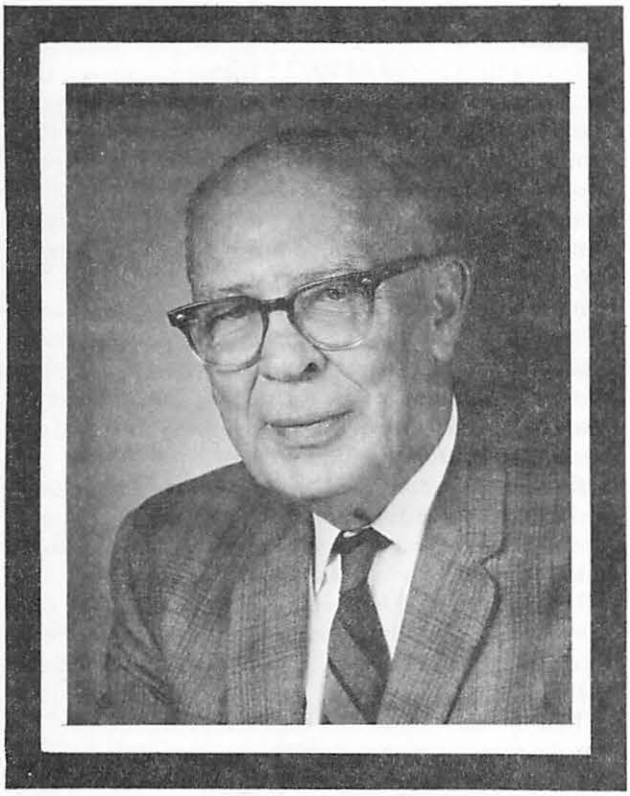
Inter-Society Color Council Newsletter

NUMBER 228
January-February 1974

TABLE OF CONTENTS

Number 228–January-February 1974

COVER DESIGN – DONALD M. GENARO AND VALERIE PETTIS OF HENRY DREYFUSS ASSOCIATES, NEW YORK CITY
COVER PRINTED BY PROGRESSIVE COLOR CORPORATION, ROCKVILLE, MARYLAND
COVER STOCK – OXFORD STARFLEX GLOSS ENAMEL
COURTESY OF OXFORD PAPER CO., DIVISION OF THE ETHYL CORP., RICHMOND, VA.
CONSULTANT – MIMEOFORM SERVICE, INC., WASHINGTON, D.C.



RALPH M. EVANS

Ralph Merrill Evans, 68, ISCC president 1946-7, secretary 1951-70, died in Rochester, N.Y. on January 29, 1974.

Many of us heard Ralph Evans for the last time give one of his famous lectures at the 1973 O.S.A. meeting in Rochester. As featured speaker on a special Visual Science program he gave a profusely illustrated but highly technical lecture on "Trichromatism and Color Perception," providing a glimpse of the work on color perception on which he concentrated after retirement from Kodak in 1970. Nor shall we forget the very spirited discussion that took place at the Color Technical Group meeting the following evening, much of it relating to discussion and refutation of points raised in Ralph's Monday evening lecture. He was ill at the time – he knew that the illness was terminal – nevertheless he took part and enjoyed the session, pleased that his efforts had sparked so much controversy, for it meant that people were thinking about his ideas, and that is what he wanted! His friends will be glad to know that his recently completed book on color perception is scheduled for 1974 summer publication.

Ralph Evans was a man of ideas in color, a pioneer in opening up new fields for color study. Fortunately this was recognized by early research heads at Kodak, and for a period in the 40s and 50s the psychologists began to have their day in laboratories directed by Evans. There the work of many – among them Newhall, Burnham, the Hurviches – was either started, or encouraged to develop further. The 1948 Evans book, Introduction to Color, was one of the first and best of modern books on color. In a review Dean Farnsworth (another of our few real thinkers and pioneers in modern color study) recalled that "Leonardo da Vinci was one of the last men to study color as a whole" – that it has been studied since then by a host of specialists, but the Evans book "is a most successful attempt to recombine all of the scientific approaches into one orderly discussion." Many of Ralph's ideas were first presented in lectures, ideas which he never accepted until they could be successfully illustrated. His slides are memorable – prepared by unusually capable and talented associates whom he had a knack for discovering.

A native of Massachusetts, Ralph Evans graduated from the Massachusetts Institute of Technology in 1928 with a degree in Optics and Photography. On graduation he worked briefly for Kodak but left to work for Twentieth Century-Fox Film Corporation, 1929-33, then DeLuxe Laboratories, Inc. in New York, 1933-35 in research and control work, after which he returned to the Kodak Research Laboratories as supervisor in the Color Process Development Department, becoming Superintendent of the Color Control Department in 1945. In 1953 he was named Director of the Color Technology Division, where he served until a reorganization that placed him in charge of the new and larger Photographic Technology Division, where he served until retirement in 1970.

He was the author of four books published by Wiley: An Introduction to Color, 1948; Principles of Color Photography, with Brewer and Hanson, 1953; Eye, Film, and Camera in Color Photography, 1959; and one on color perception now in process for 1974 summer publication. A list of his published research papers and lectures prior to 1959 is contained in *ISCC Newsletter* No. 140, April 1959, in the report of the 1959 Annual Meeting at which Ralph Evans received the Godlove Award for his contributions to color knowledge. Several important papers since 1959 are published in the journal of the Optical Society of America. He held 17 patents for inventions.

Ralph Evans was active as a member of the Society of Motion Picture and Television Engineers, the Optical Society of America, the Society of Photographic Scientists and Engineers, the Photographic Society of America, the Illuminating Engineering Society. In all of these he was recognized as a Fellow Member. His awards, in addition to the Godlove Award of the ISCC, included three from SMPTE, the Warner Medal in 1949, Progress Medal in 1957, Kalmus Gold Medal in 1961. He was an honorary member of Sigma Xi, and held a 1955 citation from the Photographer's Association of America which honored him for "contributions to the solution of the enigma of how we see color" and for "sponsoring at Eastman Kodak Company creative experimentation to delimit the boundaries of color photography."

He is survived by his wife, Pauline Fowler Evans; three sons, Dr. David R. Evans of Amherst, Mass., Dr. John P. Evans of Portland, Oregon, and Robert H. Evans of Warsaw; a brother, Charles, of Rochester, and four grandchildren.

Dorothy Nickerson

RESOLUTION BY THE BOARD OF DIRECTORS

On direction of the Board of Directors at its meeting on February 8, 1974, the following resolution was prepared by the Secretary and George B. Gardner, and sent to Mrs. Pauline Evans.

Be it resolved:

It is with deep sorrow that we record the death on January 29, 1974, of our distinguished Honorary Member, Ralph Merrill Evans. We shall miss him sorely.

Inasmuch as Ralph M. Evans was present at the preliminary Conference on the Organization of what became the Inter-Society Color Council in February, 1931, and was a Member and Chairman of the Delegation from the Society of Motion Picture (and Television) Engineers from the time it became a Member-Body of the Council in December, 1939, to the time of his retirement in 1970, and

Inasmuch as Ralph M. Evans served as Vice-Chairman of the Inter-Society Color Council from 1944 to 1946, served as Chairman from 1946 to 1948, served as Secretary from 1952 to his retirement in 1970, and continued to serve as an ex-officio member of the President's Advisory Committee from that year until his untimely death, and

Inasmuch as Ralph M. Evans was the second recipient of the Inter-Society Color Council's I. H. Godlove Award in 1959, and was elected an Honorary Member of the Council when that class of membership was established in 1968,

Now therefore, the Inter-Society Color Council, through its Board of Directors, signifies its deep sorrow at the passing of one of the truly great original thinkers in the world of color, and expresses its deep sympathy to Mrs. Pauline Fowler Evans and to the sons and family of Ralph M. Evans.

And furthermore, the Board of Directors of the Inter-Society Color Council orders that a copy of this resolution be published in the Inter-Society Color Council *Newsletter.*

For the Board of Directors,

Fred W. Billmeyer, Jr.
Secretary
February 8, 1974

RALPH EVANS' NEW BOOK

"The Perception of Color" by Ralph M. Evans, to be released later this year by Wiley, is the culmination of some twenty years of study and experimental work. Deliberately avoiding the temptation to theorize as to color vision mechanisms, Mr. Evans has provided an orderly presentation of many of the facts of color perception.

When he first started work on the book in the fall of 1970, it was intended to be an elementary treatment. The ambiguities arising from divergent theories (and the bodies of facts supporting each) made an elementary presentation impracticable. Somewhat reluctantly, Ralph began a search for the source of the disagreements among Helmholtz, Goethe, and Hering as well as among modern workers. "I'm not sure I can finish it" was his comment early in 1971. However, by late spring of 1973 (before the serious nature of his illness had been established), the manuscript was ready for typing and was then submitted to the publisher.

During the summer of 1973 "Trichromatism and Color Perception" was prepared for presentation in October. Those who heard him lecture have had a preview of the book and seen demonstrations of some of the perceptual phenomena that prompted his questioning of generally accepted assumptions regarding color perception. Since the demonstrations are not reproducible in the book, the description of the effects and discussion of their interrelationships is necessarily more detailed. The facts are presented and reasoning developed which leads to the assertion that at least four variables are required to specify a color *perception* except for the singular case of an unrelated color. That three variables are always sufficient to specify a color *stimulus* is never questioned.

Removing the constraint that a color perception be specifiable in three dimensions permits a fresh viewpoint. A number of seemingly incompatible facts are found to be quite consistent in a four dimensional framework.

The data required for establishing a perceptual specification system are not yet available with sufficient precision or reliability. The nature of some of the data needed is indicated in the book.

That the main thesis of "The Perception of Color" will provoke controversy has already been demonstrated. If it motivates experimental work along some of the lines suggested (or any others) the book will have been worth the effort.

On January 28, 1974, Ralph called me to confirm the weekly meeting to discuss his writing – but to change the date from the 29th to the 31st. He said he now was ready and felt he knew how to write the "primer" he had wanted to write in 1970.

Bonnie K. Swenholt

43RD ANNUAL MEETING

The 43rd annual meeting of the Inter-Society Color Council will be held at the Statler-Hilton Hotel, New York, New York, on Monday and Tuesday, April 29 and 30, 1974.

On Monday, April 29, open meetings of the ISCC Problems Subcommittees will be held, in both morning and afternoon sessions. As in the past, members and friends of the Council are urged to attend. In addition to meetings of the established active Subcommittees, the Subcommittee for Problem 35, Color and Appearance Matching of Living Tissue, will hold its first regularly scheduled meeting.

The annual business meeting of the Council will be held on Tuesday morning, April 30, and will include the presentation of reports by Chairmen of Member-body Delegations as well as by Officers and Standing Committee Chairmen.

