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PUBLICATIONS COMMITTEE: 1st Row, Chris Burton, guest, Ed Cairns, Paula Alessi. 2nd Row, Tom Webber, Mary Ellen Zuyus, Harry K. Hammond III

PUBLICATIONS COMMITTEE RECONSTITUTED

The editor of this newsletter is extremely pleased to announce the reconstitution of the Publications Committee. The Committee members are: Paula Alessi, Edward L. Cairns, Harry Hammond, III, Raymond Spilman, Thomas G. Webber and Mary Ellen Zuyus, Chairman. The committee is committed to providing material and support to the newsletter. An avid reader will have noted that the committee members have already been busy. Paula Alessi contributed a splendid report of the Williamsburg Conference in the last issue. Edward Cairns begins a series of articles on member bodies in this issue and Harry K. Hammond, III reports on a recent color meeting. In addition, Thomas G. Webber initiates a column on book reviews.

The Publications Committee held an organizational meeting in Detroit at the Annual Meeting at my invitation. Chris Burton attended as a guest and interested contributor.

Mary Ellen Zuyus

ELECTION RESULTS

The ISCC is pleased to announce the results of the last election and to thank the retiring officers and directors for their years of service. Retiring directors include Mr. Warren Reese, Ms. Barbara Schirmeister and Dr. Thomas G. Webber. Mr. Louis A. Graham replaces the incumbent Dr. William D. Schaeffer as Past President.

Joyce S. Davenport has been elected to the office of President. Joyce is Supervisor, Color Development, Color Research at De Soto, Inc. She has an extensive background in color science in the plastics and coating industries, and has lectured in business and industry. Miss Davenport served as President-Elect of the ISCC, Chairman of the Project Committees, as Co-Chairman of Subcommittee 25-P, and as a member of the FSCT delegation. In addition, she has served on the Board of Directors, as the Member-Body Liaison and as Chairman of the Color Marketing Group delegation. Her activities include serving on the CMB Board of Directors as Treasurer and as Chairman of Technical Direction. She attended the University of Nottingham, majoring in Chemistry. Further study in interior design was completed.

The position of President-Elect will be filled by Allan B. J. Rodrigues. Dr. Rodrigues has been an active participant of the ISCC for the past twelve years. He currently serves as a Project Committee Coordinator. He is also co-chairman of the Project Committee 27, Indices of Metamerism. He is a former Director of the ISCC and was program co-chairman for the Golden Jubilee Anniversary Meeting in 1981 as well as general chairman of the 1984 Annual Meeting.

Dr. Rodrigues is a Research Associate in the Finishes and Fabricated Products Department of E. I. DuPont de Nemours and Company. He received the B.Sc. degree in Chemistry from the University of Bombay and earned a Ph.D. in Chemical Engineering from the University of Notre Dame in 1969. He then joined DuPont at their Experimental Station near Wilmington and held a position at Marshall Laboratory in Philadelphia before moving to their R&D Laboratory in Troy, Michigan. He is with the Color Operations Group, responsible for support of their instrumental color operations. His research has covered all phases of color paint manufacturing, applying color science, instrumentation and computers to color styling, formulation and production shading. He has lectured here and abroad and published papers on color science and its application to instrumental color systems. Through his work on the ISCC committee on Indices of Metamerism, he has co-authored papers, surveys and lectures on Metamerism. In addition to the ISCC, he is a member of ASTM and of the Detroit Colour Council.

His goals are to implement the recommendations of the July 1981 ISCC Long-Range Planning Conference in which he participated. In particular, he would emphasize the strengthening of the Project Committees and the development of the future leadership of the ISCC.

Therese R. Commerford was re-elected to the position of Secretary. She is Chief, Countersurveillance Section of the Materials Research and Engineering Division, Individual Protection Laboratory, at the US Army Natick R&D Center in Natick, Massachusetts. Prior to joining Natick, she spent many years at the Derby Co., Inc. as Supervisor of their Color Measurement Laboratory.

Miss Commerford earned a B.S. degree in Chemistry from Lowell Technological Institute (now, University of Lowell). She has authored or coauthored several papers on color, and has presented papers and lectured on this subject at symposiums and workshops sponsored by AATCC and Clemson University.

Miss Commerford has been Secretary of the ISCC since 1982. She served as a Director from 1977 to 1980, as a member of the 1981 Long-Range Planning Committee of the ISCC, and as a former Chairman of the AATCC delegation to ISCC. Miss Commerford has just completed a 3 year term as a Vice-President of AATCC. She has served as an AATCC National Councilor, as chairman of AATCC Research Committee RA36, Color Measurement, and as chairman of the AATCC 1979 symposium, "Color Science in the Textile Industry." She is presently serving as secretary of the Natick chapter, Sigma XI.

Edward T. Connor was re-elected to the position of Treasurer. He is Corporate Vice President of Pacific Scientific Company, and President of the Company's Gardner/Neotec Instrument Division in Silver Spring, Maryland. Mr. Connor earned a B.S. degree in Electrical Engineering at the University of Pittsburgh. He spent 10 years with the General Electric Company and was later president of Instrument Development Laboratories, Inc., prior to joining Gardner Laboratory in 1971. During the years, he has served as President and a Director of MCCA, as a Director of CTS, as a Senior member of ISA, and as a member of ISCC—becoming Treasurer in 1980. He is heavily involved in community affairs, also being the President of his Citizens Association, a past President of Rotary Club, a Director of the YMCA and active with United Fund, Little League and the Zoning Board. He and his wife Louise have six children and five grandchildren. For relaxation he enjoys being outdoors—golfing, bicycling along the Potomac, or working in his yard.

NEW BOARD MEMBERS: Danny Rich, Nancy Jo Howard, and, Peter Kaiser

Nancy Jo Howard is joining the Board as a Director. She received her undergraduate degree at Cornell University in Textiles and a M.S. from the University of Connecticut in Materials Science (Polymer Science). She received her Ph.D. from the University of Manchester Institute of Science and Technology in Manchester, England in the Department of Polymer and Fiber Science, and it was at this time that she started to teach Colour Science for the Society of Dyers and Colourists Associates degree program.

Dr. Howard currently holds the position of Assistant Professor of Color Science/Chemistry at the Philadelphia College of Textiles and Science where she has been instrumental in organizing a new undergraduate degree in Color Science.

She is also a member of the Canadian Society for Colour, the Society of Dyers and Colourists, the American Association of Textile Chemists and Colorists (RA36) and is currently serving as the national representative for the AIC Study Group on Colour Education.

Peter K. Kaiser, another new Director, is a Professor in the Department of Psychology, York University, in Ontario, Canada. He has just completed a year as a Visiting Scholar, Center for Human Information Processing, University of California, San Diego. He previously held positions as Lecturer, Department of Psychology, at UCLA (1965), Post-Doctoral Fellow, U. of Rochester (1966-1968) and Research Associate at the Center for Visual Science, U. of Rochester (1968). His research interests include vision research, sensory processes, physiological optics and human factors.

Dr. Kaiser received a B.A. degree in Psychology from Adelphi University in 1960. He earned both a M.A. and a Ph.D. degree in Psychology from the University of California, Los Angeles, in 1963 and 1966 respectively.

Dr. Kaiser is a Fellow of the Optical Society of America, and a member of the Association for Research in Vision and Opthalmology, ISCC and the Canadian Society for Color. Among his many activities, he is a member of the OSA delegation to the ISCC, a member of the Canadian National Committee to the CIE, and President of the Canadian Society for Color. Dr. Kaiser has authored or coauthored over 40 papers.

