

DALTONIANA

NEWSLETTER

OF THE INTERNATIONAL RESEARCH GROUP ON COLOUR VISION DEFICIENCIES

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Nr 6 - 15th september 1972

LITERATURE SURVEY

Visual evoked responses during exposure to strong coloured lights, by C. HUBER, *Ophthal. Res.* 3, 55-62, 1972.

Specific colour-dependant wave forms of the VER were isolated using test lights (10° visual angle) projected with a slow repetition rate on a strong background (subtending 15° visual angle, central fixation). Stimulus and background lights were produced by a combination of xenon-arc and Schott interference filter. The study of the monocular VER of students showed a strong effect of red light on the VER; responses could be recorded 0.2 L.4 above the sensory thresholds. Responses to green and blue lights were small. A white test lights were small. A white test light gives different VER's depending on the colour of the adapting background. - E. Greve.

Spectral discrimination in the rabbit, by J.F.W. NUBOER, *Docum. ophthal.* 30, 779-299, 1971.

The ability to discriminate lights of different spectral composition was investigated in a specially trained wild rabbit. It is concluded that beside the rod system probably two other systems are functional: one system with maximal sensitivity near 450 nm and a second system with maximal sensitivity near 530 nm.

In the blue part of the system the just noticeable difference in wavelength probably is in between 30 and 35 nm.

The ability to discriminate spectrally different lights points to the independence of the "blue sensitive system" and the "green sensitive system".

The author gives a suggestion as to the biological value of the rabbits dichromatic colour vision. - E. Greve.

Spectral sensitivity beyond the blind spot. I. - Small size test-flash, dark-adapted retina, by L. RONCHI, O. NOVAKOVA and M. CETICA, *Atti Fond. G. Ronchi*, 27/5, 1972.

The absolute threshold is recorded at different locations along the horizontal meridian of the dark-adapted retina. The loss of sensitivity, when passing from 30° to 60° nasal, is found to depend on stimulus wavelength. This

effect cannot be accounted for simply by assuming that Ricco's area is smaller at the red end of the spectrum. In fact, for two over three observers, the sensitivity of the dark-adapted retina is greater at 30° than at 60° both around 600 nm and around 500 nm. - Lucia Rositani-Ronchi.

Luminosity and CFF in deuteranopes and protanopes, by J. POKORNY and V.C. SMITH (Eye Res. Labor. Univ. Chicago), J. Opt. Soc. Amer. 62, 1, 111-117, 1972.

The paper represents a contribution to findings by Heath (Science 128, 775, 1968) who reported that luminosity measurements at a constant CFF criterion showed that deuteranopes had greater sensitivity than normals for wavelengths greater than 500nm. Dichromatic luminosity functions were measured in two ways. The first was with heterochromatic flicker photometry, with a 580^{nm} standard and with a 3000°K standard on a 2 field. The observer adjusted the monochromatic light until there was minimal sensation of flicker. The second was with side-by-side brightness matching on a 2° bipartite field. The comparison light was a 580 nm field providing 4, 40 or 400 td. Relative luminosity was calculated for an equal energy spectrum referring to the protanopic maximum at 560 nm. Moreover, absolute-threshold spectral sensitivity curves were obtained for a field of 12 min, 12 ms. On protanopes and deuteranopes, the absolute threshold provided the same estimate of luminosity as heterochromatic flicker photometry or brightness matching in the wavelengths below 580 nm and less sensitive to wavelengths above 580 nm. Considerable variability of matches was observed for stimuli below 500 nm. The luminance level of the standard field did not affect the brightness match for wavelengths above 500 nm. - CFF log I functions were obtained for 6 spectral lights. For each wavelength 5 or 6 luminance levels were used. After 10 min dark adaptation the CFF thresholds were established beginning with the lowest luminance and using the method of limits. Owing to lack of energy in the blue no data are shown for extremely short wavelengths. When plotting the log trolands on the abscissa and the cycles per sec on the ordinate the curves show characteristic slopes. Normal observers who's average slope was intermediate between the two types of dichromats show considerable variability of the slopes. For instance, at the wavelength 580 nm, the CFF thresholds for deuteranopes and protanopes are close together at a low luminance (- 0.5 log td) and draw increasingly apart as luminance increases. To obtain 20, 30 or 40 cps CFF at 580 nm a deuteranope requires less energy and the protanope more energy than an average of normal observers. The supersensitivity of the deuteranope found by Heath occurs only above 500nm; it results from the different slopes of the CFF-log I functions for deuteranopes and protanopes". At each type of dichromats the CFF log I functions tended to superimpose for all wavelengths and showed no systematic wavelength effects. - Ingeborg Schmidt.