Mr. S. Leonard Davidson, Program Committee Chairman for this meeting, has arranged a symposium for the afternoon meeting on Tuesday, April 30, entitled "The Development of a Color from Design to Execution." The Symposium Chairman will be Dr. E. I. Stearns of Clemson University, and the speakers will be Mr. Roland Meyer, Appleton Paper Company; Mr. John J. Hanlon, Mohasco Industries;

Mr. William V. Longley, Ford Motor Company; and Miss Joyce Davenport, DeSoto, Inc. They will speak on the development of specific color applications in the paper, textile, plastics, and paint industries, respectively.

The reception and banquet of the Council will be held on Tuesday evening, April 30. During the banquet, the Macbeth Award will be presented to the 1974 recipient. The banquet speaker will be Mr. Max Saltzman, recently retired as Manager of Color Technology, Allied Chemical Corp., and Adjunct Professor of Color Science, Rensselaer Polytechnic Institute.

A final program and registration form will be sent to the membership in late March. Preregistration and the advance purchase of banquet tickets is urged.

THE GIFT OF COLOR

A comprehensive presentation entitled "The Gift of Color" will be presented between March 23 and May 10 at the Kodak Photo Gallery, 1133 Avenue of the Americas, New York City. This presentation will feature various demonstrations associated with the physical, emotional and psychophysical aspects of color as well as displays demonstrating some of its practical applications in color photography, home decoration and offset printing. The late Ralph M. Evans' presentation entitled "On Seeing Light and Color" will be a featured part of this exhibit. Free admission open to the public Tuesday through Saturday, 10:00 a.m. to 5:00 p.m.; Monday, 12:00 noon to 5:00 p.m. Note that this presentation will be on during the time of the ISCC annual meeting.

ISCC MACBETH AWARD TO GO TO MIDGE WILSON

The 1974 Macbeth Award of the Inter-Society Color Council will be presented to Miss Midge Wilson, Executive Director of the Color Association of the United States, Inc. The presentation will be made at the banquet of the Council's annual meeting at the Statler-Hilton Hotel in New York on April 30, 1974. The award is presented biennially in recognition of recent important contributions in the field of color.

Midge Wilson has achieved an international reputation for directing the selection and production of forecast colors for industry, without which chaos in the merchandising area of color usage would result, from the manufacture of products in an unwanted, uncoordinated, multiplicity of colors. She has been a vibrant spokesman for color usage before many societies and associations with fashion, design, and merchandising interests. She has written many articles on this subject for fashion, home furnishing, and textile periodicals.

Before joining the Color Association of the United States, Inc., as Executive Director, Miss Wilson studied chemistry, psychology, and law and had experience in textiles, advertising, merchandising, and publications.

In addition to augmenting the existing services of the Color Association of the United States, Inc., Midge Wilson has introduced and developed several new color forecasts:

Men's wear color forecast . . . . which encouraged the transformation from monotonous dressing to today's color-conscious males, where color is now a dominant styling factor.

Men's sock color forecast . . . . which highlights style and color developments, in pace with the rest of men's wear.

Women's knitwear, sportswear and sock color forecast . . . . which synchronizes color developments with the rapid growth of knitwear, in all areas.

Home furnishings color forecast . . . . which is concerned not only with color developments, but the relationship of color and its applications to the changing environmental and living needs.

Under her direction, and prompted by rapid fashion and economic changes, the emphasis of these forecasts has shifted from a pure fashion approach to the use of color as a bridge between fashion and merchandising.

Miss Wilson has also initiated special consultation services to augment the forecasts and provide in-depth application of colors as related to specific needs. In cooperation with the Government, she has developed and issued standard colors for the DEPARTMENT OF DEFENSE THREAD COLOR CARD, the DEPARTMENT OF DEFENSE BUTTON CARD, and the new DEPARTMENT OF DEFENSE EMBROIDERY YARNS COLOR CARD, which will be issued early in 1974.

Midge Wilson works closely with INTERCOLOR, an international color commission, where the Color Association represents the United States. This commission develops forecasts for world-wide color coordination. She has received a citation from the Department of the Army for the work in connection with the D.O.D. THREAD COLOR CARD, and a Volunteer Service Award from the Mayor of the City of New York for volunteer work done at Manhattan State Hospital. She is a member of the Fashion Group, serving as Treasurer and on various committees; of the National Home Fashions League, serving as treasurer and on committees; of Trends, also serving as treasurer; and of the American Society for Psychical Research, with particular interest in experimental work in the use of color in communications and therapy.

Midge Wilson has cooperated fully with the aims and purposes of the Inter-Society Color Council, immeasurably aiding the general public and industry, by serving with distinguished success on many of the problems subcommittees of the Council. She was elected to the Board of Directors for the 1966-1968 term. Her willing cooperation, intelligent guidance, and prevailing modesty have made an indelible mark on the list of historical accomplishments of the Council. She has made the arrangements for many symposia conducted for the members of the Inter-Society Color Council, and the success of these symposia is evidence of her diligent and careful planning. Finally, by assuming the responsibility for creating the arrangements for the annual banquet of the Council over a period of many years, she has earned the gratitude of all of the officers of the Council.

APPLICANTS APPROVED FOR INDIVIDUAL MEMBERSHIP

Applicant — *Member-Bodies and Interests*

Dr. Robert Apter
22A Mordeh
Haquetaot, Israel

OSA. Obtained his Ph.D. in spectroscopy. Professional activities include imaging devices and radiative transfer problems (turbid-medium theory). Present professional activities are related to color-measuring devices. (He is also a member of the Israel Optical and Electro-Optical Society.)

Mr. Daniel E. Barrer
General Electric
Nela Park
Cleveland, Ohio 44112

ACerS. Interested in the formulation of color coatings to be used in the lighting industry.

Mr. William L. Butters
Alcan Metal Powders
P.O. Box 290
Elizabeth, New Jersey 07207

Interested in metallic finishes and his work relates to metallic pigments.

Mr. Vernon J. Fowler
22 Kathleen Drive
Andover, Massachusetts 01810

OSA. Particular interests in color are: (1) selection of primary colors for new flat-screen TV display devices (brightness, efficacy and color rendering trade-offs); (2) personal scientific interests in colorimetry; (3) techniques for control of color in electronic painting (i.e., "painting" on TV set via electronic image storage). He is also a member of the Institute of Electrical and Electronic Engineers and the Society for Information Display.)

Mr. Terence Grant
3 Grosman Terrace
Rochester, New York 14620

Is an art school teacher presently working with E.M.D. children and looking for ways to enhance their lives with color.

Mr. Richard Heller
6924 Barri Lyn Road
Hammond, Indiana 64323

Specifications on standards, measurement, quality control for purchased inks and printed material. Vat dyed color liner, printed corrugated foil, cellophane and paper. With the Wrigley Company.

Mr. Dwight A. Holtzen
R.D. #2
Old Post Road
Newark, Delaware 19711

Is interested in computer formulation and prediction of spectra. Works in the Pigments Department at DuPont.

Dr. John N. Kidder
Physics Department
Dartmouth College
Hanover, New Hampshire 03755

OSA. Teaches an introductory general science course in "Light, Color, and Visual Perception" and an intermediate course in "Physiological Optics" at Dartmouth. He is designing an experiment on the perception of spatially varying color patterns. His particular interests in color are making more people aware that there is a science of color, relating the various approaches to color, research using psychophysical experiments to gain insight into the mechanics of color vision. (He is also a member of the American Association of Physics Teachers and the Society of the Sigma Xi.)

Mr. Joaquim J. H. Monteiro
Information Scientist
Central Library & Information Center
Post Bag No. 7318
Lal Bahadur Shastri Marg
Bhandup, Bombay, India 400 078

His work relates to paint products and research information services. (He is also a member of the following associations: Packaging Institute, USA; Society of Commercial Teachers, UK; Institute of Commerce, UK; and The Institute of Information Scientists, UK.)

Mr. Donald R. Ross
Alcan Metal Powders
P.O. Box 290
Elizabeth, New Jersey 07207

Interested in metallic finishes and works with metallic pigments.

Mrs. Dianne Sargent
31 Aborn Street
Peabody, Massachusetts 01960

Physiological and psychological effects of color on human beings, particularly in relation to advertising, food preparation, architectural materials and interior decoration.

Mr. John L. Schwartz
2847 Clayton Drive
Troy, Michigan 48084

Interested in the styling of colors for use in automotive exterior finishes and the use of color in painting, and teaching water color classes for the Royal Oak Adult Education System. He is presently employed by P.P.G. Industries as a Color Stylist.

Mr. B. W. Tansley
Department of Psychology
University of Rochester
Rochester, New York 14624

OSA, SPSE. Interested in basic processes in color perception, color scaling and contributions of color channels to brightness perception. (He is also a member of the Association for Research in Vision and Ophthalmology.

Mr. Philip Van Beusekom
2300 Case Avenue
St. Paul, Minnesota 55119

TAGA. Subtractive color as applied to color printing. Control and identification of organic pigments. Color formulation and matching.

Mr. Howard W. Yawn
6901 W. 107th Street
Worth, Illinois 60482

TAGA. Graphic Arts color reproduction problems, development of Electro-Optical color devices for Graphic Arts, instrumental color measurement. He is a Senior Research Scientist for the Platemakers Educational and Research Institute.

Information only – delegate from NPCA

Mr. Morris F. Gall
Glidden/Durkee
Div. SCM Corporation
900 Union Commerce Bldg.
Cleveland, Ohio 44115

CMG. Color forecasting, development of color palettes, production of color graphics, sale of color (paint) through advertising and sales promotion.

COOPER-HEWITT MUSEUM

In about a year, the Cooper-Hewitt Museum will be moving its superb collections relating to decorative arts and design into a new home, the former Andrew Carnegie mansion, at 2 E. 91st St., New York City.

LIBRARY OF CONGRESS PLANS "COLOR IN THE GRAPHIC ARTS" EXHIBIT FOR FALL SHOWING

Herbert A. Sanborn, Exhibits Officer of the Library of Congress, an ISCC member known to many of us, has been working for some time with his staff on the preparation of a major exhibit on the development of "Color in the Graphic Arts." The following release from the Library of Congress tells us that this exhibit is scheduled to open in September 1974.

The Library has received assistance from several private companies involved with the commercial applications of color to products or services for libraries, institutions, and the public. Significant contributions to the development of this exhibit are being made by Barnes Press, Berkey K&L Custom Services of New York, Eastman Kodak Co., Harris Intertype, Hennage Creative Printers of Washington, D.C., Ilford, Inc., Kollmorgen Corp., Munsell Color Foundation, the National Georgraphic Society, and 3-M Corp. A grant of $10,000 in matching funds has been provided by the National Endowment on the Arts to assist in the preparation of a 1975 traveling exhibition based on the Library's show.

