

Inter-Society Color Council *News*



ROBERT F. HOBAN

The Council deeply regrets the death of Robert F. Hoban on February 2, 1985.

Number 296

JULY-AUGUST 1985

FROM THE EDITOR

The Annual Report Issue has been postponed due to lack of submission of annual reports from project committees and member bodies. I have received only three of each. Please send all outstanding project committee reports to the project committee coordinators and all member body reports to Joyce Davenport. These reports are required by the ISCC Bylaws.

This issue of the News includes a new feature article "In This Issue" reprinted from the well-known journal COLOR research and application. This feature will provide increased coverage of the field of color and a quick look at the highlights of an outstanding journal.

ISCC ELECTS NEW DIRECTORS

ISCC announces the election of three members of the Board of Directors who will take office following the annual meeting in Pittsburgh in April, to serve three year terms.

Jack J. Hsia began his education in Taiwan and received a Ph.D. in Thermal Physics from Purdue. He is now Leader of Spectrophotometry at the National Bureau of Standards. His responsibilities include measurement of transmittance, reflection, retro-reflection, gloss, haze, and optical density. Dr. Hsia is a member of the Optical Society, ASTM, and the Society of Mechanical Engineers. He is NBS representative to the American National Standards Institution, is active in CIE, and has written over 25 papers.

Justin J. Remilson majored in astronomy at California, then did graduate work in optical physics at the Optical Institute in Berlin. He has been associated with San Diego State, Scripps Institute of Oceanography, the Jet Propulsion Laboratory, and was president of Gamma Scientific. He is currently the owner of Retro-Tech. Mr. Remilson is a member of the American Institute of Physics, OSA, Society for Information Display, Illuminating Engineering Society, ASTM, CIE, and Sigma Xi. He is the author of 35 papers.

Wolfgang Walter was born in Vienna, studied at Yeshiva University, obtained a Ph.D. in physics at New York University, and a M.S. in management from Northeastern. He manages the Engineering, Computer, and Mathematics Dept. at GTE Sylvania, Danvers, Mass. His field includes all phases of light source development and the color rendering properties of

light. Dr. Walter is active in the Illuminating Engineering Society and is a member of the CIE committee on Color Rendering.

Retiring members of the ISCC Board are Dr. Fred W. Billmeyer, Jr., formerly of Rensselaer Polytechnic Institute, Rolf G. Kuehni of Mobay, and Richard D. Ingalls, Target Color Technology, Lancaster, Pa.

DRY COLOR MANUFACTURER'S ASSOCIATION

The DCMA is an industry trade association representing pigment color manufacturers throughout the United States and Canada. The 36 North American Corporations which are currently members can account for about 95% of the color pigment production in these countries. Foreign pigment manufacturers with sales in the United States and Canada and domestic suppliers of intermediates to the pigments industry are also members. At present there are eight foreign member companies and six intermediate suppliers.

The objectives of the DCMA are to promote the common welfare of those engaged in the manufacture of pigment colors in the U.S. and Canada; to furnish trade information; and to do such other things in the interests of its members and of the trade as may be lawful and proper.

They accomplish these objectives through the actions of various committees and with the assistance of a professional staff located in Arlington, Virginia. Scientific and technical committees are organized along generic pigment types; there are for example, separate committees for: Cadmium; Diarylide; Lead Chromate; Monoazo; and Phthalocyanine pigments. Another visible committee, which incidentally prepared and distributed a paper on the proper use of Colour Index designations this past year, is the Scientific and Technical Steering Committee.

Administrative committees includes Finance, Grants and Awards, International Commercial Relations, Membership, Nominating, Planning, and Program. There is even an Inter-Society Color Council Liaison Committee with Al Schneid as Chairman.

An actively visible organization the DCMA in addition to committee meetings, holds biennial and annual meetings, along with sponsoring seminars and workshops on subjects of interest to its general membership. It also keeps a watchful eye on pending state and federal regulations through a legislative update and general bulletins it distributes to its members.

A prestigious color organization, the ISCC looks forward to

a continued active, participatory relationship with the DCMA.
Ed Cairns

A SPECIAL EXHIBIT OF COLOR DOCUMENTS

Sanford Wurmfeld, Chairman of the Department of Art at Hunter College in New York, has organized an impressive exhibit of Color Documents. This has been held at the Hunter College Art Gallery from April 15 to June 7, 1985.

In connection with it, an attractive catalog has been issued. This has 40 pages, with extra cover, measures 8½ x 11 inches, and is generously illustrated with black and white and full color reproductions taken from treatises on color published from the 18th century to the present. Represented are rare items from the Faber Birren Collection of Books on Color at Yale, the Yale Center for British Art, The Metropolitan Museum, Museum of Natural History and the Cooper-Hewitt Museum all of New York.

