binocularity than the traditional OEP 21 point exam, without the problems inherent in the Polaroid system (reduced VA, maintaining proper alignment of the analyzers, equipment cost). Four subjects preferred the B-21 routine because of problems associated with the Polaroid system.

Two subjects noted that some patients were confused by the B-21 routine. With proper instruction, the patient will realize that both eyes are open although he is seeing clearly with only one eye. Extra care must be taken to insure the patient is properly fogged throughout the exam as it will be difficult for the patient to determine if the conditions are incorrect.

There was a large variety of patient types that the subjects felt would be helped by the B-21 routine. It is important to note that all of the subjects noted at least one type of patient that would benefit, and two subjects noted that all subjects would benefit. Seven subjects indicated that the B-21 exam was more natural than standard examinations. If it is indeed more natural, then it
would benefit all patients and not just those with certain problems.

If the B-21 exam were in use widely the question would certainly arise as to its effect on the use of the OEP analysis of the findings. This study is not designed to address this question. It will first have to be determined if the findings obtained with the B-21 routine are significantly different from those obtained in a standard OEP exam. If they are different, the analysis would have to be adjusted to give a meaningful analysis.

If the analysis is disrupted, the individual findings alone would give the subjects enough reason to use the B-21 exam. The findings were more stable, more repeatable, had better endpoints, better balanced and were obtained under more natural and comfortable conditions than standard monocular findings.

It is clear that a binocular examination routine is desired by the young interns involved in this study. The degree to which this routine would be accepted into the established Optometrist's testing battery is unknown.
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APPENDIX A
A PROCEDURES MANUAL
FOR A
MODIFIED HUMPHRISS IMMEDIATE CONTRAST
BINOCULAR REFRACTION SYSTEM

Revisions of
"Procedures Lab Manual"
Lynn J. Coon, O.D.

Written by
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Pacific University
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Forest Grove, Oregon
Jan. 9, 1980
RED-GREEN (BICHROME) TEST:

Illumination: dim;
Target: R/G split Snellen, 20/60 to 20/25 letters;
Control Lens: #1 net with +1.00D;
Record: equality;

This test immediately follows dynamic retinoscopy unless the #1 cylinder was suspect and rechecked with an optional test. One purpose of this test is to provide a control lens for the Jackson Cross-Cylinder (JCC) test.

The target is the "split" Snellen chart with the projector's red-green filter in place. One-half of the chart presents black letters on a red background, the other half-chart black letters on a green background.

Illumination is no room lighting, except for the projector.

The control lenses are the net sphere and cylinder endpoints of static retinoscopy with +1.00D.

Procedures and Instructions:

1. Patient is asked to compare "clearness (or distinctness) and blackness" of letters on both sides of the chart. Add enough plus sphere until the letters on the red side are darker or blacker. Do not occlude either eye.

2. Reduce plus OD only until the letters on the green side are clearer or blacker. Continue to the first definite green response. If the transition from red to green does not occur within .50D, bracket the finding.

3. Add +1.00D OD and repeat procedure #2 OS.

4. Record the "equality" response, OD and OS. Leave the first green response in the phoropter.

Notes:

It is often helpful if the patient's attention is directed towards the smallest letters on the chart. Initially, if no apparent difference in blackness exists, try adding -.50D to -1.00D sphere to establish a definite green response, then bracket to find equality.

Some patients will not respond to the bichrome test. Improper
2- red/green test

illumination, a control lens of too much plus (or minus) or poor instructions can all influence the patient's response. Also, some people are just not sensitive to the test.

The endpoint of the test should approximate the #4 net and the #7a sphere. In most cases, it will be exactly the same.
**JACKSON CROSSED-CYLINDER TEST (JCC):**

Illumination: 10-15 fc.;
Target: 20/40 (or smaller) Snellen letters;
Control lens: endpoint of bichrom test;
Record: cylinder power and axis- OD, OS;

The Jackson crossed-cylinder test is a subjective cylinder power and axis refinement test. There are two phases in the procedure:
1. axis determination;
2. cylinder power determination;

The illumination is standard room lighting.