Danny C. Rich is the final new Director elected to the Board. He attended the University of Idaho and received the B.S. degree in Physics in 1973. His graduate career began at Virginia Polytechnic Institute and State University in Blacksburg, VA. He worked under S.P. Almeida in classical light scattering and particle sizing. While at VPI he spent a summer as an intern in the Sherwin-Williams Research Center studying particle size analysis of latex pigments. After finishing his Masters degree in Physics from VPI, he transferred to Rensselaer Polytechnic Institute in Troy, New York, to pursue a Ph.D. degree under Dr. F. W. Billmeyer, Jr., where he studied the measurement and perception of color. His dissertation dealt with the perception of moderate color differences in surface color space. After graduation, he accepted a position with the Sherwin-Williams Coatings Research and Development Center in Chicago, IL where he is group leader for Color Research, Instrument Development, and Computing.

NEWS OF MEMBERS

Application for Individual Membership Approved at Board of Directors Meeting April 7, 1984

Mr. Wayne B. Barry
c/o Joann Tomaczewski
6150 W. Michigan
Lansing, Michigan 48917

Mr. Barry is a teacher, and conducts research. His connections with color problems are in the areas of psychology and physiology. He is particularly interested in the effects of color in the environment on physical and psychological health.

Mr. Wayne A. Fisher
4712 Commons Drive, #203
Annandale, Virginia 22003

Mr. Fisher works for the U.S. Coast Guard, where he is involved in color films and paints. His present color problems are in the selection of the proper colors for use as aids-to-navigation. His particular interests are how to specify and measure color for use by the Coast Guard.

Mr. Richard D. Juday
11306 Sageway Drive
Houston, Texas 77089

Mr. Juday's work relates to information display, specifically in the color image display of numerical imagery. His particular interests include color metrics, modelling the colorimetry of various color display devices (CRT, dot-matrix, photographic film, halftone printing).

Ms. Mary C. Mulry
Kellogg Company
235 Porter St.
Battle Creek, Michigan 49016

Ms. Mulry's work involves control and research in food products. Her present color problems are concerned with objective measurements of raw material, in-process material and finished food; particularly appearance and texture measurement. Her particular interests are the control of color to improve product quality. She is a member of IFT.

Mr. Elly Rosen
1404 East 13th Street
Brooklyn, New York 11230

Mr. Rosen's work is in gemstones and precious metals, where he performs service work in teaching, grading, research and matching. His connections with color problems have been through trade experience, seminars, conferences, and text study.

Mr. Ronald A. Schuchard
1111 Bonnie Brae
River Forest, Illinois 60305

Mr. Schuchard's work involves research and education in CRT technology. Present color problems are dissertation work on color imaging in medical imaging techniques using CRT (not film). Particular interests are color vision and colorimetry.

NEWS OF MEMBER BODIES

Detroit Colour Council

The first 1984 meeting drew an all-time record 275 people to hear James Abell of General Motors discuss the G.M. approach to color measurement for quality control of exterior body parts. The G.M. program will utilize CIELAB color space and set tolerances, different for each color, in terms of Delta L*, a*, b*. Measuring instrument geometry is to be (45,0). A great many issues were discussed, including the care necessary to maintain good standards, and Mr. Abell expressed the desire to improve on the current system of purely visual analysis.

The DCC was delighted to play a key role in staging the annual ISCC meeting in Detroit. We are also proud to become the newest member body of ISCC after several years of sustaining member status.

Bill Longley

NAPIM

This article initiates a series by Ed Cairns describing ISCC member-bodies.

NAPIM is the acronym for National Association of Printing Ink Manufacturers. The Association has been in continuous existence since 1914, and its objectives are to deal with intra-industry management problems and cooperate in promoting any proper and lawful activities to conduct the printing ink industry efficiently and economically. Active membership is open to any company in the USA or its territories that is engaged in commercial manufacture and sale of printing inks, while associate members are those engaged in manufacturing printing inks for their internal use. At last count, there were 77 companies classified as active members, and there were 36 classed as technical associate members. International affiliate associations exist in Australia, Canada, Japan, India, and Great Britain; and, while not formally affiliated with NAPIM, local printing ink associations are active in Atlanta, Chicago, Cleveland, Los Angeles, New England, New York, and Philadelphia.

Each active member company has one vote which is embodied in an individual assigned as official representative. From these individuals, the present five officers and sixteen directors are elected. Technical associate companies do not vote, but they assign two individuals as management and technical representatives respectively, many of whom serve on about 25 appointed committees which help the officers and directors carry out the aims and objectives of the Association.

NAPIM maintains a full-time executive staff in Harrison, New York. James Renson is Executive Director, and Paul Volpe is Technical Coordinator. A regular journal is published: *The American Ink Maker;* and Francine Del Vescovo is Editor. To round out its activities, NAPIM maintains a technical institute at Lehigh University's Sinclair Lab with Jacqueline Fetsko as Technical Administrator.

This association's interest in color is ingrained in all its various activities, but perhaps those of the Technical Education Group, with D. Carlick as Advisory Officer, has the greatest concentration of color interests, consisting of the following committees: Color Book Technical with G. Lindquist as Chair-

man; Color Standards (includes the ISCC delegation) with A. DiBernardo as Chairman; Conference and Symposium with R. Savageau as Chairman; and Training and Education with R. Bassemir as Chairman.

The ISCC feels proud and honored to number this distinguished association as one of its member bodies.

Ed Cairns

SID PAPERS

There are many technical papers concerning color display, printing and perception which were presented at the 1983 SID Symposium held in Philadelphia in May and at the Japan Display '83 in October in Kobe. The papers are listed below. Anyone who is interested in these works, please feel free to contact the SID office and/or the individual authors.

SID Symposium:

1. *Anti-Halo Coatings for CRT Faceplates*–J. Rancourt, OCLI
2. *Multilayer Coatings for CRT Panels*–S. Saulsbury et al., OCLI
3. *Horizontal MTF Analysis for Color CRTs*–A. Kojima, Sony
4. *A High Brightness Shadow-Mask Color CRT for Cockpit Displays*–R. C. Robinder, et al., Tectronix
5. *A Beam-Index Color Display System*–K. Ando, et al., Hitachi
6. *High Resolution Full-Color Printer by a Microdot Ink-Jet Printing Method*–T. Yamada, et al., Hitachi
7. *High Resolution Color Ink Jet Printer*–J. Maeda, et al., Sanyo
8. *Two-Color Thin-Film Electroluminescence with Spatially-Selective Activator Doping*–A. H. Kitai, et al., Cornell
9. *Brightness and Color Contrast of Information Displays*–G. Murch, et al., Tektronix
10. *Color Contrast Effects on Visual Performance*–T. M. Lippert, et al., VPI & State University
11. *Simulator Evaluation of Color in Pictorial Fight Displays*–T. C. Way, et al., Boeing and USAF

Japan Display '83

1. *A High Resolution Color Display with Autoconvergence*–D. Denham, et al., Tektronix
2. *Color Guided-Beam Flat Panel Display*–T. L. Credelle, et al., RCA
3. *A Two-Color Electrochromic System Using InN Thin Films*–O. Takai, U. of Tokyo
4. *New Color Switching Electrochromic Display Using Organic Redox Couple*–T. Ueno, et al., NEC
5. *Two Color Vacuum Fluorescent Image Panel*–M. Uchiyama, et al., ISE Electronics
6. *New Non-Glare Coating for Color Display Tubes*–T. Ishii, et al., Mitsubishi
7. *Pocketable Color Display*–T. Kitani, et al., Matsushita
8. *Compact Color Image Processor for Electronic Still Camera*–S. Kageyama, et al.
9. *A Method of Color Image Display*–H. Hara, et al.

