DALTONIANA

NEWSLETTER
OF THE INTERNATIONAL RESEARCH GROUP ON COLOUR VISION DEFICIENCIES

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THE LAST PAGES OF THIS ISSUE ARE AGAIN TAST ILLUMINATION ENQUIRY AND THE LAST CALL FOR PAPERS FOR THE 8TH INT. IRGCVD SYMPOSIUM IN AVIGNON, JUNE 1985.

LITERATURE SURVEY

Recent developments in the physiology of color vision, by P. LENNIE (Center for Vis. Sci., Univ. of Rochester NY 14627, USA), Trends in Neurosciences 7, 243-248, 1984.

This clear and intelligent review of the physiology of colour vision will most recommend itself to those who already know something of the field. Lennie quickly summarises the properties of the retinal receptors and the psychophysical evidence for post-receptoral chromatically-opponent channels. He describes how cells projecting to the magnocellular layers of the LGN have properties quite distinct from those of cells projecting to the parvocellular layers; and he then concentrates on the question of whether there is a physiologically identifiable channel, with high spatial and temporal resolution, that corresponds to the achromatic channel sometimes postulated by psychophysicists. Lennie adopts the position with which Ingling has been particularly associated in recent years (see, e.g., Daltoniana Nr. 51, p. 1) and postulates a double role for those retinal ganglion cells that draw antagonistic inputs from the long- and middle-wave cones : such cells respond to chromatic contrast when the stimuli are of low spatial frequency and to achromatic contrast when the stimuli are of higher frequency. Central mechanisms will thus be needed to resolve the ambiguity associated with the signal of any individual ganglion cell and the review concludes with a brief

account of the representation of spatial and chromatic contrast in the striate cortex. - Lennie Throughout uses the term "red-green" for opponent units that are maximally polarised by red and by blue light, and the term "blue-yellow" for units that are maximally polarised by violet and by red light. It is a pity that he continues this usage, for one's thoughts are often as casual as one's words and the terms "red-green" and "blue-yellow" may prove to hold back the understanding of post-receptoral channels as much as the terms "red", "green" and "blue" obstructed the proper understanding of the receptors. - J.D. Mollon.

The psychology and physiology of colour vision, by N.W. DAW (Dept. Physiol. and Biophysics, Washington Univ., St. Louis, Miss. 63110, USA) Trends in Neurosciences 7, 330-335, 1984.

This review usefully complements that by Lennie (see above). Daw concentrates on the problem of colour constancy, the fact that there is a consistent relationship between the spectral reflectance of a surface and the colour that we see - despite large variations in the spectral composition of the illuminant and thus in the spectral composition of the light that reaches us from the surface. Land's theory of colour constancy (see below) requires that spatial comparisons are made over a distance for each cone system separately, before the derived "lightnesses" for the separate systems are compared. Daw points out that all electrophysiological results suggest that comparisons are made between cone systems at an early stage of analysis and before extensive spatial interactions occur. But he passes on an insight that he attributes to Marks : provided a log transformation of the receptor signals precedes the comparison stage, it does not matter mathematically whether (a) the long-wave signal in a local region is first compared with the long-wave signal in adjacent regions and is then compared with the corresponding middle- and short-wave signals, or whether (b) the comparisons are made in the opposite order. The "double-opponent" cells of the striate cortex may represent an early stage of a system of type (b), a stage by which only local spatial comparisons have been made. - J.D. Mollon.

Recent advances in retinex theory and some implications for cortical computations : Color vision and the natural image, by E.H. LAND (Rowland Inst. for Sci., 100 Cambridge Parkway, Cambridge, Mass 02142, USA) Proc. Natl Acad. Sci. USA 80, 5163-5169, 1983.

