

DALTONIANA

NEWSLETTER

OF THE INTERNATIONAL RESEARCH GROUP ON COLOUR VISION DEFICIENCIES

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LITERATURE SURVEY

A method for the treatment of metamerism in colorimetry,
by F.J.M. SCHMITT (Laboratoire Image, Ecole Nationale Su-
périeure des Télécommunications, 75013 - Paris, France),
J. opt. Soc. Amer. 66/6, 691-698, 1976.

All of the spectrally different colors that match accor-
ding to an observer form a metamer ensemble. A new method is
presented to generate the metamer ensembles for both direct
light and reflecting-surface-color. The procedures is particu-
larly appropriate for treating problems of theoretical limits
of metamerism. - Ingeborg Schmidt.

Effect of field size on red-green color mixture equations,
by J. POKORNY and V.C. SMITH (Eye Research Laboratories,
University of Chicago, Chicago, Ill. 60637), J. opt. Soc. Amer.
66/7, 705-708, 1976.

On a modified Moreland Universal Anomaloscope red-green
color mixture equations were measured in 10 normal trichromats,
age 22 to 36 years, for fields of view varying from 30' to 10°. The G/R mixture decreases continuously as field size is increa-
sed (that is the observers require continuously more red in
their G/R mixtures matched with yellow). The log G/R ratios
changed most rapidly for small field sizes, leveling off above
4°. The data are consistent with the interpretation that the
cone visual photo-pigments decrease exponentially in effective
optical density as the field size is increased. - Ingeborg
Schmidt.

Luminance and opponent-color contributions to visual
detection and adaptation and to temporal and spatial integra-
tion, by P.E. KING-SMITH and D. GARDEN (Visual Sciences Unit,
Ophthalmic Optics Dept. UMIST, P.O. Box 88, Manchester M60 1QD,
England), J. opt. Soc. Amer. 66/7, 709-717, 1976.

The processes of visual detection and of temporal and
spatial summation are analysed in terms of parallel luminance

(achromatic) and opponent-color systems. A test flash is detected if it exceeds the threshold of either system. The spectral sensitivity of the luminance system has a single broad peak near 555 nm; the spectral sensitivity of the opponent-color system has three peaks, at about 440, 530 and 600 nm (on a white background). The temporal and spatial integration of the opponent-color system are generally greater than for the luminance system. A white background selectively depresses the sensitivity of the luminance system relative to the opponent color system. The analysis is discussed in relation to Stiles' model of independent mechanisms. - Ingeborg Schmidt.

Luminosity curves of populations of class I and class II normals in colour vision, by St.R. COBB (University of Glasgow), Perception and Motor Skills 42, 1143-1149, 1976.

Luminosity curves were measured for 8 points in the spectrum on a Wright colorimeter for a 2° field on 18 Class I and 18 Class II male normal trichromats. They were classified according to the spectral location of the unique green (W. RICHARDS, J. opt. Soc. Amer. 57, 1047, 1965). The results confirm earlier findings that the Class II subjects had a consistently lower luminosity at about the 565 nm point in the spectrum. On the base of these findings and additional data obtained from 2 normal subjects, one in Class I and one in Class II, and 3 color defectives, a protanope, a deuteranope and a deuteranomalous, their luminosity measured by a slightly more detailed procedure, a new visual pigment model was proposed to account for the Unique Green Phenomenon and colour-vision defect data. - Ingeborg Schmidt.

An approach to equalizing the energy and the number of photons of chromatic lights of the Tübinger perimeter, by K. KITAHARA (Dept. of Ophthalm., Jikei Univ. School of Med.) and H. ICHIKAWA (Dept. of Ophthalm., Nagoya Univ. School of Med.), Acta Soc ophthalm. jap. 79, 59-66, 1976.

The relative quantity of radiation of monochromatic lights of the Tübinger perimeter was obtained from the spectral distribution of the light source and the spectral characteristics of the interference filters for the test target.

Furthermore, the absolute quantity of radiation and the number of photons were measured with a photomultiplier tube (head-on type, 1-1/8 inches, HTV-R374 TA5012) made by Hamamatsu-TV Co., Hamamatsu, Japan, and the conditions for putting the chromatic lights on the equal energy or the equal quantum conditions were studied.

1. The energy ratios obtained from approximate calculations of $\Sigma W\lambda \cdot T\lambda \cdot \Delta\lambda$ and $W\lambda \cdot T_{max} \cdot Hw$ (where $W\lambda$ is relative energy of the light source for the test target, $T\lambda$ is transmittance of the filter, $\Delta\lambda$ is 10 nm, T_{max} is maximal transmittance, and Hw is half-value width) for obtaining the relative quantities of radiation showed nearly the same values as the energy ratios obtained with the photomultiplier tube. Thus, the approximate calculations gave fully satisfactory results.