The target is a horizontal row of 20/40 (or smaller) letters presented at 20 feet.

The first "definite green" lens from the red-green test must be in place. The cylinder of the retinoscopy, JCC search test, or Javal's rule is the starting point.

Procedures and Instructions:

1. Add +1.00D to the left eye's side of the phoropter. Do not occlude either eye.

2. Tell the patient- "I'm going to add a lens which will blur those letters. As I change the lenses, I want you to report which is clearer or less blurred. If the two choices look the same, say equal."

3. Move the crossed-cylinder lens into place with the handle in the axis meridian. Flip the crossed-cylinder around this meridian and ask the patient to choose the more clear position.

4. Move the crossed-cylinder handle and the axis of the phoropter cylinder through equal angles of rotation toward the preferred position of the JCC minus cylinder (red dots).

5. In order to equalize the viewing time of the two positions use hand occlusion after each presentation.

6. Use the method of limits to refine the axis position. Bracket the position of equal clarity (or blurredness, distortion, etc.).

7. Rotate the crossed-cylinder until it's principal meridians coincide with the principal meridians of the phoropter cylinder.
2- Jackson crossed-cylinder test

8. Again ask the patient to choose the lens position that makes the letters "more clear."

9. If the patient chooses the position where the minus cylinder axis of the crossed cylinder (red dots) coincides with the minus cylinder axis of the phoropter, .25D of minus cylinder power is added. If the patient prefers the position where the plus cylinder axis (white dots) coincides with the minus cylinder axis of the phoropter, .25D of minus cylinder power is reduced.

10. The endpoint of the test is the cylinder power that elicits an "equal" response. If no equal response is given, the test is stopped at the lens power that yields "red."

11. Always maintain a "spherical equivalent" during this test. That is, for each .50D cylinder power change, adjust the sphere by .25D so the spherical equivalent lens power is kept constant.

12. Add +1.00D sphere OD and add -1.00D sphere OS. Repeat steps 3-11 for the left eye.

13. Record the monocular sphere to best vision and the cylinder power and axis- OD, OS.

Notes:

Failures in administering the JCC test arise from either an improper control lens or not maintaining spherical equivalent. The patient must not be overplussed ("fogged") or overminused by the control lens. If the bichrome test failed, use the subjective monocular to BVA as the control.

Room illumination and/or acuity demand of the target may be varied to refine the patient's response. For example, 20/25 letters and dimmer room illumination may aid the patient in the selection of the clearer image. Also, some patients may respond better if they observe the letter 0 as you differentially distort the image with the crossed-cylinder lens.
PARABOLINE OR T-CHART TEST:

Illumination: 10-15 fc.;
Target: AO Paraboline or B+L T Chart;
Control Lens: Monocular SBV (with no cylinder) or endpoint of JCC;
Record: cylinder power and axis- OD, OS;

Two very sensitive verifications of a JCC refined cylinder are the AO Paraboline or B+L T chart tests. Either test may also be used in place of the JCC test for patients that don't respond well to the JCC.

Procedures and Instructions: (AO Paraboline)

1. Add +1.00D to the left eye's side of the phoropter. Do not occlude either eye.

2. Add +.50D (fog) over the sphere of the JCC (or MSBV) in front of the right eye, and reveal the projected astigmatic chart.

3. Ask the patient which line or group of lines of the chart stand out sharper and blacker than the others.

If the patient reports that the lines all look equally black, there is no significant amount of residual astigmatism as determined by this test. This confirms a valid response to the JCC test.

If the patient reports that one line or group of lines appears sharper and blacker than the rest, remove the JCC determined cylinder from the phoropter.

4. Have the patient notice the location of the darkest line or lines and using the knob at the top of the slide rotate the pointer.
2- Paraboline or T-chart test

until it points to the line (or the center of a group of lines).

5. Once the pointer is positioned correctly, move the slide in the "Project-0-Chart" until the Paraboline dial is projected on the screen. The Paraboline Dial is automatically positioned for the axis refinement test as it is geared to the astigmatic chart pointer.

