DALTONIANA

NEWSLETTER
OF THE INTERNATIONAL RESEARCH GROUP ON COLOUR VISION DEFICIENCIES

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THE LAST PAGE OF THIS ISSUE IS THE CALL FOR PAPERS FOR THE 7TH INT. IRGCVD SYMPOSIUM IN GENEVA, JUNE 1983.

This issue contains the last abstracts sent by Ingeborg Schmidt. From now on, and in order to feed Daltoniana, the other reviewers are asked to do their best, and, moreover, all IRGCVD members are asked to send to me reprints of their recent papers - Guy Verriest.

LITERATURE SURVEY

Staining of blue-sensitive cones of the macaque retina by a fluorescent dye, by F.M. de MONASTERIO, S.J. SCHEIN and E.P. McCRANE (National Eye Institute, NIH, Bethesda Md., USA), Science 213, 1278-1281, 1981.

Intravitreal injection of a fluorescent dye, Procion yellow, results in the complete and systematic staining of a cone population in the monkey retina. These cones form an approximately regular array whose separation varies with retinal eccentricity. They are absent in the very center of the fovea, and their density peaks at 1°. The distribution of stained cones resembles that reported for blue-sensitive cones of other primates and, consistent with such an identification, they are found with less incidence in species having lower concentrations of blue cones. - The Authors.

Color coding in primate retina, by P. GOURAS (Columbia University, New York) and C. ZRENNER (Max-Planck-Institute for Physiological and Clinical Research, Bad Nauheim, G.F.R.), Vision Res. 21, 1591-1598, 1981.

Information about colour in the primate retina is mediated by two distinct groups of tonic ganglion cells. One consisting of about 5% of the total, transmit the signals of blue (B) cones. This system if comprised of on-center cells, excited at the onset of light by B cones and inhibited, all to a similar degree, by mid-spectral cones. The spatial properties of these antagonistic mechanisms are similar and the receptive field size of these cells is relatively large, about 1/4-1/3°. The second group comprises about 70% of the total (higher in the fovea), and transmits the signals of mid-spectral, red (R) and green (G), cones. This R-G system is more heterogeneous. Some cells are on- and others are off-centers; the center response is mediated by R or G cones; in each cell this center response is antagonized by the other cone mechanism, i.e. colour opponency. The center mechanism tends to be small (1/6° or less); the antagonism integrates over a larger area and has consequently been called the surround; it probably extends into the center of the receptive field. With large stimuli which activate both mechanisms, there is a considerable range of cone opponent interactions from cell to cell, even in the same retinal area. Some cells show extremely weak, others show extremely strong cone opponency.

These results suggest a new model of primate color vision. It is proposed that only excitation from these retinal (and geniculate) channels conveys the relevant message about colour to visual cortex. On-center cells transmit increments of brightness for each cone mechanism; off-center cells transmit increments of darkness, confined to mid-spectral cones. Color is computed by edge detectors sensitive to contrast <u>across</u> a contour. Red-green contrast detectors are excited by R on-center cells with strong cone opponency on one side and G on-center cells with strong opponency on the <u>other</u> side of an edge. Blue-yellow contrast detectors are excited by B on-center cells on one side and R and G off-centers with weak opponency on the other side of an edge. Brigthness-darkness contrast detectors are excited by all grades of R and G on-centers on one side and R and G off-centers on the other side of an edge. Cone opponency in this system enhances <u>both</u> brigthness and color contrast and depends on the spatio-temporal properties of the stimulus. - E. Zrenner.

<u>Chromatic signals in the visual pathway of the domestic</u> cat, by R.P. SCHUURMANS and E. ZRENNER (Bad Nauheim, F.R.G.), <u>Doc. Ophthal. Proc. Series</u> <u>27</u>, 27-40, 1981.

Recordings from the cornea (ERG) and optic nerve (ONR) in the arterially perfused cat eye as well as in vivo from the visual cortex (VECP) revealed a rod (500 nm) mechanism and two clearly distinct cone mechanisms with sensitivity maxima near 460 and 560 nm, when strong selective chromatic adaptation was applied. However, the action spectra obtained during the first seconds of dark adaptation had a sensi-

tivity maximum near 510 nm and came spectrally close to a rod action spectrum. It became apparent that a 510 nm mechanism was present during strong purple adaptation light, when rods were clearly saturated. This mechanism was able to follow flicker as high as 38 c/s; it could be found in the cone dominated VECP recordings; in the ERG it produced cone-like responses of short latency with pronounced a-waves and off-responses; it showed steep V-log I functions, different from rods, and followed the cone branch of the dark adaptation curve. Its spectrum could not be matched by any weighted addition of a 460 nm and 560 nm pigment nomogram. Apparently in cat under photopic conditions, besides a 460 and a 560 nm cone mechanism, a 510 nm mechanism is active which differs in many respects from rods. When strong white or yellow adapting lights are used, opponent-like interactions between these three mechanisms can be demonstrated. - The Authors.

