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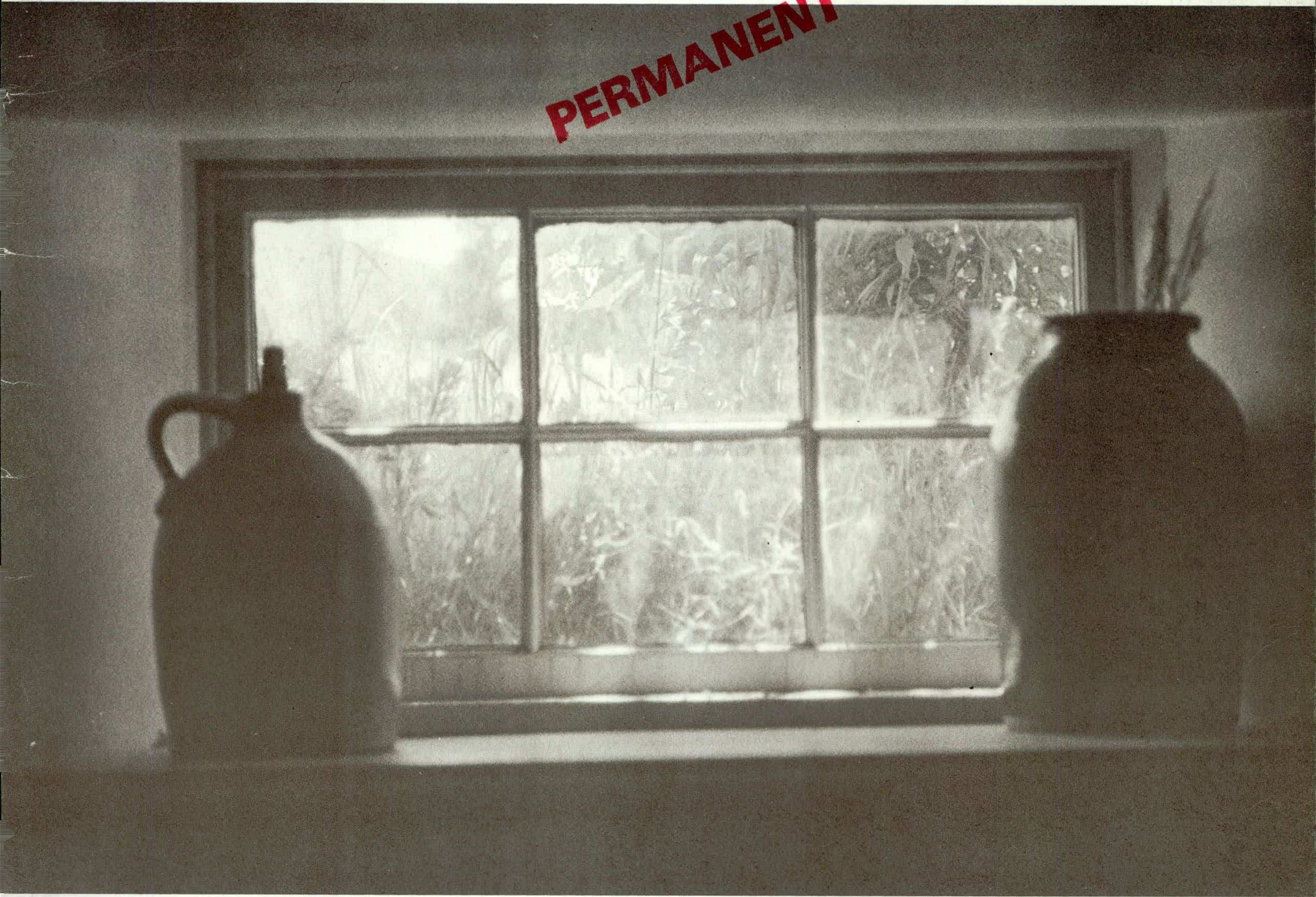

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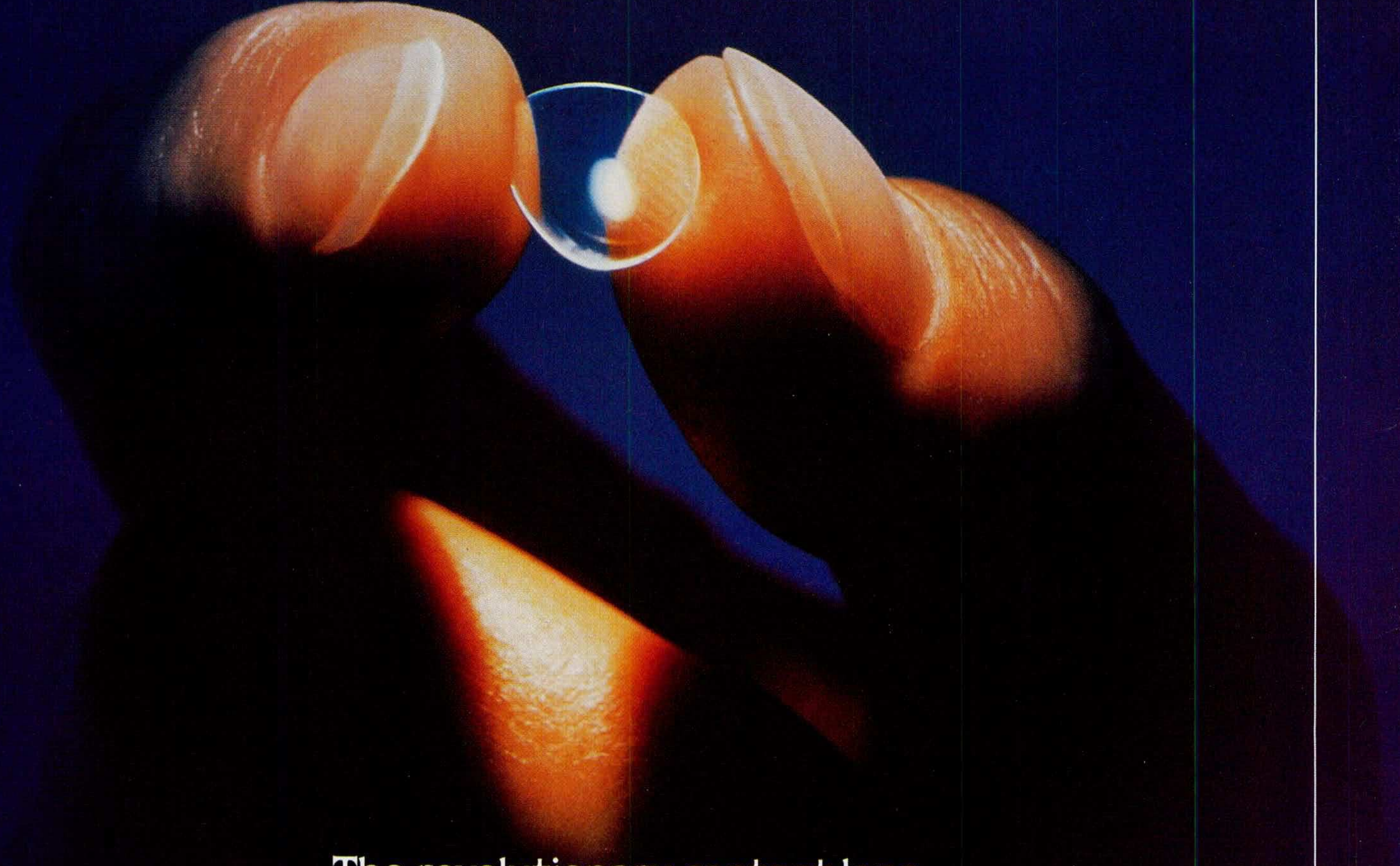

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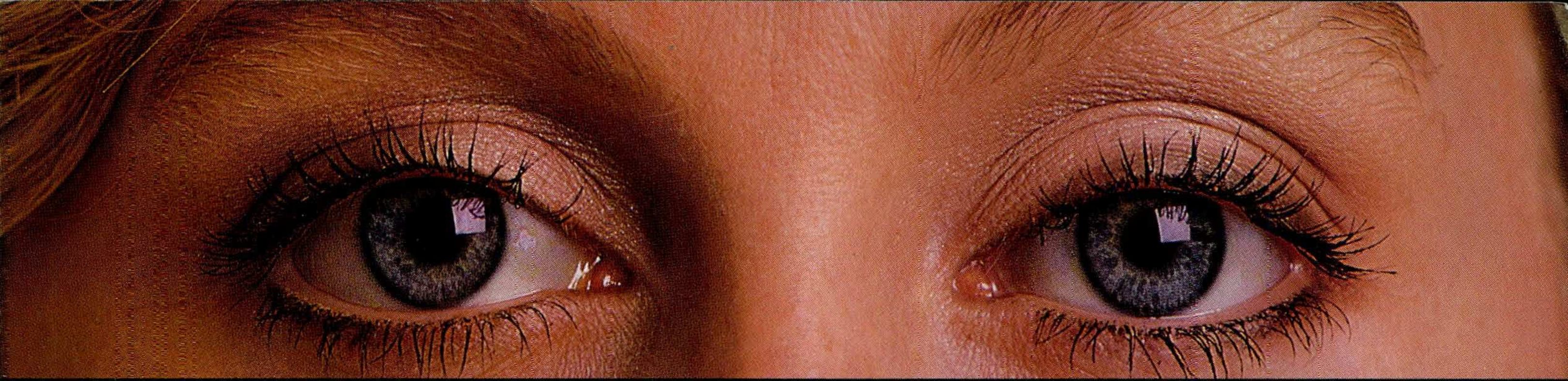

CANADIAN ASSOCIATION OF OPTOMETRISTS

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EDITORIAL

A Little Bit of History

Pride in one's family, city, country or profession is a healthy and very human trait. Provided that it is not tinted with arrogance and self-conceit, it can be an important factor motivating one to greater accomplishments.

Pride is rooted in history, for one cannot take pride in family, city, country or profession, unless one is fully aware of the accomplishments of those who preceded us.

Canadian optometry is the possessor of a varied and meaningful history going back to the turn of the century, in areas as diverse as education, professional organization and social responsibility. Starting in the mid twenties, optometric leaders have gradually forged a viable federation of provincial associations culminating in the granting of a federal charter to the Canadian Association of Optometrists in 1948.

However big this step forward may have been, the charter could not be fully effective until a permanent office and administration were established. This only came about in 1953 when Edward B. Higgins, M.A., was hired as the first Executive Director of C.A.O.

But we are anticipating ourselves, so let us backtrack a bit. In 1951, Mr. Higgins had been hired by the Ontario Association of Optometrists to conduct a survey of the profession in Ontario. A copy of this report had been sent to the C.A.O. Council in January, 1952. Under then-President Harry Nowlan, of Winnipeg, Council studied this report and, in a farsighted move, voted to ask Mr. Higgins to carry out a trans Canada version of his survey. He accepted.

Many weeks were spent in planning the tour, so as to coincide with as many provincial General Meetings as possible. An extensive questionnaire, covering some 29 items, was prepared and dispatched to all provincial executives for study and comment. Among the many facets being looked at were: education and its financing, the O.D. degree, health insurance, professional relations ("inter" and "intra"), internal administration, cost structure, legislation and relations with government, types of practice, economics and relations with the industry.

In the spring of 1952, Mr. Higgins embarked on his tour. It was to last a period of some 4 - 5 months, travelling, meeting and interviewing from coast to coast. In so doing, it depleted almost to nil what little reserves a cost-conscious Council had managed to set aside to that time, the formidable sum of a little over $4,000.00. All provinces contributed to defraying the expenses while Mr. Higgins was in each of their respective provinces.

In November, 1952, Mr. Higgins presented his 100-page report to J.J. Mulrooney, then the President of C.A.O. Council. Council members spent the next 6 months studying the document and, at its July, 1953 meeting in Montreal, voted to ask Mr. Higgins to implement his recommendations by becoming a part-time Executive Director of C.A.O. He accepted and it was agreed that his management consulting firm's office would be the locale for the C.A.O. office.

This report, entitled *A National Survey of Canadian Optometry*, was presented in a limited edition and distributed to members of Council, the two schools (at the time in Toronto and Montreal), the Editor of the C.J.O. and some members of the Colleges of Optometry.

With the passing of years, some recipients of the report died, and their files were lost. Other copies were destroyed, in one case at a fire at the clinic building in Waterloo, or through other accidents to storage files and archives, like the flooding of C.A.O.'s basement storage in Ottawa.

Some three years ago, the Editor of the C.J.O. began a search for copies. He cannot now indicate how many letters he sent to individuals and institutions inquiring if they had a copy, or knew the whereabouts of one. The continued negative response was most discouraging and it began to seem like this cornerstone of Canadian optometric history would be forever lost to the profession.

Finally, the Editor turned to the ophthalmic industry, in the hopes that one of the optical companies would have a copy tucked away in its archives. It was much to our relief and joy when Mr. Sydney Hermant, of Imperial Optical, informed us that he had found a copy in the company archives. That copy was loaned to C.A.O. and copies of The Higgins Report are once again a part of the Association's permanent archival record.

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IMPERIAL OPTICAL CANADA

The C.J.O. and C.A.O. would like to extend our thanks to Mr. Hermant for his efforts in uncovering a copy, and for his generosity in loaning it to the Association.

Now that is is once again available, we see what a milestone document The Higgins Report is. **We recommend it be read by present-day optometric leaders, few of whom have ever seen or even heard of it.**

Ed Higgins himself concluded, "I cannot help but have the feeling that optometry can and will do those things which are now essential to its future... It is their opportunity and their responsibility to make a decision." Mr. Higgins' future is our present and his report makes for a fascinating study, then and now.

G.M.B.

Editor's Note: As per the old adage, It never rains but when it pours; as this issue was going to press, we received a short note from Dr. Austin Forsyth, newly appointed Executive Director of the Saskatchewan Optometric Association. Himself a prominent figure in Canadian optometric history, Dr. Forsyth had just uncovered a copy of The Higgins Report in a long unexplored section of his personal files.

LETTERS

Editor, C.J.O.

In the past year, I've had over 20 referrals from other doctors, mostly optometrists, but also chiropractors, M.D.'s and even an ophthalmologist (Glory be!), all for Ortho-K. At the same time, I've found myself on the receiving end of more and more phone calls asking advice about the Ortho-K treatment for various patients.

All of this leads me to believe that interest in Ortho-K is increasing rapidly. What I'd like to find out is just how many practitioners are doing orthokeratology right now. Would it be possible to ask that question in the Journal? If there are enough, it might pay to consider an Ortho-K chapter of some sort — perhaps as part of the Canadian Optometric Contact Lens Society.

I believe that getting the figure on the number of optometrists practicing Ortho-K is important to Canadian optometry as a whole.

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M5B 1J3
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Editor, C.J.O.

I congratulate you for so accurately identifying the issues in your editorial "A Conflict of Interest..." (C.J.O., June, 1983). In a few paragraphs, you have exposed the medical argument for what it is — a non-sequitur. I think that a corollary of your own argument is apparent. It is that, surely, professionalism in any sphere of health care is not related to whether or not one is involved in the treatment of one's own diagnosis. It depends, rather, on the integrity and expertise one brings to that treatment and diagnosis.

R.B. Perkins, O.D.
Wardsville, Ontario

CLINICAL

Computer-Based Analysis of Visual Fields:

Age-Related Norms for the Central Visual Field

T.D. Williams*

Abstract

This paper will fulfill two purposes:

A. To describe ways, means, and advantages of using computers to analyse two-dimensional clinical data (e.g. photographs, charts) so that the reader will have a clearer understanding of these methods and perhaps start considering applying them in practice.

B. To present the results from a study of the central visual fields of 129 normal patients aged 10 to 70 years. These results are presented as average central fields for individual age groups (15, 25, 35, 45, 55, 65 years) so that the reader may compare a given patient's central field data to a norm for that patient's age group.

Abrégé

Ce travail se propose deux objectifs:

a) une description des procédés et des avantages d'utiliser un ordinateur dans l'analyse des données cliniques à deux dimensions (photographie-tabler, figures) afin que le lecteur apprécie d'avantage la technique et considère son emploi dans sa practique.

b) de rapporter les résultats d'une enquête du champ visuel central sur un échantillon de 129 personnes reparties entre les âges de 10 à 70 ans. Ces données sont présentées en fonction d'une moyenne du champ visuel par groupe d'âge (15, 23, 35, 45, 55, 65) permettant une comparaison d'aucun individu à une norme pour son âge.

Part A: Analysing Two-Dimensional Figures

Hardware

One of the best devices for converting data on a chart into data which the computer can handle is a digitizing table. This is shown in Fig. 1. Each point (e.g. points A, B, C, and D in Fig. 2) must be represented in terms of X and Y coordinates. To do this, the figure to be analysed is taped to the surface of the digitizing table. A moveable cursor, consisting of an X-shaped reference mark, a receiving coil, and a pushbutton switch, is lined up with the point to be 'digitized' (e.g. point B in Fig. 2), and the button is depressed.

Fig. 1 View of digitizing pad (Summagraphics BIT PAD ONE) and microcomputer (Commodore PET). Digitizing pad is sitting on the extendable writing surface of the desk.

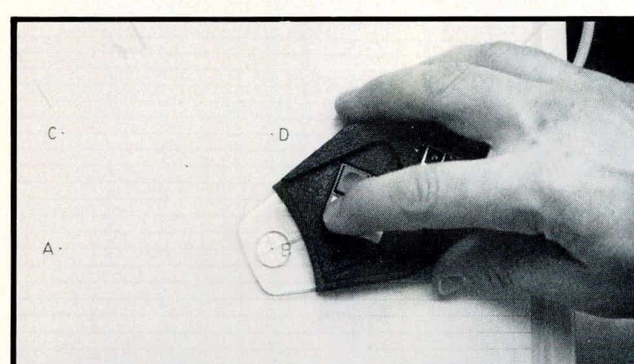

Fig. 2 A sheet of graph paper has been taped to surface of digitizing table and cursor placed on it. Four points on the paper will be digitized. Note X-shaped reference mark with circle around it: the circle contains a fine copper wire which is the sensor. There are four push-buttons on the cursor. The computer knows which button has been pressed, and it is possible to program different functions for each button.

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School of Optometry, University of Waterloo

Measuring an Area

Fig. 3 shows the X and Y coordinates for the four points shown in Fig. 2 as they appear on the computer display. The coordinates are given in 1/10 mm units: thus point A is 108.9 mm from the left hand edge, and 82.5 mm above the bottom edge of the digitizing table. Coordinates for B are (1920,832). If the line AB had been placed exactly parallel to the bottom edge of the digitizing table, then there would be no difference in the Y values for points A and B: as it is, there is a difference of 0.7 mm. This slight misalignment of the figure on the digitizing table is of no practical importance, as the computer is programmed to calculate distances (like the distance AB) based on the formulae of analytic geometry: only the point coordinates are required. Thus the distance AB would be calculated correctly regardless of the orientation of the line AB on the digitizing table. The same is true for calculation of the area of the rectangle ABDC (which is 3704.3 mm^2). (For more information concerning hardware, see Appendix A.)

Measuring Visual Field Area

Analysis of visual field charts presents two fundamental problems:

1. Are there any marked abnormalities in the *shape* of the isopters (an isopter is the locus of points at which a specific stimulus is seen)? Are there quadrants or larger portions of the field missing, or anomalies of the blind spot?
2. Are the isopters of normal *size*?

The first question is usually answered by observation of the field chart and will not be dealt with in this report. However, computer-based analysis may be used for this purpose.