6. Obtain the exact axis position by rotating the Paraboline Dial until the patient reports that both limbs near the top of the arrow-like figure appear equally distinct or black. Bracket this position by rotating to equality from the other side.

7. The dashed line (which may appear continuous) bisecting the arrowhead will appear more distinct than the one perpendicular to it. Insert minus cylinder power at the axis indicated by the projected SIDE pointer until both dashed lines appear equally clear.

Notes:

The B+L "T" Chart is used in an analogous manner to check or replace the refined JCC power and axis.
PRATT NEAR CYLINDER TEST:

Illumination: 15 fc. and a near-point light;
Target: cross grid and at 40 cm;
Control Lens: #21m recovery lens with the #7a cylinder;
Record: cylinder power and axis- OD, OS;

The Pratt near cylinder test provides an additional method for determining the cylindrical component of a spectacle correction. Some patients cannot respond well or quickly to the standard JCC test or the cylinder rock test. The possible change of cylinder axis due to cyclotorsion on near gaze is well documented. This change is especially significant on higher astigmatic corrections.

The targets used are the vertical/horizontal (90 + 180) crossed cylinder near point card and the oblique (45 + 135) crossed cylinder near point card.

The near cylinder test is performed with the monocular negative relative accomodation recovery lens (21 monocular recovery) so that the patient's accommodative posture is placed as close to the far point posture as possible. The #7a cylinder is the control lens cylinder.

Procedures and Instructions:

1. With the #21m recovery lenses in place OU add +1.00D to the left eye. Do not occlude either eye.

2. Place the vertical/horizontal crossed cylinder card back to back with the oblique crossed cylinder card so that by flipping the holder around the patient sees either card.

3. Use the vertical/horizontal card initially if the patient has a #7a cylinder of WTR or ATR. If the cylinder is oblique, use the oblique card first.

4. Add or subtract minus cylinder power of the phoropter to equalize the darkness of the target lines.

Add minus cylinder power if the orientation of the darkest lines are 90 degrees away from the patient's correcting axis.

Subtract minus cylinder power if the orientation of the darkest lines is approximately the same as the patient's correcting axis.

Leave the cylinder power in place that either gives neutrality or is -.25D more than neutral if neutrality does not occur.
2- Pratt Near Cylinder test

5. Flip the card-holder around so the line orientation not used in steps 2 and 3 is visible to the patient.

6. Using a method of limits, equalize the darkness of the lines by changing the cylinder axis. To make a given line orientation darker, rotate the cylinder axis towards that orientation. After a reversal of line darkness has been obtained, rotate the cylinder axis back towards its original position. Instruct the patient to say "now" when both sets of lines appear equally "dark." You may need to "bracket" the equality point. This is the axis of the correcting cylinder lens. If an equality range is present, choose the mid-point of the range as the endpoint.

7. Flip the cardholder back to the original line orientation and again, equalize the line darkness by adding or subtracting minus cylinder power. If an equal response is not possible, leave in the minimum minus cylinder power before neutral.

8. Now both cards should have equally dark lines (if equality was achieved) without further modification of power or axis. If the #7a cylinder and the near point cylinder are equal, no modification of cylinder power and axis will be necessary.

9. Add +1.00D sphere OD and reduce plus by 1.00D (add -1.00D) sphere OS. Repeat steps 3-8 for the left eye.
EQUALIZATION TEST:

Illumination: 10-15 fc.;
Targets: 20/40 and 20/20 Snellen letters;
Control lens: endpoint of JCC, Paraboline, SBVA, etc.;
Record: amount of anisometropia;

The purpose of the equalization test is to determine the anisometropia for the patient at the far point using both 20/40 and 20/20 acuity demands. The test is only valid if the acuity potential of the two eyes are approximately equal.

The endpoint of the test is an equal accommodation posture of both eyes.