2. But measurements by photomultiplier tube are required in order to measure the absolute quantities of radiation as well as the number of photons, and to put the measured values under the equal quantum conditions.

3. The neutral density filters built in the Tübinger perimeter were proved to have nearly flat transmittance characteristics.

4. From the values measured by photomultiplier tube, calculation charts for putting the values measured by the Tübinger perimeter under the equal energy and the equal quantum conditions, have been prepared.

5. When the relative spectral sensitivities, which were put under the equal energy conditions and the equal quantum conditions, have been compared, the sensitivity put under the equal quantum conditions showed a slight drop in the long wavelength area and a slight rise in the short wavelength area, as compared with the sensitivity under the equal energy conditions. - Yasuo Ohta.

Semispheric perimeter for investigating spatial summation in the field of vision, by R.B. ZARETZKAYA, E.D. PERLSHTEIN and A.D. TUCHIN (Chair for Eye Diseases, First Medical Institute, Moscow, SSSR), Vestn. Oftalm. 1975, No. 6, 63-65.

Description of a hemispheric perimeter similar to that by Etienne (Ann. Oculist. Paris, 157, 461, 1954). The targets, variable in size, luminance and color (red, blue, green and orange-yellow) are produced by a projector. - Ingeborg Schmidt.

A critical review of congenital tritan defect, by N. OHBA and T. TANINO (Dept. of Ophthal. School of Med., Univ. of Tokyo), Acta Soc. ophthal. jap. 79, 1077-1081, 1975.

Literature on congenital tritan defects was critically reviewed and some problems inherent to the rate of this type of colour vision deficiency were pointed out. Although the colour vision characteristics of the entity have been worked out by Wright and others during the last two decades, the question is not yet fully answered as to the existence of a congenital form as an independent entity. Some authors, in fact, still refuse its existence. The present authors have an opinion with their recent own experience that there really exists congenital tritan defect, but it is also likely that some cases so far described might have been acquired due to autosomal dominant optic atrophy as hypothesized by Krill et al. At any event, more new cases should be added to the literature for a definitive conclusion. The authors propose diagnostic criteria for the congenital tritan defect. - Yasuo Ohta.

Early receptor potential (ERP) of a typical rod monochromat, by A. TAMAI (Dept. of Ophthalm., Totteri Univ. School of Med.) and M.G. HOLLAND (Dept. of Ophthalm., Tulane Univ. School of Med.), Acta Soc. ophthal. jap. 79, 534-539, 1975.

A case of typical rod monochromasy is presented with special reference to the results of the ERP examination. The mean total initial ERP amplitude of the patient was 137.5 μ V, accounting for 64.5% of the mean total ERP amplitude of 6 normal subjects (212.9 μ V with a standard deviation of 40.4 μ V), and was a statistically significant subnormal as compared to normal ($P < 0.001$). This indicated that the patient's ERP contained some photolabile cone pigment responses (probably mainly generated in rhodopsin-filled cones and/or cones which are neither rhodopsin-filled cones nor blue cones) in a percentage of about 34.5% to the normal human ERP even with no apparent cone ERG or cone psychophysical function, since the rod and photostable response accounted for at about 20% and 10% of normal, respectively. In fact, the total recovery rate of the patient's ERP ($t_{1/2} = 3.6$ min) was slower than the recovery rate of human ERP in this study ($t_{1/2} = 1.6$ min) and also slower than the regeneration rate of human cone pigments ($t_{1/2} = 1.5$ min), but substantially faster than the rate of rhodopsin regeneration ($t_{1/2} = 4.5$ min).

It was noted that R in the ERP of the typical rod monochromat was not detectable without resorting to adaptation and it was concluded that the R in the human ERP was mainly generated in the usual cone pigments (in other words, the "cone" R).

In conclusion, the ERP is practical for an estimate of the rod and cone contributions in typical rod monochromatism and to determine its functional identification. - Yasuo Ohta.

Colour identification by Saharais natives (La identificación de los colores entre les Saharais), by J. MURUBE and J. DE LA FUENTE, Arch. Soc. Esp. Oftal., 35, 863-872, 1975.

The color band of a solar spectrum was shown to 40 saharan nomads, and they were asked to draw one or more lines dividing it into as many colors as it contained. Fifteen subjects marked only three colors: one they denominate "ahamar", which includes red and orange up to wavelengths of 585 nm; a second "asafar", which includes yellow and olive green up to 555nm; and a third "ahadar", which includes the medium and cool greens, blues and the remainder of the spectrum. These three colors are the only ones which have a specific name in the Saharan language. Of the remaining Saharan nomads, 11 marked 4 colors, 11 marked 5, 2 marked 6 and 1 marked 1.

When the same experiment was repeated with 40 Saharan students studying the last year of the Spanish Bachelor's degree at the Institute of El Aaiun (High School), the results were 6 colors marked by 4 subjects, 7 colors by 6, 8 colors by 12, 9 colors by 14, 10 colors by 2, and 11 colors by 2.