The second question prompts reference to normal visual field data: difficulties sometimes arise here because (a) the patient's isopter occasionally wanders inside and outside the limits of the normal

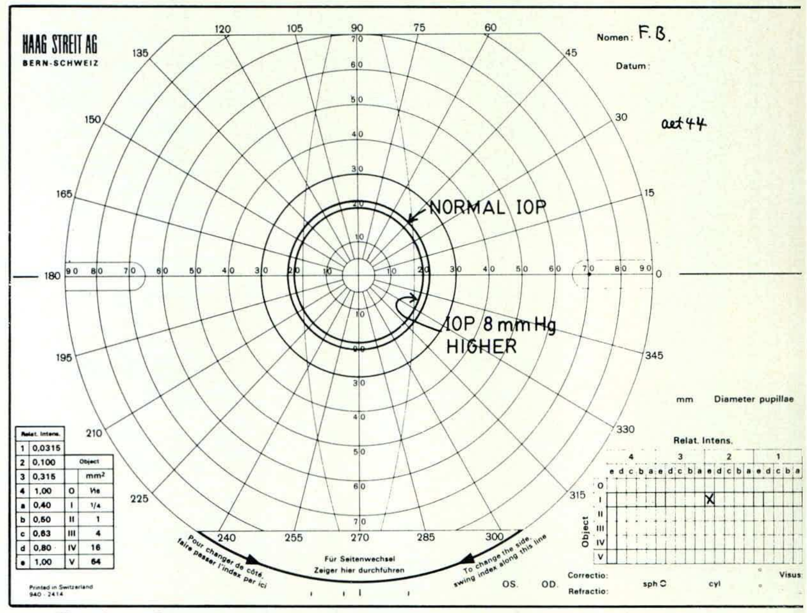

Fig. 4 **Outer isopter represents normal I_2 isopter for a 44 year old patient with normal intraocular pressure. Inner isopter represents reduction in field size in an ocular hypertensive whose intraocular pressure has increased 8 mmHg due to provocative testing with topical steroid. The inner isopter has an area 20% smaller than the outer isopter.**

chart, or (b) no normal data are available for the patient's age group (the size of the visual field is known to decrease with age).

There is a subtler problem in estimating the size of isopters: while the practitioner may do a good job of estimating the *length* of lines (or radii), it is very difficult to establish by inspection the *area* of a figure. This is further complicated when the figure is irregular.

Advantages of Measuring Area of Visual Field

(i) Area changes with the square of the radius

The area of the visual field is roughly a function of the *square* of its component radii: small, consistent changes in the position of data points on the isopter will have large effects on the area of the isopter. For example, Hart and Becker[1] employed computer-based visual field analysis to assess the effect of temporarily increased intraocular pressure. They found that an intraocular pressure increase of 8 mmHg produced a decrease in visual field area of approximately 20%. Such a change is shown in Fig. 4. For the purpose of this demonstration, the isopter is shown as round. If this patient had an initial isopter radius of 22.5° (26.4 mm on the chart), this would correspond to a visual field area (on the chart) of 2189 mm^2. If this field were to be reduced by 20% (to 1751 mm^2), this would correspond to an isopter radius of 20° (23.6 mm on the chart). Thus a small change in radius produces a much larger change in area of the field.

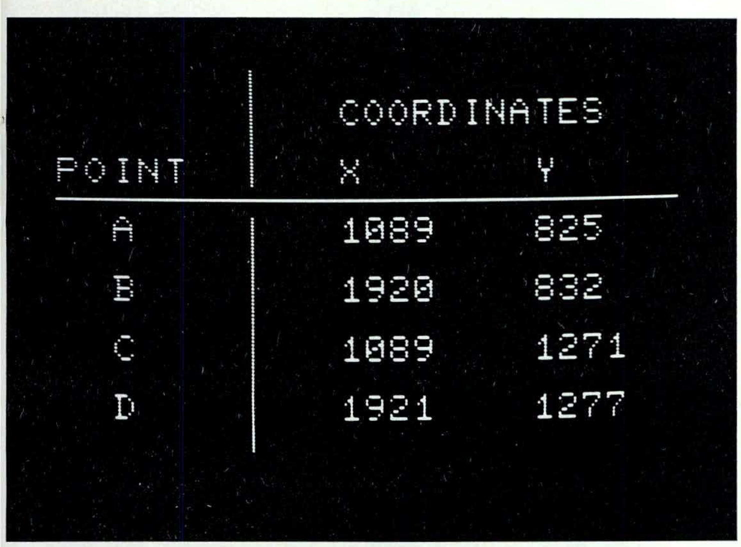

Fig. 3 **Computer display showing X and Y coordinates obtained for the four points in Fig. 2.**

(ii) Variability of points on the isopter

Most clinicians will agree that patients show some variability in the location of individual points on the isopter. Data supplied by Werner and Drance[2] indicate that variability of 5° or less in any point on the isopter is probably not clinically significant. Since this variability can occur on either side of a given isopter point, it is quite likely that it would not have a marked effect on the area of isopters plotted on different occasions, because there are usually at least 12 points on each isopter: some will be inside the first isopter points and others will be outside the first isopter points. If an *area* is computed for each isopter, this will effectively average out these differences.

Targets for Central Field Testing

Central fields are tested with the tangent screen or the perimeter. These procedures will yield equivalent visual field dimensions, provided that equivalent test stimuli are used: for the tangent screen, this would be a 1 mm white pin at 1 m, with a screen illuminance of 10 to 15 foot-candles (100-160 lux); for the perimeter, the test stimulus I_2 would be used. In other words, the 1/1000 W tangent screen isopter should match the I_2 perimeter isopter. (For more information concerning test targets, see Appendix B.)

Analysing a Field Chart

To measure the area (in terms of square millimeters on the chart) of an isopter, the chart is taped to the digitizing pad and the data points are digitized using the cursor. This arrangement is shown in Fig. 5. The field chart to be analysed is for the normal right eye of a 70 year old patient. It is necessary to let the computer know how many points are on the isopter: for routine analysis of fields, 12 points are used. The fixation point is also digitized, so that the area of the field may be measured sector by sector. The first three sectors of the innermost isopter are shown in Fig. 5. After all data points have been input, the computer displays for each isopter the area of each of the 12 sectors on the chart, the sum of the sector areas for each of the 4 quadrants, and the sum of the areas of all 4 quadrants. If desired, the blind spot may be analysed similarly, and its area subtracted from the total, although most studies of visual field area do not do this. The total areas of the three isopters shown in Fig. 5 (not subtracting the blind spot areas) are 2215, 5830 and 14833 mm² for the I_2, I_3, and III_3 isopters respectively.

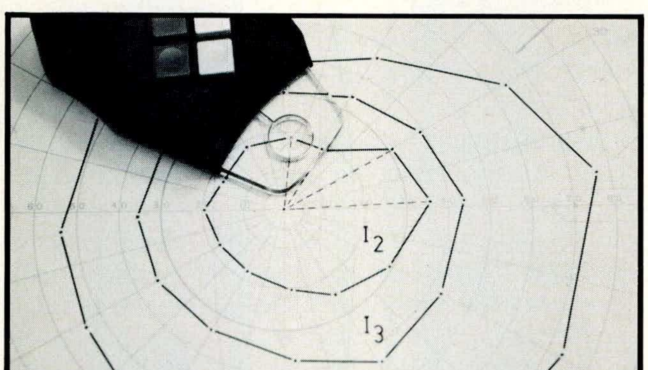

Fig. 5 Field chart on digitizing table with cursor lined up with first data point on the I_2 isopter. This isopter is equivalent to a 1/1000 W tangent screen isopter.

Part B: Central Field Study

Population Studied

Patients aged 10-70 years were asked to participate in the study while they were seen in the Clinic of the University of Waterloo School of Optometry. All patients were free of systemic and ocular disease, and had best corrected acuities of 6/6.

Method

All visual field data were obtained using the same Goldmann perimeter, manufactured by Haag-Streit.

Instructions to Patient

Since patient instructions are an important determinant of successful field testing, it would be useful to mention here the instructions we used:

1. We will be testing *one eye at a time.*
2. This is a test of your *side vision*; you must resist the (natural) urge to look at the moving target. You must concentrate your attention on the tip of the silver pin you see in the center of the black hole in front of you.
3. This is a *threshold test*: we will be going from a condition where you are positive you *don't* see the target (spot of light) to a condition where you are positive you *do* see the target. We want you to let us know (push the response button) as soon as you *think* you see the spot. Don't wait until you are certain. You will probably be uncertain of your responses most of the time. That is normal.
4. We will be using a small, dim spot: it *is* hard to see, but that is part of the test.
5. We will always tell you what direction we are coming from (in terms of o'clock position) so you won't have to guess.

These instructions are given while the patient is seated in a semi-darkened room, facing the illuminated bowl of the perimeter. A trial case lens is used to give the patient an appropriate correction for the 1/3 m viewing distance of the perimeter. All patients were tested with their pupils and ciliary muscles in a normal state.

Results

Using the Goldmann perimeter target I_2 (target area = ¼ mm^2, intensity = 100 apostilbs — this target yields field results which are equivalent to those obtained with a 1 mm W pin at 1 m when the tangent screen illuminance is 10-15 foot-candles), right and left visual fields were determined for 129 normal patients. Their age distribution is shown in Table I.

X and Y coordinates were determined for each point around the I_2 isopters. As no significant difference ($p<.05$) was found between left and right visual fields, the left visual field data were pooled with the right visual field data by mathematically reversing the left visual field data.

Next, the isopter coordinates for each age group were averaged to produce the normal field plots shown in Fig. 6.

The outermost isopter is for the groups aged 15 and 25 years: the averaged data points for these two groups were coincident. The second isopter in is for the group aged 35, the next for age 45, and so on. At the 4 o'clock position, the average isopter points for the first three age groups are coincident.

The areas of the isopters are shown in Table II.

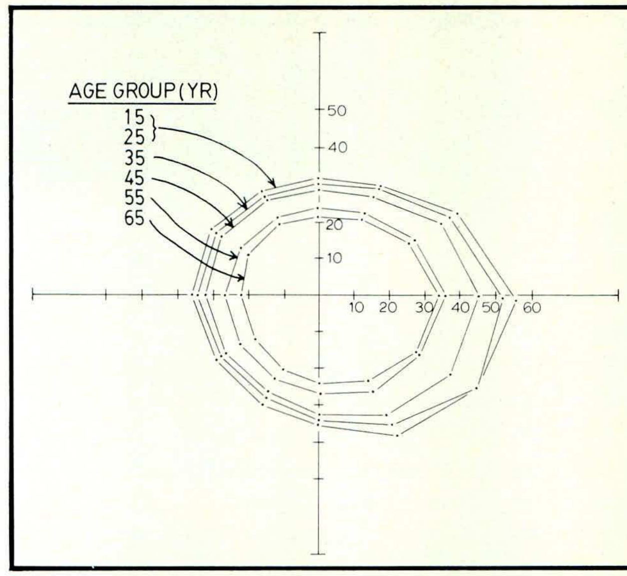

Fig. 6 **Normal central field isopters for different age groups. Test target was the Goldmann I_2 stimulus, which is equivalent to a 1 mm W pin at 1 m when the tangent screen illuminance is 10-15 foot-candles.**

TABLE I

AGE DISTRIBUTION OF PATIENTS PARTICIPATING IN STUDY

Age Group	Range	Number of patients	Number of isopters
15	10-20	13	26
25	20-30	33	66
35	30-40	22	44
45	40-50	24	48
55	50-60	22	44
65	60-70	15	30
	TOTALS	129	258

TABLE II

AREA OF NORMAL CENTRAL FIELD
(Goldmann I_2 stimulus)

Age Group	Isopter area (mm^2)	Per Cent. Reduction*
15	6728	0.0
25	6728	0.0
35	6125	8.9
45	5156	23.3
55	3376	49.8
65	2772	58.7

*relative to 15-25 yr. age group

Comments

1. The series of normal central isopters shown in Fig. 6 should provide a helpful age-related reference point for the practitioner who is evaluating the size of a central field for an individual patient.

2. The size of the field appears to drop more markedly after the age of 45. This would suggest that the effects of aging (at least as indicated by changes in the size of the visual field) are not linear, but are less marked before age 45 and more marked thereafter.

3. Manipulating visual field charts as *data* may lead to better clinical decisions (in some cases) than simple subjective analysis of *shapes*.

Acknowledgments

Collection of the visual field data was made possible by a grant from the Canadian Optometric Education Trust Fund, whose assistance is here gratefully acknowledged.

Perimetry and digitizing of isopters were performed by Diane Quinlan (UW Optometry Class of 1984), who was my research assistant during this project. Her meticulous work and enthusiasm were invaluable.

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1. Hart, W.M., and B. Becker, Visual field changes in ocular hypertension, a computer-based analysis, *Arch Ophthalmol* 95:1176-1179, July 1977
2. Werner, E.B., and S.M. Drance, Early visual field disturbances in glaucoma, *Arch Ophthalmol* 95: 1173-1175, July 1977

Appendix A

Pushing the button starts a timer and releases a pulse of electrical current along a wire below the surface of the table, generating a strain wave through a mesh of wires just under the surface of the table. The receiving coil, simply a circle of fine copper wire in which the X-shaped reference mark is centered, senses the passing of the strain wave: this is used to time the delay required for the strain wave to reach the receiving coil. The timing information is converted by the microprocessor of the digitizing table into X and Y coordinates (accurate to 0.1 mm), which are then transmitted from the digitizing table to the computer. All of this happens virtually instantaneously.

Incidentally, the digitizing table (or pad, or graphics tablet as it is cometimes called) may be programmed to output X and Y coordinates in several different ways. For example, it is possible to have it provide a continuous stream of data points whenever the switch is pressed. It is also possible to have the X and Y coordinates produced as soon as the cursor is brought close to the surface of the pad. There is also a different cursor (like a ball-point pen) which can be used to replace the larger cursor shown in Figs. 1 and 2. The advantage of the larger cursor is that the four switches can be used to put labels on certain coordinates, so that (for example) four different figures could be analysed on the same chart: the computer will know which data points belong together because each will have an identifying label attached to it according to which button was pressed.

Appendix B

Equivalent Stimuli for Tangent Screen and Perimeter

Central visual fields may be tested (a) at the tangent screen, usually with a 1 mm white pin at a 1 m viewing distance, with a screen illuminance of 10 to 15 foot-candles (100-160 lux), or (b) at the perimeter, usually with Goldmann stimulus I_2.

In the Goldmann system, the target *size* is given by the Roman numeral (O to V), while the target *intensity* is given by the Arabic numeral (1 to 4). Goldmann target size I has an area of ¼mm^2 on the surface of the perimeter: this has an angular size of 5.82 minutes of arc at 1/3 m, which is a reasonable approximation to the angular size of a 1 mm pin at 1 m, which is 3.43 minutes of arc.

Goldmann intensity 2 = 100 apostilbs: this is the equivalent of 13 foot-candles (142 lux). The background intensity in the perimeter is 31.5 apostilbs, which is equivalent to 4 foot-candles (43 lux).

The contrast of the Goldmann target (compared to the tangent screen target) is somewhat reduced, owing to the illuminated background; however, the Goldmann target size is somewhat larger than the tangent screen target size (5.82 vs 3.43 minutes of arc). These two factors tend to counterbalance each other, as the size of the 1/1000 W tangent screen field usually differs very little from the 1_2 Goldmann perimeter field.

The target areas increase in size in steps of 0.6 log area, while the target intensities increase in steps of 0.5 log intensity. Thus, in Fig. 5, the I_3 stimulus is 0.5 log units brighter than the I_2 stimulus (i.e. 316 apostilbs vs 100 apostilbs), and the III_3 stimulus is 1.2 log area units larger than the I_3 stimulus (i.e. 4 mm^2 vs ¼ mm^2). In terms of tangent screen targets, the III_3 stimulus would be equivalent to a 6.7 mm pin at 1 m.

BINOCULAR VISION

A Stereoacuity Test for Detecting Aniseikonia

W.L. Larson*

Abstract

Thresholds of stereopsis were measured bilaterally using two vertical pins, one nearer than the other to the subject. In the majority of cases, the threshold when the left pin was nearer was different from the threshold when the right pin was nearer. This inequality was thought to be caused by aniseikonia. When calculated from bilateral inequalities, aniseikonia was found to be of small amount. The effect of inequalities on the measurement of stereoacuity was also investigated by comparing bilateral and unilateral arrangements of the same data. Stereoacuity calculated from bilateral data was found to be more precise than that calculated conventionally (i.e. unilaterally).

Abrégé

Nous avons mesure le seuil de la stereoscopie bilateralement en presentant deux aiguilles verticales dont une plus rapprochee que l'autre. Dans la plupart des cas, le seuil differait selon que l'aiguille de gauche ou de droit etait la plus rapprochee. On croyait que cette difference pouvait provenir d'une aniseconie mais un calcul base sur ces inegalites bilaterales ne soutenait pas cette hypothese.

Les effets des inegalites sur la mesure de l'acuite stereoscopique ont etes examines en comparant les memes donnees sous un aspect bilateral ou unilateral. L'acuite stereoscopique est plus precis, base sur un calcul bilateral qu'unilateral.

It may be possible to detect and measure aniseikonia by measuring thresholds of stereopsis bilaterally. This idea came to me after completing an investigation of the relationship between induced errors of refraction and stereoacuity.[1] A reduction in stereoacuity occurred when lenses of unequal power were before the eyes and this might have been due, in part, to differences in retinal image size caused by the lenses used. If this were so, there might be a relationship between aniseikonia and stereoacuity which could be detected by the test used for the investigation.

To study this possibility, the test[2] was revised so that thresholds of stereopsis could be measured bilaterally. This was possible because test disparities were presented by means of two adjacent pins which were parallel and in the vertical plane. One pin was nearer to the observer than the other pin by the amount of the disparity. Two pairs of pins were provided for each disparity, one with the left pin nearer and the other with the right pin nearer. Therefore, one threshold of stereopsis could be found for left-nearer and another for right-nearer pin arrangements. The word bilateral is used to differentiate such thresholds from those found by pooling data together so that the identity of the nearer side is lost.

The apparent position of objects in space can be altered when retinal images differ in size (aniseikonia). This distortion is due to stereopsis and cannot be perceived without it. An observer with aniseikonia in the horizontal meridian will not see the test's disparities as they really are because the plane of the pins will appear to have been rotated about a vertical axis. The amount of this rotation will be the same as that which occurs when a frontoparallel plane is seen with aniseikonia, as Ogle has shown.[3] As a consequence of this apparent rotation, the same disparity will appear to be bigger when one side is nearer and smaller when the other side is nearer. Some disparity other than zero will appear to lie in a frontoparallel plane.

The smallest disparity at which the nearer pin can be identified establishes the threshold of stereopsis. With aniseikonia, the left-nearer and right-nearer thresholds will not be numerically equal. It can be assumed that these disparities are at equal and opposite angles with respect to the apparent frontoparallel plane. The disparity which lies in the apparent frontoparallel plane is then half-way

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between the threshold disparities. The amount of aniseikonia can be calculated from this information.

To test this hypothesis and to investigate the prevalence of aniseikonia as well as to discover its effects on stereoacuity, bilateral thresholds of stereopsis were measured using a group of 42 people. From these data, stereoacuity and aniseikonia were calculated according to threshold criteria as described in the following section. The results of this study are reported here.

Method

The apparatus has already been described in detail.[2] The test distance was 0.6m. A head rest was used. Disparities were concealed from view by a metal screen with a window that could be closed by a shutter. The disparity to be viewed was positioned behind the window and the shutter was opened. The subject saw two vertical pins and identified the nearer by depressing one of two microswitches located under the left and right hands. The left hand switch was actuated when the left pin was nearer; the right switch when the right pin was nearer. If neither pin were perceived to be nearer, both switches were actuated at the same time.