Genetic structure of the population of Valparaiso. V ABO bloodgroups, color vision deficiency and their relationship to other variables, by J. PINTO-CISTEMAS, H. FIGUEROA, B. LAZO, C. SALINAS and C. CAMPUSANO (Departamento de Biologica, Univ. de Chile, Valparaiso, Chili), Human Heredity 21/5, 431-439, 1971.

407 males and 416 females were tested from different zones of Valparaiso city, but is not stated how. This is a regrettable omission. 23 of the males (5.6%) and 10 of the females (2.4%) were found to have abnormal colour vision. - L.N. Went.

Glucose-6-Phosphate dehydrogenase deficiency and colour-vision studies in Indian muslims, by S.M.A. HAKIM, A.J. BAXI, V. BALAKRISHNAN, K.V. KULKAMI, S.S. RAO and H.I. JHALI (Haffkine Inst., Parel, Bombay 12), Humangenetik 15/1, 90-92, 1972.

By means of the Ishihara plates 464 males from 5 different groups of Muslims from Gujarat State were studied; 12 of these were found to be colour deficient (2.6%), although in 2 groups more were observed. - L.N. Went.

Experience about an unknown variety of colour vision. Theoretical and practical consequences (Erfahrungen mit einer bisher verkannten Varietät des Farbensinns und Folgen für Theorie und Praxis), by F. LENZ (Montessoriweg 1, Göttingen, DBR), Humangenetik 15/1, 75-80, 1972.

The author refutes the statements made that he, being a protanope, cannot observe pure red. The diagnosis was made 3 times between 1909 and 1961 with the aid of an anomaloscope. He explains this as a threshold phenomenon and also believes that one should not speak of normal trichromats but of normal tetrachromats. - L.N. Went. (!)

Linkage studies in X-linked retinitis pigmentosa, by P. GRÜTZNER, R. SANGER and B.E. SPIVEY (Universitätsaugenklinik, Freiburg, DBR), Humangenetik 14/2, 155-158, 1972.

In a small pedigree with X-linked retinitis pigmentosa deuteranomaly was also observed with probably three recombinants between the two loci, presenting further evidence about the great distance between these loci. - L.N. Went.

Diagnostic criteria in dominantly inherited juvenile optic atrophy, by D.P. SMITH (Victorian College of Optometry, Univ. of Melbourne, Australia) Amer. J. Optom. 49/3, 183-200, 1972.

As a result of a review and qualitative analysis of the findings on 554 affected persons reported in the literature 8 major clinical manifestations of the dominantly inherited juvenile optic atrophy (DIJOA) are demonstrated: (1) Dominant autosomal inheritance (2) Insidious onset between the age of 4-8 years. The disease has never been demonstrated

as congenital. (3) Moderately reduced visual acuity, 6/20 to 6/60. (4) Temporal pallor of the optic discs. The macular area looks normal or the foveal reflex may be absent or modified. (5) Centro-cecal enlargement of the blind spot without or with involvement of the fixation spot. The field for blue may be absent. (6) Full peripheral fields to white. (7) Inverted peripheral fields to colors and (8) An acquired blue-yellow dyschromatopsia. - Moreover, dark adaptation is described as normal and impaired, the ERG as normal and modified. Progression and non-progression of the disease are about equally likely. The eight features are proposed as a clinical definition of the disease and as suitable diagnostic criteria. DIJOA has not previously been reported in Australia. On the basis of the eight criteria, 14 affected persons from three unrelated families were diagnosed. Color vision was tested by pseudoisochromatic plates, Panel D-15 test, FM 100 Hue test, FM 28 Hue test and the Nagel anomaloscope. Visual fields were measured on the Goldmann perimeter and on a 2 meter Bjerrum screen. The site of the basic lesion and the mechanism of the disease is not known. Histopathological examinations have never been performed on an affected eye. - Ingeborg Schmidt.