A library is a natural choice for the development of an exhibit on "Color in the Graphic Arts." Unlike other institutions, libraries have collections broad enough both to research the technical and artistic applications of color and to illustrate the results of that research. This broad view of color is almost impossible for all but the largest libraries to compile and display. The Library of Congress, the world's largest library, is one of the few institutions with the materials and resources necessary to illustrate the use and history of color in printing books, magazines, newspapers, fine prints, photographs, and maps.

A number of dramatic features in the exhibit will demonstrate how light is the source of color. A prism will split light into the visible spectrum as Isaac Newton did in 1666. An unusual demonstration will show how filtered light in each of the primary colors appears and how these blend into the secondary colors. The impact of color on the graphic arts will be illustrated with color transparencies projected on an overhead screen. Perhaps most spectacular of all will be a large color reproduction of a human eye made from four layers of transparent color dot patterns to illustrate the application of the halftone screen in the four-color printing process.

Books printed in color will span the centuries from the color chapter headings in Gutenberg's 15th-century Bible printed with a handpress to the contemporary use of color in fully automated presses. Highlights from the important historical literature on color will include works of Sir Isaac Newton, James Clerk Maxwell, Johann Wolfgang von Goethe, Michel Eugène Chevreul, Hermann Ludwig Ferdinand von Helmholtz, Thomas Young, Wilhelm Ostwald, and Albert Henry Munsell.

The exhibit will draw on more than 100 items from the

Reproduced courtesy American Cyanamid Company, Dyes and Textile Chemicals Department.

Library's collections of books, magazines, newspapers, fine prints, posters, maps, and photographs to detail the story of color in the graphic arts. On view will be some of the first important attempts at creating a full color picture with colored inks by such methods as aquatint, chromolithography, mezzotint, and serigraphy. Special attention will also be given to surviving editions of the first complete comic supplement to appear in a newspaper, the first halftone engraving of a photograph to appear in a periodical, and the first four-color picture produced for a periodical.

The exhibit will be located in the Great Hall and the first floor north and south galleries of the Library's Main Building. It will remain on view for approximately six months. A selection from the Library's exhibit, mounted on panels, will then be available for showing at other libraries and museums throughout the United States for two or more years.

COLOR EXHIBITIONS OPEN APRIL 25

Arthur Pope, Professor of Fine Arts at Harvard 1909-1949, sought to impress upon his students the idea that to appraise and appreciate a painting or drawing it was absolutely essential to have a clear understanding of the nature of color relationships and their use in art. Now, at 94, still interested in color, he will be able to see his approach to the subject presented in the COLOR IN ART exhibition discussed by H.T. Fisher in *Newsletter* #227. The exhibition is scheduled at Harvard University's Fogg Art Museum, Cambridge, Massachusetts, from April 25 through June 16, after which it will appear at a number of other museums including the Krannert Art Museum at the University of Illinois, Champaign, Illinois, August 25 - September 15, and the Bixler Art and Music Center at Colby College, Waterville, Maine, October, 1974.

Organized by James M. Carpenter, Professor of Art and Chairman of the Art Department at Colby College, the exhibition first examines Prof. Pope's theories and then applies them in an analysis of 46 paintings and prints selected from the permanent collections of the Fogg Art Museum and Colby College. Among the artists whose works are included in the exhibition are Rubens, Hals, Tiepolo, Copley, Turner, Monet, Renoir, Matisse, Picasso, Homer, and Hopper, as well as artists of the Rajput, Bukkhara and Persian (Qazuin) Schools.

Working in coordination with the Fogg, The Museum of Science in Boston will present a concurrent exhibition, COLOR AROUND US, that will be shown April 25 - July 24. Proposing to stimulate an awareness of color in the natural and man-made world, as well as an understanding of basic color theory, the exhibition includes visitor-participation devices directed toward an analysis of color and color relationships, art forms illustrating color concepts, and natural specimens that show the variety of color in nature.

THE FABER BIRREN COLLECTION OF BOQKS ON COLOR AND COLOR THEORY NOW AT YALE UNIVERSITY

The study of color and color theory at Yale has been wonderfully enriched by the recent gift to the Art Library of the personal library of Faber Birren, the distinguished color consultant, writer and editor of books on color theory and color psychology. Mr. Birren's work has spanned a wide range of approaches to the use of color and to associations resulting from color stimuli. Since 1934, when he set up his own firm in Chicago after years of self education in the field following studies at the University of Chicago, he has pioneered in functional applications of color to promote safety, reduce eye fatigue, and create pleasant working environments. Among his clients have been many branches of the United States Government, including the Army and Navy, for which he provided comprehensive color schemes for all aspects of buildings and equipment. To the public he is best known as the author of books on color and as editor of historic texts on color dating from the eighteenth to the twentieth centuries.

Current Biography of 1956 reports that Faber Birren's "private library of books on color is considered one of the best in the country" and the addition of that collection to other works on the subject at Yale makes the facilities for study here very strong. Professor Robert Herbert of the History of Art department has twice taught a seminar on color and color theory using the Birren Collection as a nucleus of research. This seminar included graduates, undergraduates, and professional students in the History of Art department and the School of Art, and interest continues to the point that the course will be offered again. In both of the terms in which this seminar was given, the enrollment was very heavy.

Available in Birren's collection are original works of Robert Boyle and Isaac Newton. A famous work on simultaneous contrast by M. E. Chevreul, which was widely admired in the generation of the Impressionists, is included in its original edition and a memorial edition printed by the French Government. Students of the Neo-Impressionists may read Charles Henry's *Cercle chromatique* and *Rapporteur esthétique,* both of 1888, which were central documents in the evolution of Seurat's and Signac's Neo-Impressionism, and which were known to many other artists. Birren's copy of the *Rapporteur esthétique* is signed by both the author and publisher. Moses Harris' extremely rare *Natural System of Colours (ca.* 1776), distinguished by a beautiful color wheel hand tinted over engraving, is included, as is J. B. Corneille's *Les premiers éléments de la peinture pratique* (Paris, 1684), from which a series of palettes bringing sense and order to color compositions was adopted by most of the leading artists.

Along with his library and funds to add to it, Faber Birren has also given to the Art Library the fruits of his recent interest in the ways that artists' palettes were represented in paintings. This unique photographic archive contains records of over two hundred and fifty examples from museums and private collections all over the world, accompanied by verifications of the colors on the represented palettes according to a standard color scale. It is the largest

known photo-archive of this type and offers important iconographical information, such as the role of painters' apprentices in mixing colors. Mr. Birren has arranged to make this available to other institutions in photocopy.

Professor Herbert is at present working on an annotated bibliography of the Faber Birren Collection and this, along with detailed information concerning the archive on artists and their palettes, will be published soon.

(From the Yale University Library Gazette, January, 1974, *48*, 211-212. By Robert C. Kaufmann, Art and Architecture Librarian.)

ISCC BOARD POLICY ON DUES

The following procedure concerning dues was formulated and approved at a recent meeting by the ISCC Board of Directors: To comply with the By-Laws, first invoices will be sent out on February 1, showing the usual due date of April 1. A carbon copy will be stamped FINAL NOTICE and sent out four months after the due date, on August 1. All members whose dues are not received by October 1, six months past the due date, will be dropped automatically.

Between six months and one year after the due date, members may be reinstated on request with payment of dues plus an extra charge of $1.00 for membership list expenses. Reinstatement is taken to mean no more than current individual membership status. Back *Newsletters*, if desired, must be purchased as described below.

Members whose dues are more than one year delinquent cannot be so reinstated but must reapply for membership and receive Board approval.

Back *Newsletters* will be supplied by the Secretary on request (to anyone) for a charge of $5.00 for up to three, or $10.00 per year's issues. Extra items such as symposia proceedings will be supplied at the same cost as to nonmembers.

The above policy was approved for publication in the next *Newsletter* and at least one more (This one. Ed.) prior to next April 1, and to become effective on April 1, 1974.

Members on the current delinquent list will receive one more notice, then be dropped 60 days later if the dues have not been paid. Otherwise, the provisions of the new policy will apply.

The Board adopted a new policy for dues for foreign members: Members residing in countries other than the United States, Canada, and Mexico, shall pay dues of $15.00 per year including air mail delivery. This policy was approved to be effective April 1, 1974, replacing the present air mail option, which was requested by only 12 out of 62 foreign members.

DUES INCREASE NECESSITATED FOR 1975-1976

At its meeting on February 8, 1974, the Board of Directors of the Council reluctantly recognized the necessity of increasing member-body and individual member dues at the end of the coming year, in order to maintain a balanced budget in the face of rising costs. For the year 1975-1976 (that is, the payment due on April 1, 1975, one year from this spring), the dues for individual members will be $15.00 per year (with a surcharge of $5.00 for overseas members to defray the cost of air mail delivery, for a total of $20.00), and the member-body dues will be $75.00 per year.

CHANGES IN DUES POLICIES FOR OVERSEAS MEMBERS

At its meeting on February 8, 1974, the ISCC Board of Directors passed two motions affecting dues payments and *Newsletter* delivery to overseas members of the Council.

An earlier motion was reaffirmed to the effect that all overseas mailings of the Council, including the *Newsletter*, meeting notices, and others, whether to individual members or our colleagues in the AIC, will be sent by air mail rather than sea mail, beginning April 1, 1974. As noted in *Newsletter* No. 227, dues for overseas individual members have been set at $15.00 for 1974-1975, reflecting the cost of this service.

It was also moved that overseas individual members can pay their dues in the currency of their country, in an amount equivalent to $15.00 U.S. at the rate of exchange current at the time of payment.

NEW MEMBERSHIP LIST TO BE PREPARED

All those receiving the *Newsletter* are advised that the Secretary's Office will prepare and issue a new membership list in the late spring. Work on this will begin immediately after the annual meeting, and a deadline will then be set after which no further changes can be made for inclusion in the 1974-1975 membership list.

Chairmen of member-body delegations are urged to be sure that the Secretary is informed of the correct names, addresses, and voting status of their delegates, and the correct names and addresses of their liaison officers and journal editors, if any.

Chairmen of problems subcommittees are likewise urged to provide the Secretary with an up-to-date list of the membership of their subcommittee immediately after the annual meeting. While there is no requirement that subcommittee members belong to the Council, these chairmen are reminded that we do not publish addresses of subcommittee members who are not Council members.

All those receiving the *Newsletter* are urged to anticipate if possible any changes in address contemplated, so that the new list can remain reasonably correct for at least a short time.