Cone threshold vs. retinal eccentricity : changes with dark adaptation, by B. DRUM (Department of Ophthalmology, George Washington University, Washington, D.C. 20037, USA), Invest. Ophthal. 4, 432-435, 1980.

Detection threshold vs. retinal eccentricity functions measured during the cone plateau of the dark-adaptation curve differed from comparable functions measured on a uniform photopic background. Dark adaptation increased parafoveal sensitivity more than either foveal or peripheral sensitivity. - The Author.

Relation of brightness to threshold for light-adapted and dark-adapted rods and cones : effects of retinal eccentricity and target size, by B. DRUM (Department of Ophthalmology, George Washington University, Washington, D.C. 20037., USA), Perception 9, 633-650, 1980.

"Equal-brightness" functions of retinal eccentricity and target diameter were measured by a matching procedure, and compared with the corresponding threshold functions for four different adaptation conditions : light-adapted cones (LAC), dark-adapted cones (DAC), light-adapted rods (LAR) and dark-adapted rods (DAR). The separation between log brightness matches and log thresholds decreased with eccentricity and increased with target size for all adaptation conditions, but overall separation was substantially greater for the DAR condition than for the other three. A two-channel model of achromatic brightness is proposed to explain the results. The model assumes "strong" and "weak" channels, which contribute unequally to brightness. These channels are tentatively identified with tonic and phasic classes of retinal ganglion cells. - The Author.

Ageing of the lens. Proceedings of the Symposium on ageing of the lens held in Paris 29th-30th Sept. 1979, edited by F. REGNAULT, O. HOCKWIN and Y. COURTOIS. Elsevier/North Holland Biomedical Press, Amsterdam-New York-Oxford, 1980, 316 pp.

Of interest to the readers of Daltoniana is the chapter on lens transparency and ageing by K. Sasaki, T. Shibata, N. Fukada and O. Hockwin (pp. 195-206). It was examined on 193 eyes of 122 physically normal individuals, 30-69 years of age. The effect of aging on color vision is not mentioned, also not in the analysis of individual cataract patients and their lenses, by P.S. Bartholomew, R.M. Clayton, J. Cuthbert et al., pp. 241-261. In the chapter "Lens transparency and aging" by S. Lerman, pp. 263-279, age-related changes in the percent transmission of UV and visible light through the normal human cornea are shown, also figures of the yellow to yellow-brown color of the normal aging lens nucleus. The general acceptance is mentioned that chronic exposure to ultraviolet radiation to some extent is responsible to the increased yellow color of the lens nucleus. A figure (No. 5) demonstrates the changes in UV and visible light transmission of normal human lenses ranging in age from 6 months to 82 years. - Ingeborg Schmidt.

Study of foveal tritanopia, by S.R. COBB and M.A. Mc CROSSAN((University of Glasgow), Perceptual and Motor Skills 46, 1319-1327, 1978.

This paper discusses the possibility there is a difference between men and women in foveal tritanopia. The discussion is based on a study carried out by Cobb and McCrossan in 1973 in which they measured the luminosity curves of the fovea in five women and five men. The instrument used was a Wright colorimeter which measured the luminosity curves with a 2° 12' field and a 0° 12.5' field. Comparison shows a loss of sensitivity to blue for the curve obtained with the 0° 12.5' field relative to the curve obtained with the 2° 12' field. Male subjects obtained two maxima with the 0° 12.5' field, usually at 555 nm and 595 nm, whereas for females on maximum, usually at 555 nm and from 555 nm to the long wavelength end of the spectrum, curves followed loosely the curve obtained with the 2° 12' field. Thus, a significant difference was found between the males and the females in their response to the longer wavelengths when the 0° 12.5' (0° 12.5') field was used. In addition to this there were also large individual differences in the matching points obtained by the males while the individual differences among the females were much smaller. - The Authors.

Chroma Cosmos 5000, Japan Color Research Institute Tokyo 1978 (Review by K.L. Kelly) Color, Research and Application 6, 59-60, 1981.

The Japanese Tables "Chroma Cosmos 5000" consist of 24 double color charts containing 5000 samples. They may be a

very useful tool for scientists, designers and technologists. They represent a color order system based on the Munsell Hue-Value-Chroma notation and on the Universal Color Language (ISCC-NBS) Designation System. Their advantages are pointed out. (See also F. Birren, Color, Research a. Application 4, 171-172, 1979). - Ingeborg Schmidt.

The modified lamp of Wilczek, by M. MIS, Klinika oczna No. 4, pp. 297, 1979.

A rotating disc with colour filters mounted on an electric torch facilitates the investigation of colour perception. - Felicia Jakubik.

Binocular gain in 100-Hue score, a fixation effect?, by S. VILLANI (Istituto Superiore di Optometria, Vinci, Florence, Italy), Atti Fond. G. Ronchi, 36/4, 436-437, 1981.