The 11 disparities shown in Table 1 were presented 3 times in random order. After each presentation had been identified, the shutter was closed for 2.4 sec while the disparity was changed. When the test was completed, the results were presented on a display terminal in a format similar to that shown in Table 1.

Each subject performed the test at least twice, usually on different days. When the test was failed, it was repeated with disparities of 256, 128, 64, 32 and 16 sec.

The data from each test were arranged in two ways. In the *bilateral* arrangement, disparities were treated as if they formed part of a descending sequence. The left-nearer sequence was -24, -16, -12, -8, -4, 0, 4, 8, 12, 16 and 24 sec. The right-nearer sequence was 24, 16, 12, 8, 4, 0, -4, -8, -12, -16 and -24 sec. In the *unilateral* arrangement, the data of the left and right nearer disparities were combined by adding them together. The resulting sequence was 24, 16, 12, 8 and 4 sec. In this arrangement, zero disparity had no significance.

Each sequence was analysed to find the *perfect* and the *absolute* thresholds of stereopsis. The perfect threshold was defined as the least disparity

Table 1. Data of 4 subjects arranged bilaterally and unilaterally
Disparity (arc sec)

Bilateral arrangement		Left rod nearer						Right rod nearer					Unilateral arrangement					
Subject	Response	-24	-16	-12	-8	-4	0	4	8	12	16	24	Response	24	16	12	8	4
	Left	3	3	3	3	2	2	0	0	0	0	0	correct	6	6	6	5	4
L.R.	Right	0	0	0	0	0	1	2	2	3	3	3	opposite	0	0	0	0	0
	Equal	0	0	0	0	1	0	1	1	0	0	0	equal	0	0	0	1	2
	Left	3	3	2	0	0	0	0	0	0	0	0	correct	6	6	5	3	3
N.T.	Right	0	0	0	0	2	2	3	3	3	3	3	opposite	0	0	0	0	2
	Equal	0	0	1	3	1	1	0	0	0	0	0	equal	0	0	1	3	1
	Left	3	3	3	2	3	2	0	1	0	0	0	correct	6	6	5	4	4
D.M.	Right	0	0	0	0	0	0	1	2	2	3	3	opposite	0	0	0	1	0
	Equal	0	0	0	1	0	1	2	0	1	0	0	equal	0	0	1	1	2
	Left	12	12	12	12	12	3	2	1	0	0	0	correct	24	23	24	21	19
M.L.	Right	0	0	0	0	0	2	7	9	12	11	12	opposite	0	0	0	1	2
	Equal	0	0	0	0	0	7	3	2	0	1	0	equal	0	1	0	2	3

Table 2. Thresholds of stereopsis, stereoacuity and aniseikonia from Table 1 data.

Arrangement	Threshold	Result (arc sec)	Subjects L.R.	N.T.	D.M.	M.L.
Bilateral	Perfect	left-nearer	-8	-16	-4	-4
		right-nearer	12	4	16	12
		stereoacuity	10	10	10	8
		aniseikonia	2	-6	6	4
	Absolute	left-nearer	-4	-12	0	-4
		right-nearer	4	-4	12	8
		stereoacuity	4	4	6	6
		aniseikonia	0	-8	6	2
Unilateral	Perfect	stereoacuity	12	16	16	12
	Absolute	stereoacuity	4	12	4	4

at which all responses were correct. The absolute threshold was the least disparity at which stereopsis was in evidence. In the bilateral arrangement, this was defined as the final disparity in a sequence of 3 correct or 2 correct and 1 equal. In the unilateral arrangement, this was defined as the final disparity in a sequence of 4 or more correct. If a bilateral sequence contained a disparity with 2 correct and 1 equal flanked by disparities with all 3 correct, this disparity was counted as if all had been correct. In the unilateral sequence, 5 correct and 1 equal was treated in the same way.

Stereoacuity was found from these thresholds. For the unilateral arrangement, threshold and stereoacuity were the same. For the bilateral arrangement, the stereoacuity was one-half of the algebraic sum of the left and right-nearer thresholds.

Aniseikonia was obtainable only with the bilateral arrangement. This was found by subtracting the stereoacuity from the right-nearer threshold of stereopsis. This gave aniseikonia in terms of disparity rather than in terms of the relative size difference of retinal images.

Aniseikonia in terms of disparity was converted into a retinal image size difference by the following formula:

$M=A/(36(\arctan((2a+d)/2b)-\arctan(2a-d)/2b)))$

where A is the aniseikonia in arc sec, 2a is the interocular separation, d is the pin separation, b is the distance from the eye's base-line to the pins and M is the % retinal image size difference. All distances are in mm and a positive A means that the right eye image is bigger than the left. For this apparatus, d=3.8 mm and b=600 mm.

Results

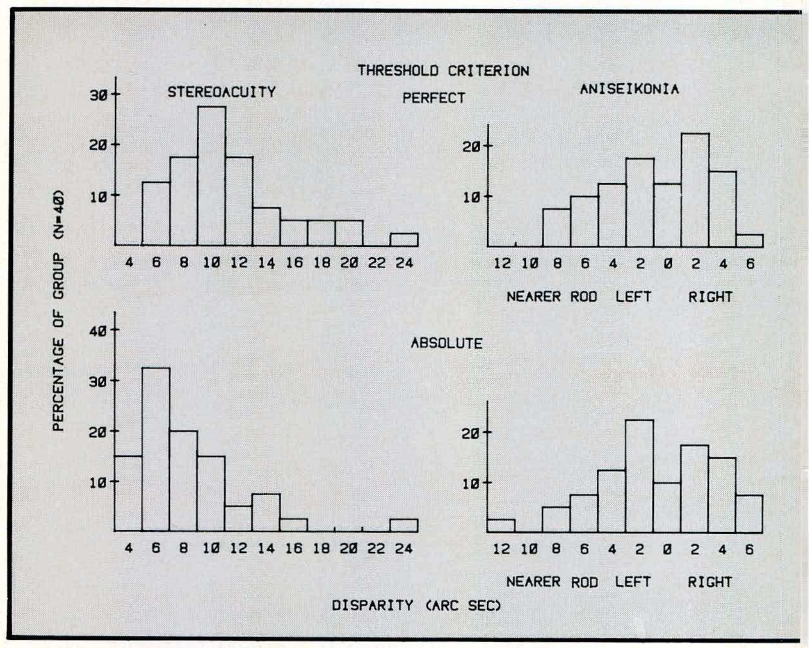
All 42 subjects were university students in their early twenties. Apart from this, the group was selected at random. Data from the initial test were discarded because all subjects were unfamiliar with the apparatus. Two subjects had stereoacuities greater than 24 sec which excluded them from the group. Therefore, the group was comprised of 40 subjects whose stereoacuities ranged from 4 to 24 sec.

Examples of test data are shown in Table 1. These were selected as representative of negligible aniseikonia (L.R.), left-nearer aniseikonia (N.T.) and right-nearer aniseikonia (D.M.). An amalgamation of data from 4 tests is also shown (M.L.). This provides 12 and 24 responses at each disparity for the bilateral and unilateral arrangements respectively. The disparities are for an interocular separation of 60 mm.

The bilateral data of Table 1 were analysed to find the left-nearer and right-nearer thresholds of stereopsis, the stereoacuity and the aniseikonia of each subject. The results are shown in Table 2 along with stereoacuities from the unilateral data. The absolute threshold criteria for the amalgamated data (M.L.) were 9 and 18 correct for the bilateral and unilateral arrangements respectively. This 75% correct threshold was chosen because Howard used it for his pioneering study.[4]

Results for the whole group are summarized by the histograms in Fig. 1. These show how members of the group were distributed with respect to stereoacuity and aniseikonia for perfect and absolute threshold criteria.

With the perfect threshold criterion, over half (57.5%) of the group had a stereoacuity of 10 sec or better. With the absolute threshold criterion, almost half (47.5%) had a stereoacuity of 6 sec or better. This supports Howard's observation that the absolute threshold of good stereopsis is 8 sec of arc or less.[4] The distribution of aniseikonia was slightly biased toward left-nearer. This may have been due to a small calibration error or else to a bias in the relatively small sample. With one exception, aniseikonia did not exceed 8 sec. An aniseikonia of 8 sec corresponds to a retinal image size difference of 0.6%.



Histograms showing the group's distribution with respect to stereoacuity and aniseikonia for the perfect and absolute threshold criteria. N=40.

Discussion

Asymmetrical thresholds of stereopsis were found for 88% of the group. The asymmetries were small with half being less than 4 sec. An examination of the data in Table 1 and in particular those of subject M.L. (who repeated the test 4 times) suggests that asymmetries were real and not just an artifact of the test.

The idea that aniseikonia can be calculated from these asymmetries is probably original. Nevertheless, it has not been demonstrated that the asymmetries measured here have been caused by aniseikonia. Aniseikonia of such small amounts (i.e. 0.6% or less) is probably of no clinical significance and may be typical of residual aniseikonia.

When bilateral thresholds of stereopsis lose their identity in a unilateral arrangement, stereoacuity is less certain. At first, I thought that a unilateral arrangement would always give an underestimate of stereoacuity. After examining these results I find that overestimates are possible also. The results of subjects M.L. show an underestimate with the perfect threshold and a slight overestimate with the absolute threshold. On the other hand, subject N.T.'s stereoacuity was underestimated with both threshold criteria.

Head position changes during the test might have caused unequal thresholds. To investigate this possibility, an experienced subject (whose thresholds were invariably equal) performed the test with the head rotated 6 deg to the left and again with it rotated 6 deg to the right. In both positions, the absolute thresholds remained equal and unchanged. Therefore, it is unlikely that small differences in head position (which were never as great as 6 deg) caused thresholds to be unequal.

Among other things, the results of this study have demonstrated the versatility of the test system and have shown that bilateral thresholds of stereopsis are often unequal. In addition, it has been demonstrated that estimates of stereoacuity are more precise when the bilateral nature of the data is recognised. It has also been shown that zero disparity is not different from other disparities. In some instances, it is above the threshold of stereopsis (subject N.T., Table 1).

Aniseikonia was calculated from threshold asymmetries with the assumption that retinal image size differences caused these asymmetries. Nothing in this study has demonstrated that assumption to be true. To demonstrate this, another study is required in which retinal image size differences are induced artificially by means of afocal size lenses. Aniseikonia will have been found measurable, if threshold inequalities vary in accordance with apparent rotations of the frontoparallel plane.

Acknowledgement

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4. Howard, H.J., A test for the judgement of distance. *Am. J. Ophthal.* 2: 656-675, 1919.

PROFILES IN HISTORY

Fifty Years of Optometric Education
The Continuing Education Program of the Saskatchewan Optometric Association**

W.A. Forsyth*

Abstract

This paper reviews the history of the origin, development and progress of the Saskatchewan Graduate Summer Courses. It reveals the responsible attitude of those pioneer optometrists towards the need for education in the discharging of their professional responsibilities, and this prior to the acceptance of continuing education by optometry and other disciplines.

Abrégé

Ce travail est un exposé historique des origines du développement et progrès du programme d'éducation continu des optométristes de la Saskatchewan. Il révèle la prévoyance de ces pioniers sur la necessité d'une bonne formation dans l'accomplissement de leurs taches professionnelles et ça, avant même que le principe de l'éducation continu aie gain de cause parmi les professionnels de la santé.

As optometry matures and moves toward a full acceptance of its role as a provider of primary health care, its practitioners should remind themselves of the traditions which they have inherited. One of the finest of these traditions had its origin, of all places, in the sparsely populated mid continental province of Saskatchewan. During this year of 1983 we celebrate the 50th session of the Saskatchewan Optometric Association's Continuing Education Course . . . . a North American record holder for educational presentations of this kind!

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**Presented at the 1982 Annual Meeting of the Saskatchewan Optometric Association

(To set the statistically minded at ease, it should be explained that while the first Saskatchewan Summer Course was held in 1930, the 1983 session is labelled as number 50 because the 1935 course was cancelled following the sudden death of the principal lecturer, the 1940 and 45 sessions were victims of World War II, and the 1951 version was fused with the C.A.O. Congress in Winnipeg.)

Of course longevity alone is no measure of the value of the educational program; in this case the high standard of academic content that has existed from its inception is the key factor in its success. The level of excellence that has been achieved is almost entirely due to the co-operation of the University of Saskatchewan, the faculty members of its College of Medicine, the dedicated work of fifty organizing committees, and the unselfish contributions of many pioneers of optometric education in the United States and Canada.

For the background leading up to the beginning of Saskatchewan's program of continuing education I have drawn on the archives of the S.O.A., and to certain recollections of conversations with my father, whose name first appears on the register in 1911. It has been difficult to avoid over dependence on his anecdotes concerning friends and colleagues in the early days of optometry.

To fully appreciate the significance of their interest in professional education we must remember that our optometric forbearers were recruited mostly from the ranks of pharmacists and jewellers. In order to receive an exempt licence under the Optometry Act of 1911, one had only to produce evidence of having practised spectacle fitting with a trial frame and lenses. Most of these "Grandfather Clause" exempts later sat for their professional examinations, and their interest in improving their level of education indicated a genuine desire to better serve those who consulted them.

Typical efforts at continuing education are indicated in some excerpts from early minutes of the Saskatchewan Optometric Association. At the annual meeting of May 22, 1913 it was moved by Chas McDonald, seconded by T.S.J. Ivay, 'that the executive committee provide an educational programme, and that the executive have power to add for this purpose'. At the annual meeting in 1914 it was moved by Mr. Wheatley, seconded by Mr. Culp, 'that 8 meetings, (2 in each city) be held by the education committee in Prince Albert, Saskatoon, Moose Jaw, and Regina'. At the same meeting it was agreed that the following books be approved for use by members attending these meetings; Thorington "Refraction", Lewis "Optical Dictionary", Talbot "Diseases of the Eye", and Cross "Dynamic Skiametry". At a meeting in 1917 it was moved by Mr. Culp, seconded by Mr. Wheatley, 'that the Education Committee provide lectures in trigonometry', and it was explained that the reason for the motion was to allow members to study properly Lionel Laurance's book on Optics.

During the 1920's optometrists were becoming more aware of their professional responsibilities and also of their educational deficiencies. In January 1920 the president of the association was authorized to contact every member with a recommendation to write the Education Department of the American Optometric Association for enrollment in their "complete course". Tuition fees were four dollars and fifty cents! Later in the same year members enjoyed their first medical lecturer, Dr. G.R. Morse, at the annual meeting in Saskatoon. That meeting also suggested that a 4 day post graduate course be arranged, with W.G. Maybee as lecturer. It was March 1922 when this event took place, with lectures on Subjective Testing, Ophthalmometry, Ocular Muscles, Prisms and their Uses, and Dynamic and Static Skiametry.

At this point in time the University of Saskatchewan was well into the second decade of its life, and was offering a partial medical course which took students to the end of their second pre-clinical year. There was some question concerning optometrists becoming recipients of knowledge from such an august institution, but President Walter C. Murray held very strong views regarding the duties of a fledgling university to its constituents. With his help, and a good deal of tolerance from the Dean of Medicine, W.S. Lindsay, a two week summer program for optometrists was scheduled for August 1930. At a luncheon held to mark the 25th anniversary of the course, Dr. Lindsay made a brief speech in which he admitted that he had not expected it to survive the spartan environment into which it was born.

Sole lecturer for the first session was R.T. McGibbon, M.B., ChB., who was in effect the entire Department of Anatomy. His fiefdom was a section of the university greenhouses which had been preempted from the College of Agriculture. The experience of meeting their first cadaver on a sultry August day with the sun beating down through the glass must have provided an impressive initiation for students. Lectures were held from 9:00 a.m. to noon each day, with demonstrations from 1.30 to 4.00 p.m. The ten days of work provided Dr. McGibbon with an honorarium of $125.00, while optometrists had board and room in Qu'appelle Hall for about ten dollars a week. Reports state that levels of scholarship and fellowship were both very high.

The format of a two week program in basic health sciences was continued in 1931 and 1932, with Dr. John Fiddes instructing in the elements of physiology, and Dr. Lindsay introducing the subject of pathology. Attendance was not large, though it represented almost half of the registered optometrists in the province.

It was decided to reduce the 1933 course to six days, and to allot half of the lecture time to an optometric educator. Dr. McGibbon agreed to spend four hours daily on the anatomy of the eye and the central nervous system, while Dr. Julius Neumeuller came from the Pennsylvania State College of Optometry to lecture on aniseikonia, campimetry, and orthoptics. It was at this time that the American Optical Company was funding an extensive program of physiological optics at Dartmouth College from which men like Neumeuller benefitted greatly. The distinguished optical scientist Dr. Charles Sheard received assistance from the same company for his work on the accommodation-convergence relationship, and he too was a guest lecturer in these early days of Saskatchewan optometry.

The untimely death of Dr. McGibbon caused cancellation of the 1935 course, but it was resumed the following year with his successor, Dr. J. Jackson delivering what was to be the first of a number of presentations in anatomy and neurology. 1936 was also the first appearance of Edwin Bind, who was an instructor in optics at the Toronto Technical School, and editor of the Canadian Journal of Optometry.

In the decade commencing around 1935 the Optometric Extension Program became a major force in continuing education. Its gospel of a 21 point examination spread far and wide, and was reflected in Saskatchewan by the appearance of O.J. Melvin, A.M. Skeffington, Carl Shepherd, and Louis Jacques. However during the same period a balanced diet of scientific content was maintained by lectures from U. of S. faculty members, and visitors such as Charles Sheard, Glenn Fry, E.J. Fisher, and Kenneth Stoddard. Throughout most of this period the S.O.A. Education Committee was co-chaired by F.C. Culp and W.W. Forsyth.

Lest our predecessors be accused of all work and no play, it should be recorded that in 1939 at attempt was made to combine holiday spirit with continuing education, and the course was moved to Prince Albert National Park. Unfortunately the weather was excellent, and attendance at the golf course and on the beach outnumbered that in the lecture hall. Physiologist John Fiddes was reported to have enjoyed the fellowship immensely, but seemed less impressed by the educational impact of his teaching.

Because of difficulties in travel arrangements during wartime the 1940 and 1945 sessions were cancelled, while changes in campus activities caused a shift in dates from August to May.

For many years the format of the summer course remained virtually unchanged: usually one visiting lecturer accompanied by presentations by one of the resident faculty. However in 1954 Murray Bauer and his committee decided to offer a more varied program with Henry Hofstetter of Indiana University as visitor, and two lecture appearances each by an anatomist, a pathologist, an internist, two psychiatrists, an illumination engineer, and a College of Education reading specialist.

In his first year as chairman R.C. Campbell showed that he was not to be outdone in the field of innovation when in addition to a very solid core program he presented Professor Paton from the Department of Philosophy in twin lectures entitled "Science as Method", and "Science as Morality".

Although the transition to a full medical college on the Saskatchewan campus had begun a few years earlier, the Department of Ophthalmology was not inaugurated until 1955, when Robert G. Murray returned to his Alma Mater to organize the facility. By 1958 the effect of this addition was evident in the continuing education program. In that year Meredith Morgan of the University of California at Berkeley was the featured visitor, with practising ophthalmologists C.H. Andrew and Lloyd Probert lecturing on "Vision and Driving", and "Squint Surgery", respectively. Stephen Drance, Director of the Glaucoma Clinic, spoke on his sub-specialty, while Dr. Murray chaired a symposium on "Headache" with the participants from neurology, internal medicine, ophthalmology, optometry, and otolarnygology.