REPORT OF PROBLEMS SUBCOMMITTEES

Subcommittee on Problem 7 "A Survey of American Color Specifications – 1974"

This fifty page report is an updated revision of the 1955 report. Several new sections have been added, including an alphabetical listing by title and subject with extensive cross-referencing. The price of the report has been set at $5.00 a copy.

Subcommittee on Problem 25P – Literature Search

Subcommittee on Problem 25P has completed its literature search on procedures for strength evaluations of colorants, both dyestuffs and pigments. This compilation took several years to complete but is probably the most extensive reference library that can be found. Many articles are unobtainable in most areas, and many one-of-a-kind translations are included. This several hundred page report is available at $25.00 a copy.

Survey of American Color Specifications (1974), Table of Contents

I. Systems of Color Specification:
  A. The 1931 CIE (formerly ICI) standard observer and coordinate system for colorimetry,
  B. Munsell System,
  C. Ostwald System,
  D. Other prominent methods of color specifications with material color standards
II. Reflecting Color Standards:
  A. Systematic collections with relatively complete coverage of color space
  B. Collections with abridged or regional coverage of color space
  C. U.S. Government Standards
III. Transmitting Color Standards
IV. Standards According to Issuing or Specifying Organizations
V. Standards and Methods of Test Classified According to Material
  A. Agricultural Products
  B. Ceramics and plastic (opaque and semi-opaque)
  C. Ceramics and plastics (transparent)
  D. Chemical tests
  E. Drugs and pharmaceuticals
  F. Dyes
  G. Electric and electronic
  H. Light sources
  I. Oils and fats
  J. Paint finishes
  K. Paper
  L. Pigments
  M. Textiles
  N. Miscellaneous
VI. Color Codes
VII. Standards & Methods of Test Listed Alphabetically
VIII. Appendix
  A. References for sections 1 through 5
  B. List of abbreviations used in the report

To obtain your copy of either report send a check for $5.00 for the Problem 7 Report of $25.00 for the Problem 25P Literature Search to:

Robert F. Hoban
Problems Committee (Colorants) Chairman
c/o Sandoz Colors & Chemicals
Route 10
East Hanover, New Jersey 07936

Meeting – Problem 33

Alexander E. Styne, Chairman of Sub-committee on Problem 33: Human Response to Color reports preparations for an interesting agenda for the New York meeting on April 29 at 9 a.m. Ms. Pat Musick of the Dept. of Psychology, Cornell University, will report on the study of "Effects of Spectral Differences in Illumination on Fatigue" on which she worked as one of the original investigators with Drs. Maas, Jayson and Kleiber. Through the cooperation of Mr. Luke Thorington, Vice President, Engineering, Duro-Test Corporation a film documenting the study will be shown. Mr. Robert Spiegel, A.I.A., Research Architect, U.S. Navy, will describe the methodology of a study conducted by him on "Environmental Media Design". Dr. Eugene Sucov, Manager, Behavioral Research, Westinghouse Corp., will discuss a methodology for the study of color as behavioral factor.

BRITISH COLOUR GROUP

Editor's Note: There were no reports from the British Colour Group for meetings numbered 95 and 96. These were special meetings not in the format of those reported here. R.W.B.

Report of the 97th Meeting in October, 1973: Report on the York AIC Meeting of July 1973

At the AIC Congress in York over 100 lectures and papers were presented. At the C.G. meeting speakers were unable to make detailed comments or cover all the papers, and this report is necessarily still more condensed. Proceedings of the Congress will be published by Adam Hilger in November.

Dr. B.H. Crawford spoke about the survey lectures at the plenary sessions. Mr. Peter Gibson's outstanding lecture on stained glass in York, the excellent presentations by Hunt (colour reproduction), Lythgoe (colours underwater), and Marre (acquired colour deficiencies), and the tributes to the late Dr. Judd by Nickerson and Wright, were all appreciated. Some doubts were expressed about the lack of reference to early work by Wyszecki (colorimetry), about the undue importance attached to colour atlases by Indow, and about medical methods in research (Marre).

Dr. P.W. Trezona reported on papers on colour vision. Moreland's anomaloscope attempted to improve detection of tritanopes by selecting the best blue and green wavelengths to match cyan. Hasegawa introduced a new technique for binocular fusion of white and coloured lights. Cavonius examined the improvement of wavelength discrimination by luminance differences. Palmer showed the specific effect of green light on the red droplet cones in the pigeon retina. Walraven attributed adaptive hue shifts, due to red surrounds to a red-green mixture, to entoptic light scatter.

Mr. J.B. Hutchings, on the colour difference papers, mentioned those by Pointer, showing colour discrimination to be independent of white light adaptation; by Kuehni on the special significance of 495 and 570 nm in colour vision;

by Billmeyer on the fractionation of Munsell chroma steps down to commercial tolerance sizes. Possible colour space modifications were a linear change in V* (Eastwood), and a logarithmic luminance scale for UCS (Kowaliski). Witt recalculated data for DIN 6164 colour samples from Illuminant C to D65. Use of the Adams-Nickerson formula was discussed by Cichowski, McLaren, Richter, Coates et al, and Morley, Munn and Billmeyer. Jaeckel et al produced information on the consistency of assessors' judgements of commercial matches. In discussion there was much adverse comment on colour difference formulae and the way they were obtained.

Dr. F.J.J. Clarke discussed the colorimetry sessions, starting with his paper and Dr. Trezona's on large field tetrachromacy, for which colour matching functions have been reported for the first time and shown to agree well with CIE 10° data. On fluorescence measurements in textiles, Coates et al found systematic errors in several instruments, while Berger recommended broad band irradiance with monochromatic view as adequate for most commercial purposes. Baba and Sengoku concluded that the 2-mode method (also discussed by Simon), with one monochromator and broad band and monochromatic illumination, was required. On white standards there were papers by Erb and by Terstiege. Bentley described as standardizing system for use with digital-incremental spectrophotometers, a method with little apparent advantage. Christie used diagnostic reflectance standards to eliminate systematic errors in colorimetry. Regarding the use of the ceramic standard tiles, Clarke gave recent goniophotometric data, while Malkin discussed the unacceptable spread of measurements obtained in the international comparison of instruments.

Dr. D.A. Palmer, on the colour rendering papers, mentioned Ouweltjes' optimistic view of the CIE method, Walter's interpolation tables for reference illuminants, and the use of a dual index by Halstead et al. Morley et al found difficulty in correlating visual assessments and index when using mercury lamps. Garrett's paper on the colour rendering requirements in dental hospitals was the only contribution from a user.

Dr. C.A. Padgham reported on colour scaling, including Rowe's paper and his own with Rowe on hue and saturation scaling, where particular difficulty was found in placing brown in the hue scale. Another experiment with many observers was that of Zollinger on naming of colours. Bartleson showed observers to fall into 4 classes in their brightness scaling. The dependence of saturation of luminance was demonstrated by Mattiello & Guirao, and McConnell revised the neutral axis in Glasser cube root space to help assessments of near white paper samples. On colour memory Lakowski showed the relation of age to performance in the BCMT, and Battersby described the acute memory for flower colours, assisted by colour names, among some horticulturalists. The subject of gloss needs better terminology (Seve); measurements were reported by Thielert and by Hardnagy et al.

Mr. F. Malkin emphasised the welcome increase in sharing of technical data between industries, as shown in the papers on colorant formulation and whiteness. Anomalies still exist in the determination of the K and S constants; these will probably be required in the pharmaceutical industry (Bridgeman & Fairbrother); they have been applied to meat (McDougall) and to ceramic tiles (Dinsdale & Malkin). Computer colour matching of printing inks now uses a 2-layer method (Allen), while multi-component fabrics offer special problems (St. John). Thompson & Waller described the methods used to control colour in batches of pigment. Wool as a substrate was used by Seltzer & Janes in a predictability study, also by Powell et al, while Coates et al found the measurement of Z useful for classifying the whiteness of wool. Undertone in white pigments was discussed by Blakey, and by Volz. "White space" was defined experimentally by Grum et al.

Miss B.K.A. Battersby reported on colour applications, referring to Little's model for relating colour perception to colorimetry, to Lakowski's inconclusive study of the Luscher personality test, and Deribere's views on possible relations between the perception of colour, sound, taste and smell. Wildblood made an urgent plea for an international institute of colour. For colour education, a new colour circle was proposed by Gerritsen, and a series of teaching charts by Verity. Granger noted that views on colour harmony and discord are variable with time. Walker concluded this session with a fine display of slides showing the use of colour by artists in the last 100 years.

S.T.H.

The second part of the meeting was devoted to reports on three CIE international committee meetings which took place in London after the AIC Congress.

The first report was given by Dr. R.W.G. Hunt on the meeting of TC-1.3 Colorimetry which lasted for two days. The work of this committee had been organised so that there were five international sub-committees studying degree of metamerism, colour difference formulae, whiteness, chromatic adaptation and terminology respectively. These sub-committees carried out their work by correspondence and meetings when necessary. Reports from these sub-committees were presented at the TC-1.3 meeting but Dr. Hunt said that since his time was limited, he was only going to deal with colour difference formulae as he felt that significant progress had been achieved on this subject.

Dr. Hunt reviewed the work to date on colour difference formulae pointing out that it was not possible to derive a simple formula in terms of the x, y, z system. The 1964 U* V* W* formula was meant to be simple and similar to other formulae in accuracy and to promote uniformity in practice. It had failed to achieve this aim partly because it was misunderstood and the colorants industries had expected it to be more accurate than other formulae for all colours. When it proved not to be so, these industries had decided not to use it.

Recently the ANLAB 40 formula had been incorporated in some international standards which produced an unfortunate situation where the CIE recommended one formula and ISO used another which did not have international agreement on it. The CIE committee were reluctant to use ANLAB 40 as it stood because it used very complicated functions of X, Y and Z. They decided to investigate a modified version of the equation as given below:

$$L^* = k_1 \left(\frac{Y}{Y_w}\right)^{\frac{1}{3}} - k_2$$

$$a^* = k_a \left[\left(\frac{X}{X_w}\right)^{\frac{1}{3}} - \left(\frac{Y}{Y_w}\right)^{\frac{1}{3}}\right]$$

$$b^* = k_b \left[\left(\frac{Y}{Y_w}\right)^{\frac{1}{3}} - \left(\frac{Z}{Z_w}\right)^{\frac{1}{3}}\right]$$

Values of k_1, k_2, k_a and k_b were to be selected so that the numerical values obtained approximated to those of the ANLAB 40 equation. L* might be made equal to W* as it was a good approximation to the value function of ANLAB 40.

TC-1.3 hoped that colorant users would use the new formula which meant that the CIE would have two formulae on its books as the U* V* W* would not necessarily be abandoned. Dr. Hunt emphasized that while it would be possible to plot a* against b* and thus obtain a kind of chromaticity diagram, this would *not* be a colour mixture diagram as is the case for the u, v diagram.