This paper provides a current statement of Land's views on colour constancy. A description is first given of his "Mondrianan" experiments, which are simply demonstrations that the spectral reflectance of a surface is reliably recognised despite large variations in the illuminant. What is the computational basis for this colour constancy? Land proposes

two, very similar, versions of his theory. In both versions the visual system first computes 3 spatial patterns of lightnesses (or "records") that represent the world as seen by the 3 individual classes of cone. The lightness at a given point i in, say, the middle-wave record is derived as follows : along a path from i to a remote area j, the logarithms of the ratios of middle-wave signals in adjacent areas are obtained and these logarithms are cumulated to estimate the relative lightnesses of i and j. The average of many such estimates, relating i to many different remote areas, is taken as the final estimate of the lightness of i. In order to allow for gradual changes in the illumination across the field, a threshold is built into the model : when a ratio along the path is close to unity, it is set exactly to unity. Finally, the lightnesses at corresponding points in the different records are compared in order to estimate the spectral reflectance of the stimulus surface. The two versions of the theory appear to differ only in that one is dynamic (signals radiate intermittently from j, and other points and are appropriately modified as they travel to i) and the other is static (no specific physiological implementation being postulated in this case). - Land describes the present paper as the third in a series, the first and second being his two classical papers in Proc. Nat. Acad. Sci. for 1959. It is rather a pity that he still doesn't acknowledge that others have worked on the problem of colour constancy. - J.D.Mollon.

Colour-generating interactions across the corpus callosum, by E.H. LAND, D.H. HUBEL, M.S. LIVINGSTONE, S. HOLLIS PERRY & M.M. BURNS (Rowland Inst. for Sci., 100 Cambridge Parkway, Mass. 02142, USA) Nature 303, 616-618, 1983.

Do the long-range spatial interactions underlying colour constancy occur in the retina or the cortex? To answer this question, an experiment was performed on a 20-yr-old male patient whose corpus callosum had earlier been sectioned for relief of epilepsy. The patient was asked to name the colour of a test area that extended to the left and right of fixation and remained constant in chromaticity and luminance throughout the experiment. A "Mondriaan" pattern of coloured papers lay either to the right or the left of the test spot and its illumination could be varied independently of that of the test spot. For normal observers the appearance of the test spot changed from a chalky white when the Mondriaan was dimly illuminated to a deep purple when the Mondriaan was brightly illuminated. When the brightly lit Mondriaan was presented to the right half of the patient's retina the test spot was always reported as white; but the patient gave the normal report when the Mondriaan was presented to the left retina. The authors interpret this result as follows. The verbal report of the commissurectomised patient depends on the part of the test patch that stimulates the left half of the retina, for only this part of each retina has access to the verbal functions of his left cerebral hemisphere. Since the appearance of the test patch is unaffected by a Mondriaan presented to the right half of his retina, commissurec

tomy must have interrupted the interactions underlying colour constancy and in general, therefore, these interactions must occur in the cortex. - J.D. Mollon.

(Editor's note : A "Mondriaan" is a pattern of adjacent rectangular colour blocks of different sizes - as in Mondriaan's paintings).

Non-fluorescent dye staining of primate blue cones, by E.P. McCRANE, F.M. de MONASTERIO, S.J. SCHEIN and R.C. CARUSO (Section on Visual Processing, Nat. Eye Inst., Nat. Inst. of Health, Bethesda, MD 20205, U.S.A.) Invest. Ophthalmol. Vis. Sci. 24, 1449-1455, 1983.

The intravitreal injection in macaque retina of the fluorescent dye Procion yellow can selectively label a specific cone population whose eccentricity distribution and angular separation are consistent with those of the blue-sensitive cones of human and non-human primate retinas. Because at the concentrations used the dye is poorly visible in conventional light microscopy. Fluorescence microscopy is required for the observation of the stained cones. In this paper we describe several alternative methods for the staining of blue cones in primate retina, staining that can be visualized in conventional light microscopy and, with some methods, electron microscopy. - The Authors.

Densitometric measurement of human cone photopigment kinetics, by V.C. SMITH, J. POKORNY (Eye Res. Lab., Univ. of Chicago, 939 East 57th St. Chicago, IL 60637, U.S.A.) and D. Van NORREN (Roy. Netherlands Eye Hospital, E.C. Dondersstraat 65, Utrecht, The Netherlands) Vision Res. 23, 517-524, 1983.