While Verriest et al. compared monocular and binocular 100-Hue responses, as reported at the 6th International IRGCVD Symposium, Villani noticed that the "binocular gain" depends on the value of the total score : indeed, if illumination is slightly impoverished, just below the photopic recommended level, the binocular score persists in being superior to the monocular one provided the total score does not exceed 50. The question arises whether this effect is due to a better control of fixation in binocular vision. - Lucia Rositani-Ronchi.

Color in childhood, a preliminary report, by G. PASSIGLI (Eye Clinic of the University of Florence, 50100, Florence, Italy), Atti Fond. G. Ronchi 36/4, 468-474, 1981.

The present paper deals with both color preferences and color discrimination tested across a sample of children attending the kindergarten and the elementary school. They were requested to paint a drawing representing a typical classroom. A few ones used "white", the majority used color. Of particular importance seems to us the fact that the color assigned to the teacher's desk differed from that assigned to the desk used by the child. The color used for teacher's desk was "serious", say, brown, violet or purple. The response to the Pfister Pyramid shows an outstanding preference for light blue, contrary to the expectations, based on studies performed two decades ago. It seems that the use of color since the beginning of infancy leads to a sort of "early" maturation which shifts the preferences towards colder blues, compared to past generation. Color discrimination was tested by the use of both Ishihara Plates and Farnsworth Tritan Plate. One defective only was found out of 132 tested children. A number of children, however, are found to make some errors not typical of congenital defectives. These not typical errors are assumed to mirror a poor ability in discriminating colors. It seems of interest to note that the light blue is not the color preferred at most by children making more not typical errors. It is as if the

low skillness were accompanied by a lower degree of "early maturation" on the part of the users of color. - Lucia Rositani-Ronchi.

Study on saturation discrimination by Lovibond Colour Vision Analyser. I. Colour vision of normal subjects, by S. KOGURE (Dept. Ophthal., Tokyo Medical College, Japan), Acta Soc. ophthal. jap. 84, 537-544, 1980.

This is a study of the changes of saturation discrimination with age. The used instrument was the Lovibond Colour Vision Analyser equipped with 26 hues. The saturation discrimination could be measured by manipulating the instrument. Ninety eight persons with normal colour vision, ranging from teenagers to those in their sixties, were subjected to this examination.

Results : (1) In all subjects, a lowering of the saturation sensation was stated from yellow to green and from blue to purple. (2) Between the ages of 10 to 30 saturation discrimination did scarcely change, but above 50 years there is a marked deterioration of the sensation from yellow to green and from blue to purple. (3) There was no lowering from purple to red. - Yasuo Ohta.

Study on saturation discrimination by Lovibond Colour Vision Analyser. II. Colour vision of (subjects with) congenital colour vision deficiencies, by S. KOGURE (Dept. Ophthal., Tokyo Medical College, Japan), Acta Soc. ophthal. jap. 84, 545-552, 1980.

Saturation discrimination was examined by means of the Lovibond Colour Vision Analyser in 73 persons suffering from congenital colour vision defects. In the protan subjects there was a lowering of the discrimination ability from 492 to 510 nm and at about 493 nm, while in the deutan subjects there was a lowering at 510 nm and between 496 and 510 nm. All the red-green deficient persons diagnosed by the anomaloscope were also picked up by the analyser. - Yasuo Ohta.

Missing colours and alychnes of protanopes and protanomals and their importance for colour vision of normal trichromats. (Fehlfarben und Alychnen von Protanopen und Protanomalen und ihre Bedeutung für das Farbensehens der normalen Trichromaten), by W. PAULUS (Physiol. Inst., Lehrstuhl II, Univ. Düsseldorf). Thesis, Düsseldorf, 1977, Stencyl, 104 p.

Missing colours and univariance. (Fehlfarben und Univarianz), by W. PAULUS and H. SCHEIBNER (Physiologisches Inst. II, Univ. Düsseldorf, FRG), Ber. dtsch. ophthal. Ges. 75, 518-521, 1978.

On the basis of measured protanopic and deuteranopic blind fundamentals and pertaining tritanopic data taken from the literature, trichromatic fundamental sensation curves have been calculated. They are a modification of the curves

communicated by Vos and Walraven, 1971. The connection between blind fundamentals, primary colours, and the principle of univariance is discussed. - The Authors.

Reduction of deuteranopia from normal trichromatism (Reduktion der Deuteranopie aus der Trichromasie), by A. KRÖGER and H. SCHEIBNER (Physiologisches Inst. II der Univ. Düsseldorf), Ber. dtsch. ophthal. Ges. 75, 515-517, 1978.

The blind fundamental and the alyhne of deuteranopes were determined. From them, a pair of deuteranopic colour matching functions and a spectral luminous efficiency curve were derived. The maximum of the spectral luminous efficiency curve is - in agreement with the absorption maximum of the photopigment erythrolabe - at 566 nm. - The Authors.