In the years 1951, 55 and 69 the Saskatchewan program was modified to fit in with biennial congresses of the Canadian Association of Optometrists, an adjustment that is likely to re-occur in 1985 when Regina is host city for the annual meeting.

Throughout its history the continuing education program has reflected changes in optometric practise. For example, the widespread acceptance of contact lenses has resulted in an increased number of lectures and demonstrations concerning their use and abuse, demographic trends have aroused more interest in geriatric optometry, the so called electronic revolution has drawn attention to new possibilities in clinical measurement of visual functions, and the use of diagnostic drugs has received a good deal more attention, as have the ocular effects of an ever broadening spectrum of prescribed medications.

In recent years the absorption of the College of Optometry of Ontario into the University of Waterloo has brought greater stability to optometric education in Canada, with a corresponding increase in the potential for inter-reaction between academics and practitioners. A sampling of opinions of recent graduates appears to indicate increased interest in programs of continuing education, albeit with some differences in course content.

A less tangible but important benefit of the annual continuing education courses has been the friendships that have developed between students and faculty alike. It has long been the policy of committee chairmen to avoid the creation of a convention type atmosphere, though they have usually provided one or two social functions for deserted spouses. The tradition of the Common Room was begun during the time of two week sessions in Campus residences, and has been continued with happy consequences. The relaxation of an afternoon on the golf course was apparently required in the 1930's, abandoned in the 1950's and revived by popular demand in the 1970's.

One traditional gathering that can never be fully revived is the chicken barbeque that for many years constituted the closing ceremony of the lecture week. It was hosted by the late Newton McGregor and his wife Irma at their "Ranchette" which was located a few miles from Saskatoon. This occasion is referred to as having featured the longest cocktail hour and the latest late night sing song of any annual optometric gathering. One visiting lecturer was kind enough to describe it as an invaluable post graduate course in the sociology of a northern ophthalmic community.

The Saskatchewan program has carried several official titles during its lifetime, amongst them being "Summer Course", "Summer Extension Course", "Post Graduate Course", and "Continuing Education Program". Probably the reasons for its success are even more varied than its titles. Certainly a key factor in that success has been the development of a tolerant and stable relationship between administration and faculty of the University of Saskatchewan and successive Optometric Education Committees; the continued desire of practitioners to consume the educational "product" that has been offered must also rate high on the list, as does the dedication of educators of many academic disciplines who have shared their knowledge, sometimes at the cost of great personal inconvenience.

Almost from the beginning details and planning for the annual educational program have been a responsibility of members of the Saskatoon Optometric community, and a succession of committee chairmen have served their colleagues with dedication. While the number of Saskatchewan optometrists in attendance has varied greatly, members of neighbouring associations, especially Alberta, have filled the gap. There has been registration from all of the western provinces, as well as from western Ontario and the north central United States. Since there is no evidence of failure on the part of any of its life support systems, we can expect the Saskatchewan program of Continuing Education to serve the profession for at least another 50 years.

Acknowledgement

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Lecturers at Saskatchewan Optometric Association Program of Continuing Education 1930 to 1982.

University of Saskatchewan, College of Arts and Science

Department of Chemistry	Joseph Angel, 1979
Department of Physics	Balfour Currie, 1946
Department of Philosophy	D. Paton, 1957
Department of Psychology	B.M. Springbett, 1948; R. Rees, 1949 G.M. McMurray, 1953.

University of Saskatchewan, College of Education A.F. Deverell, 1954, Jean H. Catterson, 1967, John McLeod, 1969, 1973.

University of Saskatchewan, College of Engineering W.E. Lovell, 1954, Eric R. Thrun, 1964

University of Saskatchewan, College of Law I. Saunders

University of Saskatchewan, College of Medicine

Anatomy R.T. McGibbon, 1930, 31, 33; J. Jackson, 1936, 37, 41, 42, 43; W. Fritsche, 1956; F.B. Cookson, 1965; M. Groenendijk, 1957; Stanley Mercer, 1954; N.G. Ferrer, 1971.

Cancer Research R.W. Begg, 1959.

Ophthalmology C.H. Andrews, 1958; I.A. Chisholm, 1976; A.P. Cullen, 1971; Stephen Drance, 1958, 59, 61, 62; C.C. Ewing, 1968, 72, 73, 74: C. Howden, 1960; R.G. Murray, 1958, 59, 61, 62, 69; E. Ross, 1973, 74; R.J. Schneider, 1968, 72, 73, 74, 81.

Otolaryngology E. Stark, 1958.

Psychiatry Frank Cowburn, 1966; Eloise Jones, 1970; D.L. Deegan, 1972; P. Matthews, 1974; Ian MacDonald, 1961, 66, 67; Jessie McGeachy, 1954; D. McKerracher, 1954; Colin Smith, 1964; E.B. Wiltshire, 1967.

Pathology W.S. Lindsay, 1932, 35; Jack Newell, 1954.

Medicine R. Altschul, 1941, 42, 43, 44; J. Dundee, 1958; L.B. Jacques; L. Horlick, 1954, 55.

Physiology J. Fiddes, 1932, 38, 39; J. Miller, 1947, 64; L. Hamilton, 1955; D. Johnson, 1966; R. Hickey, 1967.

Neurology and Neurosurgery E.M. Ashenhurst, 1964; A.A. Bailey, 1955; C. Bolton, 1966; D. Baxter, 1958, 61; D.J. McFadyen, 1965; J. Stratford, 1957.

University of Alabama J.B. Eskridge, 1973.

University of California Berkeley Campus: D. Carter, 1967; M. Hirsch, 1959; M. Flom, 1963; R. Mandell, 1975; M. Morgan, 1955, 58, 69; K. Stoddard, 1949; G. Walls, 1960.

University of Houston D. Carter, 1964; A. Cullen, 1976; D. Levi, 1976; J. Rosner, 1979.

Indiana University M. Allan, 1961; I. Borish, 1971; N. Bailey, 1957; G. Heath, 1962; H. Hofstetter, 1954, 69.

Ferris State University G.E. Lowther, 1979.

University of California Los Angeles Campus, L.A. May, 1979.

The Ohio State University V. Ellerbock; Glenn Fry, 1946; F. Hebbard, 1965; R.M. Hill, 1978; H. Hofstetter, 1947.

University of Montreal C. Beaulne, 1969.

New England College of Optometry J. Rosner, 1977.

Northern Illinois College of Optometry C. Shepherd, 1943.

Pennsylvania State College of Optometry J. Neumueller, 1933.

Pacific University Harold Haynes, 1953.

University of Waterloo (Including College of Optometry of Ontario) M. Callender, 1974; A. Cullen, 1980; D. Egan, 1982; E.J. Fisher, 1948, 55, 62, 66, 69; T. Grosvenor, 1973; W. Long, 1977; W. Lyle, 1971, 80; J. Lovasik, 1981; S. Riome, 1978; T.D. Williams, 1981; G. Woo, 1975; E. Woodruff, 1970, 82.

Clinical Lecturers without specific academic affiliation H.C. Arnold, Saskatoon, 1974; R. Bannon, Southbridge, Mass. 1959; E. Bind, Toronto, Ont., 1936; T.E. Blackwell, Saskatoon, 1982; P. Blais, Ottawa, 1982; L. Brand, Saskatoon, 1978; J. Copeland, Rochester, N.Y., 1958; R. Drew, Murray Hill, N.J., 1964, 73; D.A. Frantz, DeKalb, Ill., 1964; R.S. Gulka, Saskatoon, 1979; J.E. Josephson, Toronto, 1980; G.N. Getman, Luverne, Minn, 1972; H.W. Jervis, Vancouver, 1961; I.M. Lane, Woodbury, N.Y., 1981; F.H. McWilliams, Moose Jaw, 1978; O.J. Melvin, Omaha, Neb. 1938, 39; T.R. Murroughs, Santa Barbara, Calif., 1974; R.M. O'Donnell, Kindersley, 1976; Edna Osborne, Saskatoon; L. Probert, Moose Jaw, 1958; G. Renier, Fargo, N.C. 1982; H.J. Renpenning, Saskatoon, 1978; J. Rowand, Edmonton, 1964; Charles Sheard, Rochester, Minn. 1932, 44; G. Sheridon, Toronto, 1965; G.L. Skinner, Chicago; G. Sheasby, Yorkton, 1978; E.W. Smith, Saskatoon, 1977; J.B. Turnbull, Regina, 1979; Newton Wesley, Chicago.

Chairmen of Continuing Education Summer Course for Saskatchewan Optometric Association

Frank C. Culp, Prince Albert	1930 to 1935
Frank C. Culp W.W. Forsyth co-chairmen	1936 to 1949
Newton C. McGregor	1950 to 1953
Murray Bauer	1954 to 1956
R.C. Campbell	1957 to 1959
W. Austin Forsyth	1960
M.F. Stadnyk	1961 and 1962
Jack F. Chaplin	1963
M.F. Stadnyk	1964 and 1965
G. Greenblat	1966 to 1968
Brent Beaton	1969 to 1971
M.F. Stadnyk	1972
R.S. Gulka	1973 and 1974
O.E. Panchuk	1975 to 1977
O.E. Panchuk D.J. Kerr co-chairmen	1978
D.J. Kerr	1979 to 1981
Garry W. Hayes	1982 and 1983

Season's Greetings

The President, Council and Staff of The Canadian Association of Optometrists

Meilleurs Vœux

Validité Prédictive des Tests d'Admission en Optométrie en Fonction des Tables de Taylor-Russell

J. Letourneau*
J. Bourgignon**
R. Giroux***

Abrégé

La pertinence de quatre tests d'admission au succès dans les études d'optométrie font objet de cette étude. Les résultats des tests sont comparés au dossier académique des candidats au cours de trois derniers trimestres de leurs études avant de faire une demande d'admission ainsi qu'aux différents sujets du programme en optométrie. L'usage des tables Taylor-Russell dans l'analyse des résultats peut rehausser le valeur prédictive de ces tests d'admission.

Abstract

The relevance of four admission tests to success in optometry studies is the subject of this paper. The test results are compared to the candidate's academic record during the last three trimesters prior to applying for admission to optometry and related to the various subjects of the optometry curriculum. The use of the Taylor-Russell tables in evaluating the results may enhance the predictive value of the admission tests.

Le but de cette étude était d'évaluer une batterie de tests d'admission à l'École d'Optométrie de l'Université de Montréal. Ces tests sont nécessaires étant donné que seulement 9% des candidats qui ont fait une demande d'admission, chaque année, depuis 1974 ont été acceptés. Ce taux de sélection est un des plus exigeants à l'Université de Montréal.

Deux critères ont été utilisés: le dossier scolaire et les résultats obtenus aux tests d'admission. Le dossier scolaire de chaque candidat a été transformé en cote z. Cette transformation nécessite la connaissance des notes obtenues par tous les candidats, dans les 60 collèges d'où ils proviennent pour chaque cours suivi. La cote z d'un candidat dans un cours s'obtient en soustrayant la note qu'il a obtenue du résultat moyen du groupe divisé par l'écart-type du groupe.

Les cotes z obtenues dans chaque cours sont additionnées pour être transformées en cote z moyenne. Des milliers de données brutes doivent être ainsi compilées et transformées au cours d'un échange d'informations entre ordinateurs.

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L'ordinateur central de l'université (CYBER-173) imprime une liste des candidats qui ont rempli une demande d'admission à l'Ecole d'Optométrie en indiquant la cote z moyenne qu'ils ont obtenue au cours des trois trimestres précédant la demande d'admission. Seulement 28 des 42 candidats admis sont inscrits sur cette liste; les 14 autres candidats appartiennent à d'autres catégories dans le système des quotas et sont évalués selon une méthode différente.

Tests

Les 150 candidats qui obtiennent les cotes z les plus élevées sont soumis à 4 tests:

test 016 (compréhension verbale). Cette épreuve met en jeu la capacité de saisir le sens et les implications d'un texte. Elle demande que l'on comprenne suffisamment la signification d'un court texte pour être capable de choisir, parmi plusieurs possibilités, l'énoncé qui le continue le mieux.

test 104 (habileté perceptuelle). Ce test a pour but d'évaluer l'habileté à passer de la représentation d'un volume en deux dimensions à sa représentation en trois dimensions. Il demande que l'on soit capable d'analyser les volumes présentés et d'en comprendre la structure afin de prévoir les

transformations subies par ces volumes après que l'on y ait pratiqué des coupures.
test 215 (raisonnement). Ce test fait appel à la capacité de déduire la conclusion logique d'un ensemble d'énoncés. Plus précisément, il porte sur l'aptitude à évaluer la qualité logique de différentes conclusions tirées de diverses séries d'énoncés.
test 402 (mémoire). Cette épreuve fait appel à la capacité de mémoriser des mots ou des relations entre des mots. Elle comprend deux parties, une partie "apprentissage" et une partie "exercice".

Les résultats sont commulés de la façon suivante:

z	cote z moyenne des 3 trimestres antérieurs à l'admission
TEST	résultats comulés aux tests
016	résultat au test de compréhension verbale
104	résultat au test d'habileté perceptuelle
215	résultat au test de raisonnement
402	résultat au test de mémoire
SCAD	cote z (70%) + test (30%)

Les variables prédites sont les suivantes:

*ANI 1952	Anatomie humaine
*ANI 1981	Histologie humaine
*ANI 2991	Anatomie oculaire
*MCB 2984	Microbiologie
OPM 1101	Optométrie 1.1
OPM 1102	Optométrie 1.2
OPM 1103	Optométrie 1.3
OPM 1201	Optique appliquée 1.1
OPM 1202	Optique géométrique
OPM 2101	Optométrie 2.1
OPM 2102	Optométrie 2.2
OPM 2103	Pharmacologie
OPM 2201	Optique appliquée 2.1
OPM 2301	Lentille cornéenne
OPM 2401	Rééducation visuelle 2.1

Resultats

Corrélations entre les critères de sélection et les cours

	COTE z	TEST	016	104	215	402	SCAD	N
ANI1952	.445*	-.142	-.335	-.165	.101	-.043	.347	27
ANI1981	.504**	-.051	-.011	-.163	.067	-.087	.460**	28
ANI2991	.551**	.016	.011	-.194	-.038	.197	.546**	28
MCB2984	.438*	.185	-.041	.044	.098	.349	.536**	28
OPM1101	.397*	.243	.028	.227	.001	.254	.530**	28
OPM1102	.365	.089	.188	-.211	-.128	.281	.408*	28
OPM1103	-.048	.354	.371	-.200	.132	.486**	.162	28
OPM1201	.280	.299	.293	.031	.126	.214	.449*	28
OPM1202	.434*	.065	-.169	.166	.113	-.052	.461*	28
OPM2101	.324	.263	.031	.205	.228	.140	.471**	28
OPM2102	.027	.192	.280	-.073	-.104	.446*	.140	28
OPM2103	.419*	.410*	.191	.248	.178	.352	.650**	28
OPM2201	.484**	.423*	.322	.278	.117	.245	.721**	28
OPM2301	.556**	.016	.114	-.173	-.055	.142	.550**	28
OPM2401	.415*	-.254	.072	-.573**	-.205	.083	.253	28
OPM2501	.341	.083	-.038	-.212	.133	.316	.380*	28
OPP1003A	.476*	.057	-.031	-.026	.149	-.035	.497**	28
OPP2008	.459*	.076	.004	-.185	-.011	.367*	.492**	28
OPP2009	.235	.244	.058	.003	.077	.440*	.373	28
OPP2010	.392*	-.037	-.052	-.189	.051	.036	.359	28
OPP2011	.529**	.193	.114	.111	-.087	.298	.629**	28
OPP2012	.421*	.261	.128	.038	.053	.401*	.564**	28
PHY1982	.367	-.294	-.156	-.143	-.383*	-.001	.182	28
PHY1984	.155	.119	.118	-.034	.327	-.161	.219	27
PSL1974	.393*	.245	.065	-.074	.218	.288	.527**	28
PSY1970	-.028	-.068	.112	-.377*	-.065	.076	-.067	28
PTL1976	.512**	-.057	-.119	-.237	-.249	.401*	.464*	28
cote z (le année)	.508**	.146	.053	-.088	.076	.201	.580**	28
cote z (2e année)	.607**	.184	.144	-.177	.034	.309	.704**	29

*$p < 0.05$
**$p < 0.01$

OPM 2501	Pathologie oculaire
OPP 1003A	Optique physiologique 1.1
OPP 2008	Optique physiologique 2.1
OPP 2009	Optique physiologique 2.2
OPP 2010	Optique physiologique 2.3
OPP 2011	Optique physiologique 2.4
OPP 2012	Optique physiologique 2.5
**PHY 1982	Optique
**PHY 1984	Optique (laboratoire)
*PSL 1974	Physiologie
***PSY 1970	Psychologie
*PTL 1976	Pathologie

*Cours donné par la Faculté de Médecine
**Cours donné par le Département de Physique
***Cours donné par le Departement de Psychologie.

Discussion

La cote z prédit le mieux les futurs résultats scolaires. La scolarité antérieure est en corrélation significative avec le rendement à 17 cours. Les corrélations entre la cote z et les moyennes générales en première et en deuxième année du cours sont aussi significatives ($p<0.01$).

La note globale utilisée lors de la sélection (SCAD) est composée de la cote z et des résultats aux tests. Les corrélations sont significatives entre l'échelle SCAD et 18 cours. De plus, les corrélations entre l'échelle SCAD et les résultats scolaires en première et deuxième année du cours sont significatives ($p< 0.01$).

Un petit nombre de tests sont en corrélation significative avec certains cours. Toutefois, des corrélations négatives apparaissent entre le test d'habileté perceptuelle (104) et PSY 1970 et OPM 2401, entre le test de raisonnement (215) et PHY 1982. Des corrélations positives apparaissent entre le test de mémoire (402) et six cours, dont trois sont dans la série optique physiologique. Le test de mémoire (402) est le seul test pour lequel on obtient des corrélations positives significatives avec des cours spécifiques.

Toutefois, des tests dont la corrélation avec le critère est peu élevée peuvent avoir une valeur prédictive lorsque les tables de Taylor-Russell sont utilisées (Taylor and Russell, 1939). Dans une évaluation de groupe, une diminution du taux de sélection peut suppléer à un coefficient de validité élevé; une telle substitution n'existe évidemment pas si le test n'a aucune validité (Tiffin and McCormick, 1965). Dans ce groupe d'étudiants, plus de 90% réussissent tous les cours et peuvent être considérés comme répondant au critère. En choisissant dans les tables de Taylor-Russell celle qui correspond à 90% des étudiants satisfaisants, nous trouvons par exemple, dans la rangée représentant un coefficient de validité de 0.15 et dans la colonne représentant un taux de sélection de 0.10, la valeur 0.94. Cette valeur signifie que dans les conditions spécifiées, 94% des étudiants choisis obtiendront des résultats satisfaisants au lieu du 90% atteint sans le test.

Toutefois, étant donné qu'une mesure valide a été utilisée (cote z) avant l'administration des tests, Smith (1948) suggère une autre façon d'utiliser les tables de Taylor-Russell et il soutient que cette table fournit une meilleure évaluation de la proportion d'individus qui seront considérés comme adéquats. Dans ce cas, toutefois, la méthode suggérée par Smith prédit aussi qu'en utilisant les tests, 94% des étudiants répondront adéquatement aux critères.

Les tables de Taylor et Russell (1939) sont basées sur les tables de Pearson pour déterminer les volumes de la surface normale bi-variée et conséquemment postulent une distribution normale bi-variée. Ces tables ont une valeur limitée lorsque la surface de la corrélation est triangulaire plutôt qu'elliptique; ce phénomène se produit lorsque les résultats au test et les résultats obtenus au critère ne correspondent pas à une distribution normale bi-variée. La triangularité d'une distribution correspond souvent à une valeur prédictive plus élevée lorsque les résultats obtenus au test sont faibles et à une valeur prédictive moins élevée lorsque les résultats obtenus au test sont très bons (Smith, 1948).