We measured the radiance response function for steady state bleaching lights and the regeneration of the cone visual photopigments using the continuous recording densitometer described by V. Norren and v.d. Kraats. Measurements made on 5 deuteranopes, 1 protanope and 2 color-normal observers were similar. The radiance response function was steeper than the function predicted by a simple first-order kinetic equation. For a measured density (ca 0.3) we evaluated whether high stray light (ca 47.5%) and high two-way optical density (ca 1.3) could account for the deviation from the prediction of a first-order equation. Such a model was rejected because these parameters predicted different estimates of the time course of regeneration for different test wavelengths (554 and 605 nm). Statistical analysis of the regeneration data revealed a highly significant non-linearity. A model in which the rate of regeneration increases as the proportion of bleached photopigment increased is required to explain both the radiance function and the regeneration data. - The Authors.

Variation in the photopigments of the common marmoset, by J.K. BOWMAKER, J.D. MOLLON and D.S. TRAVIS (School of Biol. Sci., Queen Mary College, Mile End Road, London E1 4NS, and Psychol. Lab. Univ., Cambridge CB2 3EB, U.K.) J. Physiol. 353, 25P, 1984.

Microspectrophotometric measurements of the visual pigments of the common marmoset (Callithrix jacchus), a New World monkey, demonstrate a variation between individuals in the location of peak sensitivity (λ_{max}) of the longer-wavelength cones. Absorbance spectra were obtained by passing the measuring beam transversely through the outer segment. A pair of dizygotic twins have two pigments in the red-green part of the spectrum, with λ_{max} values lying at approximately 545 and 565 nm. In terms of human colour deficiency, these animals might be classified as deuteranomalous trichromats. In contrast, a second pair of dizygotic twins appear to have only a single pigment in the red-green part of the spectrum, with λ_{max} at 558 nm. In terms of human colour deficiency, these animals might be classified as deuteranopes. - The Authors

Suprasylvian gyrus unit responses to light flashes with different wavelength, by A.R. KEZELI, Neirofiziologija 11, 11-17, 1979.

Unit responses in the cat's supra-sylvian gyrus to the light flashes of different wavelength were studied. 80% of color-coding units were found in the suprasylvian gyrus, especially in the Clare-Bishop area. Four groups of neurons differently responding to different spectral regions are distinguished. The possible principle of stimulus wavelength information coding in the suprasylvian units is discussed. - Marian Marré.

Physiology and psychophysics of vision (Physiologie und Psychophysik des Sehens), by H. SCHEIBNER (Physiol. Int. II der Univ., Moorenstrasse 5, 4000 Düsseldorf, B.R.D.) LICHT-Forschung 5, 3-10, 1983.

Some recent developments in the anatomy and physiology of the retina are reported. Among others, the univariance of photochemical effect and the chain of excitation transfer are presented. In order to throw a bridge also to the visual sensations, a linear colour theory consisting of the type of traditional zone theory is sketched. The position taken by the sensation qualities hue, chromatic saturation, and chroma within this theory is shown. - The Author.

Dichotomous examination for detection of defective color vision, by Ts. IMAMURA (Imamura Physical Clinic, Osaka, Japan), Jap. J. Clinic. Ophthalmol. 36, 66-69, 1982.

In order to facilitate dichotomous classification of defective color vision into "strong" (dichromatism) and "mild" (anomalous trichromatism), a new method named Disc-6 was developed and was applied in 1,500 color-defective subjects along with anomaloscopic examination, D-15 test, and pseudoisochromatic plates (PIP) of Ishihara, Ohkuma and IMC.

Findings by anomaloscope being assumed as standard for dichotomous classification, the outcome deviated from the standard by 23 to 30% for PIP, 9.3% for D-15 and 2.0% for Disc-6. Above findings indicate that utmost precaution is necessary to employ PIP in the dichotomous evaluation of color deficiency. Disc-6 test is an excellent means in this regard. - Yasuo Ohta.