The next report was given by Miss M.B. Halstead on the TC-3.2 Colour Rendering Committee meeting. The work of the committee since the Barcelona meeting in 1971 had been limited and the main progress had been the setting up of an international sub-committee to study the colour reproduction properties of light sources in the fields of colour printing, colour photography and colour television. This sub-committee had recently held its first meeting and planned a programme of work which would probably start by concentrating on the television aspects. Other topics of immediate concern were colour adaptation, where the work of the sub-committee of TC-1.3 was important, and colour preference where it was suggested that a preference index similar to the colour rendering index should be developed. Modifications to the general colour rendering index were also being investigated such as the inclusion of fluorescent colours, extension of the range of samples and the use of the new colour difference formula. Finally, Miss Halstead said that the second edition of CIE Publication 13 was expected to be published very shortly.

The third committee to meet in London use TC-2.3 Photometric Characteristics of Materials and the report of this meeting was given by Mr. J.A. Keitch. The deliberations of the committee lasted for nearly two days and most of the time was spent discussing the draft document on "The Radiometric and Photometric Characteristics of materials and their Measurement". A number of amendments and revisions were made and the document was being prepared in three languages for presentation to National Committees.

The other work of this committee was again divided among sub-committees dealing with fluorescence, poloarisation, turbid media, gloss and ageing. The fluorescence sub-committee had produced a proposed terminology and the responsibility for this committee was now being taken over by Mr. F. Grum of the U.S.A. The polarisation sub-committee had submitted a report dealing with an optical polarisation bibliography, definitions and mathematical representation of polarised light, the determination of polarisation in optical instruments and its metrological implication and polarisation effects in detectors. No definite report was received from the turbid media sub-committee but the original state-of-the-art report presented at the previous meeting would be published shortly in the Journal of Color and Appearance. The sub-committee on gloss had not yet been activated but a programme of preliminary investigations had been planned. Finally, after lengthy discussions on the work of the sub-committee on the ageing of materials, it had been decided that the scope was far too wide to be useful and this sub-committee had been disbanded until such time as some specific problems were raised.

M.B.H.

Report of the 98th meeting in November, 1973: International Symposium on Recent Advances in Colour Vision Deficiencies, Edinburgh. 28-30 June 1973. Report by Messrs Hill and Yorke

Dr. Hill simplified the problem of condensing such a conference by dividing the papers into four groups.

(1) *Limitations of current tests*

Following the invited paper by P. Aspinall in which emphasis was placed on the current limitations of our investigative techniques, Cox explained how her studies on confusion lines of dichromats and anomalous trichromats had been used to redesign some pseudo-isochromatic plates. Moreland showed how errors were introduced by the redesign of the Nagel anomaloscope. (Models I and II)

(2) *Extrinsic factors*

Verriest had investigated the effect of progressive adaptations on anomaloscope settings by normal observers. Schmidt reported similar variations in dichromats over periods of a few days. Lakowski suggested that the variations with age found in the 100 hue test might be cognitive rather than physiological. Jameson reported induced temporary dichromatism in normal persons with flicker at 5 to 10 Hz. Ronchi showed how spectral sensitivity varied with exposure time and eccentricity.

(3) *New instrumentation*

Zanen's photometer which used gratings determined chromatic and achromatic thresholds, thereby distinguishing different types of colour vision. Roth described a fibre optics anomaloscope with dichroic filters which extended the luminance range. Interference filters featured widely eg Moreland's anomaloscope and Eichengren's. Hadin's pupillometer allowed the differentiation of protan and deutan defects by measuring the pupillary spectal response.

(4) *Special problems*

Moreland's investigation of macular pigment depended on the choice of blue and green instrument stimuli which were equally affected by pigment. Bailey investigated the spectal neutral points in dichromats. Voke used the 2nd Stiles-Crawford Effect to distinguish various defects.

Mr. Yorke then presented the second half of the report.

Pickford and Cobb's amusing paper about personality defects and colour vision revealed that colour-defective persons were more neurotic, extroverted, and aggressive than might be expected. Paulson was concerned to detect naval personnel who might not properly distinguish colour-coded consoles in US ships. Scheibner proposed a matrix showing the relationship between matches made by normal and defective persons. This was criticised by Ruddock as contrary to fact. His own model explained protanomaly either as a reduction in red cone pigment or by adulteration with some green pigment. Hurvich disagreed, and suggested a cause at a higher neural level. Ball wanted a convention in spelling and classification to resolve some of these difficulties.

Robbins, Zwick and Hole had impaired the visual activity of monkeys with brief laser flashes. Sperling had induced dichromatism by more prolonged exposures. Weale had searched, without conclusive evidence for the red vision which has been reported after cataract entractions. Verriest also found no marked effects in the colour vision of aphakics. Lakowski showed that the pupil diameter had some effect on colour vision tests. Foulds simulated glaucoma by pressing on the eye and thereby affected colour vision temporarily.

Francois was trying to locate the colour vision gene on the Y chromasome, with no clear result. Cobb had found a bimodality in the responses of normal persons when asked to locate unique green in the spectrum. Verriest found that carriers of defects were significantly affected. Marré found measurable tritan defects induced by contraceptive pills.

This was a very successful conference, one of whose important acts was to propose a formal constitution for an international group on colour vision deficiencies.

Macular Pigment and Chromatic Aberration by Prof. R. A. Weale and Dr. V. M. Reading

Professor Weale reminded the audience that as the human eye was uncorrected for chromatic aberration, even an emmetrope was myopic by about 2D for violet light. First he disposed of the theory that macular pigment was a post-mortem artefact, quoting Ruddock measurements. Walls had suggested years ago that the yellowness might reduce the efficacy of the out-of-focus violet light, but until the advent of computers the extent was difficult to evaluate.

Professor Weale proposed to design the ideal pigment for the suppression of chromatic aberration, by making several assumptions. Tλ variations must be a minimum, total transmission a maximum, and the intensity of the blue circles must be reduced below a certain threshold. The computer then threw up an interesting ideal curve which vaguely followed the transmission of the real pigment. However if the transmission due to the lens were included in the computation, the fit between fact and theory was much improved. Professor Weale stressed that his real and ideal curves were on the same absolute scale. He concluded by suggesting it would be interesting to compare the visual acuities of Ruddock's observers with minimum and maximum amounts of pigment.

Discussion

In spite of the small audience, a lively discussion ensued. Professor Wright volunteered the addresses of Ruddock's subjects. Dr. Clarke suggested that the brain was the main organ in the suppression of chromatic fringes, quoting his experiences with new spectacles, the fringes were first very apparent but disappeared after a few days. Professor Weale thought this a hypothetical explanation, whereas the existence of the pigment was a fact. Another speaker suggested the pigment could hardly suppress the blue light below the threshold otherwise we could not see blue. The various contributors agreed it would be interesting to study subjects with different amounts of pigment.

Report of the 99th Meeting held in December, 1973

The Hunterlab D25D3 Colorimeter by Mr. M.B. Lloyd

Malcoln Lloyd prefaced his talk by stating the objectives R.S. Hunter worked to when he designed his first D25 tristimulus colorimeter in 1958, namely, that the D25 should have 1) good precision for *colour-difference* measurements, 2) accuracy adequate for many problems of *colour* measurement, and, 3) direct read-out of appearance related dimensions. The D25D3 Colorimeter maintains the original design concepts of the optical head separate from the measurement unit and a four-filter system: two for the x function and one each for the y and z functions of the Standard Observer. Silicon diodes now replace the photoemissive diodes of the original D25's. The measurement unit displays the three colour scale values simultaneously and includes a digital memory for the direct computation of colour difference values. The memorised colour values of a standard can be recalled at any time. Hunter 1958 L,a,b scales and CIE X,Y,Z scales are read-off direct, with other alternative scales, such as Anlab and CIE Y,x,y available by replacing analogue circuit boards. Further, single-figure indices, such as Whiteness Index, Yellowness Index, Tomato Colour, can also be displayed. The three colour scale values can be sequenced automatically to a data processing system via the instrument's BCD 24 bits output. As with other models of the D25 (D25D1 and D25D2) the four types of optical head offer various illuminating and viewing conditions for the variety of products encountered. Sample apertures vary from 10 cm. to 0.5 cm. A set of calibrated colour standards is provided.

Discussion: Dr. Crawford asked about the precision specification of the instrument. This is given by the manufacturer as follows: repeatability (same sample, same instrument) is to a standard deviation of 0.1 SCALE UNIT. Reproducibility (same sample, different instrument of

same type) is to a standard deviation of 0.3 SCALE UNIT. Dr. Clarke pointed out that the colour temperature of Quartz-halogen lamps, as used with the D3, could change if the lamp's orientation is changed, as when the optical head is used in the inverted position. The speaker has since commented that such a change is noted by a change in the L values of the yellow and blue calibrated tiles and that by adjusting the lamp voltage these values can be restored. Further, if necessary, the amber-blue ratio of the "a" scale can also be easily adjusted.

Mr. A.R.L. Ross of SIRA Institute, gave a short talk at even shorter notice about a *Large Area Colorimeter* which he has been working on.

An experimental prototype of a large-area reflectometer/colorimeter was described, having an instantaneous field of view about 250 mm diameter. The apparatus had a (0°; 45°) geometry, and utilised laminated glass filters and Si cells to provide C.I.E. tristimulus outputs. Experimental evaluation had shown the output stability of the prototype as better than 0.1% of a measured (high) luminous reflectivity, over a period of hours. The device has been used on a number of industrial samples, the most probable application being in the area of decorative printed products. Experiments have shown that for a number of simple designs of wallpaper (such as simulated wood grain) a simple measurement of luminous reflectivity may be useful for quality control. The prototype could thus be developed into an on-line shade monitor. Sira Institute would welcome discussion with potential manufacturers and users.

The new ICI colorimeter and colour difference meter, by Mr. A.C. Perry, Instrumental Colour Systems

Tony Perry then told us about the new colorimeter which they have developed in conjunction with the Fibres Division of ICI, to meet their exacting specification.

This new colorimeter is the result of 3 year's development by the Fibres Division of ICI, to their specification which included accurate and reproducable measurement of samples ranging from polymeric sheet and granules to fibre stock to finished goods. The nature of this range demands good performance at low reflectance levels and also the ability to quantify fluorescence and hence measure the efficiency of optical brighteners. As part of plant control procedure in factories it was also necessary for the instrument to be robust, reliable and simple. A further requirement was that the design should be computer compatible, and a computer version of it is the Colour Difference Meter.

