DALTONIANA

NEWSLETTER
OF THE INTERNATIONAL RESEARCH GROUP ON COLOUR VISION DEFICIENCIES

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THE END JUNE 1979 FIFTH INTERNATIONAL SYMPOSIUM OF THE IRGCVD WILL BE HELD IN LONDON (U.K.) INSTEAD OF VANCOUVER (Canada)
THIS ISSUE CONTAINS THE CALL FOR PAPERS AND THE PRELIMINARY INSCRIPTION FORM

LITERATURE SURVEY

Interaction between rod and cone signals studied with temporal sine wave stimulation, by T.J.T.P. VAN DEN BERG and H. SPEKREIJSE (Netherlands Ophthalmic Research Institute, Eerste Helmersstraat 104, Amsterdam, The Netherlands, and Laboratory of Medical Physics, University of Amsterdam, Amsterdam, The Netherlands) J. opt. Soc. Amer. 67/9, 1210-1217, 1977.

If a temporal stimulus is presented through the cones the threshold for a rod stimulus may be influenced even if the cone stimulus remains sub-threshold. The process underlying this rod-cone interaction was studied using sinusoidal stimulation. The stimulus was a circular field where two lights, produced by integrating spheres, a green (Wratten 58, dominant wavelength 540 nm) and a red (Wratten 70, dominant wavelength 670) could be mixed by a beam splitter. Intensity of the lights, frequency, phase and depth of the sinusoidal modulation of the two lamps could be controlled independently. For a threshold setting the subject set the control so that flicker was barely visible. In the mesopic experiments the green light almost exclusively stimulated the rods and the red light the cones. A model is proposed consisting of a single threshold mechanism preceded by linear summation of rod and cone signals with a pure latency difference. Two deviations from this model are described. - Ingeborg Schmidt.

Tritanopic purity-difference function to describe the properties of minimally distinct borders, by A. VALBERG and B.W. TANSLEY (Institute of Physics, University of Oslo, 1, Norway, and Psychology Department, University of California, San Diego, La Jolla, California 92093, U.S.A.), J. opt. Soc. Amer. 67/10, 1330-1336, 1977.

According to a publication by Tansley and Boynton (see Daltoniana Nr. 26, p. 1) color stimuli whose chromaticities all fall on a particular tritanopic confusion line in the CIE diagram do not form distinct borders with each other. In the present study the authors express chromatic border distinctness in terms of the equivalent or achromatic contrast matching the border distinctness of two juxtaposed white hemifields. They demonstrate that a tritanopic purity-difference function, involving only r- and g- cone contributions provides 1) a prediction of which chromatic stimuli have equivalent border forming properties and 2) a description of the distinctness of the minimally distinct borders(MDB) in terms of a equivalent luminance contrast. In experiments that evaluate color differences, investigators should be cognizant of the role that chromatic border-distinctness mechanisms may play in the response of the observer. - Ingeborg Schmidt.

Saturation of a retinal cone mechanism, by J.D. MOLLON and P.G. POLDEN, Nature 265, No. 5591, pp. 243-6, January 20, 1977.

Evidence of saturation of the blue-sensitive receptors is presented by a failure of Weber's law ($\Delta L/L$ = constant) when a violet test stimulus is presented on a blue adapting field in the presence of an auxillary yellow field at high intensity levels of the adapting field. Saturation fails to occur when the π_4 (green) mechanism begins to intrude, and the authors suggested that this property of blue receptors, which puts them in a class with rods rather than cones, has been missed previously on this account. A second experiment established saturation under conditions in which the blue receptors were absorbing a fixed number of quanta from a field, rather than as a result of inhibition by another cone mechanisms. - Janet Voke.

An anomaly in the response of the eye to light of short wavelengths, by J.D. MOLLON and P.G. POLDEN, Phil. Trans. Royal. Soc. Lond. B, 278, pp. 207-240, Mardh 29, 1977.