When the same test was given to 40 Spanish students, classmates of the preceding group, 6 colors were marked by 2 subjects, 7 colors by 4, 8 colors by 8, 9 colors by 12, 10 colors by 3, 11 colors by 3, 12 colors by 3, 13 colors by 4, and 16 colors by 1.

It was deduced that the intellectual identification of colors increases in perfection and discrimination as a person's level of education rises.

Colors were identified in the following order : Saharans with the most elementary education marked the first 3 : red-orange, yellow-olive, and green-blue-violet. The fourth color to appear was due to differentiating green-blue-indigo-violet into green and blue-indigo-violet. The fifth and sixth colors were due to the distinctions between red-orange into red and orange, and blue-indigo-violet into blue and indigo-violet, in no fixed order. The seventh was the differentiation of indigo-violet into indigo and violet. The eighth, ninth and tenth were the identification, again in no particular order, of olive green as yellow and medium green, of cool green as medium green and blue, and of cool blue as medium blue and indigo. The eleventh, twelfth and thirteenth colors came from the identification, again in no fixed order, of a color between orange and yellow, another between yellow and olive and between indigo and violet. - Maria de Mattiello.

Chromatic vision deficiencies in our school children
(Deficiencias de la vision chromatica en nuestros escolares),
by Dr. COPELLO and A. CHARA, Arch. Soc. Esp. Oftal., 33, 11,
1023-1030, 1973.

100 school boys and girls were studied. They were 6-13 years old. Seven had chromatic vision deficiency; the proportion between males and females was very similar. Deficiency for the blue and total achromatopsia were absent. A study is made on chromatic vision and their deficiencies, on research methods and heredity. Reference is made on the need of systematic survey, in view for a professional orientation. - Maria de Mattiello.

An acquired color defect of the opponent-color system, by
P.E. KING-SMITH, K. KRANDA and I.C.J. WOOD (Ophthalmic Optics
Dept. UMIST, Manchester, England), Invest. Ophthalm. 15/7,
584-587, 1976.

A 22 year old man suffered from an acquired color defect in his left eye since the age of 14 years. Tested by 1°, 200 ms test flashes on a white background, the spectral sensitivity of the left eye has a single broad peak at about 550 nm and resembles the photopic luminosity curve. It has recently been proposed that the 3 peaks of the normal for 200 ms flashes at about 440 nm, 520 nm and 600 nm reflect the activity of the opponent-color system whereas the single peak for flicker detection is related to the luminance system. The findings on the subjects left eye may thus be interpreted in terms of

a specific loss of his opponent-color system. This would explain his poor color discrimination. The subject complains of a color desaturation in his left eye. Neither Nagel anomaloscope nor Ishihara plates revealed any deviation from the normal. However, on the Farnsworth-Munsell 100 Hue test the error score was 28 for the right eye and 240 for the left eye. Since there is no response from the blue-sensitive cones of the left eye, the defect may be classified as a tritan type. However, since it is thought that the blue cones signal mainly through the opponent-color system the assumption of a general loss of opponent color function seems to be justified. The spectral sensitivity of the right eye is nearly normal, suggesting a precortical origin of the defect. - Ingeborg Schmidt.

Retinitis pigmentosa, by S. MERIN and E. AUERBACH (Vision Res. Lab. and Dept. of Ophthal., Hadassah Univ. Hosp. and Med. School, Jerusalem, Israel), Survey Ophthal. 20, 303-346, 1976.

The authors review the symptomatic and genetic aspects of the various entities of isolated retinitis pigmentosa (R.P.), both in its typical form and in the forms associated with the affection of other ocular tissues. 63% of the cases examined by the authors presented a (mainly tritan) colour vision defect. Syndromes in which R.P. is associated with the affection of other organs and systemic disorders are also considered. Origin, diagnosis and the course of the disease are discussed with regard to electrophysiology, histopathology, fluorescein angiography and biochemistry. Animal research has provided new realizations about the ultrastructure and physiological mechanisms of retinal photoreceptors, and better understanding of abnormal changes. The possible pathogenesis of the human disease, based on research findings, is considered. Although R.P. is generally thought to be an "untreatable" disease, therapy may be effective in several pathological entities. Methods and results of therapy with vitamins, light deprivation and vision aids are discussed. 480 references. - Guy Verriest.

Visual aids for correction of red-green colour deficiencies, by I. SCHMIDT (School Optom., Indiana Univ., Bloomington Ind. 47401, USA), Can. J. Optom. 38, 38-47, 1976.

This brilliant invited paper endly brings us the till now so badly known historical backgrounds and general principles of the visual aids for correction of red-green colour deficiencies.