Achromatopsia combined with sectorial retinopathia pigmentosa (Kombination einer angeborenen Achromatopsie mit sektorenförmiger Degeneratio pigmentosa retinae), by A. THALER, P. HEILIG und H. SLEZAK (II. Univ. - Augenlinik Wien), Graefes Arch. Ophthal. 183, 310-316, 1972.

A 66 year old male complained of photophobia and nystagmus since birth. Visual acuity OD 0.1, OS 0.15 dark adaptation : apparently no gross abnormality. ERG : small a and b waves, flicker fusion 10 hz. Bone-like pigments predominantly in nasal and lower parts of the retina. Visual field defects in correspondent areas. Color vision : Ishihara plates could not be seen except No. 1 and 18. Farnsworth test indicated achromatopsia (no figure). Maximum of brightness perception shifted toward shorter wavelengths, investigated with a color lantern (no diagram, no more specific information). One protanopic brother, one sister with normal color vision. - Peter Grützner.

PREPRINTS OF PAPERS WAITING PUBLICATION

O.M. BLACKWELL. - Visual performance - effects of age
(to appear in the October, 1971, issue of the Journal of the Illuminating Engineering Society.)

Mrs. Blackwell attempted, through a new series of two experiments, to isolate the reasons for an earlier finding she had made empirically. That finding, briefly, was : For every ten years of increasing age, the Visual Performance Curve is shifted upward on the contrast scale, the amount varying from only a small shift in the younger age brackets to a large shift in the older age brackets.

Mrs. Blackwell had previously postulated from the literature that scatter of light rays in the ocular media was a major reason for these shifts: light rays penetrate the cornea, lens and vitreous humor and there parts of the rays are diverted by optical particles; other parts of the rays then arrive at the retina, and - reflected back - add to the original scatter.

Together, these diverted and reflected rays lay a veiling brightness over the image of the object being viewed and reduce the contrast of the object against its background, thus reducing visibility. The effect is the same as that produced by a disability glare source.

With age, the number of optical particles increases, thus increasing the scatter effect.

In an effort to prove her postulated conclusions, Mrs. Blackwell set up an experiment in which she introduced glare and measured visibility under the created condition.

She tried first to create glare by the old method of gradually moving a bright source downward to the line of sight. This proved to be difficult, too time-consuming and subject to error due to the inability of some observers to resist the temptation of glancing at the source, thereby altering their adaptation.

Alternatively, she developed a new procedure for producing glare through the use of a large annulus that distributes rather than concentrates the same amount of glare. The band of light is ten times as bright as the background of the task. This facilitates concentration at the center and practically eliminates possible sudden changes in adaptation.

Having confirmed the effectiveness of this technique, it was incorporated into the new portable Visual Task Evaluator, Model 3. Mrs. Blackwell now can continue her age studies by going to her observers rather than waiting for them to be able to come to her laboratory.

A similar improvement is being built into the Discriminometer, the laboratory instrument with which she gathered all of her original data on the effects of age on vision.

Mrs. Blackwell's second experiment involved two sub-experiments on transient adaptation effects as a function

of age. These effects develop from looking from a task of one brightness to a task of a different brightness.

The first sub-experiment used a modified Discriminometer which introduced a sudden 10-to-1 increase in luminance. Sixteen normal, 20-to-30-year-old observers were measured after 0.3 sec exposure and registered an average 0.85 of fully-adapted visibility level. This does not agree well with the averages obtained by Boynton and Rinalducci who had previously measured 0.685 in comparable circumstances.