Extensive measurements to establish the existence and basic properties of transient tritanopia (temporary insensitivity to blue after adaptation to red/yellow) are reported. The phenomenon is examined in the light of other known "peculiarities" of the blue mechanism since attempts to produce corresponding transient deuteranopia and protanopia were unsuccessful. A very small elevation in threshold for red after adaptation to a low intensity green stimulus was noted but it was not sufficient to be established as a full transient protanopia effect. Transient tritanopia was present in para-

foveal regions up to 4°, though slightly less marked than at the foveal centre; it was absent when the adapting and test stimuli were presented to opposite eyes indicating a site of operation prior to binocular combination. The effect was produced in a protanope, and in a modified form in a deuteranope. Discussion centres around the cause/explanation of the effect. The anomaly could be an intrinsic property of the blue receptors and their neural connections or the effect of other cone mechanisms. It is further suggested that the sensitivity of the blue sensitive mechanism is controlled not only by quanta absorbed by the blue receptor but also by a mechanism with a different spectral sensitivity. Transient tritanopia then disappears at intensities of the adapting field at which the "inhibitor" becomes too bleached to exercise it inhibitory effect on the blue mechanisms. - Janet Voke.

Some remarks on the estimate of photochromatic interval in peripheral vision, by L. BARCA and G. VACCARI (II Cattedra di Clinica Oculistica dell'Università di Firenze, 50100, Italy), Atti Fond. G. Ronchi 32, 859-873, 1977.

The definition of photochromatic interval is briefly discussed, by taking into account the basic criticism, according to which no hue perceived across the so-called achromatic zone. Some experimental data are produced, obtained by delivering to the dark-adapted peripheral retina monochromatic stimuli of various sizes and durations. The variability of response across the training period and its dependence on the adopted criterion are stressed. - Lucia Rositani-Ronchi.

Response time to colored stimuli in the full visual field, by R.F. HAINES, L.M. DAWSON, T. GALVAN and L.M. REID (NASA Ames Research Center, Moffett Field, Calif. 94035, USA), NASA Report TN D-7927, 1975.

Peripheral visual response time was measured in 7 volunteer, dark-adapted subjects to the onset of 45' 50 msec colored (blue, yellow, green, red) and white stimuli imaged at 72 locations within their binocular field of view. The blue, yellow and green stimuli were matched for brightness at about 2.6 $\log_{10}$ units above their absolute light threshold, and they appeared at an unexpected time and location. These data were obtained to provide response time and no-response data for use in various design disciplines involving instrument panel layout. The results indicated that the retina possesses relatively concentric regions within each of which mean response time can be expected to be of approximately the same duration. These regions are centered near the fovea and extend farther horizontally than vertically. Mean foveal response time was fastest for yellow (288 msec) and slowest for blue (341 msec). Three

and one-half percent of the total 56,410 trials presented resulted in no-responses. Regardless of stimulus color, the lowest percentage of no-responses occurred within 30° arc from the fovea and the highest within 40°-80° arc below the fovea. These data are discussed in relation to findings by other investigations and are related to several hypothetical instrument panel/cockpit design problems. - Guy Verriest.

A simple apparatus to estimate the shift in the appearance of a color under different illuminations, by S. STEFANACCI and U. RAMACCIOTTI. Atti Fond. G. Ronchi 30, 653, 1975.

A simple apparatus is described, which allows to estimate the shift in the appearance of a color under different illuminants. The procedure is based on the binocular match method. The sensation mediated by the left eye, under given illumination conditions, is transferred into the set of perceptions mediated by the right eye, presented with the chips of the 100-hue test under C-illuminant.- Franco Carta.

Constant lightness 100-hue set under monochromatic (Na) illumination, by L. RONCHI and S. STEFANACCI. Atti Fond. G. Ronchi 30, 1035, 1975.

The paper deals with a technique which allows to estimate the lightness of 100 hue caps under monochromatic Na illumination. Then, the addition of neutral filters of suitable density leads to a "constant" lightness set of 100 hue caps. Five normal observer confirm, after careful visual inspection, the validity of the procedure. Three non-normal subjects, on the other hand, assert that there is a "modal" lightness level; some caps appear darker, others appear brighter. - Franco Carta.

Clinical symptoms relating to chromatic saturation (Sémiologie clinique de la saturation chromatique), by P. LANTHONY (Centre National d'Ophtalmologie des Quinze-Vingts, 28, rue de Charenton, Paris 12e, France), La Clinique ophtalmologique 3, 47-106, 1977.