10a. *Color LCDs: Colorimetric and Ergonomic Evaluation and Optimization*–S. Kobayashi, Tohoku Univ.

10b. *Color LCDs: Technological Developments*–T. Uchida, Tohoku Univ.

11. *Multicolor Graphic LCD with Tri-Colored Layers Formed by Electrodeposition*–M. Suginoya, et al., Seikosha
12. *A TFT-Addressed Liquid Crystal Color Display*–M. Sugata, et al., Canon
13. *A-Si TFT Active-Matrix Full Color LC TV*–M. Yamano, et al., Sanyo and Sanritsu
14. *Large-Size Multi-Color LED Flat Panel Display*–O. Ichikawa, et al., Toshiba
15. *Multi-Color Flat Luminous FIP with Internal Color Filter*–Y. Takasaki, et al., NEC
16. *Advances in Giant Screen Color Video Displays*–K. Kurahashi, Mitsubishi
17. *Giant Scale New Color Display System Using CHD (Colored High Brightness Discharge) Tubes*–T. Kaneko, et al., Toshiba
18. *A Large Screen Color Display Using an Array of Liquid Crystal Display Modules*–O. Myodo, et al., Mitsubishi
19. *65-Inch Refractive Lens Type Color Projection Display for HD-TV*–T. Kubo, et al., NHK and Hitachi
20. *High Efficacy Townsend Discharge Memory Panel for Color TV Display*–S. Mikoshiba, et al., Hitachi
21. *Color TV Display with AC-PDP*–M. Yokozawa, et al., NHK
22. *Tunable Color EL Device*–Y. Oishi, et al.
23. *A Poster-Size Color Ink Jet Printing System*–H. Kotera, et al., Matshuhita and Fuji Photo
24. *High Quality Ink Jet Printing*–M. Tsuzuki, et al., NEC
25. *A Novel Triniscope-Type Color Hard-Copy Printer for TV Pictures*–S. Ohno, et al., Fuji Photo
26. *The Development of Bicolor Multistylus Electrostatic Printing Apparatus*–K. Tomura, et al., Mitsubishi

ACADEMIC COLOR HARMONY

Let me answer Charles W. Fletcher's query about the origin of conventional color harmonies based on combinations of analogous hues, complements, split-complements and triads (ISCC News, January-February, 1984).

Having long studied the history of color in painting (I have done a book with this title) I am able to offer a fairly comprehensive answer.

In a broad sense, perhaps Leonardo da Vinci could be given first credit. In his Treatise on Painting (ca 1500 A.D.) he wrote "Of different colors equally perfect, that will appear most excellent which is seen near its direct contrary: a pale color against red; a black upon white; . . . blue near yellow; green near red: because each color is more distinctly seen, when opposed to its contrary, than to any other similar to it."

Ever since, and with very few exceptions, artists have declared the beauty of opposites or complements.

As the years went on (after Newton) J. C. Le Blon around 1720 was one of the earliest to recognize the primary nature of red-yellow-blue in pigment combinations. He was credited with

being the first to produce full-color mezzotint prints with this combination of pigments.

The red-yellow-blue theory soon became the preference of color theorists. The early color solid of Tobias Mayer (1745) used red-yellow-blue, so did Lambert's Pyramid (1772). Around 1766 Moets Harris developed and illustrated, in color, one of the first of all red-yellow-blue color circles. This helped to set a fashion for these primaries and was known and followed by the English painter Turner among others.

Goethe around 1790 visualized a red-yellow-blue circle. He wrote extensively on color harmony. "Yellow demands Red-Blue, Blue demands Red-Yellow, Red demands Green." He set further what he considered to be good and bad color combinations. He made this curious statement. "The juxtaposition of yellow and green has always something ordinary, but in a cheerful sense; blue and green, on the other hand, is ordinary in a repulsive sense. Our good forefathers called these last fool's colors."

Then in 1830 the famous Scottish scientist, Sir David Brewster, championed (illogically) the red-yellow-blue theory of primary colors. His work became so renowned that red-yellow-blue combination became known as the Brewsterian Theory for generations after.

However, the harmonious principles of adjacents, complements, split-complements, triads traces directly to one of the greatest books on color of all times, The Principles of Harmony and Contrast of Colors by M. E. Chevreul, 1839. In this master work, Chevreul set forth a series of Propositions (based on red-yellow-blue) in which he influenced color harmony theory in art education ever since. There was "scintillation" in combinations of analogous hues, and "In the Harmony of Contrast the complementary assortment is superior to every other."

In 1845, George Field, a prominent English writer on color, chose red-yellow-blue. So have men like Charles Blanc, Ruskin, Americans like Denman Ross, Arthur Pope, Walter Sargent, and painters like Kandinsky, Klee, Itten and scores of others.

In the academic world, in America, the principles of adjacents, complements, split-complements, triads were spread throughout the American education system by men such as Milton Bradley (ca 1895) and Louis Prang (ca 1893). Prang in particular wrote books on "Color Instruction" and founded a company that produced books, crayons, colorants, all adjusted to the red-yellow-blue concept. Bonnie E. Snow and Hugo B. Froehlich, in 1920, wrote "The Theory and Practice of Color" which trained art teachers throughout America by the thousands to the Chevreul "propositions." Years ago school art materials and papers were produced in Munsell colors but failed to endure. However, the Munsell System itself remains as the foremost method of color designation. But colorants in red-yellow-blue still are basic in art materials. The popular Crayolas respect them to this day.

It should be appreciated that the conventional principles that concern Mr. Fletcher require a red-yellow-blue color circle to be effective. The reason for this can be simply stated. Artists working with pigments know the primary nature of red-yellow-blue and have good reason to cling to them. If the red-yellow-blue circle is divided in half, warm colors occupy approximately the same area as cool colors. With Munsell, over half the circle (based on red-yellow-green-blue-purple) favors cool hues. So does Ostwald (red-yellow-green-blue). Artists by nature prefer warm to cool colors, so the red-yellow-blue circle continues to prevail.

On the more technical side, J. P. Guilford in an article for the Journal of Experimental Psychology (June, 1934) noted what many scientifically-minded authorities agree upon: "There is some evidence that either very small or very large differences in hue give more pleasing results than do medium differences." This means adjacents and complements. Here is an example of scientists confirming the views of Chevreul and most artists.

Incidentally, red-yellow-blue are subtractive (pigment) primaries and combine to form orange-green-violet secondaries. Colors like red-orange, yellow-green, and the like are *intermediate* colors. Tertiary colors, known to artists, are formed by mixing orange and violet for *russet,* orange and green for *olive,* and green and violet for *slate.*

Maybe I am old fashioned, but for me the red-yellow-blue theory is best and most charming of all for esthetic expression. It has by no means been displaced in art and color education.

Faber Birren

NEW BOOKS

Color: Essence and Logic by Rolf G. Kuehni, Van Nostrand Reinhold Co., New York 1983, 138 pp. Price $14.95.

A perceptive view of color by a member of the board of directors of the Council. Topics include sources of color, human vision, color order systems, dyes and pigments, reproduction, and history. The book reflects years of study and contemplation; it is a welcome and valuable addition to our literature.

The Color Science of Dyes and Pigments by K. McLaren, Adam Hilger Ltd., Bristol 1983, 183 pp. US Distributor: Heyden & Son Inc., 247 South 41st St., Philadelphia, PA 19104. Price $34.00.