Screening test using the Standard Pseudoisochromatic Plates (SPP) by, K. HUKAMI (Kyoto First Red Cross Hospital), H. ICHIKAWA (Nagoya Univ. School of Med.), Sh. TANABE (Nagoya First Red Cross Hospital), M. KOZAKI (Children's Med. Center of Osaka City) and K. HARADA (Osaka Red Cross Hospital), Jap. J. Clinic. Ophthalmol. 36, 1265-1268, 1982.

Out of the 10 screening plates in the SPP, at least 8 plates were read correctly by 90.2% of 1766 children. The results of SPP and Ishihara's Plates were in fine agreement. The incidence of color-defectiveness was 5.01% in males and 0.11% in females. The findings indicate that SPP includes useful plates for the screening of color-defective subjects. - Yasuo Ohta.

Studies on color vision test, (3) Pseudo-isochromatic plates for school children, by T. YASUMA (Dept. Ophthalmol. Nagoya Univ. School of Med.), Y. TAKAYANAGI and H. UESAKI (Nagoya Ophthalmol. Assoc. for School Children, Japan), Jap. J. Clinic. Ophthalmol. 36, 395-401, 1982.

The relationship between pseudoisochromatic plates (PIP : Ishihara, TMC and SPP plates) and anomaloscope, D-15 or lantern tests was investigated with the method of quantification type (developed by Hayashi) in 784 color-defective children at the age of 10 years. (1) The protans and deutans were clearly discriminated even if only 3 plates, which were selected from the classification plates of Ishihara, TMC and SPP plates, were used (correlation ratio : ρ^2 = 0.8243). (2) Numeric values of these best 3 plates were modified for clinical application, and a score value was given to each item category. The total score for each color defective was calculated to discriminate between protans and deutans (φ^2 = 0.7726). The rate of erroneous discrimination was about 5%. (3) Anomalous trichromats and dichromats could not be discriminated by the results of PIP. (4) It was difficult to discriminate the results of D-15 and Lantern tests by the results of PIP. - Yasuo Ohta.

A new projection anomaloscope, Technical data - Diagnosis of defective Colour Vision - New facilities of Colour Research (Ein neues Projektions-Anomaloskop, Technische Daten, Diagnostik der Farbensinnstörungen, neue Möglichkeiten der Forschung), by W. JAEGER, H. KRASTEL and SCHLÄFER (Univ.-Augenklinik, Bergheimerstrasse 20, D-6900 Heidelberg, B.R.D), Fortschr. Ophthalmol. 79, 342-345, 1982.

The new projection anomaloscope consists of 3 slide projectors, operated from a constant voltage supply. The projectors' light output is controlled by thyristors and precision potentiometers. Monochromatic stimuli of high intensity and saturation are produced by Schott cut-off- and interference filters (Rayleigh and Trendelenburg matches). A counter-rotating tandem-potentiometer increases the one primary while the other primary is simultaneously reduced in intensity. A separate potentiometer controls the comparison standard. Radiometric calibrations as well as the consistency of the

equations accepted in various sessions by the subjects demonstrate that reproducable conditions are provided by this set-up. Apart from the obvious aptitude for demonstration purposes, the projection anomaloscope has further advantages : 1. Screening tests can be done, examining a large number of persons simultaneously. 2. Various diaphragms provide free choice of test field size. Matches of the fovea can be compared with large field matches without loss of spectral purity or energy. 3. The choice of different interference filters allows to use various spectral matches. 4. All matches can also be presented in the periphery of the visual field. - The Authors.

Can "Oscar" replace the Nagel anomaloscope? (Ist "Oscar" ein Ersatz für das Nagel-Anomaloskop?, by H. KRASTEL (Univ.-Augenklinik Heidelberg, B.R.D.).

The "Oscar" -test does not concern colour discrimination; accordingly it does not allow exact diagnosis of the type of the defect and cannot replace the Nagel anomaloscope. However it distinguishes better between protan and deutan than the pseudo-isochromatic plates (because it allows to recognize an abnormal spectral luminosity curve). - Guy Verriest.