This important paper buried in an obscure journal reminds first the definitions and the features of purity and of saturation, the cliniqal methods already used for studying saturation discrimination (however with few references to the spectral saturation discrimination curves and to color perimetry), and the Munsell system, which is very extensively described. The following section is devoted to the plotting of the Munsell colours and of the iso-colour lines of the dichromats on the CIE x, y chromaticity diagram. The last section is the most interesting one for the colour vision specialist as it describes special test procedures : (1) the assessment of the neutral zones by means of the "New Color Test," as already described by the author (and also by A. Pinckers); (2) a (entirely new) "chromaticity test",

which consists in the assessment of the confusions with each of 5 pilot colours (10 R/6, 10Y/6, 10G/6, 10B/6, 10 P/6) of colours slightly different in hue and in chroma (e.g. 5 YR/6, 2.5 YR/6, 7.5 R/6 and 10 R/10, 10 R/8, 10 R/4, and 10 R/2 for the pilot colour 10 R/6), and allows to state for each pilot colour if chromaticity discrimination is more disturbed either for hue or for chroma discrimination; (3) the assessment of colour confusions by means of the desaturated Panel, which is commercially available from Luneau and Coffignon and which, as shown by Lanthony (and by Pinckers and by Verriest), is to be administered after the standard Panel when this gives a normal tracing or only minor errors, as the desaturated version then often gives characteristic confusions lines; (4) a (entirely new) "tonal deviation test", in which the subject is asked to match in hue each of the 15 (chroma 8) caps of Lanthony's New Color Test with the (chroma 6) caps of Roth's 28 hue test; in colour defective subjects, this test shows in which extent a change in purity affects the apparent hue relationships; (5) a (entirely new) "test of desaturation slopes" : after having stated which hue corresponds to the neutral zone (by means of a grey cap), one searches which of the Munsell colours neighbouring in hue and in chroma are matched, of course a rather long procedure. - The author concludes from his results in defective subjects that the discrimination loss within the chromaticity diagram begins from the central white and invades progressively the periphery of the triangle "as a wave of desaturation, and then as a wave of discouloration", first formed along the principal axis od the defect. (This had to be ascertained on an uniform chromaticity diagram, that had not be used by the author). - Guy Verriest.

Subjects sensitivity of color in estimation of dot frequency for samples of color normal and color defective males, by E. HORNE & W. LINDER (Univ. Florida), J. Psych. 86, 115-121, 1974.

Randomly presented 9 color-normal and 14 color-defective males (mean age = 22 yrs) with either yellow-red, yellow-green, or gray circular dots at 7 frequency levels on each block of 2 homogeneous backgrounds of white or black color. Ss estimated the number of dots at each of 2 illumination levels. The mean estimates increased significantly with actual number increase in both groups of Ss. The effects of ground, color, and several interactions were not significant in either group. Estimates were generally linear, and the 23-dot point slight underestimation was replaced by slight overestimation. No significant mean difference was obtained between groups. - Patrice M. Dunn.

Anomalous trichromats : color perception thresholds after adaptation to chromatic fields of different saturation levels, by E.B. RABKIN, E.G. SOKOLOVA and E.I. LOSEVA (All-Union Scientific-Research Institute of Railway Hygiene, Moscow) Doklady Biological Sciences 228, 241-242, 1976.

Attempt to elucidate how different saturation levels affect the functional state of color-perceptual apparatus of the visual analyzer. Rabkin's spectroanomaloscope was employed; in these experiments one contained a special mechanism for changing degree of saturation of the light beam falling on observer's eye. - From Rev. sens. Disab.

Evoked potential indications of colour blindness, by D. REGAN & H. SPEKREIJSE (Univ. Keele, England), Vision Res. 14/1, 89-95, 1974.

Conducted tests with 1 color-blind and 6 normal Ss which present evidence that evoked brain potentials elicited by changing the chromatic contrast of a 2-colored visual pattern give clear indications of color blindness. The appearance of equiluminant red and green checks evoked potentials in normal Ss. On the other hand, the amplitudes of the deuteranopic S's responses attenuated sharply when the brightness of the red and green checks were made equal. In the deuteranope, but not in the normal, pattern-reversal responses were generated by changing the relative brightness of adjacent equiluminant red and green checks. In the deuteranope, visual signals elicited by red and green checks converged before the site of physiological responses to contrast. A pure brightness channel, if such exists, would not contain a contrast-sensitive mechanism. - Patrice M. Dunn.

X chromosome and color blindness, by M. DE NAZARE TRINDADE MARQUES (Dept. Ophthal., Fed. Univ. Minas Gerais, Brazil), Ophthalmologica 175, 305-308, 1977.