This was not an easy specification. Looking at this range of samples gives rise to inherent problems with scattered light, polarization, surface structure and sample size. The basic design incorporates a miniature fluorescent tube (with BS 950 Pt. 1) as the light source which provides a diffuse source giving cool running and a high luminous efficiency. This permits the measurement of heavily structured samples as well as having sufficient illumination to measure samples down to .5 cm. Measurement of fluorescent or optically brightened samples is carried out in conjunction with stable fluorescent standards developed by ICI.

Two additional filter stations on the Colour Meter permit measurement of u.v. reflectance and fluorescent field. The filter for XYZ (or RGB) are mounted in an hexagonal turret which rotates about the measuring photocell. The overall geometry of the instrument conforms to the CIE 45° l11 0° viewing specification. The use of a special acrylic film permits the removal of u.v. content of the daylight source when required.

The complete illuminator, sample platform and filter is demountable from the colorimeter and in the standard instrument can be used remotely in any required position up to 12 feet away from the instrument. The electronics are all of modular integrated circuit design and may be easily exchanged for service or repair. The output of the photocell, after amplification, is displayed digitally. Each channel has independent controls for the adjustment of the zero and 100% point, and these are adjusted using a known low reflectance sample for the zero point and a known white for the high reflectance. Subsequent measurements are made by placing the sample over the measuring head and reading the appropriate values of the display.

At the outset the colorimeter was made computer compatable and there are a variety of external devices to which it can be connected. Of particular interest is the ICI Colour Difference Meter, which uses the colorimeter and an on-line computer. In use the computer controls all the functions of the colorimeter; having extracted the tristimulus values automatically the instrument then accepts data from the sample and displays the colour difference between the pair. Two models are available "LAB" and "LSH". The LAB displays total colour difference according to the ANLAB 40 formula and allows the operator to apportion the total colour difference into lightness and a difference in "a" and "b" Model LSH portions the total colour differences into saturation and a difference in hue.

COLOUR GROUP BIBLIOGRAPHY

At its meeting on February 8, 1974, the Council's Board of Directors voted to resume publication of the British Colour Group Bibliography as a supplement to the *Newsletter,* effective at once.

The first 300 entries in the Bibliography were published as a supplement to the *Newsletter* in May, 1971. A few copies of this compilation are still available and can be ordered from the Secretary at a prepaid cost of $1.00 to cover handling.

Entries 301-911 were printed in the Journal of Color and Appearance. For those not receiving this journal, the Secretary can supply a photocopy of this portion of the Bibliography at a prepaid cost of $5.00 to cover preparation and handling.

A supplement to the *Newsletter* has been prepared for inclusion with this issue, bringing the Council's reprinting of the Colour Group Bibliography up to date. Future issues of the *Newsletter* will continue the publication. Extra copies of this supplement are available at a prepaid cost of $1.00 to cover handling.

Fred W. Billmeyer, Jr., Secretary

A CALENDAR FROM JAPAN

Editor's Note: In the interest of supplying more information from Japan, the following notes were excerpted from a very artistic calendar received recently. R.W.B.

Words of Greeting

We are proud to present you with this calendar for the year of 1974. As a sequence to the prize-winning calendar for last year with the theme of natural history we took upon "Homage to Man" as the theme for this year. We are confident that today, when the loss of humanity is the subject of serious discussion everywhere, the powerful images of men explored and visualized by a sincere artist will be the source of encouragement to you in your daily life whenever you look up this calendar.

Yasuhiro Takahasi
President, Dainichiseika Color and Chemicals Mfg. Co. Ltd., Japan

On Homage to Man

In these days when life expectancy is much longer than it used to be, It should not sound odd to talk about an artist who died at the age of fifty that he died prematurely. Tatsuya Nakamoto was precisely fifty-one years old when he died. In 1959, when he was as young as thirty-seven, he was awarded the first Mizue Prize and the third Yasui Prize, both highly prestigious awards in Japan, and he emerged as a hope for the new realist school. His works at that time were an expression of restrained energy, and he symbolized in the expressions of animals, especially in their eyes and mouths, the feelings of the generation that had experienced the war as it led the life of the post-war period. Since 1963 he turned to the task of stirring up the nature within man, and kept on drawing the images of man as if he were trying to return the conflict between artifacts and nature to the point of its origin. Graphic designer Mitsuo Katsui worked on the drawings of Nakamoto in the form of a group of people which becomes larger and larger every month on the calendar. What is offered here is the image of a forum of liberation full of dialogues that has yet to be realized.

Masaomi Unagami

Personal History of Tatsuya Nakamoto

1922, born in Yamaguchi Prefecture.

1938, Entered Tokyo Industrial Technological School (present Shibaura Industrial College). Transferred to The Imperial Academy of Arts (Tiekoku Bijutsu Gakko) for pursuing the study of painting.

1943, graduated from The Imperial Academy of Arts. Drafted right after graduation and went to the front of Northern China.

1945, end of World War II. Worked on stage setting and the following year, became in one of the organizers of Tokyo University Theatre Workshop.

1951, awarded the most excellent artist prize for his work first exhibited at The Exhibition of the Society of Free Artists (Jiyubijutsuka Kyokai).

1952, was proposed to a member of Society of Free Artists.

1956, on founding Toei Animation, produced the shadow picture of "Princess Shakundara" with the cooperation of Theatre Pupee.

1959, awarded the First Mizue Prize for "Black Current" at the Exhibition of Mizue Artists in June. Also in September, won the Yasui Prize at the Third asui Prize Exhibition. The Prize winning work "Group" was bought by the National Museum of Modern Art, Tokyo. Showed the work at the Central and South America's Travelling Exhibition.

1960, the first one-man show at Ginza Kimura Gallery. Showed at The Asahi (Publishing Co.) Excellent Art Exhibition. The Mainichi (Publishing Co.) Modern Art Exhibition, The International Exhibition of Art Figurative, etc.

1961, showed at the Mainichi (Publishing Co.) Interna- Exhibition. The second one-man show at Daimaru Gallery in Tokyo.

1962, showed at the Mainichi Modern Art Exhibition and held the third one-man show at Kansai Gallery in Osaka. One-man show of etching at Form Gallery on Osaka.

1963, withdrew from the Society of Free Artists. Held exhibition of sketches and little works at Kokusai Gallery, Ginza. Travelled in Europe. Impressed by Romanesque Sculptures in Italy.

1967, the first one-man show after coming back to Japan, at Ichibankan Gallery, Ginza. Published collected works "The Walls that Remain."

1968, exhibited at Japan Art Festival. Invited to show at the 6th Tokyo Biennale of International Print Show. Had "Man-Fragment" Exhibition at Ichibankan Gallery, Ginza.

1970, published "New Introduction to Art – The Cursed Beauty" from Sanseido Publishing Co., Tokyo.

1972, produced the relief "Voices of the Rocks" on the wall surface of the Mt. Nokogiri in Bosco Peninsula. Became professor, Oil Painting Dept. of Tama University of Fine Arts.

1973, held show of his representative works up to the work "Voices of the Rocks" at Tokyo Central Museum in June. Had "Tatsuya Nakamotor Homage to Man", collected works published from UNAC Tokyo. Died of a brain tumor (the 22nd July). Motion picture in color (16mm) entitled "Homage to Man – The World of Tatsuya Nakamoto" was produced for his memory. (camera: Yasuhiro Yoshioka. music: Toshi Ichiyanagi. poem: Ikuya Kato)

Japan Color Research Institute Visited

C.J. Bartleson was in Tokyo recently, and visited the Japan Color Research Institute.

The Institute is a general color research organization founded by the late Dr. Sanzo Wada. Their principal research is concerned with standard color chart systems, colorimetry, color specification systems, color chemistry,

color psychology, and color harmony. In application fields, they have made a study of the development of various color instruments and color charts, and have made a number of color surveys. They have also provided information, technical services, and consulting advice on color in industrial and educational areas. Some of their activities have been described in past *Newsletters.*

In 1951, the JCRI initiated research in reproducing the color charts of the Munsell Renotation System, with the consent of the Optical Society of America and the Munsell Foundation. In 1963, they offered the completed "Munsell Renotation Color Book" to color research organizations in various countries of the world.

The Institute has two sections. One is the head office in Nishiazabu (Tokyo) which includes the General Affairs Department and the Design Department, and the other is the branch office at Kawasaki (Kanagawa Prefecture) which includes the Technical Department.

Mr. Bartleson first visited the branch office at Kawasaki. After touring those facilities, he then visited the head office. Mr. Bartleson observed the Japanese research organization making various scientific color cards like those of Munsell. Mr. Bartleson presented a lecture on Lightness Scales for about fifty members of the Color Science Association of Japan at the NHK hall in Tokyo on the evening before.

Dr. Genro Kawakami
Japan Color Research Institute
1-19, Nishiazabu 3-chome, Minato-ku
Tokyo 106.

SENSORY EVALUATION OF APPEARANCE OF MATERIALS (STP 545)

October 1972 yielded a two-day symposium on Sensory Evaluation of the Appearance of Materials which was jointly sponsored by ASTM Committees E-12 and E-18. The harvest of that symposium is now offered in a new Special Technical Publication by the same title and designated *STP 545.* Eleven of the thirteen original papers are included in this volume and will be of value to those seeking an answer to the question of how to properly assess the various elements of the visual appearance of materials. This includes measuring visual consumer responses. A list of the papers is given below.

Mechanism of Vision-A Review—J. A. Johnston, Jr., Georgetown University, Washington, D.C.

The Visually Perceived Attributes of the Appearance of Materials and ASTM Progress Toward Their Instrument Measurement—R. S. Hunter, Hunter Associates Laboratory, Fairfax, Va.

Product Appearance as Communication—C. J. Abend, SCM Corporation, Syracuse, N.Y.

The Connotative Meaning of Visual Properties of Surfaces—C. A. Burnham and C.T. Grimm, University of Texas, Austin, Tex.

Obtaining and Summarizing Subjective Impressions for Correlation with Analytical Measurements—M. G. Whitcomb Jenkins, E. I. Du Pont de Nemours, Wilmington, Del.

Concepts and Applications of Multidimensional Scaling—M. Wish, Bell Laboratories, Murray Hill, N.J.

Color Evaluation of Foods—Correlation of Objective Facts with Subjective Impressions—A. C. Little, University of California, Berkeley, Calif.

Relationship of Instrumental Measurements to Visual Impressions of Potato Chip Color—J. N. Yeatman, HEW, Food and Drug Administration, Washington, D.C., and B. B. Aulenbach, U.S. Department of Agriculture, Beltsville, Md.

On the Measurement of Judgmental Responses to Multiattribute Marketing Stimuli—P. E. Green, University of Pennsylvania, Philadelphia, Pa.