Color field of vision in healthy persons under photopic and scotopic conditions, by V.I.RAK, Oftalmol. Z. 6, 344-346, 1979.

The color visual field under photopic and scotopic conditions was studied in 156 persons (310 eyes) with normal visual functions. A projection-registrating perimeter PRP-60 was used. Color fields were investigated using test objects 10 mm in size, with brightness of 1,6 msb along 8 radii. Adaptation to the perimetric background lasted 5-7 min under photopic conditions and 40 min under scotopic conditions.

Under photopic conditions inversion for blue (blue isopter occupied a middle position between isopters of red- the widest, and green - the narrowest) was observed in 26.2% of cases. A great variety of visual fieldboundaries to colors was noted. Perimetry under scotopic conditions revealed inversion for blue in 100% of the subjects. In 86.9% of cases inversion for blue was deep (visual field boundaries to blue color narrowest).

These findings should be considered when estimating color field of vision. - Marion Marré.

'Objective examination of protanomalopia (sic) and protanopia by electroretinographic off-response, by H. NAKAZATO, D. YONEMURA, K. KAWASAKI, I. KAWAGUCHI and H. HANASAKI (Dept. Ophthalmol. School of Med. Kanazawa University, Japan) Folia Ophthalmol. Jpn. 34, 1049-1054, 1983.

The rapid off-response in the ERG was previously reported in the human and monkey to be composed mainly of the decay of the late receptor potential of cones at particular stimulus parameters. The present study describes the spectral sensitivity of the rapid off-response in normal (N), protanomalous (PA) and protanopic (P) subjects.

The ERG was evoked by repetitive rectangular monochromatic stimuli of equal quantal content. The stimulus light spread

over the retina to cover about 60° of the visual field under the condition of mydriasis. A stimulus of 125 msec was repeate at 4 Hz. Averaged waveform in 40 to 50 responses were analysed The amplifier time constant was 2 sec. The spectral sensitivity curve of the rapid off-response in N peaked at 550 nm, and approximated in shape the human photopic visibility curve. The spectral sensitivity of the rapid off-response was lowered at long wavelegths, with the maximum sensitivity at 520 nm, in most of the PA and P subjects. As compared with N, the mean sensitivity of the rapid off-response was significantly lowered for $\geqslant$560 nm ($P < 0.005$), and elevated for $\leqslant$500 nm ($P < 0.005$) in PA and P. The mean sensitivity of the rapid off-response showed no significant difference between PA and P subjects. - Yasuo Ohta.

Characteristics of genetic carriers of congenital color vision defects, (5), Abnormalities of cone photopigments in proto-carriers, by T. YASUHA and H. TOKUDA (Dept. Ophthalmol., Nagoya Univ. School of Med., Japan), Acta Soc. Ophthalmol. Jpn. 86, 601-606, 1982.

Anomaloscopic color matchings were performed in 45 protanomalous and the relative luminous efficiencies were measured by flicker photometry in their mothers, so as to clarify the characteristics of proto-carriers.

When the sensitivity losses of proto-carriers in the long wavelength region (log G/R ratios) are less than 0.2 log, there is a strong correlation between the log G/R ratios of proto-carriers and the quotients of anomaly (Q) of their protanomalous sons. This means that the luminous efficiencies of proto-carriers will mainly be decided by the absorption spectra of the anomalous cone pigments of protanomalies.

However, when the log G/R ratios of proto-carriers are 0.2 log or more, there is no relationship between the log G/R ratios and the Q's of their sons. This will probably be accounted for by the following explanation : the luminous efficiencies of proto-carriers will be got under control of the mosaic mixture ratios of the anomalous cone pigments with the normal red cone pigments. - Yasuo Ohta.

Clinical application of transient tritanopia effect, (3), Pathological retinal site of transient tritanopia effect, by K. ICHIKAWA and H. ICHIKAWA (Dept. Ophthalmol., Nagoya Univ. School of Med., Japan) Acta Soc. Ophthalmol. Jpn. 86, 937-946, 1982.