L'intérêt principal de ces tests réside dans le fait qu'ils compensent en partie pour les valeurs différentes des cotes z. Les cotes z indiquent les résultats (ou le rang) d'un individu à l'intérieur du groupe auquel il appartient. Toutefois, les groupes à l'intérieur desquels les cours préparatoires à l'optométrie sont suivis ne sont peut-être pas équivalents. Si les cotes z étaient utilisées seules, un individu ayant une cote z faible dans un groupe où les standards sont élevés pourrait être pénalisé en étant comparé à un candidat ayant une cote z élevée dans un groupe où les standards sont plus bas. Deux candidats ayant la même cote z et appartenant à deux groupes dont les normes diffèrent sont probablement mieux évalués en ajoutant ces tests; le candidat appartenant au groupe dont les normes sont plus élevées devrait obtenir des résultats plus élevés aux tests. Cette hypothèse pourrait être vérifiée s'il était possible d'évaluer le calibre de chaque groupe dans chaque institution.

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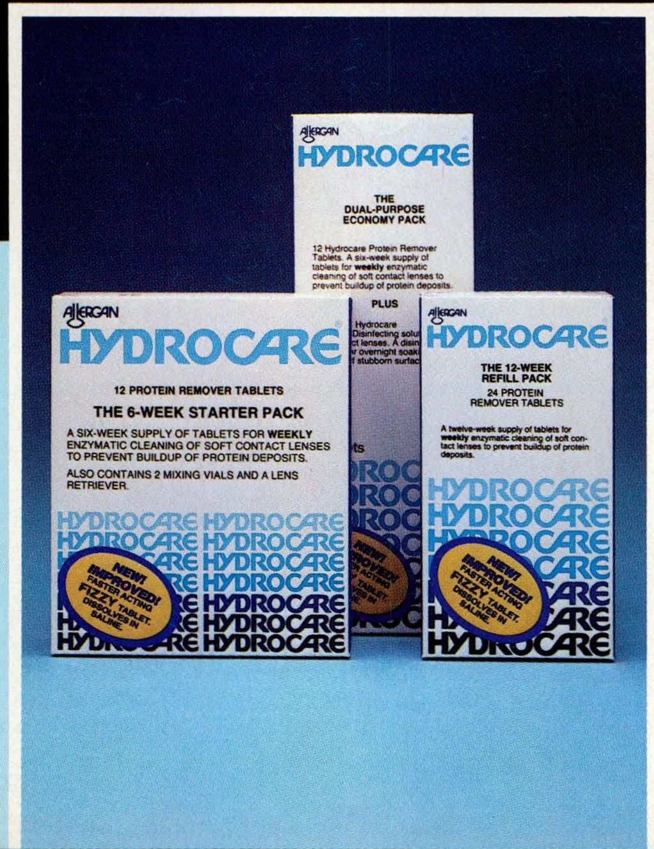
INTRODUCING



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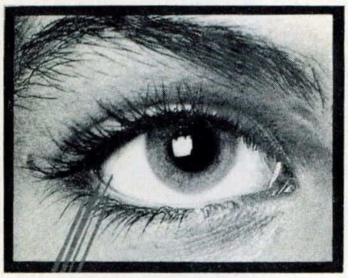
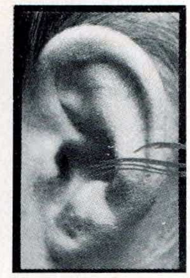


EXPO OPTICA



Expo Optica, held last May in Madrid, was conceived as a national optical exhibition whose objective was to create a greater sensitivity to the Spanish Optical Industry's capabilities among the general public, the various professions, not to mention an opportunity for the manufacturers, distributors and importers to assess their own relative potential.

The exhibition was organized by IFEMA, the Madrid Trade Fair organization, with the support of the concerned professional associations and the association of manufacturing and distributing firms. That IFEMA was able to obtain the sponsorship of eight groups speaks well for the abilities of the organizers and indicates that all concerned groups realize that progress comes from co-operation and a common effort. In fact, it can be said that this co-operation is an example to the world where all too often open rivalry and distrust divide similar groups in other countries.

For the benefit of our readers, we list the following sponsoring groups:

National Association of Opticians and Optometrists of Spain.
General Council of Pharmaceutical Associations.
General Council of Medical Associations.
Association of Friends of University Schools of Optics.
National Association of Audioprosthetists (ANA).
National Association of Pharmacists Specializing in Optics and Acoustics (AFOA).
Spanish Optics Society (SEDO).
Spanish Otochinolaryngology and Cervicofacial Surgery Society.

Just reading this list reveals several possible areas of conflict which were overcome in the better interests of these groups and the Spanish public which they all serve.

Expo '82 was the first such exhibition. It was so successful that a decision was made to repeat the event in 1983. Whether this fair will become an annual or biennial event has not yet been decided, as it competes with Silmo in Paris, Mido in Milan and the Optical Fair in the USA.

Nonetheless, Expo '83 was a great success.

An open invitation to attend was extended to the public. No admission was charged but visitors were requested to register (name, address, occupation) in order to evaluate the drawing power of the fair.

Students from the University School of Optics had a booth and raised funds by the sale of souvenirs related to optics. More importantly, their presence served to promote optometry as a career. The only international flavour to the event was the presence of representatives from Optometry Journals (Canada, England, France, Germany, Italy and one Scandinavian country.) The Spanish Trade Commission is attempting to develop its exports of optical goods and it is hoped that reports of the fair in these countries will create more interest in Spanish optical goods, and that foreign firms will seek to develop trade relations with Spanish manufacturers.

In the process of reporting activities at the fair, it is expected that some distinction will be made between firms manufacturing goods in Spain and those who act solely as importers or distributors of European, American and Japanese products.

It should be noted that Spanish manufacturing covers the following items:

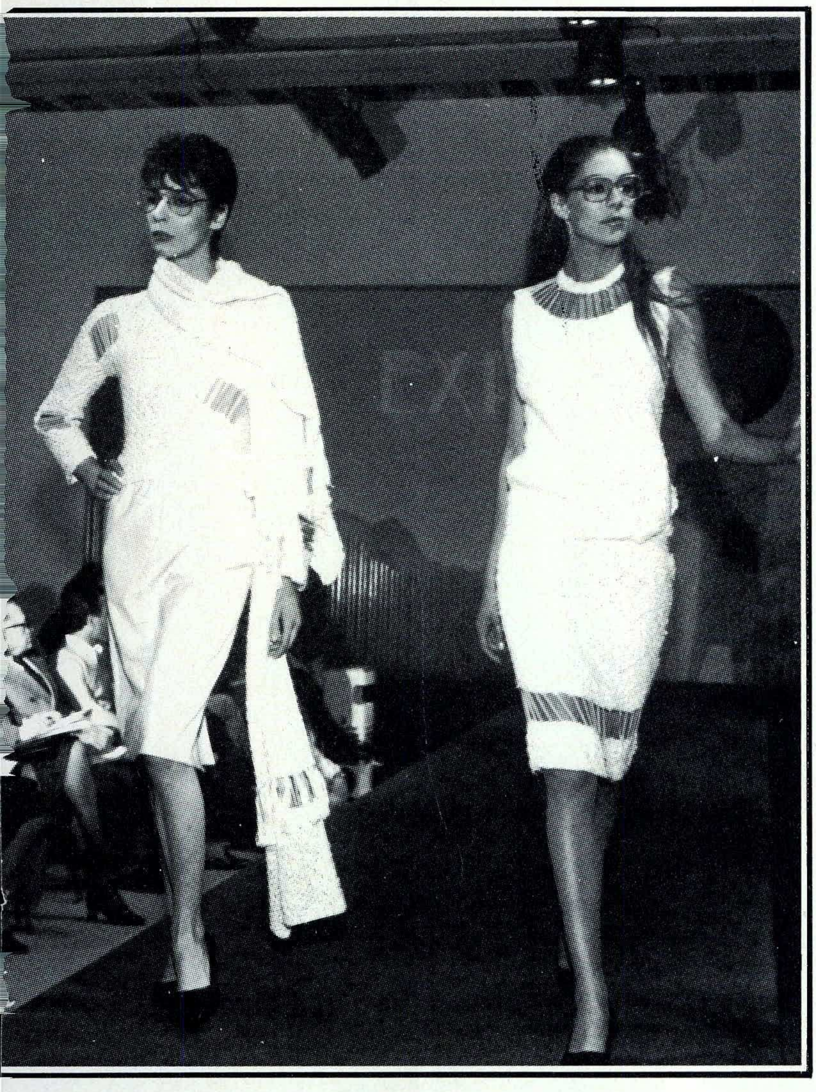
ophthalmic frames
sunglass frames and sunglass spectacles
ophthalmic lenses — there are no glass makers in Spain. Blanks are obtained from France, England and Germany (Schott, Corning and Pilkington)
hand tools — some of which this writer had never seen or even read about
lens edgers of all types, and other laboratory equipment
contact lenses
contact lens solutions
spectacle cases of unique design, chains, cords, cleaners
contact lens cases
contact lens lathes and other production machinery
diagnostic equipment
ophthalmic chairs, stands, examination room furniture and equipment.

It should be noted that Barbudo and Indo frames are to be found in Canada and that Bobes and Bosch, both manufacturers of diagnostic and examining equipment, have Canadian representatives.

Spectacle frames and sunglasses are typical Spanish design and manufacture. Contact lenses, both imported and locally manufactured, and solutions, are to be had.

Diagnostic Equipment is Spanish made, part of which is of local design and part of which is made under licence to American firms, and Japanese firms, but the more sophisticated electronic equipment is imported.

Laboratory equipment is, for the major part, of Spanish production and, again, made under licence. Stones for edgers are also of Spanish manufacture.



As in 1982, the organizers sponsored a frame design competition for Spanish makers. Six prizes were awarded: two for ladies', two for gentlemen's and two for children's frames. Winners were given a cash prize and an Optica Prism, a kind of "Oscar" consisting of a nine-inch upright prism, suitably engraved, into whose surfaces were ground three concave depressions, resulting in a unique refraction pattern when looking into the concavities.

The winners were featured at a spectacle and sunglasses fashion show on the first evening, reserved for special guests, members of the professions and the industry. It was repeated the next day for the general public.

The fair was organized by sections, although this was not too evident from the manner in which the exhibitors were located in the exhibit hall, a three-storey building.

These sections consisted of:

spectacle frames
contact lenses and solutions
ophthalmic lenses
diagnostic equipment
optical machinery
optical instruments, microscopes, binoculars, telescopes
hearing aids
audiometric (diagnostic) instruments
metrology
special light sources
associated industries — makers of metal parts for frames, hinges, metal temple screws, plaques, cases
the ophthalmic and optical press.

It seems strange to a North American visitor to see the presence of metrology instruments, hearing aids, binoculars and telescopes included in the fair. Historically, opticians did make and sell metrology instruments, telescopes and visual aids, and this explains their presence. Hearing aids are no longer truly connected to optics, as hearing aids no longer require spectacle frames to hold them.

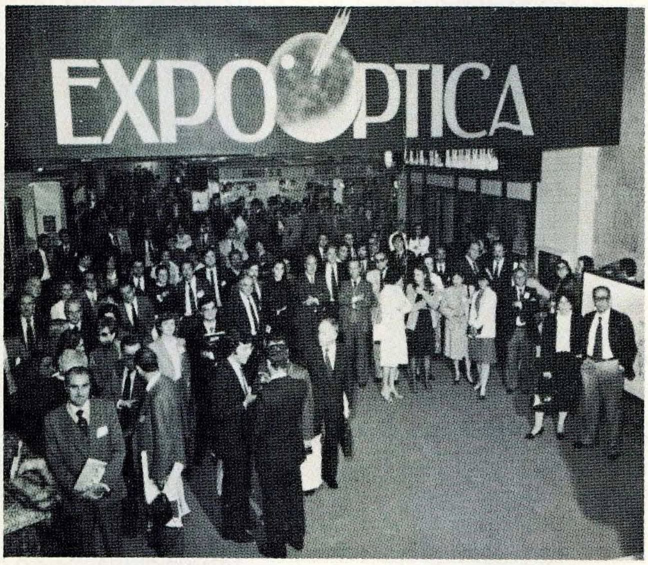
Scientific instruments, such as telescopes, microscopes and binoculars are of historical interest and, as the profession evolves into a true health care discipline, such accessory activities will cease. However, the need for low vision aids, optical or otherwise, will require the profession to maintain an interest in these devices.

The true metrology aspect, barometers, thermometers, certain time pieces, etc. have little real relationship to optics, other than the historical. Formerly, *all* these devices were handled by optical instrument makers. Here again, this relationship will decrease with the evolution of the profession.

A fair of this nature is a proper vehicle to publicize manufacturing and distributing enterprises in the optical industry, but all would be of no avail if the professions did not exist to provide the services essential to the consumption of optical products. It is, therefore, not out of place in a report of this nature to spend a few minutes describing the University School of Optics in Madrid, one of the two training institutions for Spanish optometrists.

We were privileged to have as our guide Sr. Don Pedro Jiminez Landi, former director and founder of the School.

At the outset, the School was a private institution, sponsored by the Spanish Institute of Optics, and the Professional Association of Optical Engineers. Enrollment was small, some 30 students in all. Training emphasized optics and optical engineering, rather than ophthalmic optics, physiological optics and clinical optometry.



Professor Landi, as Director of the School, realized that the progress of optometry as a health care discipline required a longer course, more broadly based, incorporating more physiological optics and clinical optometry, but in a university. He prepared a curriculum covering a four-year programme, and had it accepted by the Ministry of Education at the University of Madrid. Thus, in 1973, the Institute of Optics relinquished its authority over the school, which now became "Escuela Universitaria de Optica de Madrid".

Although the four-year curriculum has been approved, the present programme covers only three years. As development occurs, there should be no problem extending the curriculum to the full four years. A site on the main university campus has been set aside for the construction of a building specifically designed for optometry. The present faculty numbers thirty members, who average 18 hours of teaching per week. The students have a 40-hour week, and number some 400 in total. English courses are compulsory in two of the three years. Students may see 30 patients on their final year of clinic. This aspect is being reinforced as clinical subjects are given more importance.

Presently the school is housed in a half-vacant, off-campus building of the engineering faculty. The seven-storey building also houses the biology department on the upper two floors. The facilities are vast, even for a student body of 400. For example, the mechanical optics laboratory is housed in what was to have been a lab for heavy machinery. It resembles a factory, more than a classroom. The administration, lecture rooms and more optometrically-oriented classes are located in the regular section of the building. Optics and biology courses are provided by the university.

The physical inconveniences are not meant to imply poor or inadequate instruction. The curriculum seems to be at the level existing at our Ontario College in the late 1930's. Greater emphasis on pathology, neurology and clinical optometry is being carried out. The evolution of the programme is following the expected trends in development experienced by all countries, and should not be considered to be unusual. To this visitor, Spain will be one of the first continental European countries to reach the North American level in optometric education.

G.M. Belanger

CLINICAL

Identifying the Glaucoma Suspect

R. Pace*

Abstract

Factors to be considered in identifying patients who require additional investigation as glaucoma suspects are discussed. This includes intraocular pressure, anterior chamber, and optic disc features.

Abrégé

Ce travail est un exposé des facteurs à surveiller dans le dépistage d'un patient soupçonné de souffrir du glaucome. Il est question de la tension intraoculaire, la chambre anterieure et de l'apparence de la papille de Mariotte.

Glaucoma has traditionally been considered as a disease process associated with an increase in intraocular pressure leading to damage of nerve fibre bundles with associated field loss.[1a] This concept is being reconsidered in light of recent studies monitoring patients with chronically elevated intraocular pressures who fail to develop optic nerve changes or visual field defects.[1b,2] Although most glaucoma patients do, in fact, have an elevated intraocular pressure, most patients with an elevated pressure do not have glaucoma. Only a small number (i.e. 5% to 6%) of patients with ocular hypertension will go on to develop glaucoma.[3] Conversely, a normal intraocular pressure does not eliminate the possibility of open angle glaucoma being present.[4a]

Since intraocular pressure alone may not be a reliable indicator of the presence of glaucoma (except when highly elevated), the examiner must consider other factors in order to identify the glaucoma suspect. My purpose is to review the principal factors, including intraocular pressure, which identify the patient for whom additional investigation is indicated. It is not within the scope of this presentation to discuss specific methods of followup investigation, or by whom these procedures can be performed.

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Intraocular pressure

Investigators have identified the mean intraocular pressure to be approximately 16 mm Hg by applanation.[5,6] Intraocular pressures elevated 2 standard deviations above the mean (i.e. 21 mm Hg) would be found in about 2.5% of the population, and those 3 standard deviations (i.e. 24 mm Hg) would be found in about 0.14%.[7] Therefore, pressures of 20 mm Hg or below are considered statistically normal, those between 21 and 24 mm Hg are borderline, and pressures greater than 24 mm Hg are considered statistically abnormal.[8] Although patients with pressures of 21 mm Hg or greater are not necessarily physiologically abnormal, it remains that most patients with glaucoma do have intraocular pressures greater than 21 mm Hg.[4b] Differences of pressure between the two eyes can be considered significant when they are greater than 2 standard deviations from the mean difference (i.e. 4.1 mm Hg).[9] This difference, irrespective of the absolute pressure, indicates that the eye with higher pressure is hypertensive.[10] Therefore, it is advisable that patients exhibiting applanation pressures of 21 mm Hg or greater, or a difference of 4 mm Hg between eyes, should be regarded with suspicion.

Optic disc

Excavation of the optic nervehead with associated field defect is a recognized sign in glaucomatous eyes.[4c] In normal eyes the vertical and horizontal cup/disc ratio is highly correlated, and in most normal eyes the cupping is small. Only 15% to 16% of eyes with intraocular pressures under 20 mm Hg have a cup/disc ratio greater than 0.3.[11] Roy[12] has indicated a cup/disc ratio of 0.4 as significant and Cockburn[13a] has stated that a 0.5 ratio should arouse suspicion. Vertical ovalness of the optic disc cupping is also a reliable parameter in the assessment of the disc for predicting field defects.[14]

In normal eyes, the cup/disc ratio of each eye is equal. Differences between eyes of 0.2 occur in only 0.5% of the population.[13b,15a] Also of significance are eccentricities of cupping, irregularity of the nerve rim, and pallor of the disc.[15b] Disc hemorrhages have a high significance in optic nerve disease, particularly in glaucoma.[16]

Thus, further assessment is indicated in patients with cup/disc ratios of 0.5 or greater, asymmetry of 0.2 in cup/disc ratio between eyes, vertically oval cupping, cupping encroaching the disc margin, notching or undercutting of the rim, disc pallor, or disc hemorrhage.

Anterior chamber

There is an increased risk of glaucoma in patients with pigmentary dispersion syndrome.[13c] This consists of heavy pigment deposits on the corneal endothelium (Krukenberg's spindle), iris atrophy and pigment accumulation in the trabecular meshwork. A large proportion of patients with Krukenberg's spindles also exhibit pressures greater than 22 mm Hg.[17]

There is a correlation between the shallowness of the anterior chamber and angle closure glaucoma.[13d] The angle can be assessed using the Van Herick method using the biomicroscope.[18] Cockburn has suggested that gonioscopic evaluation is indicated when the Van Herick method shows an anterior chamber depth to corneal thickness ratio of 0.3 or less.[19]

It would therefore be suggested that further assessment be performed in pigmentary dispersion syndrome or with a narrowed anterior chamber angle.