In an introduction to the catalog, Professor Sanford Wurmfeld explains the purpose of the exhibit. "The selection of color has always been a fundamental problem of painting. How artists solve this problem reflects why they paint and what they communicate to their viewers. Color theory is the result of a search for information about the human visual experience of color and an attempt to formulate relationships between this experience and its causes. The color documents selected for this exhibition are limited to published works that might be classified as psychophysical — works by scientists or artists that control the organization of the color stimulus in order to demonstrate some of the emergent properties of visual experience. Moreover, they were selected to illuminate the color problems and solutions posed by 'presentational' art to date."

Limited numbers of the catalog are available. If the edition is not exhausted, requests may be sent to Sanford Wurmfeld, Chairman of Department of Art, Hunter College, 695 Park Avenue, New York, N. Y. 10021.

COLOR research and application IN THIS ISSUE

In this issue we begin with what for us is an unusual type of article, labeled *Editorial*. As noted in this column in the Spring, 1985, issue, a reader's survey was conducted for the journal in 1983. Associate Editor David H. Alman has analysed the results of this survey, applying statistics as well as more subjective judgements. He then made a number of recommendations to the Editorial Board and to the publishers, directed toward improving the journal and its service to its readers. The results of the survey and the recommendations are summarized in this editorial article. We hope you will read it and let us have your further comments.

Color constancy, the ability of a colored object to look the same under different kinds of illumination, is an important but little understood property of materials. Roy S. Berns and co-authors make the first major attempt to understand how to achieve color constancy in their article *Methods for Generating Spectral Reflectance Functions Leading to Color-Constant*

Properties. Applying corrections for chromatic adaptation and using linear-programming methods, they derive reflectance curves, of surprising shapes, that are predicted to give color-constant appearance for a variety of daylight-type illuminants. They also show how to calculate indices of color constancy, providing the first means of describing the phenomenon quantitatively.

The measurement of the colors of fluorescent materials remains a challenging problem to the small group of colorists that must produce such materials to meet specifications. (We suspect that the group would be much larger if many producers did not shut their eyes because of the complexity of the problem.) In their article *Colorimetry and Its Accuracy in the Measurement of Fluorescent Materials by the Two-Monochromator Method*, Hideyuki Minato and his co-workers provide details and discuss pitfalls in applying the fundamental method of measuring these materials in an instrument that has monochromators in both the illuminating and viewing beams.

There is a vast literature dealing with the estimation of the sizes of perceived color differences, almost all of it devoted to small differences, such as those involved with color matching and color tolerances. In other fields, however, such as color reproduction and the use of color video displays, much larger color differences are commonly found. In the article *Matching Large Color Differences with Achromatic and Chromatic Surrounds*, Takayoshi Fuchida and his coauthors present a first exploratory experimental investigation of this important field. One result is gratifying: The uncertainty ellipses for large and small color differences appear to be comparable. Another result is surprising: an unusual and unexpected effect of the surround color on the results.

For some time it has been our belief that the widely practiced computer color matching could be significantly improved if the users got inside their "black boxes" and applied turbid-medium theory more nearly appropriately than can be done with general-purpose programs, forgiving as they are. In his article *Simplified Method of Calculating Legendre Coefficients for Computing Optical Properties of Colorants*, K. T. Mehta and his coworker provide important simplifications in the procedures for applying what is perhaps the most powerful turbid-medium theory currently available.

Another of our pet themes is the importance of differences among observers within the range of normal color vision. Until now, an unanswered question has been the magnitude of the uncertainty introduced into CIE coordinates x , y , and Y by this spread among the color-matching functions of real observers. The article *Prediction of Observer Variation in Estimating Colorimetric Values*, by Kotaro Takahama and co-authors, provides the answer.

In additive color matching, as for example in color television and color video display work, optimum color stimuli can be defined as those colors that contribute most efficiently to color mixture. In his article *Optimum Color Stimuli in Various Illuminants*, Ralph W. Pridmore describes such stimuli and shows that their selection is largely independent of the illumi-

nant used.

*From COLOR research and application,
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Workshop on Color Order System

On April 14, 1985, Dr. Fred W. Billmeyer, Jr., gave a workshop on color order systems as part of the 1985 ISCC annual meeting. He began, by presenting a working definition of what constitutes a color order system. He indicated that a color order system is an *orderly* arrangement of colors, with sets of samples to exhibit this system. Using this definition, he pointed out that the Ridgeway atlas of 1906, which is a popular collection of samples, displayed very little order, but could be included in the topic because of its special historical interest.