In order to apply the Transient Tritanopia Effect (TTE) to the clinical diagnosis, the TTE was studied in patients with open angle glaucoma (disorder in the inner layer of the retina), congenital retinoschisis (disorder in the middle layer of the retina) and retinitis pigmentosa (disorder in the outer layer of the retina). In patients with open angle glaucoma, although the blue cone sensitivity was reduced, the TTE was normal. The TTE was absent in the patient with congenital retinoschisis. In patients with retinitis pigmentosa, both the TTE and the blue cone sensitivity were reduced and showed a good correlation with the stage of the disease.

These results suggest that the retinal origin of the TTE lies in the middle layer of the retina, as was suggested electrophysiologically by Valeton and van Norren (1979). - Yasuo Ohta.

Foveal densitometry in retinitis pigmentosa, by G.J. van MOEL and D. van NORREN (Roy. Netherlands Eye Hosp., F.C. Donderssstraat 65, Utrecht, The Netherlands), Invest. Ophthalmol. Vis. Sci. 24, 1123-1130, 1983.

Cone density and psychophysical thresholds were investigated in patients with retinitis pigmentosa. Our aim was to assess possible disturbances of foveal cones, especially in patients with good visual acuity. Using the continuously recording densitometer described by van Norren and van der Kraats we examined 10 patients (19 eyes). With the same apparatus it was possible to determine cone final threshold. In all patient double density values were lower than in an age-matched and sex-matched control group of an equal number, and the half time of regeneration was increased in eight eyes. In 12 eyes of eight patients the foveal final threshold was raised above normal. Pseudoprotanomaly was found in seven eyes in four males. Possible explanations for these findings are discussed. Since reduced double density was found in all patients with retinitis pigmentosa, we conclude that disturbed foveal cones are probably a common and rather early feature in this disease. - The Authors.

Spectral thresholds in macular degeneration, by S.L. WALKER, P.E. KING-SMITH and S.K. BHARGAVA (Manchester Royal Eye Hosp., Manchester M13 9WH, England), Brit. J. Ophthalmol. 67, 508-511, 1983.

Spectral foveal sensitivities were measured in 9 eyes with senile macular degeneration (SMD) and in 4 patients with Stargardt's juvenile macular degeneration (JMD). The results were compared with those in 18 age-matched normal eyes.

The normal average spectral sensitivity curve showed 3 peaks near 440, 520 and 600 nm, with each peak having approximately the same sensitivity. The eyes with SMD showed very depressed blue sensitivity as compared to the red/green area of the spectrum, whereas the JMD eyes retained blue sensitivity and the red/green peaks were much depressed. - The Authors.

Prediction of diabetic retinopathy from clinical variables and color vision data, by P.A. ASPINALL, P.R. KINNEAR, L.J.P. DUNCAN and B.F. CLARKE (Diabetic and Dietetic Dept., Roy. Infirmary of Edinburgh, EH3 9YW Scotland), Di betes Care 6, 144-148, 1983.

Predictions about the onset of retinopathy in 295 diabetic patients, all originally having no evidence of retinopathy, have been made in a longitudinal study over 7 yr. Out of many color vision tests and clinical variables, the best individual predictor was a measure of yellow-blue discrimination, using an anomaloscope. The other predictors of significance were the degree of blood glucose control and the duration of diabete

Although the predictions from a linear logistic model were significant in classifying the diabetic subjects into those whose fundus will remain normal and those in whom it will develop retinopathy, the number of misclassifications was substantial. An examination of the goodness of fit between the data and the model suggested a criterion value (P) of around P = 0.3 for the probability that a patient develops retinopathy. At this value, the probability of being normal for an individual classed as normal was 0.82, and the probability of developing retinopathy for an individual classed as having retinopathy was 0.54. - The Authors.