Reduction of deuteranopia from normal trichromatism (Reduktion der Deuteranopie aus der normalen Trichromasie), by A. KRÖGER-PAULUS (Physiol. Inst., Lehrstuhl II, Univ. Düsseldorf). Thesis, Düsseldorf, 1979. Stencyl, 114 p.

Reduction of deuteranopia from normal trichromatism (Reduktion der Deuteranopie aus der normalen Trichromasie), by A. KRÖGER-PAULUS (Düsseldorf), Die Farbe 28, 73-116, 1980.

Investigations have been carried out, with a visual trichromatic colorimeter type Guild-Bechstein-Richter and five deuteranopic subjects, to determine convergence points and alychnes for this type of color deficiency. The investigations confirm the finding of previous authors that the individual convergence points of deuteranopes scatter considerably along a straight line in the chromaticity diagram. Supplementary measurements with a deuteranomalous subject were carried out. Some probability for Alpern's cluster theory has been found. - The Author.

Psychophysical studies for the determination of deuteranomaly by the two long wavelengths cone pigments (Psychophysische untersuchungen zur Charakterisierung der Deuteranomalie durch die beiden langwelligen Zapfenpigmente), by H. STÖCKER (Physiol. Inst., Lehrstuhl II, Univ. Düsseldorf). Thesis, Düsseldorf, 1980. Stencyl, 123 p.

Erythrolabe and deuteranomaly (Erytholab und Deuteranomalie), by H. STÖCKER, E. WOLF and H. SCHEIBNER (Düsseldorf), Ber. dtsch. Ophthal. Ges. 76, 409-414, 1979.

Spectral colour matching functions of four deuteranomalous observers were measured and the alychnes determined by heterochromatic brightness matches. Spectral brightness sensitivity curves were then calculated from the spectral colour matching functions and alychnes. The results confirm the classical alteration towards longer wavelengths shown by the middle wavelength cone pigment. The spectral absorption of the long wavelength cone pigment exhibited considerable interpersonal scatter along the wavelength scale. - The Authors.

Polymorphisms of red-green vision in some populations of Southern Africa, by A. ADAM (Everyman's University, Dept. of Human Genetics and The Goldschleger Eye Institute, Tel-Aviv University, Sackler School of Medicine, Tel-Aviv, Israel), Amer. J. Phys. Anthrop. 53, 339-346, 1980.

Some 5.000 schoolboys of the Khoikhoi, Negro, "Coloured", and Malay populations were screened with the Ishihara plates, and those with defective red-green vision were diagnosed with an anomaloscope. The findings are presented in terms of the six protan and deutan mutant alleles, a few large population-samples (e.g. Nama and Zulu) being characterized by absence of the allele for protanopia.

The overall frequencies of mutants range from less than 1% to over 4%. No correspondence was found between these data and linguistic affinities of eight Bantu-speaking groups, nor between the frequencies of colorblindness and previously estimated proportions of San genes in these eight populations; on the other hand, a north-south cline of increasing frequencies of mutants and of dichromacies among the Bantu-speakers was noted.

The overall frequency of defective red-green vision among Cape Coloureds, 3.3%, is compatible with previously estimated racial composition of this population. The Malay sample is characterized by the highest frequency of protan mutants (2%), a 1:1 protan-deutan ratio, and an overall frequency of 4% of red-green defects.

The study illustrates the potential value of anomaloscopic characterization of colorblindness in attempts to evaluate human evolutionary processes. - The Authors.

A variant of red-green colour defect, by J. POKORNY and V.C. SMITH (Eye Research Institute, Chicago, USA), Vision Res. 21, 311-317, 1981.

The colour vision characteristics of a young male are described. He appears a moderate deutan on PIC and pigment tests with a 100 hue error score for right eye 147 and left eye 169 accompanied by a strong deutan axis, but shows a definite protanomalous Rayleigh match (except for a normal brightness match). His foveal spectral sensitivity is deuteranopic and there is no ophthalmoscopic abnormality. The authors consider him to be an unusual variant of deutan colour vision in which a rhodopsin photopigment is active in small foveal fields, but they are unable to establish an hereditary basis for the defect. - Janet Voke.

A case of incomplete form of achromatopsia, by D. CZEPITA and J. DZIKOWSKI, Klinika oczna (Ophthalmic clinic) No. 3, pp. 169-170, 1980

In the reported case photophobia was the only clinical finding. ERG investigations under different adaptation states and using various filters demonstrated typical features of achromatopsia and enabled the correct diagnosis. - Felicia Jakubik.

Color matching in autosomal dominant tritan defect, by J. POKORNY and V.C. SMITH (Eye Research Laboratories, The University of Chicago, 939 East 57th Street, Chicago, Illinois 60637, USA), J. opt. Soc. Amer. 71, 1327-1334, 1981.

