DALTONIANA

NEWSLETTER
OF THE INTERNATIONAL RESEARCH GROUP ON COLOUR VISION DEFICIENCIES

President: Prof. Dr. J. FRANÇOIS, Gent (Belgium)

Secretary for the Western Hemisphere:
Dr. R. LAKOWSKI
Department of Psychology, University of British Columbia, VANCOUVER 8 (Canada)

General Secretary and Editor of the Newsletters:
Dr. G. VERRIEST
Dienst Oogheelkunde, Akademisch Ziekenhuis
De Pintelaan 135 - B-9000 GENT (Belgium)
(Verantw. uitg.)

Secretary for the Socialist Countries:
Dr. M. MARRE
Universitäts-Augenklinik, Fetscherstrasse 74
8019 DRESDEN (D.D.R.)

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THE DIRECTORIAL COMMITTEE ACCEPTED AS SPECIAL THEMES OF OUR NEXT SYMPOSIUM (to be held in Italy in 1977) :

1. NEUROPHYSIOLOGICAL APPROACH OF COLOUR VISION AND OF ITS DEFICIENCIES

2. COLOUR VISION UNDER REDUCED ILLUMINATION

3. PRACTICAL ASPECTS OF COLOUR VISION DEFICIENCIES (o.a. professionnal selection, methods for the improvement of performance etc.)

Next the traditional sessions devoted to the methods of examination of central and peripheral colour vision, the congenital and acquired defects, the genetics of colour vision.

LITERATURE SURVEY

Two short wavelength sensitive cone systems in pigeon, chicken and daw, by D. VAN NORREN (Institute for Perception TNO, Soesterberg), Vision Res. 15, 1164-1166, 1975.

With ERG techniques spectral sensitivity measurements were made under strong chromatic adaptation, to verify Wessels behavioral findings of the existence of two short wavelength cone systems in the daw. In all three bird species the existence of cone systems with λ_{peak} = 415 nm and λ_{peak} = 480 nm was confirmed. - The Authors.

Cone systems interaction in single neurons of the lateral geniculate nucleus of the macaque, by P. PADMOS and D. VAN NORREN (Institute for Perception TNO, Soesterberg), Vision Res. 15, 617-619, 1975.

The spectral sensitivity of single cells in the dorsal LGN was recorded on various intense chromatic backgrounds.

It was found that the majority of the so-called non-opponent cells yet showed evidence of colour-antagonistic interaction. Therefore the existence of a separate luminosity channel becomes doubtful. Also, probably about half of the cells in the LGN have input from all three cone systems. - The Authors.

The effect of lens density on the Stiles-Crawford effect, by J.J. VOS and F.L. VAN OS (Institute for Perception TNO, Soesterberg), Vision Res. 15, 749-751, 1975.

The absorption of the human lens in the blue part of the spectrum produces a sort of anti-Stiles-Crawford effect due to the reduced thickness of the lens near the pupil border. New data are given to correct the experimental data on the wavelength dependence of the Stiles-Crawford effect for this non-retinal artefact. - The Authors.

Eccentricity dependence of absolute sensitivity to He-Ne laser radiation, by L. RONCHI and S. STEFANACCI (Ist. Naz. Ott., Firenze), Atti Fond. G. Ronchi, 30, 397, 1975.

Both histological and functional changes take place in the visual system when passing from central to peripheral vision. The decrease of receptor density was regarded by early investigators as the sole factor responsible for the deterioration of sensitivity at large off-axis angles. Next, the eccentricity dependence of ganglion cell density and the consequent change in spatial summation were called into play. The data recorded in the present experiment, where a small test spot is let to explore the horizontal meridian of the dark-adapted retina, and He-Ne laser is used as source, require additional suggestions : say, the eccentricity dependence of the spectral sensitivity of peripheral cones and the change of "time constant" of the set of responding cells. The deterioration of the optical quality of peripheral imagery does not seem to be responsible for the observed drop of sensitivity at large off-axis angles, since, for two out of three observers, the slope of the radiance-time relationship decreases with increasing eccentricity. - Lucia Rositani-Ronchi.

Luminous and chromatic flickering patterns have opposite effects, by D.H. KELLY (Stanford Research Institute, Menlo Park, California 94025), Science 188 No. 4186, 371-372, 1975.