The author of this book spent many years with ICI coloring textiles. He observed and participated in the changes that have taken place in color. Topics covered include a history of colorants, the mechanism of light absorption and emission, color vision, color order systems, measuring instruments, difference calculations, and colorant formulations. The discussions show a thorough mastery of the subjects as well as an understanding tolerance of the controversies that have arisen from time to time. There are many references for further study.

Thomas G. Webber

Color Vision by Leo M. Hurvich, Sinauer, Sunderland, Mass., 1981, 336 pp., $37.50 cloth, $25.00 paper.

Why is the sky blue? Although there is no simple answer, Hurvich's *Color Vision* goes a long way toward helping the reader understand the complex answers to such deceptively simple questions about color perception.

A Place in History

Color Vision represents a milestone in the history of color vision theory begun in the late 19th century by Ewald Hering. What makes this book special is the author's unique tutorial approach. He presents the opponent-processes theory and its relation to a three-cone receptor system, and he does this with clarity and simplicity and without sacrificing rigor.

In the latter part of the 19th centiry, Helmholtz and Hering engaged in a scientific feud regarding the appropriate way to consider the human color vision mechanisms. Helmholtz explained color vision by assuming three sets of receptors in the retina, each sensitive to red, green, and blue light. Hering, on the other hand, agreed that there were three mechanisms, but argued that they were three opponent mechanisms: red/green, yellow/blue, and black/white. Hering did not object to Helmholtz's receptor response functions, but rather to his concept of the neural coding mechanisms. Helmholtz objected to both Hering's pairing of three variables and to the fact that in Hering's theory negative as well as positive responses were required (Hurvich, 1969). The influence of this debate was evidenced in Abney's (1895) book, *Color Vision,* in which he not only described the Young–Helmholtz trichromatic theory and Hering's opponent-processes theory, but also devoted considerable space to a section called "Young v. Hering." In an attempt to resolve this conflict, Abney proposed a "modified Young theory." There is little doubt that trichromacy was the favored view in the 19th century and continued to hold reign well into the 20th century (Hurvich, 1969).

Hurvich (1969) beautifully described Hering's problems vis-á-vis the scientific community. Indeed, it was not until the mid 1950s that Hering's opponent-processes theory was openly acknowledged as acceptable. This change of heart by the scientific community can be attributed to the elegant psychophysical work of Hurvich and Jameson and to some timely electrophysiological recordings from the fish retina (Svaetichin, 1956).

In 1955 Jameson and Hurvich published the first of a series of papers that was to change completely our view of color vision mechanisms. The 1955 and subsequent papers provided the psychophysical evidence for the "rebirth" of Hering's opponent-processes theory. Hurvich and Jameson (1957) took the results of their hue cancellation experiments and presented the still-accepted two-stage or zone theory of color vision. Stage 1 incorporated three classes of cone photopigments. Stage 2, the neural stage, operated according to the opponent-processes concepts.

Although Hurvich and Jameson were not the first to propose a two-stage model, their success can be attributed in part to fortunate timing. Beginning in 1956, the vision research community began to receive the first electrophysiological data interpretable from an opponent-processes point of view. The initial data came from the retinas of fish and later from monkey lateral geniculate nucleus (LGN) (DeValois, 1960; Svaetichin, 1956). These data, together with Hurvich and Jameson's psychophysical hue cancellation experiments, firmly established the opponent-processes theory of color vision. These original formulations form the basis from which all modern theories developed. The basic tenets remain, and newer versions build on this foundation.

The essence

In the preface of his book, Hurvich points out that he has had numerous requests to recommend a single book that provides a "clear and simple picture of color vision and how it works" (p. vii). He acknowledges that there are excellent books that treat various aspects of color vision, but he has "not found books written from the viewpoint of others that are congenial to" him (p. vii). In *Color Vision* he tries "to present a systematic, comprehensive, scientifically rigorous development of the topic of color vision in the context of a unified, coherent theoretical model—an opponent-process theory of color vision" (p. vii).

Hurvich notes that light "is absorbed by photo chemicals in the receptors at the back of the eye." He then asks, "Is light therefore a photochemical event that occurs in the receptor layer of the eye? Or is it perhaps a neural brain-connection process? Or a physical event?" (p. 13). In a later chapter he explains,

> . . . color is not physical light radiation itself, that it is not something that inheres in objects, having to do exclusively with the chemical makeup of the object, nor is it only the nervous excitation that occurs in the eye and brain of an observer. In our perception of object color all these elements are involved: there is light radiation, which is selectively absorbed and reflected in different ways by objects that differ physically and chemically; when the light rays coming from objects are imaged on the retina, they set off a complex series of neural events that are associated with the visual experience of color. (p. 52)

Then in chapter 10, he explains,

> A basic theme of this book is that there exists a correlation between experienced color and certain patterns of neural activity; changes in neural activity are related to differences in perceived color. The pattern of neural activity may change because various internal physiological changes occur whose origins are unknown, or in response to inappropriate stimuli, or, most commonly, because light rays enter the eye and produce these neural changes.
>
> But since light rays do not act directly on the neural tissue, we need to look at the way light first affects the eyes. (p. 113)

These quotations capture the essence of Hurvich's book. He tries to help the reader understand color vision by explaining many common perceptual experiences via opponent-processes theory. He devotes the first third of the book to the more experiential aspects of color vision, focusing on classification of visual experience, on color experience and the nervous system, on spectral radiation and color appearance, and on chromatic and achromatic response functions. Color mixture is considered from several points of view, including matching hues, complete matches, and the relation of color mixtures to cone photopigments. In the middle of the book, and central to the theme of his text, Hurvich discusses color vision models and receptor-neural linkages. This is where one finds the schematic diagram typical of current zone models of color vision. The

following chapter briefly describes opponent processing and electrophysiology. Succeeding chapters discuss spatial and temporal contrast effects, assimilation effects, adaptation, and defective color vision. He completes the book with discussions on color specification and color reproduction.

Although one cannot cover all topics in a reasonably sized textbook, I would have liked to have seen some attention paid to the important topics of cone photopigment kinetics, heterochromatic photometry, retinal densitometry, and microspectrophotometry. These topics are important because they relate directly to the information fed into the opponent-processes system.

To assist in his explanations of the topics covered, Hurvich makes excellent use of 25 color plates. These plates are used to illustrate a number of conventional concepts such as the color circle, color mixture of light and of pigments, after-images, the visible spectrum, contrast effects, assimilation effects, and color vision tests. He also includes an interesting plate that illustrates natural color camouflage used by the flower mantis. A reproduction of a Braque painting together with the color circle is presented to illustrate the color perception of certain red-green defective observers. A Vasarely painting is used to illustrate the physiological contrast mechanisms of the visual system.

Liberally sprinkled throughout the text are mini-experiments that the reader can perform in order to experience first-hand the phenomena under discussion. Some of these experiments can be easily performed using material within the book; others require readily available materials.

Hurvich believes, as I do, that his "book is unique among color vision texts" (p. vii): This is the only book available that completely explains color vision from the opponent-processes theorist's point of view. Because the book is clearly written and self-contained, understanding it requires little more than a command of the English language, a basic understanding of arithmetic, and a genuinely inquiring mind. Thus, *Color Vision* is suitable as a text in an undergraduate coruse specializing in color vision. In addition, those graduate students and vision scientists who wish to obtain a detailed working knowledge of and facility with opponent-processes modeling will find studying this book the easiest way to do so.

Many readers may be annoyed at the lack of referencing within the text. Hurvich frequently presents information without explicitly indicating the source. The knowledgeable reader can go to the "Background Readings" at the end of each chapter to get an indication of possible references. However, those new to the subject of color vision would not have this advantage. It would be a simple matter for the next edition to utilize the usual referencing system found in this type of text.

The Competition?