Such aids are classified by Mrs. Schmidt in 3 types :

(1) selective filters for successive comparison of brightness relationships (e.g. a green and a red filter mounted side by side at the top of a spectacle lens, enabling the wearer, when he looks a "yellow" object successively through to the 2 filters, to decide, by means of the brightness relationships, if

it is in reality green, yellow or red); (2) selective filters or special illuminants which are used for an immediate evaluation of a change in chromatic experience (e.g. a magenta filter that absorbs the part of the spectrum corresponding to the dichromat's neutral zones, so that the saturation of the perceived colours are increased); (3) miscellaneous designs, especially Zeltzer's X-chrom lens, as it combines the 2 preceding clues with additionally some effects of binocular viewing.

The main conclusions are that many red-green deficient benefit from the introduced clues for a more correct identification of colours, at least after intensive training and in every day life if not in difficult situations; and that the advantages can be coupled with new errors, some contrasts being diminished while white appears coloured.

It is astonishing to state that the most essential facts were already published by Sebeck as early as 1837. - Guy Verriest.

Spectral sensitivity by constant CFF : effect of chromatic adaptation, by L.E. MARKS (John B. Pierce Foundation and Yale Univ., New Haven, Conn. 06519) and M.H. BORNSTEIN (Dept of Psychology, Yale Univ., New Haven, Conn. 06510) J. opt. Soc. Amer. 63/2, 220-226, 1973.

Spectral sensitivities were measured by a method of constant CFF under adaptation to high-luminance chromatic fields and under dark adaptation. Adaptation to yellow yielded a narrow curve of spectral sensitivity whose maximum was at about 440 nm (similar to Stiles' π_1) when the CFF was low but yielded a broader spectral sensitivity when the CFF was high. Adaptation to red and green yielded spectral sensitivities that were similar in shape to those of π_4 and π_5 respectively. Spectral sensitivities obtained under dark adaptation by the method of constant CFF are consistent with the hypothesis that the flicker threshold is determined by disjoint action of the underlying components when CFF is low (flicker perceived when either component's threshold is surpassed) but by conjoint action when CFF is high (flicker perceived when both thresholds are surpassed). - Ingeborg Schmidt.

Effect of tinted contact lenses on color vision, by M.G. HARRIS and Ch.R. CABRERA (School of Optometry, University of California, Berkeley, California), Amer. J. Optom. 53/3, 145-148, 1976.

Color vision performance of 8 subjects (6 women and 2 men, 19 to 25 years of age, with normal color vision) was evaluated with the Farnsworth Munsell 100 Hue test while each subject wore each of 13 differently tinted contact lenses. The lenses were 13 standard polymethyl methacrylate contact lenses, diameter 8.6 mm. The tints used were shades No. 1, 2 and 3 of standard brown, grey, blue and green colors and one untinted

clear lens. No significant differences in color vision were found with the various lenses. However performance on the test was affected by repetition. Regardless of the lens tint being tested color discrimination for the blue quadrant of the 100 Hue Test was the poorest. - Ingeborg Schmidt.

The effect of coloured filters on the refraction of the eye (L'effet de filtres colorés sur la réfraction de l'oeil), by M. HILL(D.T (Cardiff, G.-B.) Ann. Oculist. (Paris) 209, 605-608, 1976.

Red (dominant wavelength 642 nm) and blue (487 nm) filters were fitted binocularly to 14 subjects to be worn for 5 hours. Initial measurements of refraction with the filters in place showed that the eye was, on average, myopic with the blue filters and slightly hyperopic with the red filters. After 4 hours wear all pre-presbyopic subjects (11) showed a significant diminution in the induced ametropia. The 3 presbyopic subjects exhibited no clinically significant changes in ametropia. Control measurements made after removal of the filters and without any filters for the same period of time provide evidence supporting the effect of the colored filters on ametropia.

These results may be interpreted by the fact that the retinal image through these filters is more or less punctual (except for diffraction) since the chromatic aberration of the eye is eliminated and as it is not formed on the retina it plays the role of a new stimulus to accommodation. Indeed objective measurements with a refractometer show that accommodation varies simultaneously with the changes of ametropia determined subjectively.

It is also suggested that the discomfort experienced by some emmetropes wearing tinted lenses (not neutral) may be attributed to this phenomenon. - The Authors.

Memory colors in afterimages : A bicentennial demonstration, by Ch. W. WHITE and D.A. MONTGOMERY (Duke University, Durham, North Carolina 27706, USA), Perception and Psychophysics 19/4, 371-374, 1976.

The after-image inducing stimuli used in the experiment were on a white background : (1) a complementary-colored American flag with the stars black, the field orange, the equal-width stripes alternately black and one of the test colors (2) a pattern of vertical stripes which were alternately black and one of the test colors. The test colors were blue-green and yellow-green. Six psychology students, all with normal or corrected visual acuity and normal color vision, adjusted a colorimeter to match the colored stripes in the afterimage that resembled either a red, white and blue American flag or a simple striped pattern. They matches the afterimage of stripes in a flag pattern as redder than afterimages of the same stripes in a simple striped pattern. The results suggest that the apparent color of an afterimage depends on memory color. - Ingeborg Schmidt.