When the entire field is flickering uniformly, sensitivity to low-frequency luminous flicker reaches a maximum at about 10 hertz decreasing at higher and lower frequencies. A split field with right and left halves flickering in opposite phases greatly increases the flicker sensitivity. When the hue of the stimulus is varied, e.g. by using saturated red and green while luminosity is held constant, and the entire field is flickering uniformly, chromatic flicker sensitivity decreases monotonically over the same frequency range where the luminous flicker sensitivity is increasing. However, when the field is

split into two halves, e.g. the right half changing from red to green as the left half changes from green to red, the sensitivity to chromatic flicker greatly decreases, contrary to the counterphase effect obtained with luminous flicker. Possible mechanisms are discussed. - Ingeborg Schmidt.

Visual construction of color is digital, by P.A. KOLERS and M. VON GRUNAU, (Dept. Psychol. Univ. of Toronto, Toronto, Canada M 5S 1A1), Science 187, 757-758, 1975.

If a triangle and a square are exposed alternately for about 150 msec with an interval of about 50 msec the two shapes appear to change into each other in a smooth and continuous fashion. The two shapes can be separated by a few degrees of visual angle. Two squares, 0.9° x 0.9°, at a distance of 3.6° center to center, of two different colors, one red, the other green, or one blue, the other yellow, but of appr. equal brightness and saturation, ware flashed alternately on a white background each for 150 msec with a time interval of 50 msec and a pose of 1.5 sec between offset of the second flash and reillumination of the first one. The appearance was of a colored shape moving from the first location to the second changing in color abruptly (with no smooth transition say by going through gray or through yellow) and typically before the halfway point of its path. - Ingeborg Schmidt.

Color essays, by D.L. MACADAM (Research Laboratories, Eastman Kodak Co., Rochester, New York 14650), J. Opt. Soc. Amer. 65/5, 483-492, 1975.

The content is best expressed by the authors own words : "An essay about a few essays that have been made to understand color. Genesis, Aristotle, Plato, Newton, Palmer, Young, Helmholtz, Maxwell and Frederic Ives are represented." - Ingeborg Schmidt.

Colour vision in persons over 70 years of life, by M. WASILEWSKI, Klinika Oczna, 45/4, 355-359, 1975.

Colour vision was investigated in 100 persons over 70 years of life. In the 70-79 y age group 38 men and 39 women were examined, in the 80-89 y age group 12 men and 11 women. All female subjects showed normal colour discrimination; in 2 men the colour discrimination was deficient. This deficiency may be referred to advanced arteriosclerosis of the central nervous system because the patients had been periodically checked during their service in the Polish Railways and have had normal colour vision. Normal colour vision in the 8th and 9th decade of life may be considered as a shifting up to the maximum age of men's mental efficiency. - Emilia Chomiczewska.

Note. These results are in contradiction with that of Lakowski and of Verriest, who showed that color discrimination in the elderly people is progressively impaired with chronological age by yellowing of the crystalline lens. - Guy Verriest.

Racial differences in color vision : do they exist? by W.O. DWYER and L. STANTON (Department of Psychology, Memphis State University, Memphis, Tennessee) Amer. J. Optom. 52/3, 224-229, 1975.

Fifty black and white observers with normal color vision, representing a wide range of skin (and fundus) pigmentation, made direct heterochromatic brightness matches for a white standard field against each of five chromatic comparison fields. The test field was a circular bipartite field, subtending 13°, in Maxwellian view. The intensity of the chromatic field was controlled by a Kodak Wratten neutral density wedge. Twenty five observers used the method of adjustment and 25 others the method of constant stimuli. The results were evaluated statistically. The results indicated that variation in fundus coloration does not influence color vision, as measured by a large stimulus field matching technique. Small racial differences found by others appear to be limited to foveal vision. The data showed that the heterochromatic matches were less reliable for the more saturated colors, violet and red, and also that the methods used to obtain the matching data differentially influenced the results for these colors. - Ingeborg Schmidt.

Photopic electroretinogram. Part I. Studies on normal and color blind subjects, by Kenji UI (Department of Ophthalmology, Mie University School of Medicine, Edobashi 2, Tsu, Mie, 514) Jap. J. ophth. 19/1, 57-68, 1975.