There are now two color vision textbooks from which to choose, the alternative being *Human Color Vision* by Boynton (1979). In order to choose between the latter book and Hurvich's, one must take a number of factors into consideration. The approach taken in Hurvich's *Color Vision* is largely theoretical. Boynton explicitly states, "My approach is scientific and theoretical." Hurvich's book is shorter by just over 100 pages and can be easily covered in a one-semester course. The ease with which Hurvich's book can be completed in one semester is facilitated by the consistent story line (the opponent-processes theory), which helps guide the student through the various topics within color vision.

Boynton's book, on the other hand, tends to be more encyclopedic. He attempts to provide the reader with a broader coverage of the various contributions made by color scientists from the time of Newton to present day. Boynton has 1.44 times as many names listed in his "Index of Names" as does Hurvich. He discusses in some detail the work of a number of prominent people either ignored or only briefly noted by Hurvich. These include, Brindley, Crawford, Helmholtz, Kelly, Konig, LeGrand, Rushton, Stiles, Wald, and Wright. These differences result from Boynton's objective to provide a somewhat broader coverage of color vision. Thus, although he deals with opponent processing (albeit not to the extent covered by Hurvich), he gives about equal coverage to trichromacy. There is considerable redundancy in the general topics covered by these two books. Boynton goes into more detail in each of the topics he covers, whereas Hurvich is more tutorial, a feature most undergraduate students will appreciate. Boynton starts his book with a chapter entitled "A Brief History of Color Science," which is useful in providing a historical perspective for the topics that follow.

To summarize the comparison of these two books, I would say that Hurvich's *Color Vision* is preferable for a one-semester undergraduate course. It probably caters better to the needs of the average student majoring in psychology because of its "tutorial" approach. This book also provides the best and most complete account of opponent-processes modeling both from a conceptual and from a quantitative point of view. Boynton's book, on the other hand, could be used in an undergraduate, one-semester course taught by a professor whose aims are ambitious and who expects to teach a select group of students. I clearly would prefer Boynton's book for a graduate course, but would hope that the students would have been exposed previously to Hurvich's book.

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Prof. and Mrs. Dong Tai-Huo

New Journal on Colour, Colorimetry and Optics

A new Chinese-language journal, the *China Journal of Colour, Colorimetry and Optics,* will start publication in the spring of 1984 in the Peoples Republic of China, the ISCC has been informed. The Editor-in-Chief of the new journal, a quarterly, will be Professor Tai-Huo Dong, an individual member of the ISCC and appointed by his country to be official liaison between it and the ISCC. Professor Dong was born in Shanghai, China, in 1916. He graduated from the Henry Lester Institute of Shanghai in 1936, and obtained his M.Sc. degree from London in 1939. From 1942 Prof. Dong assumed the position of professor in the China Universities of Guangxi, Wuhan, Yingshi, and Zhejiang, in succession. At his present position in Zhejiang, his duties include lecturing and researching in precision mechanics, metrology, optical engineering, colorimetry and physiologic optics. He has also devoted himself to the study of visual science in recent years. Prof. Dong is one of the founders of the Optical Instruments Speciality of Zhejiang University of China, in 1952, and this speciality was expanded into a Department in 1959. Prof. Dong has written several Chinese books and papers on scientific and technical subjects. Among his social and academic activities, Prof. Dong is Academic Advisor, Bureau of Instrumentation Industry, Ministry of Machine Building of the Peoples Republic of China; Director, China Instrumentation Society (CIS); Chairman, Audio-Visual Engineering Commission of CIS; Co-chairman, Mechanical Parametric Instrumentation Commission of CIS; Director Colour Optics Commission of the Optical Society of China; Editor, China Journal of Instrumentation; Editor-in-Chief of the new China Journal of Colour, Colorimetry and Optics; and a member of several societies.

Prof. Dong kindly invited me to provide a manuscript for publication in the inaugural issue of the new journal. This honor was made possible by the presence in my laboratory of Mr. Yuan Chen, studying with me as a Guest Worker from the People's Republic of China, who could translate the article into his own language. Mr. Chen was born in Nanjing, China, and educated in the Physics Department of the Northwestern University in Xian, People's Republic of China. He is presently a Research Associate at the Xian Institute of Optics and Precision Mechanics, Chinese Academy of Sciences. His research interests there have included measurements of colorimetry, photometry and spectrophotometry, the development of a high-speed spectrograph and of a cotton-color and gloss grader, color television colorimetry, metamerism, and pseudo-color principles and applications.

After some consideration, I asked Prof. Dong for the privilege of submitting two articles, one for possible later publication, so that one of them could be coauthored by Mr. Chen. This was agreeable, and the following articles were submitted (I reluctantly refrain from presenting their titles and abstracts in Chinese):

"New Proposals for Calculating CIE Tristimulus Value," by Fred W. Billmeyer, Jr. *Abstract:* A Working Group of USTC-1.3, Colorimetry, has recommended that in the revised Publication CIE No. 15.2, the integrations leading to CIE tristimulus values be carried out by summation, and that for most colorimetric purposes summation at 5-nm wavelength intervals over the wavelength range 380-780 nm suffices. Recognizing that measured data fulfilling these requirements are not usually available, recommendations were also made concerning abridgement, interpolation, extrapolation, truncation, calculation of weighting factors, and numerical methods. This paper describes and illustrates the proposed recommendations. If adopted, they will for the first time provide clear and complete guidelines for uniform calculation of CIE tristimulus values.

This paper was presented at the 20th CIE Congress, Amsterdam. The Chinese manuscript is expanded over the version printed in Vol. 1, Papers, of the Proceedings of the Congress. A still more complete version describing the work is in preparation for publication in *Color Research and Application* under the title "Methods of Tristimulus Integration."

"Measurement and Calculation of the Spectral Radiance Factors of Fluorescent Samples" by Fred W. Billmeyer, Jr., and Yuan Chen. *Abstract:* When fluorescent samples are measured, it is usually desired to obtain results that correlate with the visual appearance of the samples. Most specifications for fluorescent colors require that the visual appearance is that obtained under standard daylight. It is very difficult to make the necessary measurements with good accuracy. This article describes the quantities that must be measured, the requirements for obtaining correlation with the visual appearance of the samples, and two different approaches, by calculation and by experiment, to achieve this correlation.

This paper consists of two parts. A review of the requirements for the correct measurement of the spectral radiance factors of fluorescent samples is first presented. This part is based on, and contains nothing beyond, several earlier publications[1-7] from this laboratory. The second part describes a new proposal for measuring fluorescent samples in integrating-sphere spectrophotometers using a compensation filter. This

proposal, developed by Yuan Chen, will be the subject of a Color Forum contribution, in English, to be published in Color Research and Application.

We wish the new *China Journal of Colour, Colorimetry and Optics* great success, and hope that it will be possible to obtain English translations of at least the Table of Contents, possibly also abstracts, for publication in *ISCC News.*

Fred W. Billmeyer, Jr.

1. Analysis of the Conventional Reflectance of Fluorescent Samples. Fred W. Billmeyer, Jr., Applied Optics *13,* 1007-1008 (1974).

2. A Comparison of One-Monochromator Methods for Determining the Reflectance of Opaque Fluorescent Samples. David H. Alman, Fred W. Billmeyer, Jr., and Daniel G. Phillips, Proceedings 18th Session CIE (London, 1975), Publication CIE No. 36 (1976), Bureau Central de la CIE, Paris, pp. 237-244.

3. Integrating-Sphere Errors in the Colorimetry of Fluorescent Materials. David H. Alman and Fred W. Billmeyer, Jr., Color Research and Application *1,* 141-145 (1976).