ABSTRACTS OF THE PAPERS OF THE
SECOND INTERNATIONAL VISUAL FIELD SYMPOSIUM
(Tübingen, 19-22 september 1976) relating
to colour vision

AOYAMA T. & KANI K. - Pupillographic perimetry.

Several characteristics of the pupillographic perimetry were investigated using a modified Goldmann perimeter, an infrared videopupillography (Irisorder) and a computer. Threshold, latency and contraction rate of the pupillary area were measured under scotopic, mesopic and photopic condition changing size, brightness, colour and exposing time of the test-object.

The threshold of pupillographic perimetry is compared with that of subjective perimetry. The contraction rate of the pupil in relation to the condition of test-object is discussed.

CARLOW T.J., FLYNN J. & SHIPLEY T. - Color perimetry parameters.

Since standard color isopters have not been well defined, a study was undertaken to determine the reproducibility of the end points for colored targets : target recognition (achromatic) and color recognition (chromatic). Seven subjects were evaluated, utilizing a Tübingen perimeter first for energy and second for brightness.

Achromatic and chromatic color thresholds for equal energy targets gave smaller red isopters. The data is supported by the fact that more energy is needed to stimulate the retina in the red end of the spectrum.

Achromatic thresholds for equally colored targets gave smaller isopters in the longer wavelengths (red). The inverse relationship between energy and wavelength or the protanopy of the peripheral retina might explain this finding. Chromatic thresholds for equally bright colored targets gave a large blue, midzone red and green along with a small yellow isopter. Saturation is postulated to be responsible for this variation in isopter size.

The data supports Traquair, that all color isopters would be equivalent if hue, saturation and brightness were equated.

DANNHEIM F. - Kinetic perimetry with suprathreshold stimuli.

A steady moving suprathreshold target may be used for rapid detection of small visual field defects. This method is applicable to all types of scotomata regardless of the location of lesions within the visual pathways. The accuracy lies in the same order as that of static perimetry. The optimal conditions for this technique are demonstrated. Coloured stimuli are only in certain cases superior to white ones.

DANNHEIM F. - Colour perimetry in chiasmal lesions.

Static and kinetic perimetry with coloured stimuli in early chiasmal lesions give results comparable to those of white stimuli. Perception of saturation of suprathreshold stimuli shows more pathological changes than threshold stimuli of static and kinetic perimetry. Red stimuli are superior to all others in detection of this "desaturation-effect".

FOERSTER, M.H. - The recording of the scotopic and photopic DC-ERG by means of local stimulation with white light and coloured backgrounds.

After reviewing the earlier experiments on local retinal stimulation, our results are presented using a DC-ERG method with light stimuli of one second. Photopic and scotopic answers are recorded and assessed in the central visual field on the basis of b-wave and DC-component measurements.

HANSEN E. - Investigation of retinitis pigmentosa by use of specific quantitative perimetry.

A reduced light threshold sensitivity is commonly found in retinitis pigmentosa. By static perimetry applying the two-colour threshold technique of Stiles differentiated response pattern can be obtained. Retinitis pigmentosa patients in different stages were analyzed with this technique. Colour vision examinations were made parallel herewith. The most typical finding is an early loss of the blue receptor mechanism which is consistent with the tritan type of colour vision deficiency being present in the same patients.

ISRAEL A.H. and VERRIEST G. - Normal results of kinetic colour perimetry by means of the Goldmann apparatus.

The authors present a statistical study of the results of achromatic and chromatic increment threshold kinetic perimetry in normal subjects. They studied also the extent of the blind spot. Four colours were used : red, green, blue and yellow. Although the spreads are large the method seems to be useful for clinical purposes.

LAKOWSKI R., WRIGHT W.D. and OLIVER K. - High luminance chromatic Goldmann perimeter.

A modification to the Goldmann projection perimeter is described in which a high luminance coloured target is produced. The modification employs a 150 watt Xenon Arc lamp to provide a 1000 apostilb target in each of white, red, green, and blue. An additional Quartz-Iodide lamp provides an independent background illumination in the four conditions, at 31.5 apostilbs. Thus the perimeter may be used for :

- white target on white background
- coloured target on white background
- coloured target on coloured background

and with additional filter, coloured target on complementary coloured background; all at 1000/31.5 asb.

Results have been collected for each of the above conditions and are presented for a young normal male emmetrope, a young protanopic male emmetrope, and an older deuteranomalous myope.

MARMION V.J. - The results of a comparison between the hundred hue test and static colour perimetry.

A study has been made of patients with diabetic exudative retinopathy who have defective colour vision as measured by the D15 and Hundred Hue Test.

A comparison has been made between the results from the D15 and Hundred Hue compared with the defect as found on static perimetry for similar colours. This indicates a considerable reduction in the threshold of colour sensation whereas the results on the Hundred Hue Test are variable.