Four small pedigrees with the usual sex-linked transmission of protanomaly (1st and 3rd pedigree) and of deuteranomaly (2nd and 4th pedigree). The carriers had normal colour vision. - Guy Verriest.

Angiographic functional correlation in retinal diseases (Correlacion angiografica funcional en procesos retinales), by A. GONELLA, A. DAMAL and G. SALAS BUZO, Archivos Chilenos de Oftalmologia, 32, 153-171, 1975.

Fourteen clinical examples demonstrate the value of the study of the visual functions (visual acuity, visual field, colour vision and electroretinogram) in relation with fluorescein angiography. A clinical classification of the maculopathies based on functional and angiographic studies is presented. - Maria de Mattiello.

Peripheral cone disease, by A. PINCKERS and A.F. DEUTMAN (Dept. ophthal., Univ. of Nijmegen, The Netherlands), Ophthalmologica 174, 145-150, 1977.

Peripheral cone disease is characterized by an absent cone function as measured by the ERG, but on the other hand by a normal or slightly affected colour vision. 20 cases were examined. The most striking fact was the high incidence of myopia and the prese ce of nystagmus; the authors suggest that at least some cases of peripheral cone disease are due to myopic choroido-retinal degeneration. - A. Pinckers.

Contribution to the electroretinographic study of the hereditary vitreo retinal degenerations (Contribution à l'etude électrorétinographique des dégénérescences vitréo-rétiniennes héréditaires), by P. DEHON, Y. COMHAIRE-POUTCHINIAN and M. WATILLON (Clin. Ophtal., Univ. Liège, Belgium), Bull. Soc. belge Ophtal. 176, 58-81, 1977.

In sex-linked recessive juvenile retinoschisis (7 cases) colour discrimination was usually normal for the usual tests, while blue-yellow or scotopic patterns were evidenced by means of (Lanthony's) desaturated tests; a red-green pattern was observed only in 1 subject characterized by an altered peri-macular pigment epithelium. - Guy Verriest.

On the impairment of color discrimination in diabetic retinopathy, A report of 24 cases, by L. BARCA and G. VACCARI (Eye Clinic of the University of Florence, Careggi, Florence 50100, Italy) Atti Fond. G. Ronchi, 32, 635-635-640, 1977.

Twenty-four patients suffering from diabetic retinopathy were examined by means of the 100 hue test. As expected, higher total scores higher than that of normals belonging to the same age group were found. In addition a yellow-blue defect was foumd in 30% of the subjects; in 46% discrimination impairment in the blue-green region has no symmetrical counter-part. In the remaining 25% the errors were evenly distributed. The suggestion is made that, in addition to changes in the photoreceptors, in the neural retinal layers, in the eye lens, and to retinal edema, a component of the defect could be ascribed to changes in the inert macular pigment. However, no available references on this latter point were found. - Lucia Rositani-Ronchi.

Acquired color vision deficiency in open angle glaucoma, by J. KOLIOPOULOS (University Eye Clinic, 21 Omirou, ATHENS 135, Greece), paper presented at the International Glaucoma Congress II, Miami Beach, USA, 28.1.1978. Published as a booklet of 16 p., to be obtained from the author.

Review of the literature and of personnal data, that are resumed in a figure dep cting the relationship between field loss and 100 hue total score in 59 cases of chronic open angle glaucoma. Account is made of the different factors influencing the results of the colour vision tests. - Guy Verriest.

Colour vision (Vederea culorilor), by P. CERNEA (Clinico de Oftalmologie, Craiova, Romania) and F. CONSTANTIN, ed. Scrisul românçesc, Craiova, 1977. 386 p., 199 fig., 42 tables, 8 pages of colour figures.