The workshop demonstrated that color order systems, fall into one of two basic categories; those systems based on the behavior of the colorants, such as the Mertz & Paul Color Dictionary or the Ostwald system and those based on some form of equal perceptual spacing such as the Munsell and the OSA systems.

A description of a perceptual based system was given, taking examples from the Munsell system. A brief history of the origin of the Munsell scales was given, illustrating Mr. Munsell's fascination with the Dewey decimal system in his setting-up of the hue and lightness scales. Several sample sets using the Munsell notation were cited and shown, including the student set, the Color Cascade, the S.C.O.T. (Standard Color of Textiles) and the Japanese systems, Chroma Cosmos 5000 and Chroma Tone 707. Even though the Munsell system is a national standard in Japan, the Japanese sets do not conform closely with the given Munsell specification in several color regions. These differences have been documented and communicated to the Japan Color Research Institute who publishes the sets.

A second type of perceptual system based on opponent hues was described. Both the Swedish Natural Color System (NCS) and the OSA sampling are opponent hue color order systems. Dr. Billmeyer indicated that the NCS system is based on six unattainable, imaginary elementary colors, four hues and total white and black. The NCS was described as having no constant lightness planes, but rather planes of constant blackness or in Ralph Evan's description — constant grayness. The accuracy of the space has not been well documented, yet there is a technical committee in the International Standards Organization (ISO) proposing to adopt the NCS as an international standard color order system. Dr. Billmeyer encouraged anyone with an interest and/or concerns in this area to contact, W.N. (Nick) Hale (a long time ISCC member), the representative of the ASTM-ANSI to ISO.

Dr. Billmeyer spent a few minutes describing the OSA system and some of the unique and unusual ways of displaying planes of colors. He pointed out that the unique cuboctahedral sampling provides 12 equally spaced neighbors around each point in the sampling. The OSA system provides true constant visually perceived lightness by making allowances for changes in perceived lightness with increasing chroma.

The Ostwald system and the German DIN system were also mentioned in passing. Two important points were made with respect to these systems. First, there are no current versions of the Ostwald system available and each of the older versions are unique and not inter-relatable. Second, the DIN system was designed to approximate the Munsell System and yet be easily converted from CIE coordinates. Hue lines are straight instead of curved and the constant chroma lines are more nearly circular.

Dr. Billmeyer's closing comments made the following points:

1. A color order system needs to have a conversion to/from CIE coordinates for use with color measuring instruments.
2. In the Munsell system, constant hue lines are curved and constant chroma lines are egg shaped and both change shape from one lightness plane to the next.
3. The NCS system displays 100% chromaticness at the same level even though the Munsell chroma maximum changes from one hue to the next.
4. The Munsell hue changes unsystematically on a page of constant NCS hue.
5. None of the present color difference formulae reproduce the Munsell, OSA, or the NCS systems very well.

This workshop was well attended and well received. I believe, that Dr. Billmeyer could have spoken for another hour and not lost any of his audience. Workshops of this nature — detailed tutorial histories are of immense value to new and prospective ISCC members and excellent reviews for those already acquainted with the topics.

Danny C. Rich

MEETINGS

Color in Painting and Photography November 1-3, 1985 Higgins Hall, Pratt Institute, Brooklyn, N.Y.

This "Color Conference" will bring together painters and photographers to discuss color, a major force in their art, and to examine changing concepts of color and technological advances which may affect their work.

Together they will 1) improve their understanding of color by verbalizing concepts about color; 2) investigate the mysteries of human response to color; 3) present artists' concepts of color; 4) review historical perspectives on color in art; 5) examine how the eye and brain see and interpret color; 6) hear new information about color stability of artists' materials and photographic processes; 7) discuss cultural trends in relation to color; and 8) explore the ramifications of computer-generated graphics.

This three-day forum will allow painters and photographers to participate in lectures, panel discussions and workshops led by researchers and scholars in the fields of language, perception, aesthetics, art history, optics, chemistry, fashion and computer graphics. Speakers, panelists and workshop leaders have been selected for knowledge and expertise in their fields. The audience will be primarily artists, educators and students in the fields of painting and photography.

The "Color Conference" is being funded in part with a grant from the Mellon Fund through Pratt Institute. We have received encouragement about a grant from the National Endowment for the Arts. Additional funding is being sought from private sources.

The registration fee has not yet been determined. For further information contact the conference director, Nina Prantis, 386 Dean Street, Brooklyn, N.Y. 11217. Phone: 718-622-9551.