4. New Method for the Colorimetric Measurement of Opaque Fluorescent Materials. David H. Alman and Fred W. Billmeyer, Jr., Color Research and Application *2,* 19-25 (1977).

5. How to Measure the Color of Fluorescent Plastics. Fred W. Billmeyer, Jr., pp. 3-1 thru 3-14 in Technical Papers, Regional Technical Conference "Control of Color and Appearance," Color and Appearance Div., Soc. Plastics Engineers, Stamford, CT, 1979.

6. Colorimetry of Fluorescent Specimens: A State-of-the-Art Report. Fred W. Billmeyer, Jr., Ph.D. NBS-GCR 79-185, National Bureau of Standards, Washington, D.C. 20234, 1979.

7. Calculation of the Spectral Radiance Factors of Luminescent Samples. Fred W. Billmeyer, Jr. and Tak-Fu Chong, Color Research and Application *5,* 156-168 (1980).

MEETINGS

ISCC 1985 Williamsburg Conference

The theme of the 1985 ISCC Williamsburg Conference (February 11-13, 1985) will be "COLOR: Then and Now." Its main theme will be the history of color in art and science. However, there will also be a number of important lectures describing current knowledge in the areas of color vision, the causes of color, and color science. "Life must be lived forwards, but can only be understood backwards." In that sense it is necessary and desirable to know and understand the ideas and conceptions of past generations, in our specific case on the subject of color. The two co-chairmen, Mark Gottsegen and Rolf G. Kuehni expect to have a program consisting of some 15 papers, involving speakers both local and from overseas. The program will include the following presentations: "Color: Mysticism and Mythology" by Faber Birren; "Modern Color Field Abstraction and the Mural Traditions of Classical Antiquity" by Vincent Bruno, University of Texas at Arlington; "A Painter's View of Color Theory" by Robert Gerhart, University of North Carolina at Greensboro; "Color Vision in 1985" by Dr. Dorothea Jameson, University of Pennsylvania; "The Scientific Aesthetics of Charles Henry" by Rolf G. Kuehni; "Color Vision Research in the 19th Century; Germany between Idealism and Empiricism" by Heinwig Lang, Germany; "The Fifteen Causes of Color" by Kurt Nassau, Bell Laboratories; "Color History: Remembered Highlights" by Miss Dorothy Nickerson; "Roger Bacon: Color in the Middle Ages" by Charles Parkhurst, Williams College Museum of Art; "Newton on the Nature and Rules of Color Mixing" by Alan Shapiro, University of Minnesota.

Contributed papers (for a 30 minute presentation), preferably on historical subjects of color in art and science, are invited. Title and extended abstract should be submitted to one of the two co-chairmen by July 1, 1984:

Mark Gottsegen	Rolf G. Kuehni
Department of Art	Mobay Chemical Corp.
University of North Carolina	PO Drawer 2855 CRS
Greensboro NC 27412	Rock Hill SC 29730

The Publicity Chairman of the Conference is Dr. F. W. Billmeyer, Jr., the Arrangements Chairman Mrs. Bonnie K. Swenholt. The organizers look forward to another informative, interesting, well attended Williamsburg Conference.

Mark Gottsegen
Rolf G. Kuehni

ISCC 1985 Annual Meeting

April of 1985 will be a very exciting month. Be certain to mark your calendars for this one as it is the first time that an annual color meeting has been combined with a major color and instrument symposium. The subject of the combined conference will be "Color: The End User" and it will be held at the Sheraton Station Square Hotel in Pittsburgh.

The ISCC portion of the program will be Sunday, April 14 through Tuesday, April 16. Tuesday afternoon will actually be bridge papers and SCAI will begin on Wednesday morning the 17th and go through Thursday, April 18.

If you have an interest in presenting a paper, please contact:

For SCAI: Jacki Welker, 1228 Resaca Place, Pittsburgh, PA, 15212. For ISCC: Joy Turner Luke, Studio 231, Box 18, Route 1, Sperryville, Virginia 22740.

Report of Meeting of ISCC Board of Directors February 11-12, 1984, Williamsburg, Va.

On the occasion of the 1984 Williamsburg Conference, the Board of Directors of ISCC met to conduct the business of the society. A special session was held on Saturday evening to deal with three specific items, and the more general meeting was continued on Sunday. This report will summarize the principal activities, as a report to the membership.

With a majority of the board present to constitute a quorum, President Lou Graham asked Bonnie Swenholt to present the results of the voting for officers and board members, which were accepted and approved by the board. (These results are presented in a separate news item). The board also approved the recommendation of the MacBeth Award committee that the 1984 award be made to Ruth Johnston Feller. The remainder of the Saturday evening session was devoted to a dis-

cussion of a proposal by Richard Ingalls in his capacity as chairman of the Long Range Planning committee.

The proposal is to initiate a large scale education program in the field of color, by preparing illustrative and instructional materials for distribution to various educational facilities. The most concrete part of Ingalls' proposal was that cooperation of printers be obtained, to donate their excess capacity or press space so that high quality graphic material could be obtained inexpensively. Less well-developed were the concepts of how the educational messages or topics would be selected or prepared, and how these materials would be introduced into educational curricula. Discussion of these two points resulted in a tentative endorsement of Ingalls' continuing to work on his proposal. It was suggested that he form a group that includes persons with educational experience, to develop more concrete ideas of appropriate educational subject matter, and to determine the feasibility of the use by educators of the materials that might be made available from Ingalls' program. The board also concluded that, while Ingalls' proposal was an interesting activity, it in itself did not discharge the responsibility of the Long-Range Planning committee to make recommendations based on the Report of the 1981 Long-Range Planning Conference, printed in the ISCC News as ISCC Technical Report 81-1. Lou Graham appointed a new subcommittee of the long-range planning committee, chaired by Ralph Besnoy with Daan Zwick as member, and Lou Graham and Joyce Davenport as advisors, to deal with that charge.

At the Sunday meeting the board approved the application for membership of twenty-one new individual members. (These members and their interests are reported elsewhere). A recommendation was made to update the membership list, and also the list of project committee members. Some work needs to be done to determine the status of the committees, and of the member-body delegates, before the new membership book can be published.

Treasurer Ed Connor presented the proposed budget. An increase in the amounts budgeted for the office of secretary and of president was recommended. It was felt that the work of the secretary would be expedited by the use of paid help, rather than the less-dependable, donated assistance that has often caused delays in carrying out the function of secretary. The increase in budget for the president's office would allow persons who did not have the support of a large organization for office and travel expenses, to become president. The budget as approved by the Board will result in a deficit of about $1700. While this is in contrast to the surpluses of previous years, it is not alarming, since it reflects higher than normal non-recurring expenses, such as printing bills, that are necessary this year for materials that will be used over a few years. Connor noted that work was needed to collect dues from several of the member-bodies. Other than the report of the Treasurer, there were no reports from the officers of the society.

Fred Billmeyer suggested the need for a bylaw specifying how many votes are needed to make an election valid. He expressed concern about having such a small percentage of the total membership of ISCC voting in elections. While there was no support for a new bylaw, the suggestion was made that a Newsletter item and telephone calling by each member-body chairman might encourage more voters.

A Godlove Award subcommittee had been appointed by Graham, with Milt Pearson as chair, and Gunter Wyszecki and Daan Zwick as members. There was no report from that new subcommittee. Graham is to appoint a new Macbeth Award committee. While it was recommended that there be an ad hoc committee to nominate people for the Service Award, there was no report from the Service Award subcommittee, and no action was taken. The nomination of Kenneth L. Kelly for Honorary Membership was approved.