Appearance: Likes and Dislikes—E. P. Rubacky, Access, Inc., Bethesda, Md.

Subjective Scaling of the Appearance of Tissue Smears—R. M. Pickett, Harvard School of Public Health, Boston, Mass.

Publication Code Number 04-545000-36 STP 545, 200 pages, hard cover, $19.75; ASTM Members allowed a 20% discount; please give member number; 5% foreign shipping will be added as will local sales tax.

American Society for Testing and Materials
1916 Race Street
Philadelphia, Pennsylvania 19103

LETTERS TO THE EDITOR

Re: Stamp Colors

A comment may be in order to the publication of "The Problems of Describing and Identifying Colors and a Philatelic Solution" by A. Lasis, York University, Downsview, Ontario, Canada, published on page 7 of *Newsletter 227.* Although I cannot find Mr. Lasis listed in the 1971 Directory, I assume him to be a member of ISCC and think he should be familiar with the result of years of work by council members, documented by "The ISCC – NBS Method of Designating Color and a Color Names Dictionary" published by the National Bureau of Standards as circular 553 in 1955. It would also be helpful to him – and many other members – to read "A Universal Color Language" by Kenneth L. Kelly published in Color Engineering, March-April 1965, and become familiar with supplement to circular 553, "ISCC – NBS Color Name Charts Illustrated with Centroid Colors". Reference is also made to "The Universal Color Language – A Working Tool for the Designer" by Alexander F. Styne published in the Construction Specifier, May 1970, and accepted by ISCC as a report by sub-committee on Problem 30: Color in the Building Industry.

With these documents he would find it easy to teach undergraduate students an established terminology for the description of colors in laboratory and other work and so avoid the invention of yet more color names expressing strictly individual feelings. Color guides for stamp collectors have indubitably their use as well as specific color communication systems in other areas of avocation and industry.

It would be more appropriate to teach undergraduates a common language of color applicable to any field they may engage in later.

Alexander F. Styne, A.I.D. – I.D.S.A.
Adjunct Professor of Electrical Engineering
University of Miami

Re: Stamp Colors

I read with interest the Note by A. Lasis on "The Problems of Describing and Identifying Colors and a Philatelic Solution," [J. CHEM. EDUC., 50, 355 (1973)]. I suspect that Mr. Lasis is unaware of the major advances that have been made in the national and international standardization of color names and the description and identification of colors. I would very much like to have seen him recommend a "Universal Color Language" for the further use of chemists, as indeed one is used by many chemists, other scientists in a wide variety of disciplines, designers, architects, artists, business men, etc. Such a language, using descriptive color names understood even by those not trained in color, was developed some years ago by the Inter-Society Color Council and adopted by the National Bureau of Standards. It is described, and its terms are related to those of many specialized, less readily comprehended, and less widely accepted "color guides" in NBS Circular 553, "The ISCC-NBS Method of Designating Colors and a Dictionary of Color Names," available from the Government Printing Office for a few dollars. For about the same price one can order a chart of about 250 internationally accepted color guide samples designated in the ISCC-NBS universal language, as Standard Reference Material No. 2106, from the National Bureau of Standards.

Fred W. Billmeyer, Jr., Secretary
Inter-Society Color Council
Rensselaer Polytechnic Institute
Troy, New York 12181

Reproduced with permission from J. Chem. Educ., 1973, *50*, 797.

BOOK REVIEWS

COLOUR 73 – The Second Congress of the International Colour Association held at the University of York 2-6 July 1973. A Halsted Press Book, John Wiley and Sons, New York, 1974. xviii + 566 pp, $39.95. Orders may be placed with The Halsted Press, 605 Third Ave., New York, N.Y. 10016.

Originally published in England by Adam Hilger, Ltd., and available as book proof at the "Colour 73" congress, this contains the complete survey lectures (nine) and long abstracts of the papers presented (107) at this second quadrennial AIC Congress.

Since the "Colour 73" meeting itself has not been reviewed in the *Newsletter*, I shall combine a review of the book with some comments on the meeting; because of the meeting format, reflected in that of the book, the two are not unrelated.

Two types of presentation were given at the second AIC Congress. The first was invited Survey Papers by noted experts. There were nine of these, the oral presentations lasting about one hour each, and they were, in my opinion, truly outstanding presentations. The written lectures are reproduced in full (more or less, according to the author's whim) in the book, and account for almost half of it (250 pages).

The second type of presentation was 15-minute contributed papers, given in two (in one instance three) simultaneous sessions. As might be expected, these varied considerably in quality, and the meeting suffered from the fact that one could attend only one of the two sessions; even going between one and the other was virtually impossible because of the distances involved.

Rapporteur sessions were scheduled in which the papers in a given session were summarized and then discussed. The idea here was that one could attend session A, and later the rapporteur session for B, thus getting partial coverage at least of all the papers. One soon found, however, that the summary and discussion in the rapporteur session was likely to be better than the original papers, so for subjects of interest it paid to attend both. Additionally, authors and session chairmen (of which I was both) were constrained to attend both original and rapporteur sessions, so my coverage of the meeting was somewhat limited. Unfortunately, there are no summaries of the rapporteur sessions in the Colour 73 book. This is a pity, since in some instances the heart of the topic was contained in the rapporteur discussion.

The abstracts of the contributed papers make up the rest of the COLOUR 73 book (280 pages). They vary in length from a half page to five-six pages, and in some instances the content of the abstract and the oral paper were quite different.

The following papers were of particular interest. They are covered in the order of presentation, which is not identical with the order of their appearance in the book.

E. F. MacNichol, *Colour Discrimination Processes in the Retina* (survey lecture), pp. 191-251. This was very well presented, and is an excellent survey of the retinal process of color vision. The written version is quite extensive.

P. L. Walraven, *Theoretical Models of the Color Vision Network* (survey lecture), pp. 11-20. Although Walraven can get quite theoretical, this was a fairly simple discussion, largely of his own theory of color vision. The written version is quite brief. It is interesting to see the extent to which the different types of color vision defects appear to provide much of the evidence on which decisions among color-vision theories are based.

Session B1 – Color Differences. Chairman, H. Terstiege; Rapporteur, G. Wyszecki.

B111. M. R. Pointer, *The Effect of White Light Adaptation on Color Discrimination*, pp. 283-286. This was an important paper, based on Pointer's Ph.D. thesis. It showed that color discrimination thresholds are essentially independent of the state of adaptation of the eye to *white* light over the range of (correlated) color temperature from 2000 to 6500 K, at least. This means that any color differ-

ence formula should work equally well for data calculated to any illuminant in this range. (This was announced, in advance of completion of the work, at Driebergen in 1971.) Adaptation to strongly chromatic lights such as red and blue did produce significant changes.

B113. R. T. Marcus and F. W. Billmeyer, Jr., *Step Size in the Munsell Color Order System. I. Preliminary Observations*, pp. 290-293. Paired-comparison testing of surface-color samples in the yellow-red to yellow near-gray region showed that the Munsell and MacAdam (FMC-2) spacings for value and for chroma were compatible over the range 0.25-2 value or chroma steps.

B114. D. Eastwood, *A Simple Modification to Improve the Visual Uniformity of the CIE 1964 U*V*W* System*, pp. 293-296. Eastwood used a V** = 1.5V* to get better fit to Munsell.

B115. K. Witt, *Farbmetrische Untersuchungen der Farbkarte zum Farbsystem DIN6164 für die Normlichtarten C and D_{65}*, p. 297. Paper and brief abstract in German. Witt gave a simple transformation (not in the abstract) shifting the DIN sample coordinates from Ill. C to Ill. D_{65}, and made some comments on the stability of the samples over 10 years.

B116. P. Kowaliski, *The Role of Luminance in Colorimetry*, pp. 298-299. This paper described a color space of u, v, log Y. The full paper is published in J. Color Appearance *2* (2).

B121. E. Coates, R. C. Kiszka, J. R. Provost and B. Rigg, *The Accuracy of Color-Difference Equations in Relation to Perceived Color Differences*, pp. 300-302. A further statistical study of existing data on small color differences by various equations led to the usual results. The study showed that (in Wyszecki's words) "the diversity of viewing conditions is perhaps the biggest single factor" leading to poor agreement.

B122. Dorothy I. Morley, Ruth Munn, and Fred W. Billmeyer, Jr., *Small and Moderate Colour Differences. II. The Morley Data*, pp. 300-307. In Wyszecki's words, while "it is gratifying to see (these authors) providing new data. . . . . the familiar poor correlations were rediscovered (while) one looked for some kind of encouragement through statistics." The paper did point out and emphasize the need for giving more serious thought to the statistical analysis of visual responses.

B123. M. Richter, *Further Investigations on the Relations between Different Color-Distance Formulae*, pp. 307-308. The paper showed again that (in Wyszecki's words) "there is no doubt that no universal factor exists" for converting from one equation to another.

B124. S. M. Jaekel, C. D. Ward, and F. Blackman, *Assessor Severity and Inconsistency Estimates from Duplicate Visual Pass/Fail Decisions*, pp. 308-311. Color-difference acceptability (pass/fail) data described at Driebergen were reanalyzed to provide measures of the severity of assessors.

B125. A. C. Cooper and K. McLaren, *The Practical Exploitation of the Adams-Nickerson Color Difference Equation*, pp. 311-312. The oral talk deviated completely from the abstract, being a description of a new ICI colorimeter.

G. Wyszecki, *Current Developments in Colorimetry* (survey lecture), pp. 21-53. A good sound survey, well represented by the written version.

R. W. G. Hunt, *Problems in Color Reproduction* (survey lecture), pp. 53-77. The lecture was excellent, particularly because of the demonstrations and visual aids. The written version, not having these, suffers by comparison though it is of high quality also. The differences among Hunt's six classes of color reproduction (spectral, colorimetric, exact, equivalent, corresponding, and preferred) became quite clear and meaningful when properly illustrated.

Session A2 – Colorimetry. Chairman, L. F. C. Friele; rapporteur, F. Grum.

A211. F. J. J. Clarke, *Needs and Prospects for a Tetrachromatic System of Large Field Colorimetry*, pp. 319-324. Largely a description of revisions to the NPL visual colorimeter; see comments to next paper.

A212. Patricia W. Trezona, *Tetrachromatic Color Measurement*, pp. 324-328. The problem described by papers A211 and A212 arises because of rod intrusion in large-field color matching, even at levels of illumination previously thought high enough to eliminate this contribution. The tetrachromatic technique, first discussed at Driebergen, accommodates this by requiring that two matches hold simultaneously: a low-illumination brightness match using rod vision and a high-illumination color match. The technique is difficult and just being worked out, and the consequences for industrial color matching are not yet clear.