Other considerations

Subjective symptoms of pain in and around the eyes, blurred vision, and haloes may be suggestive of narrow angle glaucoma. Any of these symptoms should prompt further assessment. Patients who report a previous history of glaucoma should be assessed in greater detail unless presently under treatment. Those with a family history of glaucoma are at higher risk,[20a] as are those with diabetes or coronary disease.[20b] These factors should be considered when other aspects of the case are borderline.

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Errata

In our *Summary of C.O.E.T.F. Grants since 1980* (September, 1983), one of the studies was incorrectly identified, and we inadvertently omitted two of the authors' names from the funded study. The entry should have read as follows:

Dr. J. Jantzi, Dr. W. Jackson, Dr. K.M. Smith, Surrey, B.C. ($4,000.00) for a study entitled the Incidence and Severity of Corneal Vascularization Induced by Soft Contact Lenses.

In the same summary, A grant of $2,500.00 was identified as having been awarded to Drs. A. Devon and M. Long of Thunder Bay. While the C.O.E.T.F. Trustees did vote to approve the award as identified in the summary, that project was, in fact, not carried out as developed, and no C.O.E.T.F. grant was received by Drs. Devon and Long.

The editors apologize to the above optometrists for the erroneous attributions which were made in this summary.

Spectral Transmittance of Selected Tinted Ophthalmic Lenses

B.R. Chou*
A.P. Cullen**

Abstract

Spectral transmittance data over the waveband 200 to 2500 nm are presented for a selection of tinted ophthalmic lenses. Criteria for the prescription of tinted lenses are briefly discussed.

Abrégé

Ce travail présente la transmission spectrale d'un échantillonage de lentilles ophtalmiques pour les ondes entre 200NM et 2,500NM. On discute brièvement des critères à employer dans la préparation d'une ordonnance pour lentilles teintés.

Introduction

The prescription and provision of tinted ophthalmic lenses has been, and continues to be, an important aspect of optometric practice. Whether the tinted lens is for cosmetic, sunglass, occupational, environmental or therapeutic purposes, it is important for the practitioner to be familiar not only with the range of tints available but also the manufacturing processes and the absorptive properties of the tinted lenses, so that the most appropriate choice may be made.

Previously published spectral transmittance data for tinted spectacle lenses[1-5] have been limited to the near ultraviolet (300 to 400 nm) and visible light (400 to 780 nm). The effects of ultra-violet radiation on the anterior segment[6-8] and the retina[9-11] have been well documented, and there can be no doubt that high levels of near-infrared radiation (780 to 2500 nm(can also damage ocular tissues.[12-13] Our data include spectral transmittance measurements in the far ultra-violet (200 to 300 nm) and the near infrared (to 2500 nm) which have not been reported earlier.

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There are three general approaches to tinting ophthalmic lenses. The solid or through-and-through tint is produced by adding metallic oxides to the constituents of the glass prior to fusion of the mixture. Such coloured glasses have the advantage of long-term stability of the tint with good reproducibility between production lots. However, such glasses used in high-power single vision lenses, or in any fused multifocal lens design, will produce lenses with non-uniform density of tint, being denser in thicker areas.

White (i.e. colourless) glass may be vacuum coated with a thin film of colorant. Such tints are relatively stable over long periods of time and uniform over the entire lens. They may, over a long period of time, be worn away, or scratched, during the course of normal use. They can generally be removed and replaced as desired.

Plastic lenses are generally tinted by immersion in hot aqueous dye solutions for a period of time which increases with the density of tint desired. The dye is absorbed and adsorbed by the surface layers of the lens. Uniform colour is achieved over the entire lens. Certain dyes are less chemically stable than others, however; consequently, tinted plastic lenses may show changes with time. (This is especially true of grey plastic lenses, which over a period of years, take on a reddish hue, as the green dye constituent breaks down). Dyed lenses may be bleached and redyed as desired.

For convenience of classification, we have included photochromic lenses among the solid tints, as well as the ultraviolet-absorbing materials UV400 and Lite Gard UV. Although the latter are plastic lenses, the active constituent (UV inhibitor) is mixed with the CR-39 components prior to polymerisation of the resin, in a manner analogous to the addition of the photochromic silver halide, or the solid tint metal oxide, to a glass mix prior to fusion.

Materials and Methods

The lenses used in this study were randomly selected from the stock of local suppliers, or taken from the collection of sample tinted lenses used in the Optometry Clinic of the University of Waterloo School of Optometry. A few lenses which are not readily available were kindly lent by Dr. S.D. Riome from his personal collection. All lenses used in this study were plano power, 2 mm thick uncut finished lenses. Table 1 describes the tinted lenses used, according to colour, density (light, medium or dark), and method of tinting (solid, coat, dye).

The measurements of spectral transmittance were made with a Zeiss (Oberkochen) DMR-21 dual-beam recording spectrophotometer. The instrument was electronically balanced to 0% and 100% levels prior to each spectral scan, and a chart record made of transmittance values over the entire waveband. The record tracings were then redrawn to consolidate the data according to tint classification.

Results and Analysis

Spectral transmittance curves over the waveband 200 to 2500 nm for the tinted lenses listed in Table 1 are shown in Figures 1 to 13. The photochromic

TABLE I
TINTED LENSES USED IN THIS STUDY

Colour	Name	Density*	Material	Method*	Figure	
White		N/A	Spectacle crown glass	N/A	1	
		N/A	CR-39	N/A	1	
Yellow	Hazemaster	L	glass	solid	2	
	Kalichrome	M	glass	solid	2	
	UV400	L	plastic	solid	2	Note 1
Green	Calobar D	D	glass	solid	3	Note 2
	G-15	D	glass	solid	3	
	Omnigard Green 3	D	polycarbonate	dye	3	
	K&W Green 50	M	plastic	dye	4	
	K&W Green 50	M	plastic	coat	4	
	Vision Ease Green 1	L	glass	solid	4	
	Vision Ease Green 2	M	glass	solid	4	
Grey	K&W Grey 60	M	glass	coat	5	
	K&W Grey 50	M	plastic	dye	5	
	Trucolor	D	glass	solid	6	Note 3
	Grey 3	D	polycarbonate	dye	6	
Brown	Custom Opt Tan 1	L	glass	solid	7	
	Custom Opt Tan 2	M	glass	solid	7	
	Custom Opt Tan 3	D	glass	solid	7	
	Vision Ease Tan 3	M	glass	solid	8	
	K&W Brown 50	M	glass	coat	8	
	K&W Brown 50	M	plastic	dye	8	
Pink	Cruxite AX	L	glass	solid	9	Note 4
	Cobum Pink 1	L	glass	solid	9	Note 5
	K&W Pink 2	L	glass	coat	10	
	K&W Pink 2	L	plastic	coat	10	
Blue	K&W Blue 30%	M	plastic	dye	11	
	Hoya Neo	L	glass	solid	11	
	Crookes A	L	glass	solid	12	
Special purpose	Hoya UI	L	glass	solid	12	
	Hoya UV	L	glass	solid	12	
Photo-chromic	Photobrown Extra		glass	solid	13	
	Photosun Extra		glass	solid	13	

* - described in text

Notes
1. Same as Lite Gard UV.
2. The Calobar D curve was the same as those of Toneray and Custom Optical Green 3, both solid glass tints.
3. This curve was the same as those of C-15, Custom Optical Grey 3 and Vision Ease Grey 3, all solid glass tints.
4. Same as Imperial Pink 2, a solid glass tint.
5. Same as Tonelite 1, a solid glass tint.

lenses were measured after storage in the dark overnight ("faded") and after exposure to full afternoon sunlight for 5 minutes ("dark").

The white lenses show neutral density (i.e. constant spectral transmittance) over the entire visible spectrum, with glass at 92% transmittance and optical plastic at 96%. The shortwavelength cutoff for the glass lens was 290 nm, compared with 360 nm for optical plastic. The greatest difference between glass and plastic lenses is in their infrared absorption. Whereas glass is relatively transparent to the infrared waveband studied, optical plastic shows 5 strong absorption bands between 1100 and 2250 nm which arise presumably from molecular bonds. There is very strong absorption of infrared radiation between 2250 and 2500 nm by the plastic.

Yellow glass lenses were originally developed as "shooting glasses" for improving contrast in a hazy visual environment. Both the Hazemaster and Kalichrome tints show a sharp shortwave cut off at 440 nm and neutral absorption at longer wavelengths. The UV 400 and Lite Gard UV are of CR-39 resin to which is added an ultraviolet-absorbing material prior to polymerisation. The straw colour of these lenses is similar to a glass solid tint, and the lenses may be tinted in the usual dye method. Both lenses show a sharp cut off between 390 and 400 nm, and neutral density across the visible spectrum. The characteristic infrared absorption features of CR-39 resin are evident.

Green lenses are generally used for sunglass applications, and may be light (transmittance about 70%), medium (50%) or dark (under 20%). All green tints produced transmittance curves with maximum transmittance near 520 nm, but showed remarkable differences in absorption in the ultraviolet and infrared. All tints transmitted long-wave-length ultraviolet (320 to 400 nm), with the polycarbonate Omnigard Green 3 having the longest cut off wavelength (approximately 385 nm). The glass solid tints transmitted less infrared; the best performance between 800 and 2500 nm was by the Calobar D, Toneray and Custom Optical Green 3 tints. The plastic lenses showed high infrared transmittance, comparable in the case of the K & W Green 50 to white CR-30. Inspection of all figures shows that indeed all tinted CR-39 lenses showed no substantial difference in infrared transmittance from that of white CR-39.

Grey lenses are used primarily as sunglasses; such lenses are favoured over green sunglass tints, as colour perception is not distorted. In general we found that glass lenses performed better in the infrared, while the plastic lenses were better absorbers of ultraviolet. All lenses transmitted long wavelength ultraviolet; the coated glass sample also transmitted a significant amount of ultraviolet radiation between 290 and 320 nm. The best overall performance was by the Tru Color, C-15, Custom Optical Grey 3 and Vision Ease Grey 3 tints, all of them solid glass.

Brown lenses (tan and brown tints) are used for cosmetic and/or sunglass purposes. All showed an increase in transmittance with wavelength up to 700 nm. In the infrared substantial differences were found; these were presumed to be due to the different methods of tinting (and different colorants used in the solid glass tints). Best overall performance was by the Custom Optical Tan 3; worst was the K & W Brown 50 glass coating which transmitted ultraviolet as short as 290 nm.

Pink lenses have traditionally been used to provide relief of asthenopia due to fluorescent lamps and other blue-rich or ultraviolet-rich light sources. It has been speculated[14] that relief is due to attenuation of short-wavelength radiation entering the eye. None of the lenses studied showed a significant reduction in the ultra-violet radiation reaching the eye; indeed the difference between transmittance at 400 and 700 nm amounted to only 10% in all cases. We found no physical explanation in these data for the reported relief of asthenopia.

Blue lenses transmit high levels of ultraviolet and infrared radiation. The Hoya Neo lens is a multiple-antireflection-coated version of the Crookes A solid tint.

Hoya UV is advertised as a general purpose lens which protects the eye from ultraviolet radiation due to the sun and fluorescent lamps. Although this solid glass tint does absorb all ultraviolet radiation below 320nm, it is almost as transparent to the longwavelength ultraviolet (320 to 400 nm) as white crown glass.

Hoya UI, another solid glass tint, is advertised as providing protection from ultraviolet and infrared radiation. This material has its ultraviolet absorption cut-off at a longer wavelength than that of white crown glass, and has greater infrared absorption. However, its performance in the longwavelength ultraviolet is similar to that of Hoya UV. Neither the Hoya UV nor the Hoya UI provides significantly greater protection from longwave ultraviolet than white crown glass.

The photochromic lenses studied are adequate when fully darkened for sunglass use. While they are effective absorbers of ultraviolet radiation at wavelengths less than 320 nm, they transmit significant amounts of longwavelength ultraviolet (320 to 400 nm) and levels of infrared comparable to levels transmitted by white glass, even when fully darkened.

Discussion

Given the number of colorants and tinting methods available to optical laboratories and lens manufacturers, it is not surprising that a given

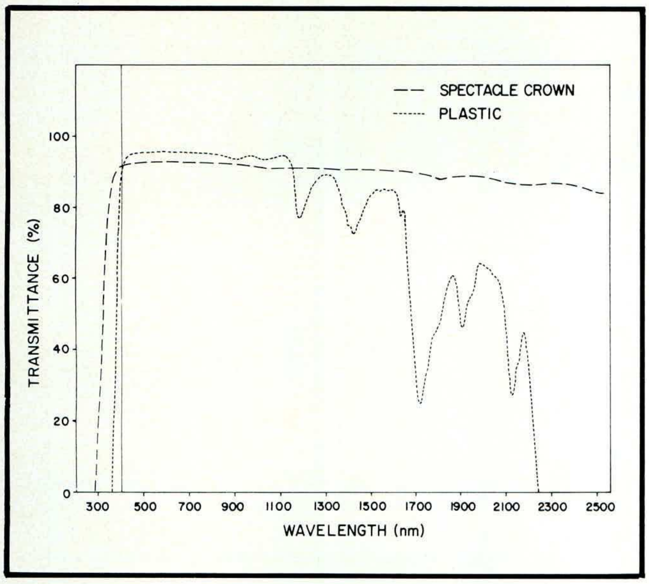

Figure 1: Transmittance curves of untinted spectacle crown glass and plastic lenses. All lenses in this study were plano power, 2 mm thick. Note the infrared absorption common to all plastic lenses. Glass transmits much more of the ultraviolet (wavelengths below 400 nm). In all figures the vertical line denotes 400 nm, the long-wavelength limit of UV-A.

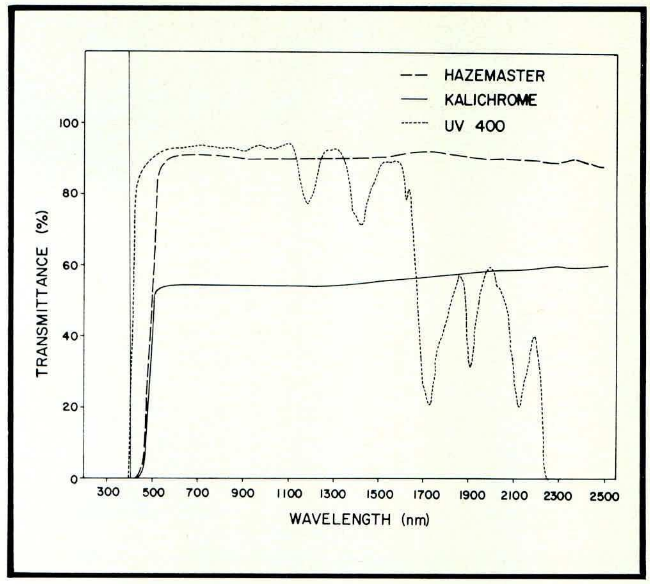

Figure 2: Transmittance curves of yellow lenses. LiteGard UV and UV400 have almost identical curves.

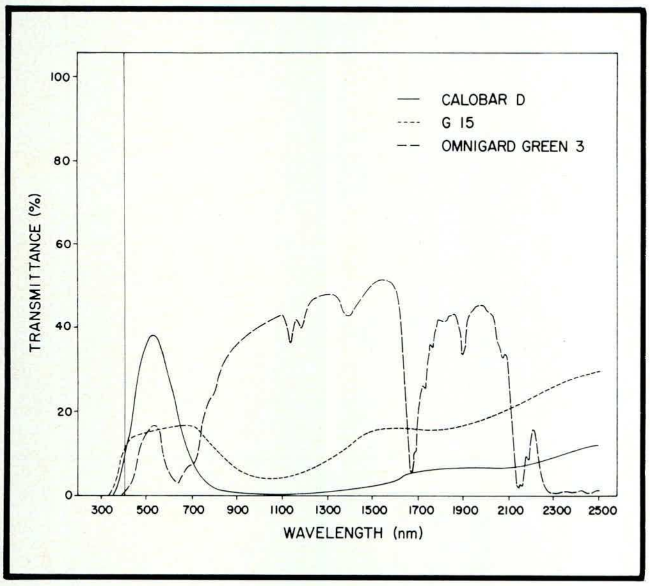

Figure 3: Transmittance curves of green lenses. Calobar D, Toneray and Custom Optical Green 3 have identical curves. Note the high infrared transmittance of the polycarbonate Omnigard Green 3 compared to that of the glass lenses.

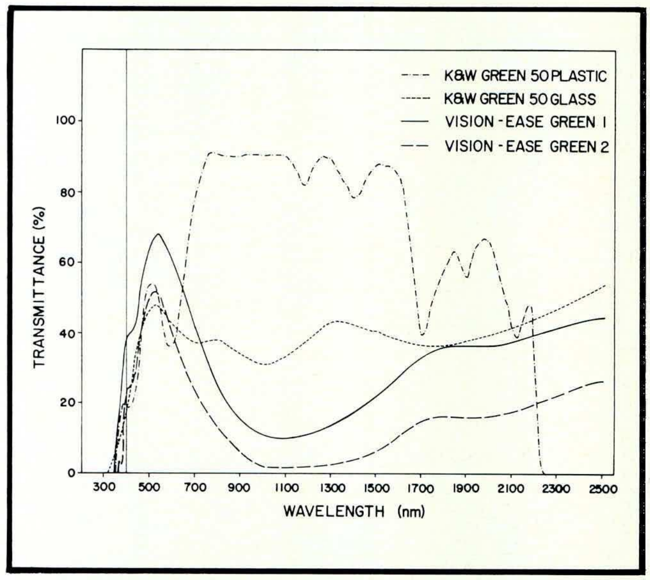

Figure 4: Transmittance curves of green lenses. All show transmittance peaks near 520 nm. There are significant differences in both ultraviolet and infrared transmittances. Note also the difference between the infrared curves of the plastic lens in this figure, and the Omnigard Green 3 of figure 3.

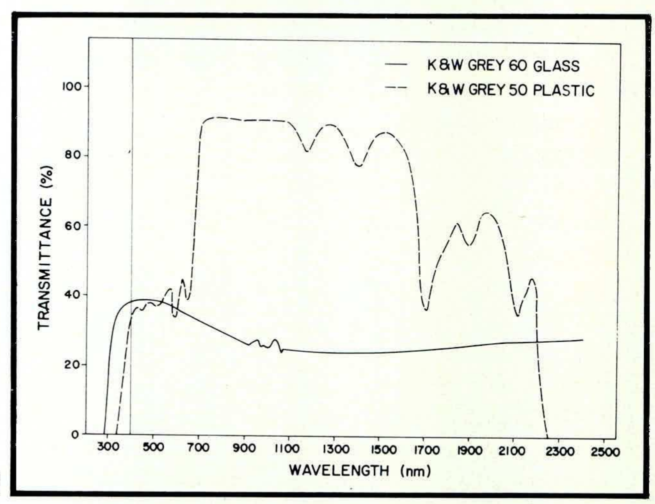

Figure 5: Transmittance curves of grey lenses, showing the difference between a glass coating and plastic dye. Note that infrared transmittance of the plastic lens is unaffected by the dye.