The second sub-experiment introduced a "glance-away" technique requiring the observer to look from his viewing task to a bright luminance for one second before looking back at his viewing task. The same 16 normal observers were measured and registered an average value of 0.89 of the fully-adapted visibility level, which compared well with the Boynton-Rinalducci value of 0.917.

Following these pilot runs, the experiments were discontinued because it appeared that they would overlap the area being investigated by Dr. Rinalducci.

With the aid of a new pupillometer and of Dr. Smith's new eyemaker, pupil size and the accuracy of fixation soon will be studied in the continuing investigation of the causative factors of age-related changes in visual performance, time-pause and eye movement pattern.

(From the Annual Report 1971 of the Illuminating Engineering Research Institute).

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

17. Papers by Dr. J. KELECOM (49, rue d'Amercoeur, B-4000, Liège, Belgium).

KELECOM J. - Vision des couleurs et sélection, Acta Belgica de Arte Medicinali et Pharmaceutica Militari, n° 2, 204-222, 1962.

KELECOM J. - Les dyschromatopsies acquises. Considérations sur 84 observations personnelles, Arch. Opht. (Paris), 23/1 15-25, 1963.

18. Papers by Dr. John KOLIOPOULOS (University Eye Clinic, El. Venizelou 26, Athens-135, Greece).

VERRIEST G. and KOLIOPOULOS J. - The perception of colour vision and its defects, Annals of Ophthalmology (Athens) 5/4, 145-166, 1968.

- R KOLIOPOULOS J., PALIMERIS G. and ANDREANOS D. - Evaluation of the different tests for establishing disturbances of colour perception, Bull. Hellen. Ophth. Soc. 38, 291-312, 1970.
- R KOLIOPOULOS J., CHATZIS P. and PAPAGEORGIU A. - Acquired disturbances of colour perception in vascular diseases of the retina, Trans. 5th panhellen. Ophth. Congress, 238-254, 1971.
- R IORDANIDES P. and KOLIOPOULOS J. - Incidence of colour vision defects in a screening of 29.985 young Greek employees, Iatrika chronika, 11/105, 561-571, 1971.
- R KOLIOPOULOS J., TSAPAKIS M. and THEODOSIADIS G. - The colour vision perception as a functional test pre- and postoperative in retinal detachment, Bull. Hellen. Ophth. Soc. 39, 298-309, 1971.
- R KOLIOPOULOS J. and PALIMERIS G. - Acquired colour vision disturbances during treatment with ethambutol and indomethacin, Mod. Probl. Ophthal. 11, 178-184, 1972.
- R KOLIOPOULOS J. and THEODOSIADIS G. - Retinal detachment and acquired colour vision disturbances, Mod. Probl. Ophthal. 11. 118-121, 1972.

19. Papers by Dr. G. LAVERGNE (99, Boulevard de la Constitution, B-4000 Liège, Belgium).

LAVERGNE G. - Etude de l'adaptation à l'obscurité des cônes de l'oeil amblyope, Bull. Soc. belge Ophtal. 126, 1121-1130, 1961.

LAVERGNE G., DUBOIS J. & LEKEUX M. - Les fonctions visuelles maculaires dans le glaucome à angle ouvert débutant, Bull. Soc. belge Ophtal. 137, 303-312, 1964.

20. Papers by Prof. Y. LE GRAND (43, rue Cuvier, Paris 5, France).

LE GRAND Y. & GEBLEWICZ E. - Sur l'achromatopsie artificielle par papillotement, Bull. Soc. Ophtalm. Paris, 18 mars 1939, 2p.

LE GRAND Y. - Standard response functions for protanopic and deuteranopic vision, J. Opt. Soc. Amer., 38, 815-816, 1948.

LE GRAND Y. - Variations dans la vision humaine des couleurs, in : I. MEYERSON, Problèmes de la Couleur, Paris, 1957 (S.E.V.P.E.N.ed), pp. 75-86.