Friday, Nov. 1

4 - 5 p.m. "Science — What Contribution Has It Made To Art? a review of viewpoints held by scientists and artists since the Renaissance on the subject of color and its expression in art. Faber Birren, best known and most widely read color authority of our time, responsible for the resurrection of several significant works in color literature.

5 - 6 p.m. "Color and Form," possibilities for creative experimentation relating color to form; though presented in the context of painting, the ideas can be applied to any medium. Roy Osborne, English artist, author and lecturer on color in art and design.

6 - 7:30 p.m. Registration, Reception and Exhibition: "Illuminating Color," color in contemporary art, and the interconnections between painting and photography during the last fifteen years, curated by Donna Stein and Lynn Zelevansky.

7:30 - 8:30 p.m. Lecture: "The Power of Color," a concept of seasonal color theory for the self-image, derived from Itten via Carole ("Color Me Beautiful") Jackson. David Kibbe, originator of David Kibbe's Total Image Enhancement Center in New York.

Saturday, Nov. 2

9 - 10 a.m. " 'Saturday Morning Cartoons' — The Computer: Color, Video, Graphics and Animation," work by participants in the computer graphics panel (3 - 4 p.m.) and by other artists.

10 - 11 a.m. Lecture: "Appetite for Color: Reactions to Color in Art," an examination of color sensibility in contemporary art. Max Kozloff, art critic, photographer and author.

11 a.m. - 12:30 p.m. Panel discussion: "Perception and Language Issues," visual and verbal literacy among artists who use color as a major force in their art. Moderator: Mary Buckley, painter, professor and pioneer in developing color and light courses at Pratt Institute. Panel artists: Richard Anuszkiewicz; Janet Fish; Helen Levitt; George McNeil; Elizabeth Murray, and Richard Prince.

12:30 p.m. = 1:30 p.m. Luncheon: "Color Buffet."

1:30 p.m. - 2:50 p.m. Workshops. (Participants may select either workshop.)

1. "Color Reproduction," the problems inherent in reproducing paintings and photographs in four-color offset printing; in color photographic processes, and in black and white. Discussion leaders: Conrad Gleber, director of Chicago Books, fine offset printers; John Milisenda, black and white photog-

rapher and photochemist; Guy Stricherz, owner of CVI Labs, dye transfer printers for fine-arts photographers; and Malcolm Varon, photographer for the Metropolitan Museum of Art and other museums, who specializes in color photography of fine art for reproduction.

2. "Materials: Pigments and Dyes," new products, stability and preservation, honesty in marketing, related health hazards in photographic and painting materials. Speakers: Henry Wilhelm, independent researcher in dye stability and the preservation of photographs; author, and founder of the Preservation Publishing Company; and Joy Turner Luke, painter, researcher; and lecturer in the field of color and artists' materials.

2:50 - 3:10 p.m. Break.

3:10 - 4:30 p.m. Workshops. (Participants may select either workshop.)

1. "Color and the Computer," relating to Goethe's theories of color, to the theory of relativity and to color in television. Discussion leaders: Juan Downey, video artist working on interfacing computers and video discs, and instructor in video and in architecture at Pratt Institute; David Geshwind, founder of Digital Video Systems, a firm specializing in computer graphics, animation and interactive video; and Lillian Schwartz, artist and filmmaker, pioneer in the field of computer-generated art.

2. "Human Response to Color," how the eye and the brain see and interpret color in art and in our physical environment. Discussion leaders: Mary Buckley, and Margaret Hagen, associate professor of psychology at Boston University specializing in perception.

4:30 - 5:30 p.m. Lectures. (Participants may select either lecture.)

1. "Color and Brightness Contrast in the Visual System," relating neural activity to visual perception; the importance of visual contrast to brightness and to color; and relating contrast perception to form. Dr. Robert Shapley, associate professor of biophysics working in vision studies at Rockefeller University.

2. "Historical Color Sources and Late '80s Fashion and Design," using art history and historical artifacts as a source for contemporary design. Margaret Walch, associate director of the Color Association of the United States, which forecasts color for textile, interior and environmental design industries.

5:30 - 6:30 p.m. Reception and Exhibition: "Artistic Application of Goethe's Theory," with extracts from the "Aesthetic Effects of Color." Artist and organizer: Doris Morath.

Sunday, Nov. 3

10 - 11:30 a.m. Panel Discussion: "The Purple Cow and Other Thrills of Synthetic Color," focusing on expressive synthetic color as seen in the work of innovative artists. Moderator: Judy Seigel, photographer working in experimental mixed media; instructor in non-silver processes at Pratt Institute. Panel artists: Scott Hyde, Barbara Kasten; Sandy Skoglund; Rosamond Wolff Purcell, and D. Jack Solomon.