We evaluated color matching in 39 observers with an autosomal dominant tritan defect. Eleven tritans were dichromats with a 1° field, and only two were dichromats with an 8° field. Twenty-one of the tritan observers had normal blue-green equations with an 8° field, indicating that autosomal dominant tritan have short-wavelength-sensitive cones. Some of the tritan observers showed a shifted blue-green equation, which was ascribed to rod activity. - The Authors.

Central serous chorioretinopathy : evaluation of outcomes, by F.M. GRIGNOLO, L. BAUCHIERO and W. MALINVERNI, Boll. Oculist. 57/11-12, 671-684, 1978.

The Authors assess the outcome of central serous chorioretinopathy in 16 subjects at 6-15 months distance, with special reference to visual acuity, visual field, fluorescein angiography, light and chromatic sense. Angiography reveals choroidal hyper-fluorescence of cicatricial appearance without any leakage. Visual acuity maintains between 9/10 and 10/10 during both the acute and cicatricial phases, being therefore hardly influenced by the disease. The visual field shows perfect correspondance between the lesions detected by the white light and the laser light with the kinetic method : scotomas are found in 47% of cases. Static perimetry shows central defects in all cases, as partially confirmed by the Amsler test. The light sense reveals deep alterations of the rods and cones systems. The chromatic sense shows irreversible alterations at almost every wavelength in all patients, with a prevalence of deutan and tritan forms. The Authors thus underscore the relative benigness of the disease, which, without any impairment of visual acuity, causes significant alterations to the more subtle aspects of perception and binocular vision. - Luigi Barca.

Results of the study on diabetic patients without ophthalmoscopic and fluoroangiographic alteration, by A. DIVERSI, L. PRESTI and M. MUSSO, Boll. Oculist. 58/5-6, 287-288, 1979.

After a brief survey of the literature on the subject, the authors report a study on 20 diabetic patients (38 eyes) who did not present any ophthalmoscopic and fluorangiographic alteration. The results showed normal adaptometric curves, while the colour sense and visual field, examined by kinetic laser perimetry, revealed some alterations. Consequently the authors propose this last method for a quick and simple screening of these patients. - Luigi Barca.

Ethambutol mainly effects the function of red/green opponents neurons, by E. ZRENNER (Max-Planck-Institut für Physiologische und Klinische Forschung, Parkstr. 1, D-6350, Bad Nauheim, F.R.G.) and C.J. KRÜGER (Augenklinik der Mediz. Hochschule, Karl-Wiechert-Allee 9, D-3000 Hannover, F.R.G.), Doc. Ophthal. Proc. Series 27, 13-25, 1981.

In patients with ocular defects caused by the tuberculostaticum Ethambutol the spectral data obtained under selective chromatic adaptation with psychophysical and electrophysical methods clearly indicate that signals of all three types of spectrally different cones are present in the visual cortex; however, the signs of color-opponent interactions between the individual cone mechanisms are lacking. Therefore it becomes evident that Ethambutol mainly affects the function of red/green antagonistic neurons. This method of investigation in patients as described here permits differentiation between toxic alterations affecting the cone receptor and their direct pathways to the visual cortex from those disturbing the action of color-antagonistic mechanisms, upon which chromatic as well as spatial coding strongly relies. - The Auters.

About disorders in optic analysis of patients suffering from chronic alcoholism, by M.A. TRAVINSKAYA and E.A. SHTILMAN, Oftalmologi Schurnal Nr. 2, p. 83, 1973.

A colour discrimination function of the eye has been studied in 123 patients suffering from chronic alcoholism and in 15 healthy persons. The study was performed by means of polychromatic and pigment tables by E.B. Rabkin. Disorders of colour vision were revealed in 31 of 49 patients suffering from chronic alcoholism of the second stage and in 54 of 57 such patients of the third stage. In 17 patients with the first stage of chronic alcoholism no alteration of colour vision was found. In most of the patients disorders of colour vision correspond to changes which are characteristic for acquired pathology. Peripheral vision for white, red and green colours was studied in 38 patients using Förster's perimeter. Concentric narrowing of various degree for white was recorded in all patients and in almost all for red and green. It was established that values of peripheral vision narrowing are related to the severity of the clinical manifestations of chronic alcoholism.

Especially strong disorders of both colour vision and peripheral vision were recorded in patients who suffered from prolonged alcoholic psychosis in the paat. The presence of disorders mentioned above should be considered in selecting professional groups at the plants where full vision is required. - Marion Marré.

Central achromatopsia : behavioral, anatomic, and physiologic aspects, by A. DAMASIO, T. YAMADA, H. DAMASIO, J. CORBETT and J. McKEE (Dept. of Neurology, University of Iowa Hospitals and Clinics, Iowa City, LA 52242, USA), Neurology 30, 1064-1071, 1980.