There was no report available from the Member-Body committee, but Ed Connor described a degree of confusion that exists about which member-bodies among the several that are delinquent in payment of dues, are still viable as members, and who are their delegates. The Board asked that the Member-Body committee bring the member-body list up to date. (This request was also made at the previous Board meeting in November, 1983). The board passed a motion that the status of member-bodies now in arrears be resolved by the next board meeting in April, and that organizations in arrears at that time be dropped from the ISCC.

For the Arrangements committee Bonnie Swenholt reported that there was still no site selected for meetings beyond 1985 (Pittsburg). One proposed site in Princeton was too expensive, but others will be investigated. Boston and Chicago were also suggested. Bonnie will prepare a checklist for meeting coordinators, to present at the April board meeting. Allen Rodrigues reported that his plans for the Detroit meeting are well completed, forms are ready to mail, and no problems are foreseen. Ralph Besnoy has agreed to handle the poster session. Allen was complimented by the board for his work.

For the 1985 Williamsburg Conference, on historical aspects of color, Rolf Kueni has a committee of Treva Pamer, Romesh Kumar, Charles Sturm, and Nancy Jo Howard. There was some discussion of changing the scope of that conference to increase its support by industrial concerns.

Joyce Davenport reported that there are some problems in organization of some of the Projects Committees. She is seeking some new chairmen, either to replace some resigned chairs, or to revitalize some inactive ones.

In the discussion on publications and publicity, a need for material for the Newsletter was brought out. The board recommended that the Editor seek such material more aggressively, and that the Publications Committee be strengthened and used. Fred Billmeyer stated that he has completed all of his assignments, but will do the publicity for the 1985 Williamsburg Conference before resigning his post as chair of the Publicity Committee. He will continue his duties as Editor of Color Research and Application after his retirement from Rensselaer Polytechnic Institute. There is presently a good backlog of papers, and Wiley has instituted a publicity campaign for the journal.

Daan Zwick

Successful ISCC April Workshops

Three popular workshops were held during the April ISCC Annual Meeting in Detroit. The conference room was filled for each one and for some sessions people were standing around the back of the room. It is obvious that additional space will have to be provided for the workshops next year.

The gloss workshop was arranged by Fred W. Billmeyer, Jr., and included presentations by John S. Christie, Harry K. Hammond, III and Francis X. D. O'Donnell. Gloss measuring instruments and specimens exhibiting different degrees of gloss were provided and the audience was invited to participate.

Jack Christie from Hunter Associates Laboratory covered the history and problems inherent in gloss measurement. He outlined recent approaches to measuring the surface characteristics which together with color form the basis of our perception of the surface of an object; i.e., specular reflection, diffuse reflection, haze, distinctness of image and luster. He diagrammed the angles important to measuring these surface reflections and compared corresponding aspects of opaque and transparent surfaces, i.e., distinctness of image, absence of gloss, contrast gloss and surface uniformity of an opaque object with clarity, absence of haze, translucency and film uniformity in a transparent surface. Richard Hunter, who founded the company, pioneered in this field and continues to contribute, along with Jack, to increasing understanding of what the important variables are and how to measure them.

Harry Hammond of Pacific Scientific Company who is active on ASTM Subcommittees E-12 on Appearance of Materials and D-1 on Paint and Related Coatings, described the test methods which relate to gloss measurement beginning with ASTM D523.

Frank O'Donnell has been studying those aspects of gloss evaluation which are the most difficult to define for his Ph.D. candidacy work at The Rensselaer Color Measurement Laboratory. He began his presentation by describing the four different unidimensional scales: nominal, ordinal, integral and ratio. He described the experimental methods by which observer responses can be used to define perceptual qualities such as those inherent in surface reflection. These included integral scales, category scaling, paired comparison, rank order, interval judgments, magnitude estimates and finally, the advantages of multidimensional scaling.

Most of his work was done with integral judgments with a large set of gray samples. He extended this procedure to a set including white, gray and black samples. He verified, among other points, that people can make gloss judgments whether the surface is white, gray or black.

The workshop held by Hugh R. Davidson of Davidson Colleagues was a fine tutorial rather than a hands-on workship. ISCC members from fields which do not use instrumental color measurement had requested a basic description of color measment, in part to understand fellow ISCC members and partly in order to judge where it might prove useful in their own fields. However, in looking around the crowded conference room in Detroit there were about as many color experts present as newcomers.

Hugh gave a clear and interesting description which satisfied both groups. He covered areas where color measurement has been very successful and the areas where problems still exist. The audience was still interested and asking questions when time ran out. He has been asked to continue this discussion, getting beyond the basics, as part of the program next April when the ISCC will meet in Pittsburg.

For the third workshop, Don Miller, representing a new section of Thyssen-Bornemisza, Inc., demonstrated a system for storing on computer disks the enormous amount of information that interior designers and decorators need to have at hand. The wallpapers, furniture, rugs, fabrics and other furnishings are coded by color and can be displayed quickly on a color monitor which also gives prices and in what catalogue the actual samples can be seen.

There are several companies getting ready to market similar programs. Don explained the advantages of such systems, what the problems are and approximately what they may cost.

Joy Turner Luke

Coloring of Plastics, Now and in The Future

The Delaware Valley Section of the Society of Plastic Engineers and the Color and Appearance Division will sponsor a color conference on October 2-3, 1984 at the Hilton Inn, Northeast Philadelphia, Trevose, PA. A sampling of the papers to be presented includes the following: Coloring of Plastic & the Dye Industry, Harry Kartoz, Color Chem, Inc.; How Lighting Upsets Your Color, Dr. Bill Thornton, Prime Color Inc.; The Future of Color Communication, Ralph Stanziola, Applied Color Systems; The Future Role of the Color Compounder, Bob Swain, Chroma Corporation; and Inorganic Pigments–New Applications, Dale Taylor, SCM Corporation.

For more information contact Bill Cunningham, Color Consultant, Harwick Chemical Corporation, 88 Lakedale Drive, Trenton, New Jersey 08688, 609-599-2277.

Report on "The World of Color"

The preliminary program for this conference is reported in ISCC NEWS No. 288 (Jan-Feb 1984). The conference and exhibition was held as planned at the University of Manchester, Institute of Science and Technology, April 5-6, 1984. Your reporter was not present, but conversations with Calvin McCamy, one of the conference speakers, made this report possible.

Thirteen papers were presented at the conference as originally announced, however, a paper on "The Perception of Colour Displays" by Dr. J. Laycock, Royal Aircraft Establishment, Farnborough, was added, and the paper, "Colour–The Physicists View," by Dr. A. W. S. Tarrant, University of Surrey was not presented.

The conference was nicely planned and executed. The location and the weather were both good. The exhibition of color measuring instruments and related systems and services was held off to one side in the same building. New to the US participant and this reporter was the Zinten Colourtronic, an instrument for color-code reading and automatic sorting applications. It is made by Zinten Scientific, Surrey, England. The Shirley Institute showed examples of the information it sup-

plies to the Textile Industry as well as brochures describing its well equipped laboratory designed to provide technical service to the Textile Industry.

The conference was opened by Chris Hawkyard at mid morning on Thursday, April 5, with the introduction of Dr. James Bell, Emeritus Professor of Architecture at the University, who chaired the morning session.

Dr. Robert Hunt, The City University, London, presented the first paper, "Perceptual Colour Attributes." He has spoken on this subject several times over the years, but he does it in a delightful manner so that it is always enjoyable to listen to him.

Professor W. Spillman, Department of Architecture, Winterthur Polytechnic, Switzerland, followed with his paper "Colour and Environmental Design. He too has an interesting story to tell and an interesting manner of telling it.