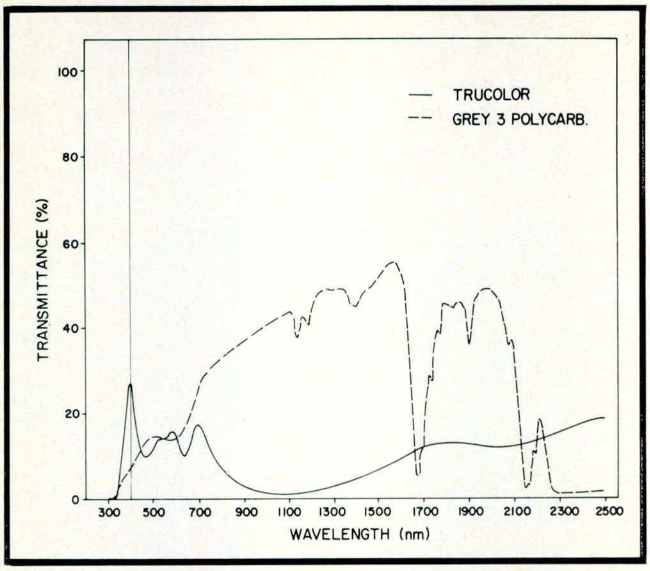

Figure 6: **Transmittance curves of solid grey glass and grey polycarbonate.**

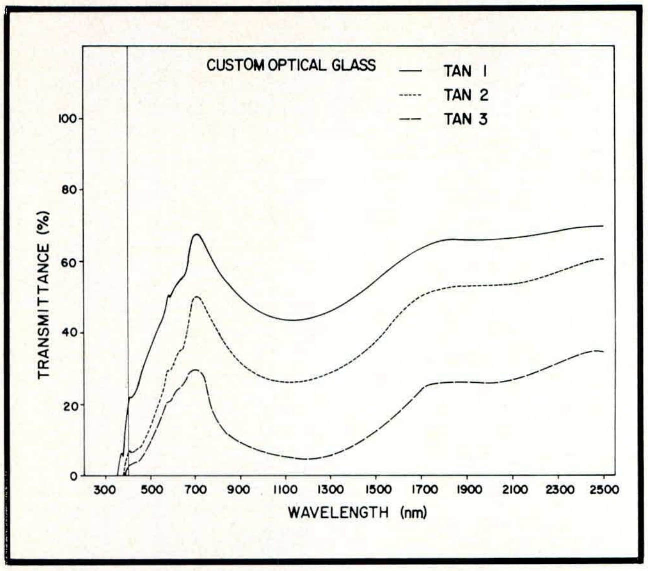

Figure 7: **Transmittance curves of three density levels of solid brown glass. The low transmittance at short wavelengths may lead to reduced hue discrimination in the blue and green regions.**

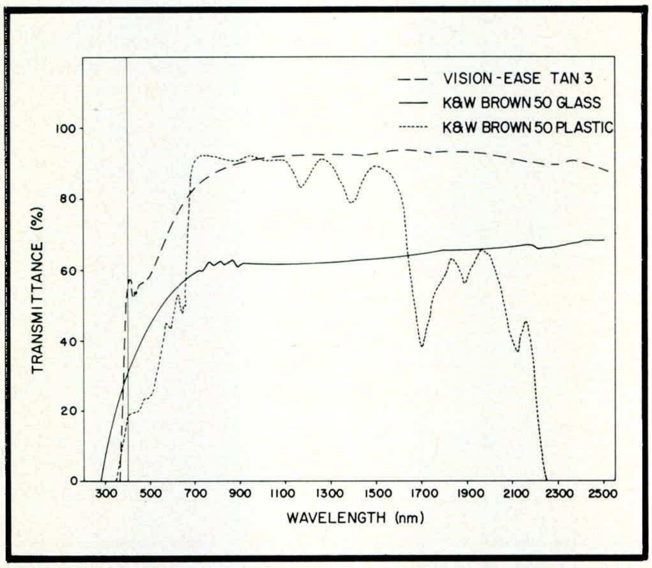

Figure 8: **Transmittance curves comparing solid glass, coated glass, and dyes plastic brown tints.**

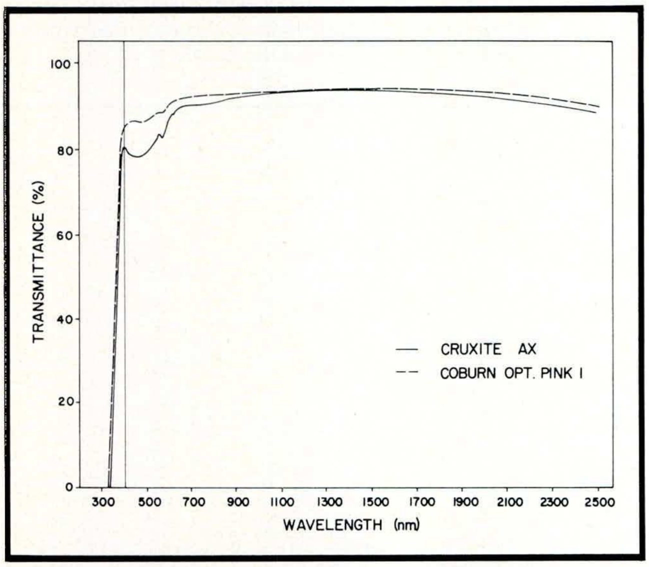

Figure 9: **Transmittance curves of fleshtone and pink solid tinted glass.**

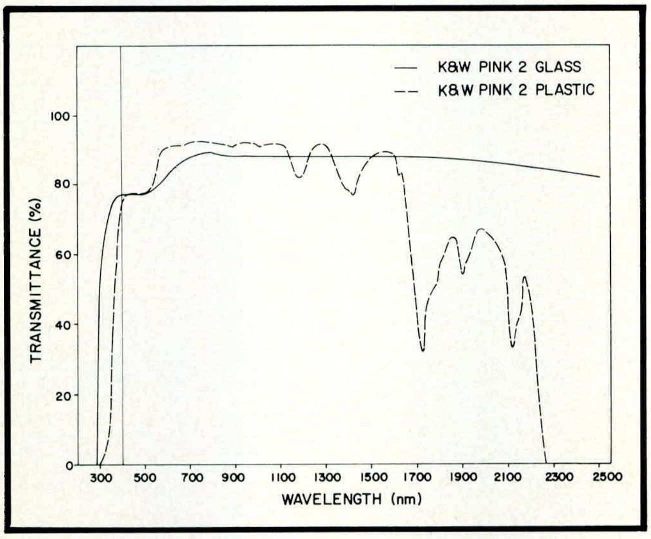

Figure 10: **Transmittance curves of pink lenses tinted by vacuum coating and dye. These are very different from the curves of Figure 9.**

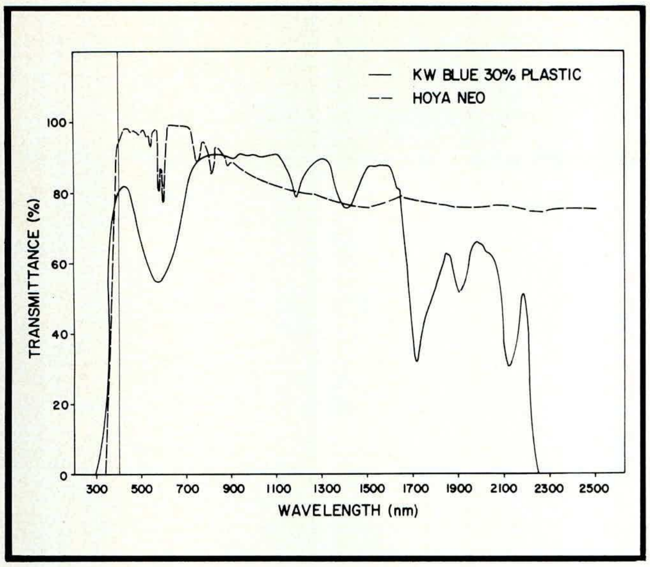

Figure 11: **Transmittance curves of blue lenses. Note the reduced transmittance near 600 nm.**

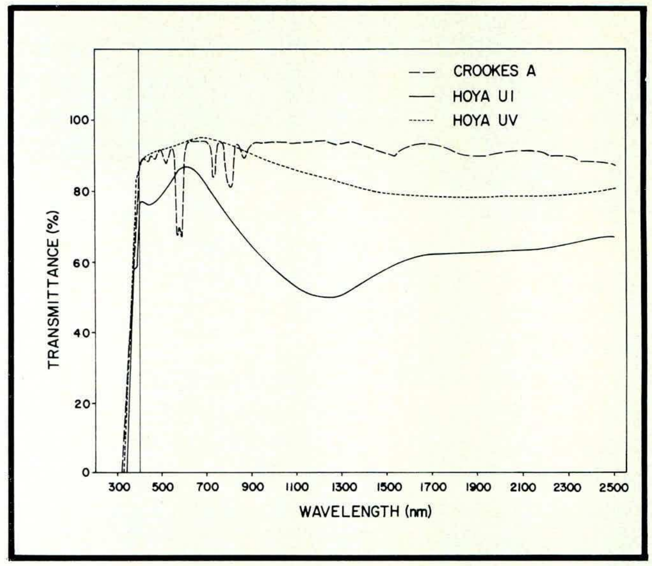

Figure 12: **Transmittance curves of special purpose glass lenses. The curves of Crookes A and Hoya Neo glass are quite similar.**

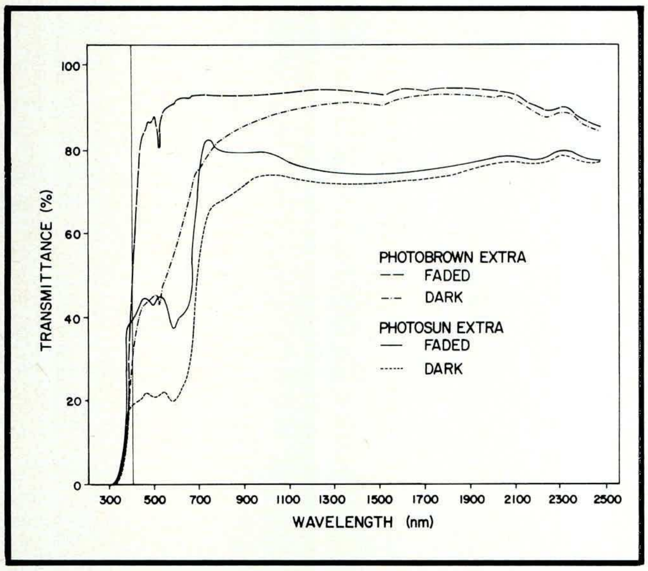

Figure 13: **Transmittance curves of cosmetic and sunglass photochromic lenses in faded and darkened states. Note that the photochromic action has little effect in the ultraviolet and infrared regions.**

popular tint will be produced in both glass and plastic lenses. Our data demonstrate that although the visual impression of such lenses may be the same, the actual spectral transmittance characteristics may differ considerably. An example would be the differences seen between the curves for Trucolor and the Grey 3 polycarbonate lenses in Figure 6, two lenses which visually appear similar in colour and absorption. Both the practitioner and patient should remember that, "What you see is not necessarily what you get — unless you specify the tint exactly!"

Earlier workers[1-3] have stressed the need to protect the eyes from near infrared radiation. In the past five years, it has become apparent that the effects of ultraviolet radiation are much more important a consideration. Radiation between 290 and 320 nm (UV-B) is known to be cataractogenic and also causes photokeratitis and photokeratoconjunctivitis upon acute or chronic high levels of exposure.[6-8] Ham et al[9-11] have demonstrated the great sensitivity of the retina to photic damage due to UV-A (320 to 400 nm) and blue (441 nm) light. It has also been speculated that chronic exposure to high levels of ultraviolet radiation may lead to development of pterygia and pingueculae.[6]

None of the solid or coated glass tints was a satisfactory absorber of UV-A, except for Hazemaster, Kalichrome and Custom Optical Tan 3 tints. Of the plastic lenses, only UV400, LiteGard UV and Omnigard Green 3 were satisfactory. No lenses transmitted ultraviolet wavelengths below 290 nm, while UV-B was totally absorbed by all tints except the coated glass tints, and the K & W pink 2 and blue 30% plastic tints.

Tinted plastic (CR-39) lenses did not show significantly different infrared transmittances compared to white CR-39. Glass tinted lenses showed very wide variations in infrared transmittance.

Each type of tinting process has advantages and disadvantages.

Solid tints are permanent and generally do not vary significantly between production lots. They do have significant disadvantages however. Lenses of high vertex power show changes of tint density across the lens according to Bouguer's law (Thicker lens substance has greater tint density), as do fused multifocals with solid tinted carriers. They are also generally available only in restricted power ranges.

Coatings are uniform across the lens and can be removed and replaced as desired, or as they wear off. However, they vary between laboratories and may change with time. The ultraviolet absorption of such coatings is relatively poor.

Plastic dye tints are also uniform, and can be removed, changed, or replaced as often as desired. However these dyes offer no additional protection from UV-A, and do not generally affect absorption of the infrared; this is clearly demonstrated by our data. There is no reason, however, why lens manufacturers could not routinely include an ultraviolet inhibitor in the resin mix prior to polymerisation, as is done with UV400 and Lite Gard UV, in order to give protection against all ultraviolet radiation.

Polycarbonate lenses present some problems if a tint is desired, but when combined with other protective filters (e.g. welding filters), provide good protection from both mechanical and radiation hazards. These lenses can be tinted by a special vacuum-coating process.[15]

The recently developed Corlon™ lens by Corning Glass Works (marketed as C-Lite™) is a thin glass lens with a polyurethane film bonded to the ocular surface. The glass carrier may be any glass lens; stock lenses are white or photochromic, and custom bonding to any glass lens is available. Additional tint including gradients can be obtained with special water-based dyes, as the usual plastic dyes are not compatible with polyurethane.[16]

Because of the vast number of tinted lenses available to practitioners, and the rate at which different tinting processes or formulae are being introduced, these transmittance data should be considered only as a general guideline to the transmittance characteristics of tinted ophthalmic lenses. A detailed knowledge of the spectral transmittance of a given tinted spectacle lens would require spectrophotometric measurements at all wavelengths for that lens.

Commercial over-the-counter plano sunglasses also present problems for the ophthalmic practitioner. Measurements on selected sunglasses are in preparation.[17]

Acknowledgements

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Note: "S*" indicates the C.O.C.L.S. Supplement to Vol. 45, #3.

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EDITORIALS

ARTICLES

FEATURES/ANNOUNCEMENTS

BOOK REVIEWS

L'Enfant Handicapé au Plan Visuel: Une Approche Optométrique Globale

J. Decarie*
L. Fortin*
J-P. Lagace*

Abrégé

La littérature abonde en ce qui concerne les activités de réadaptation de la personne handicapée au plan visuel. Par contre la plupart du temps les activités de réadaptation elles-mêmes et les modes d'évaluation et de traitement se limitent souvent et gravitent autour des aides optiques seulement.

Quant à nous, seule une approche globale et holistique peut répondre et satisfaire les nombreux besoins de l'enfant handicapé au plan visuel. Nous présentons ici l'articulation des rôles et fonctions de l'optométrie holistique dans le processus de réadaptation de l'enfant handicapé au plan visuel.

Abstract

The literature abounds with papers devoted to the care and rehabilitation of the visually handicapped child. However, these papers are centred mainly around the use of optical aids in rehabilitation. It is the authors' opinion that a global, or holistic, approach is better suited to meeting the needs of the visually-handicapped child. This paper presents the philosophy, the role and function of a holistic optometric approach in the care of the visually-handicapped child.

Modèle de la Vision et de Son Développement

Si la vision était définie de façon opérationnelle dans les seuls termes de l'acuité visuelle et du champ de vision, il en découlerait un mode d'évaluation et de traitement passablement limité pour toute personne qui consulte, handicapée ou non. Dès lors une correction optique adéquate suffirait à redonner une sorte de performance visuelle.

Or il n'en est pas le cas. La vision est le processus de traitement de l'information visuelle qui nous permet de diriger l'action de notre organisme et de tirer une signification de ce qui est vu (Kraskin, 1982). A. Gesell, MD ne desait-il pas de la vision:

> *"elle n'est pas une fonction indépendante, séparée; elle est profondément intégrée au système d'action total de l'enfant: sa posture, sa manipulation, ses habitudes motrices, son intelligence et même les traits de sa personnalité."*
> (Gesell, 1949)

Il est donc suffisant à dire qu'à un modèle de vision élaboré se rattachera des modes d'évaluation et de traitement optométriques élaborés.

Le Modele de la Vision: les composantes de la vision

On distingue quatre composantes de la vision:

— la composante oculaire:
- l'intégrité de la structure oculo-cérébrale

— la composante optique:
- les états de la réfraction
- les anomalies optiques

— la composante sensorielle:
- la fonction visuelle
- l'aspect oculo-sensoriel
- l'aspect visuo-moteur
- la coordination visuo-manuelle

— la composante perceptuelle:
- les habiletés d'intégration au système nerveux central
- le traitement de l'information visuelle pour signifier ce qui est vu
- les habiletés visuo-corporelles: la latéralité, la directionnalité, la mémoire visuelle, le schéma corporel,
- l'empan de perception
- l'intégration inter-sensorielle
- l'apprentissage

Le Développement de la Vision: le complexe visuo-moteur

(Getman, 1965)

La vision comme processus complexe ne se développe adéquatement que lorsque certains systèmes perceptuels se développent antérieurement ou conjointement.

*O.D., Clinique d'Optométrie Centre-Sud, Montréal, Québec

G.N. Getman établit ainsi la hiérarchie de ces systèmes perceptuels:

a — le système des réponses innées:
 les réflexes à la naissance

b — le développement de la motricité grossière:
 — la locomotion
 — l'exploration spatiale

c — le développement de la motricité raffinée:
 — la coordination visuo-manuelle
 — les manipulations de l'espace
 — l'intégration des systèmes perceptuels de l'organisme

d — le développement de la motricité oculaire:
 — le contrôle du mouvement des yeux
 — la signification adéquate du monde visuo-spatial

e — le développement du langage:
 — la communication des expériences visuelles

f — le développement de la visualisation:
 — l'intériorisation des expériences visuelles

g — le développement de la perception:
 — l'intégration des modalités sensorielles pour l'utilisation maximale du monde visuo-spatial significatif.

La vision est donc un tout, une émergence de plusieurs systèmes moteurs. Harmon ne disait-il pas que la vision était le "*pilote de l'organisme*"?

(Harmon, 1949)

Répercussion du Modèle de la Vision sur les Modes d'Évaluation et de Traitement.

La manifestation la plus observable, ou celle à laquelle l'on donne beaucoup d'importance, et la composante parmi les composantes de la vision qui soit la plus atteinte est sans doute la composante oculaire: les pathologies: congénitale ou héréditaire: rarement acquise chez l'enfant.

La composante oculaire est la composante de base. Elle va donc influencer grandement les composantes subséquentes soit: la composante optique, la composante sensorielle et la composante sensorielle et la composante perceptuelle.

Au point de vue développemental si la composante oculaire est atteinte, les composantes subséquentes seront donc mal intégrées ou mal apprises sinon absentes du pattern de développement de l'enfant handicapé au plan visuel.

Cela a donc des répercussions importantes sur le mode d'évaluation et de traitement optométrique.

Notion d'Évaluation Optométrique Globale.

L'évaluation optométrique ne doit pas se restreindre à la mesure de l'acuité visuelle et du champ de vision: il faut aller au-delà de ces mesures et cette évaluation doit porter sur les aspects intégratifs de l'enfant handicapé au plan visuel:

— aspect oculaire
— aspect visuel
— aspect visuo-moteur
— aspect perceptivo-moteur

"It has become clear that visual function is based upon such physical skills as visual acuity, ocular control, ocular fixation, ocular pursuits, visual motor coordination, accommodative ability, and light and dark adaptation.
Equally important however, is the development of perceptual skills such as attention, spatial perception, identification, perceptual constancy, figure/ground, form perception, visual memory and speed of perception."