The neuropsychologic, neuroanatomic and neurophysiologic correlates of achromatopsia were studied in two patients. Prosopagnosia accompanied the color perception defect in the bilateral case but not in the unilateral one. No other neuropsychologic disturbance was present in either case. The lesions compromised the ventromedial sector of the occipital lobe in both cases. Cerebral evoked responses produced by pattern shift stimulation were normal for black and white but abnormal for red and green, when stimulation was given in the achromatopsic field. - The Authors. (Unilateral case = hemiachromatopsia, G.V.).

Recognition of the aircraft navigation light color code, by K.J. BOWMAN and B.L. COLE (Visual ergonomics Research Unit, Victorian College of Optometry and Dept. of Optometry, Univ. of Melbourne, Melbourne, Australia), Aviat. Space Environ. Med. (52)11, 658-665, 1981.

Navigation lights are a set of color-coded signals intended to indicate the presence, orientation, and relative direction of aircraft at night, and thereby reduce the possibility of midair collisions. It is known that some people with defective color vision have difficulty with quite simple codes. Accordingly, the International Civil Aviation Organization (ICAO) has recommended - and most countries apply - that applicants for pilot's licences demonstrate the ability to recognise colored light signals. Pilots who fail to meet this requirement are restricted from flying at night. But is the navigation light signal system effective? This paper concludes that the navigation light system at night can serve as a crude screening method to categorise intruder aircraft into "potential threat" and "no threat" categories. An experiment is described which shows that observers with normal color vision can determine intruder aircraft orientation and relative direction from the navigation light code with a moderately high degree of reliability. The reliability of judgement is, however, decreased by the higher-intensity presence lights also displayed by aircraft. - The Authors.

Color discrimination in healthy male teenagers at Cagliari, by A. SERRA, C. MASCIA, R. CASTI and C. DESSY (Chair of Physiopathological Optics, Univ. of Cagliari, Sardinia, Italy), Atti Fond. G. Ronchi, 36, 121-123, 1981.

The present report is to be inserted in the frame of population study we are performing, by the use of both Ishihara Plates and Farnsworth Tritan Plate, across healthy population. We record both errors typical of protan and deutan defects and not typical errors (the latter indicating the degree of skillness). The 1272 young male here tested (age group 11-14 years)

exhibit a good level of colour discrimination, if abstraction is made from the unavoidable congenital defectives. Probably this is the consequence of an adequate training during the (previous) elementary school. - The Authors.

Evidence for an effect by colour defect on personality, by S.R. COBB (Dept. of Psychology, Adam Smith Building, Glasgow, G12 8RT, Scotland), Perceptual and Motor Skills 51, 159-166, 1980.

This paper discusses whether defective colour vision affects the type of personality of the individual. Three pieces of recent research are examined. Pickford and Cobb (1974) found a positive relation between colour defect and type of personality when they tested a sample of students in psychology. However, two later studies of school children did not demonstrate such a relationship. It is postulated that the contradiction in results between the first and the last two studies can be explained by the assumption that the effects of colour defect on the personality do not occur until later in life. - The Author.

Color vision, by L.M. HURVICH (Dept. of Psychology, University of Pennsylvania, 3815 Walnut Street, Philadelphia, Pa 19104, USA), 326 p., 200 fig. (25 full colour). Addison-Wesley Publ. C°, Reading, Mass., USA, 1981.

This book is a comprehensive examination of colour perception in both normal and colour defective individuals. Organized around the opponent-process theory, it provides a descriptive and quantitative account of the visual system in relation to its neurophysiology and photochimistry and describes the experimental research and theory that have contributed to our understanding of the colour experience.

Chapters 1 and 2 discuss how the colour world is experienced and the implications for the colour coding organization of the central neural mechanisms. Chapters 3 and 4 examine the psychophysics of colour vision, showing the relationship between wavelength and perceived colour and emphasizing how the same perceived colours can be evoked by different light stimuli. Chapter 5 presents a detailed account of the psychophysical measurement of the chromatic and achromatic neural response systems and lays the foundation for the discussion in Chapters 6 and 7 of the appearance of different spectral lights and spectral light distributions. Chapters 8 and 9 provide an analytical account of additive colour mixture when hue alone is matched and when matching is complete for hue, brightness and saturation. Chapters 10 and 11 examine the physiology of the eye, concentrating on the relationship between photopigment absorption and post-receptoral neural acitivity. Chapter 12 presents electrophysiological evidence supporting the opponent-process model in terms of excitation-inhibition.

The next several chapters extend the opponent-process model to explain such visual phenomena as spatial contrast and

assimilation (Chapter 13); temporal contrast effects (Chapter 14); colour adaptation and colour constancy (Chapter 15); and the varieties of abnormal colour vision (Chapters 16-19). Chapter 20 discusses the problems of colour specification, including a discussion of material standards, such as the Munsell Colour System, and the CIE colorimetric system. The concluding Chapter 21 examines colour reproduction in photography, colour printing and television, and some issues encountered in painting. - The Publisher.