Although this book is written in rumanian (with very short french and english summaries) and although the authors had few or no contacts with many actual occidental trends in colour vision and colour vision defectiveness research, I enjoyed to look this extensive monograph, which consists of no less than 29 chapters, of which many are rich in personnal views and approaches. I : Chromatic sensation. II : Physical, psychophysical and psychosensorial relations of colours. III : Functional duality of the retina. IV : Photochromatic interval. V : Chromatic differential sensitivity. VI : White and coloured lights. VII : Complementary colours. VIII : Colour mixtures and trichromatic synthesis. IX : Geometric representation of colour sensations. X : Interaction phenomena. XI : Biologic effects of luminous radiation (in plants, animals and man). XII : Colour vision in animals. XIII : Chromatic receptors (and photopigments). XIV : Transmission of chromatic sensation. XV : Colour vision theories (with references to many old theories that are today inacceptable, and to Stockenius' chimio-osmotic theory, according to which rhodopsine is the only visual pigment, "the variation factor being only the gradient of protons of cellular membrane which induces the colour sensation"). XVI : Congenital alterations of colour vision (fairly described). XVII : Methods of exploration of chromatic sensation (anomaloscopes, PIP, D-15, 100 hue, lanterns, colour perimetry - only my older paper with Israel, no references to actual trends -, ERG, and a personnal comparison of Rabkin PIP, AN-59 anomaloscope and lantern test). XVIII : Frequency of the congenital defects (personnal data : 7.5% in 7000 men - 13.2% PA, 10.75% P, 58.68% DA, 17.55% D). XIX : Genetics in hereditary dyschromatopsia. XX : Chromatic discrimination in heterozygotes (with personnal data, already published in french in Arch. Ophtal., Paris 36, 657, 1976). XXI : Chromatic discrimination in the Turner syndrome (with personnal data). XXII : Chromatic discrimination in twins (with numerous personnal data). XXIII : Secundary alterations of chromatic sensation (my older 1957 classification, thus without reference to the spectral luminosity curve and without my 1964 distinction between the Type I and Type II red-green defects; no references to the actual trends). XXIV : Secundary dyschromatopsia, Clinical aspects (very numerous personnal data, those concerning ametropia having already been published in french in Ann. Oculist. Paris 1977; the used methods of examination are gross estimation of hue discrimination thresholds in three colors, Rayleigh's match and conventional colour perimetry). XXV : Chromatic adisparopia (= temporary impairment of color discrimination in prolonged observation - indeed an important symptom of acquired defects!). XXVI : Color vision in the different professionnal activities (prin-

cipally from the legal point of view). XXVII. Therapeutic aspects in dyschromatopsia (no reference to the X-chrom lens). XXIX. Notions of photometry (good ones, but no references to colorimetry nor to colour atlasses). Bibliography (more older than newer references, with a tremendous amount of typographical errors). French and english summaries (each 2 pages, the french one is better). Alphabetic index. Table of contents. - Guy Verriest.

ANNOUNCEMENTS

SITE OF THE FIFTH INTERNATIONAL IRGCVD SYMPOSIUM

Our general assembly in Parma decided that the next (fifth) international symposium of the IRGCVD should be held in Vancouver (Canada) in end june 1979.

From 27 september 1977 I sent the usual instructions for the local organizer, but Prof. Lakowski wrote to me on 10th march 1978 that, as three of the five members of his organizing committee resigned and as he did not get enough money to underwrite this venture, the symposium cannot be held in Vancouver. Moreover, hoping that it could be nevertheless held in North America, he contacted Chicago, San Francisco and Waterloo; everybody consulted their heads and appropriate authorities with negative results.

I immediately phoned to Prof. Fletcher in London because this place has been considered in Parma and because some persons planned a meeting on colour vision defects in London in 1979 for the people who could not fly to Vancouver, while the french group had said to me in Parma that 1979 was too early for France. Prof. Fletcher immediately accepted the proposal, which was also agreed by our Directorial Committee and by our Members of Honour, that I contacted by a circular dated 20th march 1978. - Guy Verriest.

ASSOCIATION INTERNATIONALE DE LA COULEUR (AIC)

1. Study Group on Color-order Systems. Following a suggestion made by Dr. Wyszecki at the Troy meeting, Dr. Hunt proposed to set up a Study Group on Color-order Systems. The executive committee asked Prof. Wright to be the chairman of the study group.

2. Judd-AIC-Award 1979. Dr. G. Wyszecki has been chosen by the executive committee to receive the 1979 Judd-AIC Award. The award will be made at the AIC interim meeting on color appearance, August 15/16, 1979, at Tokyo.

VISUAL DEPRIVATION

Rochester (N.Y.), 8th - 10th june 1978

The Center for Visual Science in Rochester announced its Eleventh Symposium entitled "VISUAL DEPRIVATION EFFECTS IN ANIMALS AND THEIR ANALOGS IN HUMAN VISUAL PATHOLOGY". It will be held the Thursday through Saturday period from 8-10 June 1978.