Disturbance of visual functions after retinal detachment surgery (Les troubles fonctionnels visuels après opération du décollement de la rétine), by Y. COMHAIRE-POUTCHINIAN, G. LAVERGNE, M. WATILLON, M.C. BRICTEUX and A. PRIJOT (Dept. Ophthalmol., Liège State Univ., Belgium), Bull. Soc. Belge Ophtalmol. 204/205, 121-133, 1983.

Among 29 subjects examined by means of the 100-hue test 9 presented a BY defect and 6 a RG defect. - Guy Verriest.

Correlation between color vision scores and quantitative perimetry in suspected glaucoma, by J. FLAMER and St. M. DRANCE (Dept. Ophthalmol. Univ. Columbia 2577 Willow St., Vancouver, V5Z 3N9, Canada), Arch. Ophthalmol. 102, 38-39, 1984.

The mean differential threshold, studied on the Octopus perimeter, and color vision, estimated by the 100-Hue test, were studied in glaucoma suspects and patients with questionable early field defects. The results of both tests were significantly correlated. The color vision scores correlated with the central, paracentral, and midperipheral parts of the visual field. This result suggests that both functions are disturbed in glaucoma and that the disturbance may be present diffusely throughout the visual field. - The Authors.

Abnormalities of chromatic and luminance critical flicker frequency in multiple sclerosis, by R.J. MASON, R.S. SNELGAR, D.M. FOSTER, J.R. HERON and R.E. JONES (Dept. Communication and Neuroscience, Univ. of Keele, Straffordshire ST3 5BG, England), Invest. Ophthalmol. Vis. Sci. 23, 246-252, 1982.

Critical flicker frequency (CFF) was measured for stimuli varying in chromaticity only and in luminance only for patients with multiple sclerosis (MS) and for matched normal controls. The two CFF measurements showed different underlying linear interdependencies for the two groups, consistent with a greater loss of temporal luminance function than of temporal chromatic function in MS patients. These results are discussed in relation to the pathophysiology of demyelinated nerve fibers. It is suggested that demyelination affects all types of nerve fiber unselectively : in particular, no support is found for the notion of a special vulnerability of fibers carrying time-varying chromatic information. - The Authors.

Colour vision, Physiology and Psychophysics, edited by J.D. MOLLON and L.T. SHARPE (Univ. of Cambridge, England). Academic Press, London, 1983, 640 pp., $ 49.00.

This book contains selected and edited versions of papers given at the 1982 Cambridge Colour Vision NATO conference. The topics covered range from microspectrophotometry of retinal receptors to the phenomenal constancy of perceived hue. Equal weight is given to physiological and to psychophysical research. Among the questions discussed are the following : How large are the variations in colour vision between "normal" human observers? Are there separate post-receptoral channels for chromatic and spatial information? Are there areas of the visual cortex of the brain that are specialised for colour? Why is our vision so strange when it depends on signals originating only in the short-wave receptors? Tutorial papers are included on the computer-controlled raster displays that are increasingly used for research on colour vision and a number of experimental papers illustrate the use of such displays. Extensive references and a detailed index are provided. The book is illustrated with 6 colour plates.

CONTENTS

SURVEY OF ILLUMINATION USED FOR COLOUR VISION TESTS

The Standardization Committee of the ISCCVD decided at the VIIth Symposium in Geneva to make a survey of the illumination used for clinical colour vision examinations. Please help with this by completing the following questionnaire and returning it (before December 31 1984) to Mrs. J. Birch/ Department of Optometry and Visual Science/The City University/Northampton Square/LONDON EC1V OHB/England.

All replies will be treated in confidence.

Please delete where appropriate and include additional remarks if desired. Your co-operation is greatly appreciated.
Jennifer Birch.