11:30 a.m. - 12:30 p.m. Lecture: "The Artistic Application of Goethe's Color Theory." Doris Morath, German watercolorist strongly influenced by Goethe's work on color.

12:30 - 1:30 p.m. (Brunch will be available.)

1:30 - 2:30 p.m. Lecture: "Illuminating Color," the conference exhibition, and its organizing principles based on Albers, Rudolph Arnheim, Goethe, Kandinsky, and others. Lynn Zelevansky, art critic for Artnews, Flash Art and others; and instructor in contemporary issues in photography at Pratt Institute.

2:30 - 3:30 p.m. Brainstorming and Summary. Moderator: Conference Director: Nina Prantis, artist, color researcher; and instructor in the dye transfer process and color photography at Pratt Institute.

Nina Prantis ©1985

Industrial Education in Color Science Topic of RIT's Munsell Color Science Lab Course

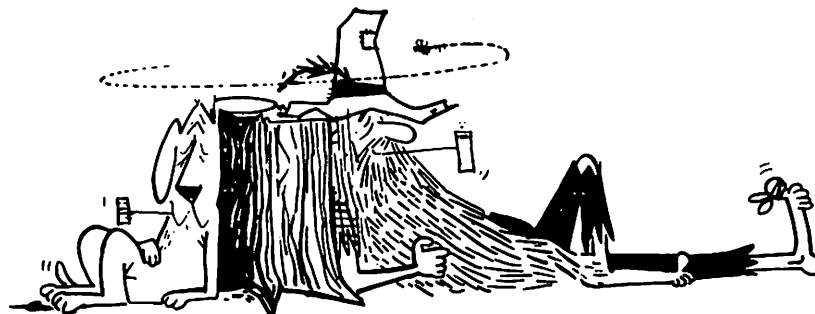
The Munsell Color Science Laboratory, located on the campus of Rochester Institute of Technology here, will present *Advanced Concepts of Color and Color Measurement: An Intensive Short Course for Industry*, August 26-28, a course that will provide scientists and engineers with advanced levels of information about selected topics in color science and engineering, featuring the industry's leading experts and scientists.

Specifically, the course will cover advances in the CIE systems of colorimetry, in a lecture by Dr. Roy S. Berns, assistant professor, color science, RIT; color vision, perception, and psychophysics and their relationships to colorimetry, Dr. C. J. Bartleson, research associate, Eastman Kodak Research Laboratories; computer colorant formulation theory for subtractive coloration systems, Dr. Eugene Allen, professor emeritus, Lehigh University; standardization and instrumentation requirements for colorimetric accuracy, Dr. Franc Grum, R. S. Hunter professor and director of the Munsell Color Science Laboratory, RIT; electronic color displays: unique measurement problems and system design considerations, Leroy DeMarsh, research associate, Eastman Kodak Research Laboratories; and non-impact full color printing, Dr. Vsev Mijhalov, principal scientist, Xerox Corporation.

The course is designed to most benefit those involved in such coloration systems as reprographics, color electronic imaging, coatings, textiles, and polymers.

For additional information and registration details, contact the Technical and Education Center of the Graphic Arts, RIT, One Lomb Memorial Drive, Rochester, NY 14623, or call 716/475-2757.

MARY ELLEN ZUYUS, EDITOR, ISCC NEWS,
REQUESTS
THE SUBMISSION OF PAST-DUE
SUB-COMMITTEE AND MEMBER BODY
REPORTS !



CALENDAR

AIC

Interim Meeting, June 19-20, 1986, Ryerson Polytechnic Institute, June 19-20, 1986

AMERICAN SOCIETY OF INTERIOR DESIGNERS

National Conference, July 24-28, 1985, Dallas, TX

FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY

Annual Meeting, October 7-9, 1985, St. Louis, MO

ISCC-CSC 1986 ANNUAL MEETING

June 16-18, 1986, Ryerson Polytechnic Institute, Toronto

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA

Annual Conference, July 21-25, 1985, Detroit, MI

OPTICAL SOCIETY OF AMERICA

Annual Meeting, October 14-18, 1985, Washington, DC

SOCIETY OF PHOTOGRAPHIC SCIENTISTS AND ENGINEERS

Second International Congress on Advances in Non-Impact Printing Technologies, November 4-8, 1985, Arlington, VA

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:

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1. Any person interested in color and desirous of participating in the activities of the Council for the furtherance of its aims and purposes . . . 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.