The spectral responses of the photopic b-wave (b_p-wave) to monochromatic stimuli of equal quantum content were recorded at white, blue, green and red light adaptations. The spectral curve from 12 normal subjects obtained from a plot of the b_p-waves, at a white background illumination, was similar in shape and peak (at 550 nm) to the spectral sensitivity curve under the same experimental conditions. - Blue adaptation significantly suppressed the b_p waves of shorter wavelength stimuli and red adaptation suppressed the responses to longer wavelength stimuli. The results on a green adaptation were intermediate. - Similar studies were carried out on two protanopic and two deuteranopic subjects. In both, blue and red light adaptations were found to have no influence on the spectral response curve. The spectral responses of protanopes and deuteranopes were, however, different. - Ingeborg Schmidt.

Clinical colorimeter and its ophthalmological applications. 1. Trial make for the colorimeter Model 1, by Y. OHTA (Dep. ophthal., Tokyo Med. Coll., Tokyo), Acta Soc. ophthal. jap. 78, 697-971, 1974.

The trial colorimeter is designed without "the through the eyepiece system" in such a way that on the front panel 3 objects may be seen. So it can be applicable to a subject with a fundus disease, especially with a pathological macular change, or to aged or very young subjects for whom it is difficult to perform a good colour vision test.

Also, it can be used to test colour discrimination, traffic signal experiments etc. This new and versatile colorimeter can have a broad field of application. - Yasuo Ohta.

Saturation studies in acquired dyschromatopsias by means of the Munsell atlas (Etude de la saturation au cours des dyschromatopsies acquises au moyen de l'album de Munsell), by P. LANTHONY (Paris, France), Ann. Oculist. 207/10-11, 741-751, 1974.

The author introduces two tests based on saturation differences :

1) A qualitative test (chroma 2, 5, 8) : desaturated Panel, Panel D-15, hypersaturated Panel. It is shown clearly that in cases of a normal Panel D-15 recording the desaturated test may reveal an axis direction; in cases of an anarchic Panel D-15 recording the hypersaturated test can give a good axis direction.

2) A quantitative test (chroma 2, 4, 6, 8) intended to find neutral zones in cases of acquired dyschromatopsias. There is no doubt that both the qualitative and the quantitative test, as soon as they become commercially available, will be used by many investigators. Their concept is clear and the author offers us a simple procedure to examine not only the direction of colour confusion but at the same time the neutral zone. The combined use of these two parameters in routine clinical practice certainly will add important information in the study of acquired dyschromatopsias. - A. Pinckers.

Impairment of colour vision in patients with ocular hypertension and glaucoma (with special reference to the D & H color scale), by H. KALMUS, I. LUKE and D. SEEDBURGH, Galton Laboratory, University College, London), Brit. J. Ophthal. 58, 922-926, 1974.

Use at the D and H color rule is described in the study of acquired colour loss associated with ocular hypertension and glaucoma. Additional tests include the Ishihara plates, the F_2 plate and the 100-hue test. Observations were made using a fluorescent lamp of 6.500 K. Using a systematic matching technique, an enlarged matching area similar to that found in congenital tritan defects was found, but the diagnosis of an acquired tritan defect was not confirmed by either the F_2 plate as 100-hue test results. - Jennifer Birch-Cox.

The effect of lead on the visual organ, by L.A. VINTS (First outpatient clinic of the administration of the self-supporting medical institutions, Moscow), Vestn. oftalm. 1975 No. 1, 74-75.

Pathology of the field of vision is one of the earliest and most frequent signs of the effect of lead, as resulted from an examination of 1045 workers who had been exposed to an increased lead content in the air at the location of their work. The color fields, especially that for green, were constricted more than that for white. Of the workers, 5.4% had developed macular dystrophy, demonstrating the necessity of systematical

ophthalmological examinations of workers, exposed to lead. - Ingeborg Schmidt.

Lens material for reducing effective color vision, US Patent 3,731,993 issued to F.A. Piringer (Vienna, Austria), US Department of Commerce, Washington, D.C. 20231, May 8, 1973.