A) Background

1) Profession : Ophthalmologist
Optometrist
Psychologist
Physicist
Other (please state)

2) Is your main occupation : Clinical practice
Teaching
Research
Other (please state)

3) Are you engaged in the clinical examination of colour vision
YES/NO

B) Practice

4) How often do you examine colour vision : Frequently
Occasionally
Rarely

5) If your main occupation is clinical practice do you examine colour vision : Routinely for every patient
Routinely on young patients only
When requested by the patient
When considered to be clinically necessary

6) What do you consider to be the lower age limit for obtaining satisfactory results (please state)

7) Is your examination confined to screening for congenital protan and deutan defects YES/NO

8) Do you give occupational advice to colour defective patients YES/NO

9) Please list the tests that you use and indicate how often you use them. Plate Tests (e.g. Ishihara)
Arrangement tests (e.g. D15 and 100-Hue)
Anomaloscopes (e.g. Nagel)
Lanterns (e.g. Beyne)
Other (e.g. Hue Memory test)

10) Do you always use a test battery YES/NO
If YES, please state what this consists of

11) Do you have facilities for psychophysical measurements YES/NO
If YES, please state what these are

12) Do you have more than one location for colour vision examination YES/NO

If YES, please answer separately for the illumination in each location.

C. Illumination

13) Do you use a special illuminant for your colour vision examination YES/NO

If YES, please state what this is

If NO, do you rely on : General illumination in your consulting room

Natural daylight

A combination of illumination and natural daylight

(Please state what your general illumination consists of)

Does your window face North/South/East/West in the Northern/Southern Hemisphere.

What colour are the walls of your consulting room

14) Do you have facilities for measuring/monitoring your illumination YES/NO

15) Do you know the level (amount) of illumination YES/NO
If YES, please state what it is
If NO, please estimate what it is (if possible)

16) Do you know the spectral composition of the illumination you use YES/NO
If YES, please state what it is (join eventually a graph)
If NO, please estimate what it is (if possible)

17) Are your lighting conditions always the same YES/NO

18) How satisfied are you with your lighting conditions
Are you very satisfied
satisfied
unsatisfied

19) Have you ever tried to buy a standard illuminant and been unable to do so YES/NO

20) Have you constructed your own illuminant YES/NO

21) What do you consider to be ideal illumination
level (amount) (specify unit)
spectral composition (join eventually a graph)

22) How important do you think the lighting conditions are for clinical colour vision tests : very important
important
not very important

Additional Comments :

(e.g. the cost of Standard illumants in your country)

NAME :

EIGHTH INT. SYMPOSIUM OF THE INTERNATIONAL RESEARCH GROUP ON COLOUR VISION DEFICIENCIES

AVIGNON, 23th - 26th JUNE 1985

PRELIMINARY INSCRIPTION FORM

(to be detached from one of the 1984 issues of Daltoniana and to be returned before 1st february 1985 to Dr. G. VERRIEST, Dienst Oogheelkunde, Akademisch Ziekenhuis, De Pintelaan 185, B-9000 Ghent, Belgium).

The special themes of this symposium will be :
1. Ageing of the eye. Invited speakers : J. Marshall and R. Weale.
2. Effects of intoxications on colour vision. Invited speaker : W. Jaeger.
3. Visual effects of intense lights. Invited speaker : H. Sperling.

Free papers will be accepted (methods of examination of central and peripheral colour vision, congenital and acquired defects, genetics of colour vision, practical aspects etc.)

The (principal) authors have to be members of the IRGCVD and are asked :
a) to ask full verbal presentation for no more than two papers (the posters will be briefly presented and will be published!);
b) to send for each paper before 1st March 1985 two copies of a summary of at most 200 words to Dr. G. VERRIEST;
c) to send before 1st may the english texts of the slides to Dr. J. VOLA for translation in french (or prepare as supplementary series of slides in french);
d) to remit before the end of the symposium the manuscript (in good english) to be printed in the Proceedings.

PAPER

THEME 1
2
3

AUTHOR(S) : .....
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TITLE : .....
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WANTED PRESENTATION : poster

OR verbal 5 min 10 min

For further information concerning the scientifical programme contact Dr. G. VERRIEST; for the other matters contact the local organizer : Dr. J. VOLA, 38 rue Jean-Mermoz, F-13008 MARSEILLE France.

(name)

(full address)