Advantages of an opponent colour metrics and the opponent purity concept, by Arne VALBERG (Institute of Physics, Dept. of Biophysics, University of Oslo, Norway), Die Farbe 29, 127-144, 1981.

Some basic properties of an opponent colour representation of the Luther-Nyberg type are presented. It is argued that the simplicity and transparency of this coordinate system makes it superior to the CIE-system in teaching colour science and in colour vision research. This statement is based in part on a demonstration of the particularly simple correlations that exist between the opponent purity concept and a number of data on differential sensitivity (threshold data). Other correlations involving equalization of sensory magnitudes are also found. - The Author.

Color vision : A review from a neurophysiological perspective, by P. GOURAS (Ophthalmology Research, Columbia University, New York N.Y. 10032, USA) and E. ZRENNER (Max-Planck-Institut, D-6350 Bad Nauheim, FRG). In : D. OTTOSON et al. (ed.), Progress in Sensory Physiology 1, Springer-Verlag, Berlin/Heidelberg/New York, 1981. From p. 139 to p. 179, 12 fig., many references.

This is the booklet expected by all people interested in colour vision and in which two of the most outstanding actual specialists fully explain the actual neurophysiological views on the function of the visual system from the cones to beyond the striate cortex concerning colour vision! - Guy Verriest.

Color Vision, by J.D. MOLLON (Dept. of exp. Psychol., Univ. of Cambridge, U.K.), Ann. Rev. Psychol. 33, 41-85, 1982.

A review on colour vision in the Annual Review of Psychology is always an important event for all students in the field. The preceeding one (by Jacobs in 1976) was already 6 years old. The new review by Mollon will be of particular interest for the members of our group as attention is focused on the retinal colour vision mechanisms as studied by means of psychophysical methods, of microspectrophotometry and of electrophysiology. The final sections are devoted to the correspondence between the Stiles mechanisms and the cone fundamentals, to the "silent substitution" for postreceptoral channels and to the extent to which colour can be analyzed from other image attributes. - Guy Verriest.

Introduction to colour measurement (Einführung in die Farbmetrik), Second edition, by M. RICHTER (Unter den Eichen 87 (B/M), D-1000 BERLIN 45, FRG), Walter De Gruyter, Berlin/ New York, 1981. 278.p., 93 fig., 4 colour fig.

Colour metrics developed to an independent discipline in which elements of physiology, of physics and of mathematics are in touch. In this book the principles of colour metrics are explained from a didactical and practical point of view.- The Publisher.

Colour vision in the nineteenth century. The Young-Helmholtz-Maxwell theory, by P.D. SHERMAN (Dept. of History of Science, Pace University, New York City, USA). 8 col. ill., 6 portraits, 51 diagrams, Adam Hilger Ltd., Bristol, U.K.

The intriguing, and previously untold, story of the chequered progress towards a fundamental understanding of colour perception and colour mixing. It offers a new, and truer, perspective of the contributions and misconceptions of the many nineteenth-century physicists who became embroiled in the colour problem, giving full credit to the work of Helmholtz and Grassmann, while highlighting an important aspect of Maxwell's career that has been largely neglected by previous historians and biographers. The related discovery and diagnosis of colour blindness, owing much to Brewster and Maxwell, is yet another engrossing feature of the book. References and bibliography. This book is based on extensive doctoral research undertaken at Imperial College, London, and is introduced by W.D. Wright. - The Publisher.

Color vision deficiencies and anomalies in the frame of the theories of color vision. II. The first four decades of the present century (in Italian), by A. SERRA (Chair of Physio-pathological Optics, University of Cagliari, 09100, Cagliari, Italy), Atti Fond. G. Ronchi 36, 474-529, 1981.

During the first four decades of the present century, the Colorimetry developed as a discipline independent of color vision, considered as a chapter of psychophysics. In fact, the standard observer is assessed, as well as the functions which afford an acceptable mathematical description of main facts upon which color vision is grounded : in addition to color mixture data, wavelength discrimination, saturation of spectral colors, Bezold-Bruecke effect. In turn, the biochemical techniques aiming at extracting cone pigments are improved, to cope with previous failures. In the area of psychophysical research, an agreement is attained as to the fact that cone responses can be deduced from spectral sensitivity of dichromatic people, assumed to lack of one of the fundamental mechanisms. At last, the zone theory conciliates the Young-Hering controversy. - Lucia Rositani-Ronchi.

An ophthalmologist looks at art, by A. LINKSZ (New York, N.Y., USA). Smith-Kettlewell Eye Research Foundation, 2232 Webster Street, San Francisco Cal. 94115, USA. 125 pp., 156 fig., 1980.