(Wiener & Vopata, 1980)

Il est aussi essentiel que les évaluations soient à la fois instrumentales, spatiales et béhaviorales (comportement de l'enfant handicapé au plan visuel vis-à-vis *son* monde visuo-spatial et à l'intérieur des limites inhérentes à son handicap).

Objectifs Général et Spécifique des Évaluations et Traitements.

L'objectif général des modes d'évaluation et de traitement optométriques consiste à:

"remplacer en tout ou en partie ou restituer la fonction visuelle en elle-même, ou pour l'écriture et/ou la lecture, ou pour accroître l'autonomie."

(Décarie, 1981)

L'objectif spécifique des interventions optométriques pour l'enfant handicapé au plan visuel sera donc de:

"tenter par tous les moyens possibles d'arriver à un fonctionnement visuel optimum et une utilisation optimale de la vision résiduelle".

(Décarie, 1981)

Le Rôle des Interventions Optométriques.

Par le cheminement clinique des interventions optométriques (évaluation-diagnostic-traitement-suivi), le praticien doit être en mesure de cerner adéquatement le portrait clinique de l'enfant handicapé au plan visuel, ses besoins, ses attentes et surtout doit être en mesure de pouvoir répondre à tout cela.

Sans toutefois dénigrer l'approche multi-disciplinaire essentielle à une action adéquate vis-à-vis l'enfant handicapé au plan visuel, nous pouvons affirmer que les interventions optométriques constituent quand même le pilier et le pivot des activités de réadaptation.

Exigences Quant aux Interventions Optométriques

Les exigences des interventions optométriques sont nombreuses pour que le processus de réadaptation soit efficace:

a— évaluations et analyse clinique rigoureuses et minutieuses autant pour statuer sur la condition visuelle de l'enfant que pour évaluer tout le plan oculaire et le plan de la performance visuelle afin de pouvoir établir un portrait clinique global de l'enfant dans ses aspects dynamiques et fonctionnels
b— évaluations spécialisées (lentilles de contact, stimulation visuelle et/ou rééducation visuelle, évaluation du développement perceptivo-moteur) pour assurer l'éventail complet des possibilités thérapeutiques
c— pronostics et échéanciers réalistes
d— proposition d'un plan de traitement de qualité et complet touchant à la fois des aspects optiques, sensoriels et perceptuels
e— plan de traitement individualisé et adapté à la capacité de l'enfant

Les Interventions Optométriques Elles-mêmes

Il sera question ici des services que doit offrir l'optométrie afin de répondre efficacement aux exigences d'une véritable réadaptation.

Il n'est pas question ici de limiter les interventions à la distribution simple des aides optiques: cela implique donc un plan d'évaluation et de traitement plans qui s'adressent à la performance de l'enfant dans tout son fonctionnement visuel global afin d'en arriver à développer ou à améliorer le comportement visuel général de l'enfant handicapé au plan visuel partant son comportement humain.

L'Histoire de Cas

But: cerner avec l'enfant et/ou la personne qui l'accompagne sa situation médicale, optométrique, sociale, fonctionnelle, ses acquis, ses besoins et ses attentes.

Description sommaire:
- l'état de santé général et oculaire
- les traitements antérieurs
- l'histoire des antécédants familiaux
- la condition visuelle (les diagnostics antérieurs)
- l'utilisation actuelle de la vision résiduelle
- la mobilité générale
- la reconnaissance visuelle actuelle
- les activités visuelles possibles
- l'éclairage nécessaire
- les besoins
- les attentes
- la motivation
- la condition sociale et familiale
- toute observation pertinente

Note: une histoire de cas est un processus continu en cours d'examen et dans le temps.

L'évaluation Oculaire

But:
- confirmer la présence d'un diagnostic médical
- noter l'information de base sur l'état oculaire pour fins de comparaison dans le temps
- évaluer, avec l'aide des autres tests, les limites anatomo-physiologiques susceptibles d'influencer le traitements de réadaptation

Description:
- l'examen du segment antérieur:
  - l'examen de la condition palpébrale
  - l'évaluation du système lacrymal
  - la kératométrie, disque de Placido
  - la biomicroscopie du segment antérieur
- l'examen du segment postérieur:
  - la biomicroscopie
  - la funduscopie
  - la mesure de la tension oculaire

L'évaluation Visuelle de Base

But:
- cerner l'état de réfraction pour établir le besoin ou non d'une correction optique de base pour les déplacements
- cerner l'intégrité physiologique et les latitudes de fonctionnement des habiletés visuelles
- cerner l'état sommaire de la coordination oculaire

Description:
- l'évaluation de l'état de réfraction
  - la kératométrie
  - les rétinoscopies
  - les subjectifs
- l'évaluation des mécanismes de centration
  - la convergence
  - la divergence
- l'évaluation des mécanismes de focalisation
- l'évaluation de la coordination oculaire
  - l'état de monocularité
  - l'état de biocularité
  - l'état de binocularité

L'évaluation Complete des Habilétés Visuelles dans l'Espace

But:
- raffiner les connaissances sur la fonction visuelle dans l'espace *réel*

Description:
- l'évaluation de la motilité oculaire
  - les habiletés de poursuite
  - les habiletés de rotation
  - les habiletés de fixation
- l'évaluation, s'il y a lieu, des paralysies ou parésies oculo-motrices
- l'évaluation des signes de diplopie, s'il y a lieu
- l'évaluation spatiale de la coordination oculaire: l'évaluation des tropies
- l'évaluation de l'état de monocularité, biocularité et binocularité
- l'évaluation des mouvements nystagmoides (position de blocage), s'il y a lieu.

VISION CARE NEWS

Calendar

1984
February
Alberta Optometric Association
Continuing Education
— Children's Vision and Learning Disabilities —
Edmonton, Alberta
Information: Gordon Hensel, O.D.
Chairman, Professional Services Enhancement Committee
c/o A.O.A.
The Professional Centre
#2 - 9333 - 50th Street
Edmonton, Alberta
T6B 2L5
(403) 468-1203

February 12-14
British Columbia Optometric Association
Continuing Education Seminars
Westin Bayshore Hotel, Vancouver, B.C.
Information: B.C.O.A.
202-1252 Burrard Street
Vancouver, B.C.
V6Z 1Z1
(604) 685-8785

February 16-20
California Optometric Association
85th Annual Congress
Anaheim Marriott Hotel
Anaheim, California
Information: C.O.A.
921 11th Street, P.O. Box 2591
Sacramento, CA
95812, U.S.A.
(916) 441-3990

March 21-23
9th International Conference on Learning Disabilities
Queen Elizabeth Hotel, Montreal, Quebec
Information: Quebec Association for Children with Learning Disabilities
QACLD Congress 1984,
GEMS
P.O. Box 997
Snowdon, Montreal, Quebec
H3X 3Y1
(514) 735-1388

April
Alberta Optometric Association Continuing Education
— Annual Interdisciplinary Symposium —
— Sports Vision —
Calgary, Alberta
Information: Gordon Hensel, O.D.
Chairman, Professional Services Enhancement Committee
c/o A.O.A.
The Professional Centre
#2 - 9333 - 50th Street
Edmonton, Alberta
T6B 2L5
(403) 468-1203

April 9-13
Diamond Jubilee
International Optometric Congress
Cape Town, South Africa
Information: South African Optometric Association
P.O. Box 3966
0001 Pretoria
South Africa
Tel. 012 21-7438

April 11-14
Frontiers of Optometry
1st International Congress of the British College of Ophthalmic Opticians (Optometrists)
London, England
Information: Michael J. DiCola
c/o C.A.O.

May 9-12
Ontario Association of Optometrists
Annual Meeting
Westin Hotel Ottawa
Information: Mr. Dennis Souder, Executive Director
(416) 923-1173
Suite 212 - 40 St. Clair Ave. W.
Toronto, Ontario
M4V 1M2

May 18-23
Expo/Optica '84
Madrid, Spain
Information: Rosina Gomez-Baeza
General Manager
IFEMA
Avda. de Portugal, S/N
Apartado de Correos 11.011
Madrid-11, Spain

May 26-29
Optica '84
International Trade Fair for Ophthalmic Optics
Cologne, Germany
Information: KolnMesse
Messe- und Ausstellungs-Ges.m. b. H. Cologne
Messeplatz, P.O. Box 21 07 60, D-5000
Cologne 21
Germany

May 30 - June 2
XII Congreso Nacional de Fedopto
Bogota, Colombia
Information: Dr. Pablo Henao de Brigard
Secretario
Federacion Colombiana de Optometras
Personeria Juridica 0914
NIT 60.030.895
Apartado 53259
Bogota D.E.
Colombia

June
Alberta Optometric Association
Continuing Education
— Practice Management —
Red Deer, Alberta
Information: Gordon Hensel, O.D.
Chairman, Professional Services Enhancement Committee
c/o A.O.A.
The Professional Centre
#2 - 9333 - 50th Street
Edmonton, Alberta
T6B 2L5
(403) 468-1203

August 19-24
5th International Contact Lens Congress
Surfers Paradise, Queensland, Australia
Information: Kenneth W. Bell
Hon. Secretary
Contact Lens Society of Australia
818 Australia Square
George Street
Sydney, New South Wales, 2000
Australia

October 19-21
7th Latin American Congress of Optometry and Optics
Lima, Peru
Information: Dr. E.J. Fisher
c/o School of Optometry
University of Waterloo
Waterloo, Ontario
N2L 3G1

November 8-11
European Society of Optometry
18th Scientific Congress
Jerusalem Hilton, Israel
Information: Dr. Harvey Rosenwasser, O.D., F.A.A.O.
1518 Walnut Street
Merlin Tower, Suite 1401
Philadelphia, PA
19102, U.S.A.

1985
March 31 - April 8
5th Asian Pacific Optometric Congress
Rasa Sayang Hotel/Batu Ferringi Beach
Penang, Malaysia
Information: Dr. Damien P. Smith
Secretary-General
International Federation of Asian and Pacific Associations of Optometrists
7 Cookson Street
Camberwell 3124
Australia

FOCUS(R) — New Contact Lens Mirror

A new contact lens fitting mirror called FOCUS(R) has been introduced recently and is considered ideal for the aphakic patient, others who have had cataract surgery and individuals who are severely hyperopic.

Individuals with other degrees of hyperopia can successfully use the mirror as well and bring their eyes into clear focus simply by moving the head slightly closer to, or further from the mirror, thereby changing the focal distance to the mirror. Perfect self-visualization of the eye is possible under all conditions and over a wide range, from an eye requiring a contact lens of +17 to the normal eye.

The mirror is equipped with its own back light for improved viewing of the eye, and comes in a folding case for easy packing and travelling.

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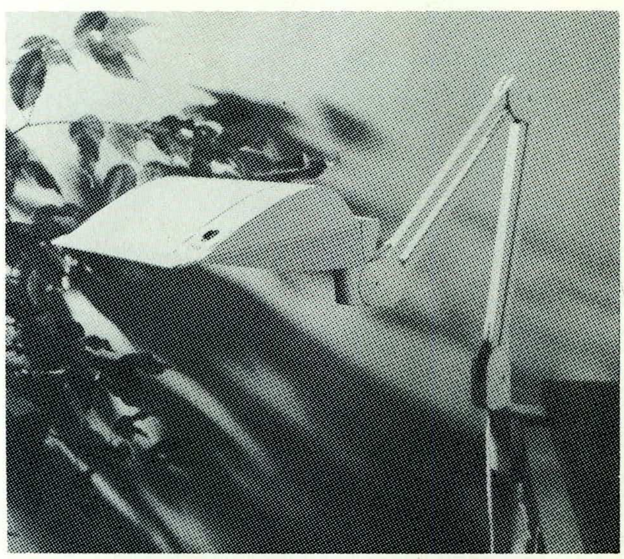

The new Luxo Series 400 features a unique, multi-faceted reflector which directs light forward across the work area. This virtually eliminates glare from both the task and work terminals. The reduction of eye fatigue that results increases employee productivity and makes for a far better working environment.

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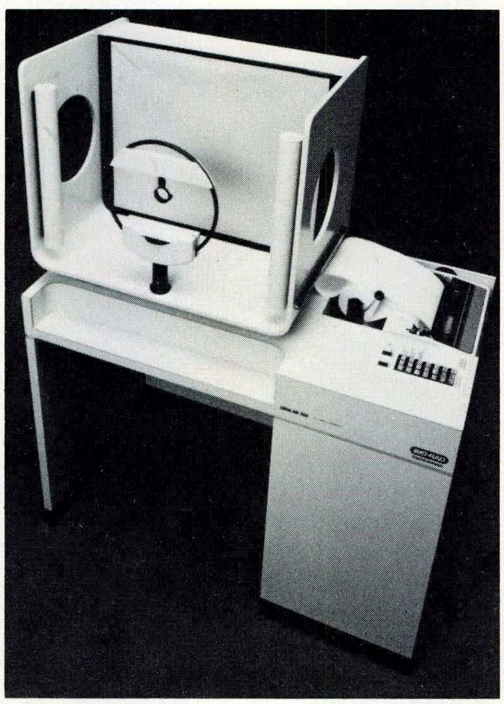
Further information:
Mr. Pierre Clouâtre
Marketing Director
Luxo Lamp Limited
P.O. Box 460
Ste. Thérèse, Québec J7E 4J9
(514) 435-1971

Automatic Perimeter from Bio-Rad Laboratories

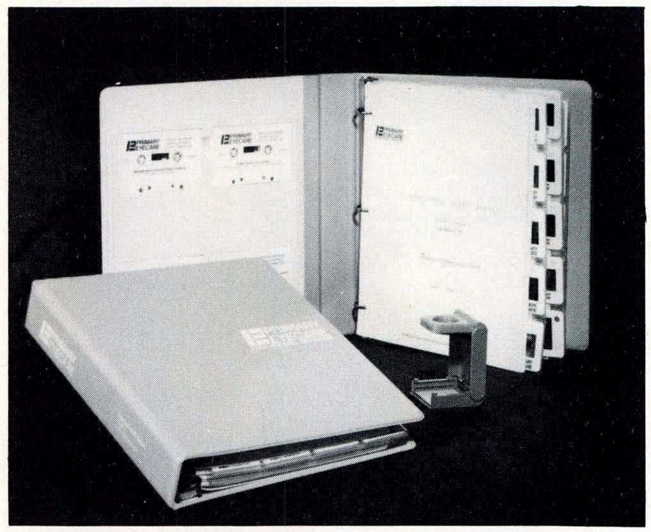


Bio-Rad's new automatic perimeter provides supraliminal and threshold testing; the operator-prompting system generates a comprehensive, quantitative evaluation of the visual field with 93% sensitivity and 81% specificity.

The Digilab 350 Krakau Perimeter patient's record printout includes five sections: Response Evaluation/Performance Index, Fixation Monitor, Blind Spot Map, Hemianopsia Monitor, and a Field Map which plots the threshold level at each test location.

Further Information:
Bio-Rad Laboratories Digilab Division
Attn. Mr. Ramgopal Rao
Director of Ophthalmic Business
237 Putnam Ave.
Cambridge, MA
02139, U.S.A.

Primary Eyecare Educational Services



Primary Eyecare Inc., an educational service to the optometric profession, published its second major audiovisual programmed text in October, 1983. The title of the program is "Volume II: Cornea, Cornea, Cornea" by Louis J. Catania, O.D.

Primary Eyecare Inc. will be marketing both "Volume I: Practical Hints Series" and Volume II at their original special subscription rate of $151.00 for each Volume. Separate units from within each Volume will also be available. A limited direct mail and advertising campaign to the profession was carried on throughout 1983, but those interested in such educational materials may contact the publisher directly:

Primary Eyecare Inc.
1414 Malcolm Drive
Dresher, PA
19025, U.S.A.
(215) 657-0520

Canadian Optometric Education Trust Fund
1984 Grant Program — Application for Funding

Complete and forward (we require 5 copies) no later than February 17, 1984, to:

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FUNDING CATEGORY .... ☑
Post Doctoral Study .... ☐
Clinical Research .... ☐
Undergraduate Research .... ☐
Public Vision Care
(conducted by non-academic
or non-practitioner) .... ☐

Title, nature and description of project ____________________

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Expected date of completion ____________________

Expected benefit from project ____________________

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Estimated Budget

Personal Services	Salaries	Equipment	Supply Mtl.	Travel	Tuition	Other (specify)
				Total Grant Requested $		

A formal written report is expected to be a part of this study. A copy must be submitted to the Trustees of the Fund, and will be considered for publication in the Canadian Journal of Optometry, within 60 days of the completion of the project.

____________________ ____________________

SIGNED DATE

Let's clear up a few things about anti-reflection coatings.

Anti-reflection coatings on CR-39 provide very valuable properties you may not be aware of.

First, they *do* reduce reflections.

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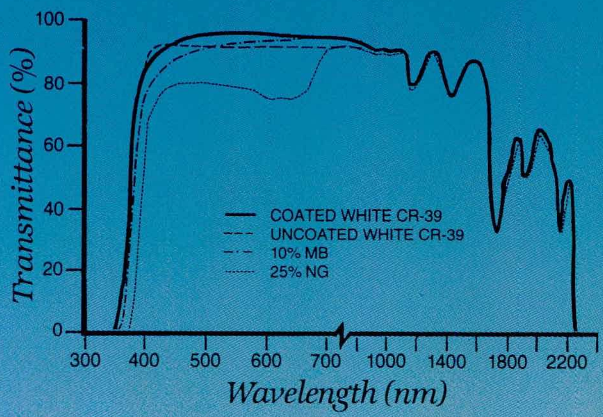

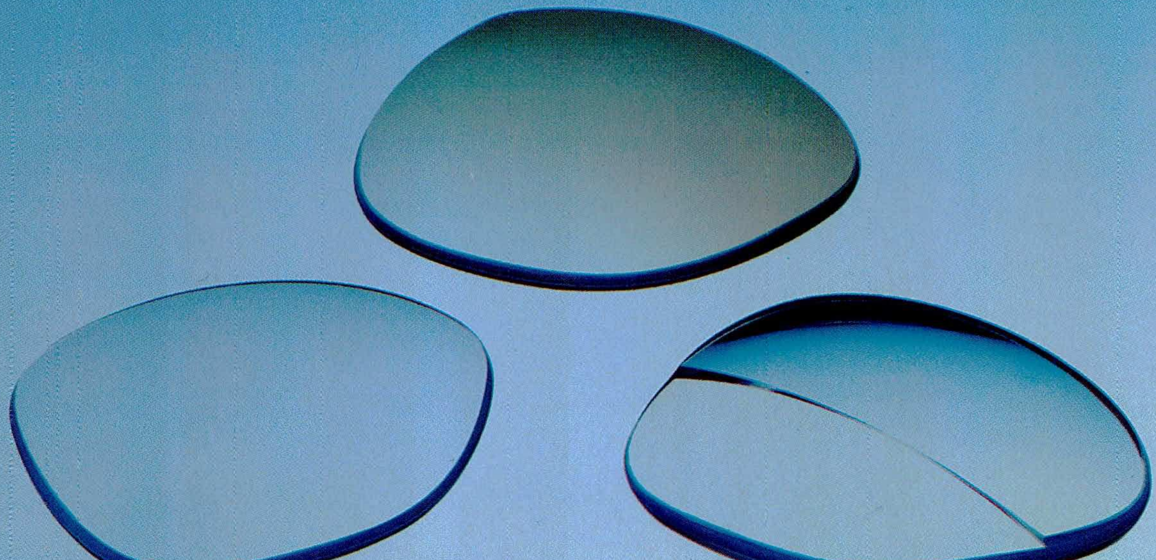

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