MORELAND J., MAIONE M., CARTA F., BARBERINI E., SCOCCIANTI L. and LETTIERI S. - The clinical assessment of chromatic mechanisms of the retinal periphery.

The Aa have studied the confidence limits of kinetic perimetry in normals with monochromatic targets at three levels of chromatic adaptation.

They have also applied the method to some neuro- and maculopathologies, with special reference to the behaviour of the Stiles W-mechanisms.

RONCHI L. and GALASSI F. - Absolute threshold for monochromatic stimuli of various size and duration across the visual field.

Absolute threshold is recorded at different eccentricities along the horizontal meridian of the dark-adapted retina from a number of normal observers. The duration of the flash is varied from 10 to 400 msec. the angular diameter of the test spot from 4'.5 to 2°. Monochromatic stimuli are used. Both eccentricity dependence of threshold data as well as critical duration are found to be wavelength-dependent for some size-duration combinations, but not for others. The results are discussed in terms of a possible intrusion of cones at absolute threshold, where the visual response is generally assumed to be mediated solely by rods. As an alternative explanation, the existence of rod systems with different time constants is pointed out.

VERRIEST G. and UVIJLS A. - Spectral increment thresholds on a white background in different age groups of normal subjects.

Mean energetical achromatic increment thresholds on a white background of 10 cd.m^{-2} were determined at 5 eccentricities, by means of 8 interference filters incorporated to a calibrated Tübingen perimeter, in 3 age groups of normal subjects (10-15, 16-41 and 60-76 years). Many of the differences between the means are very significant and only some of them can be explained by the known prereceptor changes.

VERRIEST G. and UVIJLS A. - Spectral increment thresholds on a white background in acquired ocular diseases.

Energetical increment thresholds were measured in 120 pathological eyes at 5 eccentricities by means of 8 interference filters incorporated to a calibrated Tübingen perimeter. When compared to that of normal eyes, the age factor being considered, the so obtained spectral sensitivity curves can be either not evenly lowered (especially in the cone dystrophies) or evenly lowered. The method allows to estimate the relative sufferings of the retinal mechanisms; it is quick, more sensitive than white perimetry and often very useful for clinical diagnosis and prognosis.

Guy Verriest.

PRACTICAL NOTES

The Osprey 85, Automated 100-Hue Tester,
U.K. patent application no. 27006/76.

The machine on display is an experimental prototype for automatically scoring and plotting the standard F.M. 100-Hue Test (as reported in a paper by Taylor and Donaldson).

The Osprey 85 incorporates all the proven capability of the prototype machine, and some improved features, in a thoroughly engineered, modern portable, form.

The Osprey 85 will : provide standard polar plot, totally automatically, in a few minutes; display, on demand, the grand error score; display, on demand, the four sub-total error scores, set-by-set; display, on demand, any off-scale error scores cap-by-cap; provide the option of plotting in standard or "Kinnear" modes; provide the option of calculation on standard or "end-cap" basis.

The Osprey 85 releases the ophthalmologist from the tedious, and time-consuming, scoring and plotting process. This allows him to concentrate on clinical implications.

The Osprey 85 permits testing of many more patients (one machine will handle upwards of ten patients simultaneously). Large-scale 100-Hue screening is therefore now entirely reasonable.

Cost : about 3 Senior-Registrar months.
Availability : delivery commences early 1977.
Contact : Dr. J.McKelvie,
Centre for Industrial Innovation,
University of Strathclyde
100, Montrose Street
GLASGOW, G4.0LZ, Scotland.

ANNOUNCEMENT

FOURTH WILLIAM MACKENZIE SYMPOSIUM ON THE INTRA-OCULAR FLUIDS
STIRLING, (SCOTLAND) 4TH - 7TH SEPTEMBER, 1977.

It is proposed that the main accent of the Symposium will be on fluid exchange and movement rather than biochemistry, and it is hoped that there will be sessions devoted to the formation and drainage of aqueous, the blood ocular barriers, fluid exchange in the posterior eye, abnormal intra-ocular fluids, e.g. retinal oedema, central serous retinopathy, sub-retinal fluid etc. It is intended to deal with the basic and clinical aspects of the above topics and other related topics.

Persons interested in attending or reading a paper at this meeting can ask an inscription form to : Mrs. I.J. Beard, Tennent Institute of Ophthalmology, Western Infirmary, 38 Church Street, Glasgow, G11. 6NT., Scotland.

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- Guy Verriest.