A spectacle lens was designed to correct deficient colour vision, which may be of value also for other uses. Its purpose is to restore the proper ratio of the excitations for red, green and blue as well as possible. In color deficiency "there is an incorrect ratio. "A color deficient may require" for example, five times as much red, or twice as much green to obtain a perception comparable to a normal eye. "The lens material comprises a transparent mosaic including a multitude of evenly distributed juxtaposed small color filter regions of primary colors with spectral transmittance factors which differ in magnitude inversely proportional to the diagnosed sensitivity of the intended user to the primary colors red, green and blue. The mosaic may be a photographic diapositive mounted on the inner side of the lens. The small color filter regions form a mosaic of hexagonals (width appr. 0.02 mm, the optimal size depending on the extent of the color deficiency), arranged so that no two regions of the same color are adjacent and that they border on each other with their vertical sides because the most rapid eye movements occur in horizontal direction. The transition from one color filter to an adjacent one occurs through voluntary and involuntary eye movements. Thus the cones uninterruptedly obtain light which is filtered in different colors. The intensities for red, green and blue filter regions can be chosen individually. The chosen intensities cause a correction, e.g. the cones can receive a larger amount of red light and a smaller amount of blue light without the spectacles. To the naked eye, the lens appears clear with a slight colored veil. - Ingeborg Schmidt.

4th Congress of the European Society of Ophthalmology, president M. Radnot, Ophthalmologica 169/1-3 : 1-240, 1974. Editor : J. François, Ghent, Belgium.

The volume represents the main lectures of the 1972 European Ophth. Society and is dedicated to the functional examinations in ophthalmology. G. Verriest : General remarks on colour vision (pp. 82-89), in French; A.G. Ourgaud : Combined methods in functional examination (pp. 203-233), in French; J. François : The functional syndromes (pp. 234-239). - A. Pinckers.

Studies on visual acuity and color perception in the water, by H. KABAYAMA (Dept. Ophthal., Toshima Metropolitan Hospital, Itabashi-ku, Tokyo), Acta Soc. ophthal. jap. 78, 1195-1201, 1974.

For determining a visual limit in the sea water, experimental studies on visibility and color perception under water were carried out in shallow bottoms of the coastal sea of Okinawa and Oshima Islands.

Under water visual acuity and color perception were measured using circular white disks printed with Landolt's rings in various sizes or color targets of red, yellow, green and blue color.

Data of measurements under water were compared with those of on land.

1) Even in the sea water of Okinawa Islands, where the transparency of the water is clearest in Japan, the visual acuity and the color perception were almost extinguished within the range of 10 m distance from the eye, and the reason of this was considered as visual obstructions in the water caused by light-scattering and light-absorption resulting the light-veiling and a fall of brightness.

2) It was noticed that the visual acuity of vertical direction such as viewing from sea surface to sea bottom was better than that of horizontal direction at the sea bottom, and this difference may be due to the light-veiling in the water.

3) Concerning with the color perception in the sea water, the best visibility was gained by yellow or blue, seconded by green and the lowest by red, while, on the contrary, the best visibility on land was gained by red, seconded by blue and green, and the lowest by yellow. This phenomenon may be caused not only by the particular spectral absorption of water but also by the change of color adaptation and by the color contrast effects in the eye. - Yasuo Ohta.

OBITUARY

Prof. Dr. Ernst HEINSIUS,

member of the International Research Group on Colour Vision Deficiencies.

Born in Berlin the 15th august 1906. Studies of medicine at the Universities of Berlin, Innsbruck, Greifswals and Berlin till 1931. He was a ship physician before he specialized in ophthalmology in the Berlin University (Prof. Krückman and Löhlein). Thereafter be worked successively at the Berlin Westend Hospital and at the Kiel Navy Hospital. In 1940 he became professor and chairman in ophthalmology in Kiel, but the war brought him soon back in the navy where he worked as an ophthalmic surgeon and as a vision specialist.

From 1946 till 1971 he was the chief of the Department of Ophthalmology of the Allgemeine Krankenhaus eidberg in Hamburg; moreover he was from 1957 till his sudden death on 3rd july 1975 chief ophthalmologist of the german railways.

He wrote more than 160 papers, of which many concern the congenital and acquiredcolour vision deficiencies. He was the leading authority for the minor forms of congenital defectiveness, and an enthusiastic member of our Research Group.