- R LE GRAND Y. - Photopigments des cônes humains, Docum.Ophthalmol., 26, 257-263, 1969.
- LE GRAND Y. - Light, Colour and Vision, 2d ed., London, Chapman & Hall, 564 p., 1968.
- R LE GRAND Y. - Les pigments des cônes chromatiques, Farbe, 19, 15-22, 1970.
21. Papers by Dr. M. LEWIS (Civil Aeromedical Institute AC-118, Federal Aviation Administration, PO Box 25082, Oklahoma city Ok 73125, U.S.A.).
- R LEWIS M.F. and ASHBY F.K.- Diagnostic Tests of Color Defective Vision. Annotated bibliography, Office of Aviation Medicine Report No. 67-8, May 1967.
- GIBBONS H.L. and LEWIS M.F. - Color Signals and General Aviation. Aerospace Medicine, 40, 668-669, 1969.
- GIBBONS H.L. and LEWIS M.F. - Mild Color Blindness Permissible for Police Candidates, Questions and Answers, J. Amer. Medical Assoc., 216, 1359-1360, 1971.
- R LEWIS M.F. and STEEN J.A. - Color Defective Vision and the Recognition of Aviation Color Signal Light Flashes. In : The Perception and Application of Flashing Lights, London : Adam Hilger, 1971. (Also available as Office of Aviation Medicine Report No. FAA-AM-71-27, June 1971).
- R STEEN J.A. and LEWIS M.F. - Color Defective Vision and Day and Night Recognition of Aviation Color Signal Light Flashes, Aerospace Medicine, 1972 (in press). (Also available as Office of Aviation Medicine Report No. FAA-AM-71-32, July 1971).

OFFICIAL COLOUR VISION REQUIREMENTS
THE NETHERLANDS (1972)

	Colour vision requirements	Tests
Private car driving, lorries, taxis, fire brigade man, engineer at vessels or ferryboats	No limitations	
Analyst, meat inspector, surveyor, strongcurrent- and weakcurrent assembler, topographic designer, policeman, customs officer, all cat. military drivers.	10/16 OR mild accepted	Ishihara H.R.R.
Civilian driver of Defence department	10/16 accepted	Ishihara
Busses, drivers at other departments, tramcardrivers, drawbride- and lockkeepers, bargee and bargehands of ferryboats.	discrimination between red and green accepted	Signallights
Security staff at railways	10/16 or mild deutan accepted	Ishihara H.R.R.
Ambulancedriver, enginedriver of railways	normal	Ishihara H.R.R. Anomaloscope
Navy		
airman	normal	Ishihara,
driver		H.R.R.
marine	mild accepted	H.R.R.
engineer		
assembler		
sailor	medium accepted	H.R.R.
Aviation		
military	Mild deutan	H.R.R.
ivil profess.	accepted	(in doubtful
private		cases : anomaloscope

E.L. Grève.

SECOND SYMPOSIUM OF THE INTERNATIONAL
RESEARCH GROUP ON COLOUR VISION DEFICIENCIES :

EDINBURGH 28th - 30th JUNE 1973.

PAPERS ANNOUNCED

(continued : see Daltoniana 5, p. 13).

- P. ASPINALL : Some methodological problems in testing visual functions
- E. AUERBACH : Psychophysical and electrophysiological examinations in achromats (incl. 5 cases of progressive cone degeneration)
- J.E. BAILEY and R.W. MASSOF : In search of the physiological neutral point
- G.V. BALL : Terminology of colour deficiency
- B.G. BENDER : Further experiments on an observer with anomalous colour vision
- E. CHOMICZEWSKA : Influence of tiredness on colour vision of machine drivers
- R. CRUZ-COKE : Blue-yellow deficiencies in the population of Santiago, Chile
- E.C. DE VRIES - DE MOL, L.N. WENT and H.J. VÖLKER-DIEBEN : Farnsworth 100 hue results in a series of patients with longstanding therapeutic carotinaemia
- J.M. EICHENGREEN : A new model Nagel anomaloscope
- I. FARALDI, A. VANNINI and F. FURLOTTI : (Title follows)
- G. FISHMAN : Color vision defects in glaucoma and ocular hypertension patients
- J. FLETCHER-VOKE : The Stiling-Crawford chromatic effect in colour defective subjects
- W.S. FOULDS and I.A. CHISHOLM : Effect of raised intra-ocular pressure on colour discrimination
- E.L. GREVE and W.M. VERDUIN : The two-colour-threshold in static perimetry
- P. GRÜTZNER : Achromatopsia or tapeto-retinal degeneration?
- E. HANSEN : The photoreceptors in cone dystrophies
- A. HEDIN : Study of the new series of Boström-Kugelberg pseudo-isochromatic plates
- A. HEDIN : Temperature dependence of the color vision deficiency in disseminated sclerosis
- G.S. HOLST : Effects of brief monochromatic light flashes on visual acuity on the Rhesus monkey
- L.M. HURVICH : Anomalous color vision
- H. ICHIKAWA : Genealogical studies on interesting families of defective colour vision discovered by a mass examination in Japan and Formosa.
- D. JAMESON-HURVICH : Intermittent illumination and color vision testing