NORMAL COLOUR VISION

- ENOCH J.M. (Gainesville, U.S.A.) : Wavelength effects related to waveguide properties in vertebrate retinal receptors
- FRANCESCHINI N. (Bad Nauheim, B.R.D.) : Wavelength effects related to waveguide properties in invertebrate retinal receptors
- KALMUS H. (London, England) : Teleonomy of normal and defective colour vision (15 min)
- GAVRIYSKY V., BANKOV A. & KECHLIBAROV T. (Sofia, Bulgaria) : The photopic spectral efficiency curve in the normal bulgarians (10 min)
- COBB S. (Glasgow, Scotland) : The examination of Class I and Class II normals and colour defectives on the exchange threshold colorimeter and analytical anomaloscope (15 min)
- COHEN J.D. & MACCUE R.K. (South Hadling, U.S.A.) : Unique-green spectral loci and differential adaptation in normal observers (10 min)
- PERDRIEL G., SANTUCCI G.F. & CHEVALERAUD (Paris, France) : Visual acuity on TV color screen (10 min)

NEUROPHYSIOLOGICAL APPROACH OF COLOUR VISION AND ITS DEFICIENCIES

- SPERLING H.G., CRAWFORD M.L.J. & ESPINOZA-CIFUENTES S. (Houston, U.S.A.) : Threshold spectral sensitivity of single neurons and performing monkeys (invited paper) (25 min)
- REGAN D.M. (Halifax, Canada) : Investigations of normal and defective colour vision by evoked potential recording (invited paper) (30 min)
- MEYER J.J., KOROL S. & GRAMONTI R. (Genova, Switzerland) : Psychophysical flicker thresholds and ERG flicker responses in congenital and acquired colour vision deficiencies (10 min)
- MIERDEL P. & MARRE E. (Dresden, GDR) : The effect of the rise time of colour stimuli on the VECP (10 min)

COLOUR VISION UNDER REDUCED ILLUMINATION

- RUDDOCK K. (London, England) : Colour vision under reduced illumination (invited paper) (15 min)
- DE MATTIELLO M.L.F. & GUIRAO M. (Buenos-Aires, Argentina) : Saturation functions under reduced illumination (5 min)
- BOWMAN K.J. (Melbourne, Australia) : The effect of illuminance on colour discrimination in senile macular degeneration (15 min)

PRACTICAL ASPECTS OF COLOUR VISION DEFICIENCIES

- GRAMBERG-DANIELSEN B. (Hamburg, BRD) : Practical aspects of colour deficiencies in traffic (invited paper) (30 min)
- VOKE-FLETCHER J. (Bristol, England) : Industrial requirements and testing of colour vision (invited paper) (30 min)
- RONCHI L. & STEFANACCI S. (Florence, Italy) : Color discrimination in the frame of illuminating engineering : effects of C- and high pressure Na-sources at different illuminances
- KALMUS H. (London, England) : On colour vision in mixtures of monochromatic and "white" light (10 min)
- FLETCHER R. (London, England) : Confusion spot displays for endoscopy and other situations (5-10 min)
- VOKE-FLETCHER J. (Bristol, England) : Role of colour in acquisition of military targets (10 min)

METHODS OF EXAMINATION

(a) Subjective

- HIGGINS K.E., MOSKOWITZ-COOK A. & KNOBLAUCH K. (Color vision testing : An alternative and inexpensive "source" of illuminant C (15 min)
- Note of the secretary : I loosed the address of Kent E. HIGGINS, who is not a member of the IRGCVD. If somebody knows it, please send to me.
- VELHAGEN K. (Berlin, GDR) : Charts for examination of the colour sense of children and persons suffering from dyslexia
- PINCKERS A., NABBE B. & VAN DEN BOGAARD P. (Nijmegen, The Netherlands) : Lanthony's New Color Test (10 min)
- OHTA Y., KOGURE S., MIYAMOTO T., NAGAI I. & IZUTSU Y. (Tokyo, Japan) : Clinical analysis on colour vision deficiencies with the City University Test (10 min)
- VERRIEST G., CALUWAERTS M.R. & UVIJLS A. (Ghent, Belgium) : An evaluation of three new colour vision tests (10 min)
- PINCKERS A. (Nijmegen, The Netherlands) : Lanthony's New Color Test and Desaturated 15 Hue (Clinical Evaluation) (10 min)
- OHTA Y., KOGURE S. & YAMAGUCHI T. (Tokyo, Japan) : Clinical experience with the Lovibond Colour Vision Analyser (10 min)
- TAYLOR W.O.G. (Ayr, Scotland) : Contribution of automated 100-hue test to diagnosis of acquired and congenital colour vision defectiveness (15 min, film of 7 min included)
- FLETCHER R. (London, England) : Recent experiences with the City Spot Test (10 min)
- KEELY E. (Bristol, England) : The formulation and assessment of the Keely/Bristol Colour Vision Test
- MORELAND J.D. (Waterloo, Canada) : Temporal variations in anomaloscope equations (10 min)
- MORELAND J.D. & KERR J. (Waterloo, Canada) : The optimization of stimuli for trit-anomaloscopy (15 min)