We express our condolences to his wife Anneliese-Carmen Heinsius, who accompanied and helped effectively her husband at our meetings and to whom we are also undebted for the data of this obituary.

Guy Verriest.

LISTS OF THE PUBLICATIONS ON COLOUR VISION DEFICIENCIES OF MEMBERS OF THE RESEARCH GROUP

56. Papers by Prof. R. SEKI (Dept. of Ophthal., Dokkyo Univ. School of Med., Mibu-cho, Tochigi, Japan).

SEKI R. - Ishihara test on the artificial illumination. Jap. J. clin. Ophthal. 5, 173-181, 1951.

SEKI R. - Theoretical review of Ishihara test. Jap. J. clin. Ophthal. 5, 87-93, 1951.

SEKI R. - New colour vision test used colorpyrometer. Acta Soc. ophthal. Jap. 55, 814-818, 1951.

SEKI R. - Chromaticity confusion of congenital colorweakness. Jap. J. clin. Ophthal. 5, 396-398, 1951.

SEKI R. - The discussion about the color of Ishihara test. Jap. J. clin. Ophthal. 5, 742-743, 1951.

SEKI R. - Color of Oguchi test and chromaticity confusion of tritanopia. Jap. J. clin. Ophthal. 7, 382-383, 1953.

SEKI R., OBI S. & SHMIMUZU K. - The review of Okuma test. Jap. J. clin. Ophthal. 8, 113-115, 1954.

SEKI R. - Experience of latent icteric xanthopsy. Jap. Rev. clin. Ophthal. 48, 316-318, 1954.

UMAZUME K., SEKI R. & OBI S. - Studies on trial make of new color vision test plates (Report 1). Acta Soc. ophthal. jap. 58, 732-735, 1954.

UMAZUME K., SEKI R., OBI S. & SHIMIZU K. - Studies on trial make of new color vision test plates (Report 2). Acta Soc. ophthal. jap. 59, 765-766, 1955.

UMAZUME K. & SEKI R. - Recent problems of color vision test. J. illum. Engng Instit. Jap. 39, 461-466, 1955.

SEKI R. - Colorblindness and accidents. Safety Digest, 2, 1061-1065, 1956.

UMAZUME K., SEKI R., OBI S. & SHIMIZU K. - Studies on trial make of new color vision test plates (Report 3). Acta Soc. ophthal. jap. 60, 1780-1782, 1956.

SEKI R. - Practice on color vision test. Jap J. clin. Ophthal. 11, 1331-1335, 1957.

R SEKI R. & MULAI M. - The discussion about Tokyo Medical College color vision test (the first edition). Jap. Rev. clin. Ophthal. 52, 1050-1032, 1958.

R SEKI R. - Introduction of color vision test (1). Ophthalmology 2, 860-863, 1960.

R SEKI R. - Introduction of color vision test (2). Ophthalmology 3, 119-122, 1961.

R SEKI R. - Introduction of color vision test (3). Ophthalmology 3, 349-352, 1961.

SEKI R., OHTA Y., TAJIRI K., KURATA K. & FUKUDA T. - The results on color vision test by the Panel D-15. Acta Soc. ophthal. jap. 68, 1312-1323, 1964.

R SEKI R. & OHTA Y. - Trial make of 40-hue test for color aptitude test and minute test. Acta Soc. ophthal. jap. 69, 1035-1043, 1965.

UMAZUME K. & SEKI R. - Studies on Tokyo Medical College Color Vision Test. Acta chromatica, 1, 75-78, 1963.

R SEKI R. - Studies on treatment and counterplan for the subjects with defective color vision. Acta Soc. ophthal. jap. 70, 2087-2108, 1966.

R SEKI R., SAI S., KATO H., HAMAZAKI S., MURAKAMI S. & BABA G. - Studies on trial make of fluorescent color vision test plates. Jap. Rev. clin. Ophthal. 65, 308-311, 1971.

R OHTANI K., OHTA Y., KOGURE S., KATO H., SHIMIZU K. & SEKI R. - Screening of congenital color defects by Farnsworth's Tritan Plate. Jap. J. clin. Ophthal. 28, 1217-1222, 1974.

Do'nt forget that Daltoniana is written by the members of the Research Group for their mutual information. All contributions are wellcome.