Procedures and Instructions:

1. Increase the plus power binocularly to fog the patient to a 20/40 blur out.

2. Reduce this "fog" monocularly to a 20/40 recovery. The lenses should provide somewhat blurred but still readable images. Do not perform the test with your patient's vision blurred out.

3. Using a +.50D lens (see Smith, 1979) instead of an opaque occluder, "occlude" first the left eye and then the right. Ask the patient: "which lens appears to be better, #1 (OD) or #2 (OS)?"

4. Initially change the sphere power by -.25D to the eye with the less clear imagery. If the same eye is still "less clear," fog the eye with the clearer imagery by +.25D. If desired, alter sphere power by .12D steps to achieve equality. Ordinarily, you should not have to modify the initial R/C aniso more than +/- .50D to achieve equality.

5. Change the projected target to a row of 20/20 letters (in preparation for the #7 test) and repeat the steps 2-4 using of course, a 20/20 recovery control lens. Smith (1979) characterized the difference between the two equalizations as being "free" (20/40) or "forced" (20/20) aniso findings. He explained that as the acuity demand increases, the accommodation posture of the eyes gradually change from essentially a "free" to a "forced" posture. With this change, a small change in aniso may also occur. The clinician should weight any aniso findings towards the "free" postured test.
2- Equalization test

Notes:

1. It is important not to overfog (overplus), during this test. If both charts are blurred to a point of non-legibility, the patient won't be able to make a valid decision. You may need to reduce plus sphere at times to insure target visibility. However, it is just as important not to overminus.

2. If the vision between the two eyes cannot be equalized, it is advisable to permit the dominant eye to retain the better vision. Dynamic retinoscopy may provide more information about the correct equalization in the case of unequal acuity potentials.

3. Borish (1975) stated that "if the pupils of the two eyes are of different size or if the refractive status is sufficiently different to induce differences in image size, the test may not be effective."
1. **Institution**
   A. **Title of Project:** A Feasibility Study of the Use of a +1.00 Lens Occluder for Binocular Refraction
   B. **Investigators:** Steven G. Iwasa and P. Kevin McGrath
   C. **Advisor:** Lynn J. Coon, O.D.
   D. **Location:** Pacific University College of Optometry
   E. **Date:** 1980-1981

2. **Description of Project**
   This project will evaluate a binocular refraction system which has been adapted to conform to the OEP "21" points" format. Optometric students and practitioners will evaluate the system through a questionnaire after experiencing and/or utilizing the system.

3. **Description of Risks**
   There are no more risks to the subjects than would be promoted by a refraction during a normal examination.

4. **Description of Benefits**
   This study will enable the examiners to determine the utility of a binocular refraction technique which is readily adapted to a standard refraction technique and requires no special equipment.

5. **Compensation and Medical Care**
   If you are injured in this experiment it is possible that you will not receive compensation or medical care from Pacific University, the experimenters, or any organization associated with the experiment. All reasonable care will be used to prevent injury however.

6. **Offer to Answer any Questions**
   The experimenter will be happy to answer any questions that you may have at any time during the course of this study.

7. **Freedom to Withdraw**
   You are free to withdraw your consent and to discontinue participation in this project or activity at any time without prejudice to you.

I have read and understand the above. I am 18 years of age or over.

Signed ___________________________ Date __________

Address ___________________________ Phone __________
EVALUATION OF A MODIFIED HUMPHRISS BINOCULAR REFRACTION METHOD

Steven G. Iwasa
P. Kevin McGrath

1. Do you feel that this procedure will give more stable findings on certain patients than a non-modified OEP "21 Points" routine?

2. Do you feel you will get more repeatable findings on certain patients with this method?

3. Does this method allow for a more comfortable exam for the patient?

4. Did you find the endpoints were easy to identify as a patient?

5. Was balance or equalization more readily obtained?

6. Are the conditions experienced with this method more "natural" than with other examination methods?

7. What type of patient would benefit with this examination method?

8. What advantages are obtained by using this examination method?

9. Do you have any suggestions that would improve this examination routine?

10. Do you feel that this method will give Optometrists an adequate binocular refraction method?