One of the hopes is to foster more meaningful communication between clinical and nonclinical workers dealing with essentially the same process, visual deficiency resulting from an altered visual environment during development. The program includes : Visual Abnormalities Resulting from Ocular Imbalance during Development (Friendly, Le Vay, Sherman, Mitchell, Cynader; Flynn, Blakemore, Hendrickson, Guillery, Fox, Banks), Plasticity of Orientation and Directional Selectivity (Held, Stryker, Coleman, Hirsch, Daw, Freeman), Role of Eye Movements in Visual deprivation (Cogan, Maffei, Gillard-Crowther, Pettigrew, Spear), Effects of Visual Deprivation on Spatial Resolution in Humans and Animals. All attendees are invited to participate in Evening Workshops.

Information : Robert C. EMERSON, Ph.D., Center for Visual Science, ROCHESTER N.Y. 14627, USA.

INTERNATIONAL COMMISSION FOR OPTICS

Madrid, 10th-17th sept. 1978

The 11th meeting of the International Commission for Optics and the associated international conference "Optica hoy y manana" will be held at the Consejo Superior de Investigaciones Cientificas (National Research Council) in Madrid, Spain, from 10 to 17 september 1978. The conference is sponsored by the International Commission for Optics and organized by the spanish national committee, with the collaboration of the Instituto de Optica "Daza de Valdes" and the Sociedad Espanola de Optica.

The Conference will consist of a number of scientific sessions, covering current developments on vision, image formation and processing, and optical physics. Sessions will include invited and contributed papers.

The following scientists have accepted the invitation of the Organizing Committee to be invited speakers : M. Ikeda, K. Hamdorf (The relationship between visual pigments and receptors sensitivity), K.H. Ruddock (Functional mechanisms serving pattern recognition by the human visual system), H.H. Barret (Three-dimensional radiographic imaging), J.W. Goodman (Some new methods for the use of optics in processing electronic image data), L.P. Jaroslavski (Some

topics of digital image processing), S. Lowenthal (Some trends in optical image processing), W.A. Gambling (Recent advances in optical fibers communications), T.W. Hänsch (Tunable lasers and high resolution spectroscopy), C. Imbert, L. Mandel (Photon correlations and anticorrelations).

The working language of the conference will be English.

Address all correspondence to : ICO - 11, Sociedad Espanola de Optica, Serrano, 121, Madrid 6, Spain.

INTERNATIONAL EVOKED POTENTIALS SYMPOSIUM

Nottingham (U.K.), 4th-6th sept. 1978

The first day of the symposium will be chiefly devoted to lectures on : Evoked Potentials - An Overview (A.M. Halliday), Measurement of Evoked Potential (L.H. van der Tweel), Auditory Evoked Potentials, Visual Evoked Potentials (H. Spekreijse), Somatosensory and Spinal Evoked Potentials (D.G. Smalle).

The themes of the scientific sessions of the two last days are : Physiological Origins of Evoked Potentials, Measurement and Analysis Techniques, Developmental Changes in Evoked Potentials, Visual Evoked Potentials in Normals, Clinical Applications of Visual Evoked Potentials, Somatosensory Evoked Potentials, Auditory Evoked Potentials in Normals, Clinical Application of Auditory Evoked Potentials - Early Responses, Clinical Applications of Auditory Evoked Potentials - Cortical Responses, CNV and Slow Potentials, Psychologocal Correlates of Evoked Potentials, Drug and Metabolic Effects of Evoked Potentials, Clinical Applications of Evoked Potentials - a Multimodal Approach.

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COLOUR APPEARANCE

Tokyo, 15th-16th august 1979

The Color Science Association of Japan will be the host for the AIC Midterm Symposium on Color Appearance to be held in Tokyo, August 15-16, 1979, just prior to the CIE 19th Session Kyoto '79.

The Symposium is planned in order to search a possible solution or solutions for the demand through presentations of papers and discussions on the main theme as well as on some subthemes such as Color Difference, Color Adaptation,

Color Space, Color Atlas, and Color Signal. The Symposium consists of three scientific sessions of three hours each. In each session three or four persons will present survey lectures or talk about the recent developments in the field of the selected topics and the remaining time will be open to all participants for free discussions. Preprints and proceedings will not be published.

All enquiries and correspondence should be addressed to : Mr. Akira KODAMA (Secretary of Color Science Association of Japan), c/o Japan Color Research Institute, 1-19 Nishi-Azabu 3 chome, Minato-ku, TOKYO 106, Japan.