- P.R. KINNEAR : Luminosity curves of anomalous subjects
C. KORCZAK : Colour vision deficiencies in professional advisory for youth from Warsaw schools
R. LAKOWSKI : The effect of age in red-green defects
R. LAKOWSKI and P.R. KINNEAR : Diagnostis of congenital red-green anomalies in patients with clinical conditions
R. LAKOWSKI and K. OLIVER : The effect of pupil diameter on color vision test performance
R. LAKOWSKI and B. TANSLEY :Energy modification of the Pickford-Nicolson anomaloscope
D.G.A. Mac LEOD and P. LENNIE : A unilateral defect resembling deuteranopia.
F. PARCA : New results on testing anomalies of colour vision
H.M. PAULSON : Congenital color deficiencies - detection and classification as to type and degree of defect
H.M. PAULSON : Evaluation of ten color vision tests
H.M. PAULSON : Comparison of judgments by normals and color defectives to 400 colored stimuli
I. RENTSCHLER : (Title follows)
M.C. RITTLER : (Title follows)
D.O. ROBBINS : (Title follows)
L. ROSITANI-RONCHI : Dependance of peripheral spectral sensitivity on exposure time
K.H. RUDDOCK : Mechanisms of anomalous trichromacy : hypothesis and analysis
H. SCHEIBNER : Colour vision in a case of neuritis retrobulbaris
I. SCHMIDT : New knowledge applied to data obtained by an old apparatus, the Nagel
H.G. SPERLING : Long term dichromacy induced by prolonged adaptation to intense spectral lights
H.G. SPERLING : Study of anomalous trichromatism using the increment threshold technique
H.G. SPERLING : Complete color mixture and luminous efficiency determinations on nine dichromats
O.G. TAYLOR : Problems in performance and interpretation of Farnsworth's 100 hue test : suggested solutions
H. VERDUYN LUNEL and R.A. CRONE : Static perimetry with purely chromatic stimuli
G. VERRIEST : Chromaticity discrimination in protan and in deutan carriers
J. ZANEN : The foveal spectral thresholds in congenital dyschromatopsia
H. ZWICK : Spectral deficits in visual function associated with laser irradiation
K.A. HELLNER : Analysis of color deficiencies by flicker photometry using a interference filter monochromator

Corrections to the preceeding list

R.A. WEALE : Erythrop~~sia~~ ex aphakia (and not erythronopsia!)
L.N. WENT, H. VÖLKER-DIEBEN and E.C. DE VRIES-DE MOL :
Colour vision, ophthalmological and linkage studies
in a pedigree with a tritan defect

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= NO FURTHER PAPERS WILL BE ADMITTED.
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= OWING TO THE BIG NUMBER OF COMMUNICATIONS,
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= ALL SPEAKING TIMES WILL BE OF STRICTLY TEN MINUTES
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= excepted the invited papers of François (30 min.) and of
= Aspinall (15 min.), and excepted the papers of Ball, Hellner
= Chomiczewska, Hedin, Korczak and Weale, and that of which
= the titles are still not known (each 5 min.)
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ANNOUNCEMENT

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