- DUPONT-HENIUS G. (Paris, France) : Measurement of differential color perception thresholds.
- DAVIDOFF J.B. (Edinburgh, Scotland) : A new screening test for colour defective vision (10 min)
- PARRA F. (Paris, France) : New results in searching the neutral bands in colour vision deficiencies (10 min)

(b) Objective

- OHBA N. & TANINO T. (Tokyo, Japan) : Measurements of human cone pigments by fundus photography (10 min)
- COHEN G.H. (Rochester, U.S.A.) : The human pupil responses as an objective determination of color vision deficiency (15 min)

CONGENITAL DEFECTS

- VERRIEST G. & UVIJLS A. (Ghent, Belgium) : Central and peripheral spectral increment thresholds on white backgrounds in different kinds of congenitally defective colour vision (20 min)
- SCHEIBNER H. & PAULUS W. (Düsseldorf, BRD) : An analysis of protanopic colour vision (10 min)
- VOKE-FLETCHER J. & FLETCHER R. (London, England) : A case of tritanopia (15 min)
- VOKE-FLETCHER J. (Bristol, England) : Congenital rod monochromatism in a brother and a sister (15 min)

ACQUIRED DEFECTS

- MARRE M. & MARRE E. (Dresden, GDR) : Different types of acquired colour deficiencies in dependence upon the fixation modus of the diseased eye (20 min)
- VERRIEST G. & UVIJLS A. (Ghent, Belgium) : Central and peripheral spectral increment thresholds on white backgrounds in acquired ocular diseases (20 min)
- ZISMAN F. & KING-SMITH P.E. (Manchester, England) : Spectral sensitivities of acquired colour defects analysed in terms of opponent-colour theory (15 min)
- LANTHONY P. (Paris, France) : Study of the saturation in acquired dyschromatopsias (10 min)
- MORELAND J.D., MAIONE M., CARTA F. & SCOCCIANI L. (Parma, Italy) : Acquired "tritan" deficiencies in macular pathology (10 min)
- LAGERLÖF O. (Stockholm, Sweden) : Quantitative assessment of acquired color vision deficiency in maculopathy (5 min)
- BERCH-COX J. (London, England) : A comparison between congenital tritanopia and acquired tritanopia due to diabetic retinopathy (15 min)

- MASSOF R.W. (Baltimore, U.S.A.) : Color discrimination in retinitis pigmentosa (10 min)
- CARAPANCEA M.T. (Bucharest, Rumania) : Manifestations and mechanisms of chromatic perception anomalies in quininic intoxication
- SERRA A., MASCLA C. & DESSY D. (Cagliari, Italy) : Color discrimination under C- and high pressure Na-illumination in normal persons and in patients affected by various diseases
- MARMION V.J. (Bristol, England) : The colour vision deficiency in open angle glaucoma, A comparison of tests
- MANRE M. (Dresden, GDR) : Colour vision in squint amblyopia (10 min)
- YURDAKUL S. (Bristol, England) : The comparative value of the K-B plates in diabetic retinopathy
- BARCA L. & VACCARI G. (Florence, Italy) : Diabetic retinopathy and color discrimination under various illuminants
- BIRCH-COX J. (London, England) : Acquired colour defects in diabetic retinopathy before and after laser photocoagulation (15 min)

SUPPLEMENTARY LIST

(just received inscription forms)

- POKORNY J., SMITH V.C. & LUND D. (Chicago, U.S.A.) : Technical characteristics of "color test glasses" (10 min)
- SMITH V.C., POKORNY J., DIDDIA K.R. & NEWELL F.W. (Chicago, U.S.A.) : Color matching and Stiles-Crawford effect in central serous retinopathy (15 min)
- ZWICK H. & BEATRICE E.S. (San Francisco, U.S.A.) : Long term changes in spectral sensitivity and retinal ultrastructure after low level visible laser exposure
- ZWICK H. & ROBBINS D. (San Francisco, U.S.A.) : Central protanomaly in the Rhesus
- ROMESKIE M. & YAGER D. (New York, U.S.A.) : Opponent response functions of dichromats (15 min)
- NUNN B.J. & RUDDOCK K.H. (London, England) : Non-foveal colour vision characteristics of anomalous trichromatic colour vision (10 min)
- RUDDOCK K.H. & WATERFIELD V.A. (London, England) : Central representation of colour vision deduced from studies on a subject with a central colour vision defect (10 min)
- MAIONE M., MORELAND J.D., CARTA F., BARBERINI E. & LETTIERI S. (Parma, Italy) : Further observations on the extramacular chromatic mechanisms in retinal and neural pathology
- MAIONE M., CARTA F., SCOCCIANI L. & ORSINI J.G. (Parma, Italy) : The color naming at different suprathreshold extramacular stimulations
- CORDELLA M., CRIPPA P.R., PROSPERI L., FRANCHI A. & PONGHELLINI G. (Parma, Italy) : Clinical electroretinography on chromatic saturation