Moreover, the people who promised during our symposium in the Netherlands (see Daltoniana Nr. 21 p. 3) to send material are asked to do it.

ADDRESSES OF THE MEMBERS OF THE RESEARCH GROUP

Additions

Prof. Mathew ALPERN
Dept. of Ophthalmology
5044 Kregse II
University Hospital
ANN ARBOR, Mich. 48104
U.S.A.

Dr. William R. BIERSDORF
Institute for Research in Vision
1314 Kinnear Road
COLUMBUS Ohio 43212
U.S.A.

Dr. John Lott BROWN
Centre for Visual Science
University of Rochester
ROCHESTER, N.Y.
U.S.A.

Dr. Eleftheria CHIMONIDOU
28. El. Venizelou Street
Nea Ionia
ATHENS
Greece.

Dr. Jules DAVIDOFF
Dept. of Psychology
University College of Swansea
Singleton Park
SWANSEA
England.

Dr. Bruce A. DRUM
The George Washington University
Medical Center
Department of Ophthalmology
2150 Pennsylvania Avenue
WASHINGTON, D.C. 20037
U.S.A.

Christine M. EDBURY
Department of Ophthalmic Optics
and Visual Science
The City University
Cranwood Street
LONDON EC1
England.

Miss Emma Fontani de HIPP
Laboratorio de Investigaciones Sensoriales
Facultad de Medicina UBA
M.T. de Alvear 2230 5° P
BUENOS AIRES
Argentina.

Dr. Andrzej FRYCZKOWSKI
Duracza 8 m 13
01-892 WARSAW
Poland.

Dr. A. GOLAN
Eye Department
Belinson Medical Center
PETAH-TIKVA
Israel.

Mrs. Anneliese HAUGHTY
13, Blane Crescent
BLANEFIELD
Stirlingshire
Scotland.

Dr. Alessandro PENNE
Clinica ocul. dell'Università
via Pozzo 71
MODENA
Italy.

Prof. L.N. WENT
Department of Human Genetics
Wassenaarseweg 62
LEIDEN
Nederland.

Changes in address.

Dr. Peter ASPINALL
School of Architecture
Herriott Watt University
College of Art
Lauriston Place
EDINBURG
Scotland.

Dr. I.A. CHISHOLM
Department of Ophthalmology
University of Saskatchewan
SASKATOON
Saskatchewan S7N OW8
Canada.

Prof. Ben V. GRAHAM
School of Optometry
University of Montreal
P.O. Box 6128
MONTREAL 101, Quebec
Canada.

Prof. Dr. SCHEIBNER
Physiologisches Institut II
der Universitäts Düsseldorf
Moorenstrasse 5
D-4000 DUSSELDORF
B.R.D.

Deletion (deceased)

Prof. Herbert SCHOBER
Institut für medizinische Optik
Barbarastrasse 16
8 MUNCHEN 13
D.B.R.

THE INTERNATIONAL RESEARCH GROUP ON COLOUR VISION DEFICIENCIES STANDARDIZATION WORKING PARTY

Terms of reference :

1) To provide an information service with regard to the examination of normal and defective colour vision.

2) To publish and maintain a register of clinical tests whose performance has been fully documented and justified in open literature.

3) To recommend test procedures and a minimum test battery for particular occupational, advisory or diagnostic purposes.

4) To work towards the acceptance of internationally agreed occupational colour vision standards.

5) To recommend suitable artificial illuminants for use with clinical tests and to publish and maintain a register of illuminants whose performance has been fully documented in open literature.

6) To recommend the use of standard terms and nomenclature relating to the subject.

At the third symposium of the I.R.G. held in Amsterdam it was decided to continue the work of the Standardization Committee and to formulate terms of reference. These have now been

agreed. The aim is to provide a general guide for clinicians and to include standard reference material. It is hoped to present a report for publication before the next meeting of the I.R.G. to be held in Italy in 1977. Interim reports on progress will appear in Daltoniana from time to time and members are asked to comment on or to critise any of the items, especially if there appear to be omissions.

Jennifer Birch-Cox
Dept. of Ophthalmic Optics and
Visual Science
The City University
Cranwood Street
LONDON EC1V 9HH
England.