This innovative, scholarly and charming book has been written by the illustrious ophthalmologist whose credentials include significant articles and textbooks on optics, optical physiology, color vision and dyslexia. For nearly six decades, the author has devoted his time to his ophthalmological research and practice and to his study of works of art. "Artists know many things about the eyes, about seeing, that we, physiologists, discovered only much later".

A rich and detailed chapter on selfportraits reveals the author's urge to clarify some technical problems as well as the personal approach taken by several great artists when facing the challenge of putting on paper or canvas their perception of their own faces. He also discusses the unique manner in which the artist defines the rules of distribution of light. In another chapter, Dr. Linksz discusses the concept of direction in works of art. A Western artist will generally depict the action moving from left to right, while in Oriental art, the story runs from right to left. The problem of the left-handed artist is also touched upon. Since the most revealing clues to handedness are the direction of shading lines and brushstrokes, Dr. Linksz discusses brushstrokes of various artists, especially French impressionists. The book includes a critical analysis of El Greco and the astigmatism controversy. Dr. Linksz also discusses the problems of perspective, binocular vision and the representation of seen distance. On the one hand, he calls our attention to what the ophthalmologist's eye can decipher about what the artist saw and, on the other hand, to the ways in which the art-lover's eyes take in the work of art. - The Publisher.

OBITUARY

Gunnar SVAETICHIN

(1915-1981)

Gunnar Svaetichin died suddenly of a heart attack on March 24, 1981 at the age of 66 in Caracas, Venezuela where he was an Emeritus Investigator in the Venezuelan Institute for Scientific Research, an institution that had welcomed him more than 25 years ago, when opportunities in his Scandinavian homeland were scarce.

Svaetichin began his research career in Granit's laboratory. Later he discovered, with his exploring electrode in the external layers of fish retina, extraordinary potentials to light stimulation. These responses, called S-potentials in honor of their discoverer, were of large amplitude, graded light intensity and maintained instead of being transient.

Svaetichin made another major discovery with his S-potentials : he found that a subset of S-potentials were hyper-

polarized by one end and depolarized by the other end of the spectrum and in some midspectral region only a minimal response could be elicited, because of antagonism between two opposing processes. This was the first experimental evidence that opponency existed in the visual system. - Summarized from Peter Gouras.

ANNOUNCEMENT

International NATO meeting

C O L O U R V I S I O N

(University of Cambridge, U.K., 23-27 August 1982)

The meeting will concentrate on human psychophysics and primate electrophysiology. The scientific sessions will cover : new technologies including colour displays; primate and human microspectrophotometry; psychophysical estimates of cone sensitivities and inter-observer variability; psychophysical techniques for isolating postreceptoral channels; retinal electrophysiology; pharmacology of colour vision; different directions of colour space; anomalies of the short-wavelength mechanism; cortical electrophysiology of colour vision; spatial aspects of colour vision; infant colour vision; colour constancy. The meeting will be accompanied by historical and trade exhibitions. Accommodation will be available in Trinity College. Attendance is limited to 125.

For details of accommodation and of arrangements for submission of papers, please write to the Meeting Director : Dr. J.D. Mollon, Department of Experimental Psychology, Downing Street, Cambridge CB2 3EB, United Kingdom.

MANFRED RICHTER

Dr. Manfred Richter, who was the local organizer of our preceeding IRGCVD Symposium in Berlin, received a few days later the Judd Memorial Award. This was during the Congress of the AIC (Association Internationale de la Couleur), of which Dr. Richter can be said to be the father. He gave an historical paper showing pictures of famous scientists (back to Newton) responsible for building the science of colour.

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

GENEVA, 23rd-25th JUNE 1983

PRELIMINARY INSCRIPTION FORM

(to be detached from one of the 1982 issues of Daltoniana and to be returned before 1st february 1983 to Dr. G. VERRIEST, Dienst Oogheelkunde, Akademisch Ziekenhuis, De Pintelaan 135, B-9000 Ghent, Belgium).

The special themes of this symposium will be :

1. Electrophysiology and colour vision
   I. Cellular level. Invited speaker : F.M. de Monasterio
   II. ERG and EVP. Invited speaker : E. Zrenner
2. Metameric matches relevant for assessment of colour vision defects. Invited speakers : A. Roth and J. Pokorny
3. Clinical colour vision test batteries. Invited speaker : A. Pinckers

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 April 1983 two copies of a summary of at most 200 words to Dr. G. VERRIEST;
c) to insert for their oral presentation slides with (English) text intended to render the subject more understandable for the non-English-speaking people;
d) to remit before the end of the symposium the manuscript (in good english) to be printed in the Proceedings.

PAPER AUTHOR(S) : .....

.....

THEME 1 I TITLE : .....

1 II .....

2 .....

3 .....

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 : Prof. Dr. A. ROTH, Clinique d'Ophtalmologie, Hôpital Cantonal Universitaire de Genève, CH-1211 GENEVE 4, Switzerland.

(name)
(full address)