The chairman for the afternoon session was Keith McLaren of ICI, Ltd.

The first paper, "The Natural Color System," was presented by Mr. A. Svedmyr of the Scandinavian Colour Institute, Stockholm. This color-order system and its development over the past 15 years is quite interesting and we should all take time to understand the basis for it.

The paper on the "Munsell System" was given by Keith McLaren instead of D. G. Chamberlin as originally announced. McLaren included some of his own material, especially illustrations.

The chairman for the second afternoon session was B. L. Park, Lecturer in Design, Department of Textiles at the University.

The paper, "The Visual Color System," was given by J. T. DeGroff, Applied Color Systems, Princeton, USA. He described the development of continuously adjustable Maxwell disks that can be adjusted while spinning. This is now a commercial product of Applied Color Systems.

Mr. A. Roylance, Weston Hyde Products, Manchester, presented the paper "Colour and the Designer." He reviewed the conditions that influence the designer of color for different parts of the house. Wallpaper designs in the UK are much more conservative than in USA.

In the evening there was a pleasant reception and dinner. The Guest Speaker was Dr. Maurice Tordoff, Secretary of the Society of Dyers and Colourists. He spoke about the history of the Society. It is celebrating its 100th Anniversary this year.

Dr. Robert Hunt was Chairman of the Friday morning session.

The first paper, "Colorimeters or Spectrophotometers?," by Dr. J. Ferguson of Optometric, Leeds, was a classical comparison of the colorimeter versus the spectrophotometer. There were no surprises and no comparisons of modern instruments.

"The New Ceramic Standards," by Mr. Frank Malkin of the British Ceramic Research Association, Stoke-on-Trent discussed the old and new sets of standards and the differences between them, pointed out the improvements in spectral curves and in physical materials.

Dr. J. Laycock, Royal Aircraft Establishment, Farnborough, spoke on "The Perception of Colour in Displays." This paper was brilliantly conceived and executed. He worked with phosphor displays and went through every part of the colorimetry including adaptation theory and wove it all into his design of displays. He has written many fine computer programs for design of displays as well as colorimetric and adaptative programs.

Calvin McCamy presented a paper "On-Line Colour Measurement," the only paper on the program dealing with on-line measurement. He reviewed the reasons for measuring color in industrial process control and then pointed out the advantages of going on line where applicable, showing how it is done today. He discussed the environmental problems that must be solved for on-line measurement. He told about industrial processes where automatic control has been applied such as paper, plastic extrusion, and fiber production.

The afternoon session was chaired by Mr. F. J. Mallon of Marks and Spencer, London.

Three papers were scheduled to be presented in the afternoon:

"Dealing with Special Measurement Problems" by Mr. A. McNichol, Pacific Scientific, Maidenhead.

"Fluorescence Measurement," by Mrs. R. Mckinnon, National Physical Laboratory, Teddington.

"Recent Advances in Colour Difference Quantification," by Mr. K. McLaren, ICS Ltd, Newbury.

Mr. McCamy regretted that travel arrangements made it necessary for him to leave before these papers were presented; so we are unable to give you any first-hand report at this time. The original plan of the conference was to compile and publish the papers, but since some authors spoke without manuscripts, it may be some months before the papers are available from the University. ISCC News will endeavor to keep you informed.

Harry K. Hammond III

RIT Color Technology Seminar Series

The 1984 Color Technology Seminar Series will be presented by Rochester Institute of Technology's newly endowed Munsell Color Science Laboratory. The three seminars will be directed by the Richard S. Hunter Professor, Franc Grum. Additional faculty includes Roy S. Berns and R. Mitchell Miller (both permanent faculty, RIT), Bonnie Swenholt (Eastman Kodak), Vsevolod S. Mihajlov (Xerox Corporation) and Fred W. Billmeyer, Jr. (Rensselaer Polytechnic Institute).

BASIC PRINCIPLES OF COLOR TECHNOLOGY - June 11-15 or June 18-22, 1984

This 4½ day course identifies the basic principles of color technology and shows how to apply them in daily work with color. It provides information on how color is formed (physics); color measurement fundamentals; metrology and standardization problems; the perception of color; color description including the CIE and Munsell systems; color reproduction including photography, printing and other imaging systems; color gamut; color difference calculations and tolerances; turbid media theory; and computer colorant formulation. Lecture topics will be reinforced using state-of-the-art commercial equipment.

ADVANCED INSTRUMENTAL COLOR MEASUREMENT - June 25-26, 1984

This two-day course provides advanced information on the latest developments and techniques in instrumental color measurement. Topics include but are not limited to advances in modern instrumentation; selecting appropriate measurement geometries; metrology problems of translucent, fluorescent, etc. materials; latest CIE recommendations; spectro-radiometry; and computer data handling techniques. Lecture topics will be reinforced using state-of-the-art commercial equipment.

ADVANCED COLOR REPRODUCTION - June 27-29, 1984

This 2½ day course provides advanced level information on all facets of color reproduction including photography, printing, xerography, and other methods of image reproduction. Topics include but are not limited to color gamut and fideltiy of colorants; color correction and gray balance; colorimetry and acceptability criteria; colored hard copy; and computer data manipulation. Lecture topics will be reinforced using state-of-the-art commercial equipment.

To register or for further information about these courses write to Brenda Reimherr, T & E Center at RIT, One Lomb Memorial Drive, P.O. Box 9887, Rochester, NY 14623-0887; or call her at (716) 475-2757.

CALENDAR

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS
Symposium on Textile Printing, June 14-15, 1984 – Philadelphia College of Textiles and Science

ASTM
Symposium on Review and Evaluation of Appearance, May 23, 1984 – Montreal, Canada

AMERICAN SOCIETY OF INTERIOR DESIGNERS
National Conference, August 16-19, 1984 – Chicago

FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY
Annual Meeting, October 24-26, 1984 – Chicago, IL

ISCC 1985 ANNUAL MEETING
April 14-16, Sheraton Station Square Hotel,– Pittsburgh, PA

ISCC 1985 WILLIAMSBURG CONFERENCE
"Color: Then and Now," February 11-13, 1985

SOCIETY FOR INFORMATION DISPLAY
International Symposium, June 5-7, 1984 – San Francisco, CA

SOCIETY OF PHOTOGRAPHIC SCIENTISTS AND ENGINEERS
Annual Conference, May 20-24, 1984 – Boston, MA
Electronic Imaging 84, September 11-13, 1984 – Boston MA

PANTONE, INC. COLORS NEWSLETTER

A very generous donation of paper and color printing from Pantone, Inc. has restored the color spectrum to the front page of the NewsLetter. The ISCC Board of Directors wishes to express its thanks to Pantone, Inc. for this tangible expression of support and help.

1. Any person interested in color and desirous of participating in the activities of the Council for the furtherance of its aims and pusposes . . . . shall be eligible for individual membership (By-Laws, Article I, Section 2). Application forms for individual membership may be obtained from the Secretary (address given above).

2. The Council promotes color education by its association with the Cooper-Hewitt Museum. It recommends that intended gifts of historical significance, past or present, related to the artistic or scientific usage of color be brought to the attention of Cooper-Hewitt Museum, 9 East 90th Street, New York 10028.

Deadlines for submitting items to be included in the Newsletter are: February 15, April 15, June 15, August 15, October 15, and December 15; in other words, the fifteenth of the even-numbered months.

Send newsletter items to:
Ms. Mary Ellen Zuyus
Hunter Associates Laboratory, Inc.
11495 Sunset Hills Road
Reston, VA 22090

COMMITTEE ON PUBLICATIONS

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