A232. H. Terstiege, *Spektralphotometrische Unterschungen an Weisstandards*, pp. 340-341. In German. Mainly the behavior of pressed $BaSO_4$ and MgO as a function of time under all sorts of exposure conditions. The superiority of $BaSO_4$ was clear in all cases.

A233. George P. Bentley, *An Automatic Spectrophotometric Scale Reference System for Digital-Incremental Spectrophotometers*, pp. 342-345. The written text describes the system adequately. See also J. Color Appearance *2* (1), p. 13.

A234. F. J. J. Clarke, *Goniophotometry and Use of Ceramic Color Standards*, pp. 346-350. Description of the goniophotometric measurements and properties of these standards, issued by the National Physical Laboratory, Teddington, U.K.

A235. F. Malkin, *International Comparison of Instruments Using the Ceramic Standards*, pp. 351-352. The uncertainty in measurement among users of the (uncalibrated) NPL standards is about the same as that reported in the past for ceramics and other materials by myself and others.

J. N. Lythgoe, *Colors Under Water* (survey lecture), pp. 77-98. Interesting and well presented, but of less value to those outside the immediate field.

Marion Marré, *The Investigation of Acquired Color Vision Deficiencies* (survey lecture), pp. 99-105. This paper was excellent, and the written version is extensive and comprehensive.

Tarow Indow, *Color Atlases and Color Scaling* (survey lecture), pp. 137-152. Dr. Indow's important lecture seems to utilize mathematical concepts that are difficult to get across. The written version is unfortunately brief, but the list of references (70) valuable. There is no doubt that Indow is a leader in the field.

L. Gall, *Computer Color Matching* (survey lecture), pp. 153-178. This paper was excellent, but omits the latest point of view on turbid-medium theory, much of which is

quite new. The written version is good, but the outlook for improvements now seems to be better than the paper suggests with respect to the underlying theory.

Session B3 – Colorant Formulation. Chairman, F. W. Billmeyer, Jr.; rapporteur, E. Ganz.

B314. E. Allen and P. Hoffenberg, *Color Matching of Printed Ink Films,* pp. 429-430. The 3-layer model of paper, paper plus ink, and ink, described at "Color 69," was abandoned by omitting the third layer. The result is easier to handle but less accurate. Much of the paper was a description of how one calibrates the system.

B315. R. St. John, *A Computer Color Matching System for Multicomponent Fabrics,* p. 431. A model was developed allowing consideration of cross-staining in a 3-component fiber blend system. Matches are first calculated for each fiber separately, then modified to account for staining in an iterative procedure.

B321. D. B. MacDougall, *The Kubelka-Munk Scatter Coefficient for Fresh Meat,* p. 432. Descriptive, with mouth-watering slides illustrating the practical importance of S in determining appearance.

B323. Christine Thompson and A. G. Waller, *An Instrumental Approach to Practical Pigment Blending,* pp. 436-437. Since pigment batches are blended primarily to adjust hue and not strength, the weighting of spectral points in a computer color matching program was empirically adjusted, for each pigment, to place major weight at points sensitive to hue shifts – for example, in a red, those points on the steep portion of the curve.

B234. I. Seltzer and E. Janes, *Color Simulation – Tool for Dye and Process Selection,* pp. 437-439. Computer color match prediction is improved by adjusting the dyeing conditions to give better performance.

B325. K. Powell, R. Jesty, and M. Delaney, *Color Measurement and Match Prediction in the European Wool Dyeing Industry,* pp. 439-440. An extensive survey was made of the extent to which color measurement and computer matching are used in various European countries. The results were very interesting and too detailed to summarize. Unfortunately, they are not in the written abstract.

B331. F. Grum, R. F. Witzel, and P. Stensby, *White Space and the Tristimulus Weighting Functions,* pp. 442-443. The result of pair-comparison testing of whiteness preference were used to define the "white" region of color space.

B332. R. R. Blakey, *The Measurement of Undertone of White Pigments,* pp. 443-444. This paper dealt with the application of well-known instrumental undertone methods to the calibration of a visual scale and standards in use for many years. It was most interesting to hear how long-standing discrepancies got cleared up when the instrumental methods were adopted.

B333. Hans G. Völz, *Theoretische Untersuchungen über den Farbstich von Weisspigment-Russ-Pasten,* pp. 464-467. The paper dealt again with undertone, measured as R-B in terms of colorimeter filters, and its relation to particle size and distribution in white pigments. The abstract is fairly comprehensive.

There were three simultaneous sessions on the last day of the meeting: A4, Calculations and Instruments; B4, Color Applications; and C4, Color in Design and Architecture. A few notes from these sessions follow:

A411. D. Strocka, *Are Intervals of 20 nm Sufficient for Industrial Color Measurement?,* pp. 453-456. The answer seems to be yes, since other uncorrected errors (calibration – for example of the wavelength scale – metamerism, observer differences) produce color differences as large as those arising from use of 20-nm intervals rather than smaller ones.

A415. W. A. Thornton, *Illuminants and Color Vision,* pp. 490-492. This paper was very well illustrated with demonstrations showing the pleasantness and good color rendering of light sources with energy concentrated in three spectral regions near 450, 540 and 610 nm. Thornton's many recent papers (including J. Color Appearance *2* (1), p. 23) are centered on this surprising thesis. Obviously such light sources are poor for detecting metamerism, but they seem to be unusually good in many other respects.

If your interest has been stimulated by this brief and admittedly biased review of some of the events of the York meeting, then you will want to have a copy of COLOUR 73 for the complete record.

In addition to the survey papers and abstracts already described, COLOUR 73 contains two moving personal tributes to the late Deane B. Judd, written by Dorothy Nickerson and W. David Wright. Also included, but not in the proof volume given to those attending the meeting, are a foreword by R. W. G. Hunt, three abstracts received too late for inclusion in the Hilger book proof, and a list of participants at the congress.

It is unfortunate that rapporteur sessions and Professor Y. LeGrand's closing remarks were not taped so that they could be transcribed and included, but this was not done. We are fortunate, even so, that so much of the wealth of the new information coming out of the "Colour 73" meeting is so well presented in this book.

There is a challenge here also for those of us who will be responsible for "Color 77," the next quadrennial AIC Congress, for which the Council and the Canadian Society for Color are co-hosts. I hope we can do as well in recording our meeting as has been done for this one.

Fred W. Billmeyer, Jr.

Color Vision, National Academy of Sciences, Washington, D. C., 1973. Pp. iii + 124. Price $4.95.

Color Vision is a symposium conducted at the 1971 Spring meeting of the Committee on Vision, Division of Behavioral Sciences, National Research Council. The titles of the papers contributed by the six authors imply that the name of this book, *Color Vision,* is an appropriate one. However, a more-general title would be in order.

The first chapter, by Hurvich, deals with the basic consideration of color-defective vision. The chapter by Paulson does a comparative analysis of five color-vision tests used by the Armed Forces. Judd discusses the research conducted on the chromatic and luminance contrast requirements for accurate detection of signal lights. Anson discusses the results of aerial photography done with a number of different photographic films. The chapter by Flynn deals with some relations between visual perception and visual properties

concerned with architecture. Finally, Faulkner presents a case for the standardization of commercially produced colors. The last three papers have little to say about color vision, *per se.* I expected to read more about color-vision capabilities of human observers *vis à vis* aerial photographs, and architecture.

Hurvich presents a well-written account describing the color-vision deficiencies and various possible underlying mechanisms that are responsible for these deficiencies. It would appear, however, that the paper is not intended for the novice in color vision.

Paulson's paper is well written and easy to read; it clearly describes the various strengths and weaknesses of each of the color-vision tests investigated. She discusses the percentages of color defectives who can inadvertently slip by each of the tests studied. Her discussions are frequently in the context of testing for specific types of requirements; for example, pilots, candidates for the U. S. Military Academy, Coast Guard and Merchant Marine Academies, or the Air Force Academy. Paulson concludes, in part, ". . . it is suggested that now is an appropriate time for this committee to review the tests, acceptance standards, and the testing procedures, and to revise its recommendations." It would seem to me that an equally, if not more, important task would be to determine the color-vision capabilities that are required for various classes of jobs. Although Paulson provides the probability of being considered qualified or not according to the various tests, there is no indication about the probability of a person not being able to perform his job adequately after having slipped by one of these tests.

Typically, color-vision tests attempt to prohibit subjects from making discrimination on anything other than chromaticity differences. Yet, in the real world, chromaticity differences are rarely unaccompanied by luminance differences. Perhaps we should be more concerned with the ability to discriminate adequately between people who can and cannot perform tasks requiring the discrimination of colors under a wide variety of conditions.

Judd presents an interesting paper that discusses some stimulus parameters of signal lights required for detection by normal and color-defective observers. These characteristics include the chromaticities of the visual signals, the sizes, and luminance contrast between the signal and its surround. This interesting paper lucidly discusses the relationship among these parameters, observer characteristics, and the accurate detection of signal lights. At the conclusion of the paper, Judd presents a section dealing with the application of these studies to the identification of self-luminous signals. Here, indeed, we see the synthesis of applied and basic research.

Anson's paper does a comparative study among panchromatic, Ektachrome, Anscochrome, and Ektachrome Infrared (ir) Aerial film for the purposes of photo interpretation. The author suggests that this paper should be used as a reference for planning future studies. The reviewer would agree that, at best, this paper presents a pilot study pointing out the difficulties that can be encountered in this type of research. Furthermore, it seems that greater rigor needs to be exercised with regard to controlling extraneous conditions that are not meant to be a part of the comparative investigation itself.

The author does not present any information with regard to the relationship between the colors that were available in the processed film and the ability of observers to utilize this color information. We did learn in this study that the color and infrared films were interpreted more accurately than the black and white panchromatic films.

Flynn's paper is best characterized as a research proposal for determining the relationships between the visual perception and the visual environment. He presents no data, but does provide many preliminary observations that suggest hypotheses to be studied. This paper also seems to be out of place in this book, if the title is to be taken seriously. The author makes only a fleeting reference to concepts involving color vision, even though that terminology is contained in his title.

Faulkner's paper does not deal with color vision, but rather with the logistics problem of which and how many colors ought to be produced by industry. He argues for a standardization along these lines. No reference is made, whatsoever, with regard to color vision and the abilities of human observers to distinguish among various colors.

In summary, this book would be of limited usefulness for a person who is casually interested in color vision. Only the chapters by Hurvich, Paulson, and Judd deal significantly with color vision, *per se;* the remaining chapters deal in part with color but not as related to the human-observer abilities. These latter chapters would, however, be useful for the visual scientist who has been engaged primarily in basic research but now wishes to broaden his horizons, to see how other disciplines utilize the concepts of color and the ways in which they could potentially be related to human color perception.

I would guess that Judd's chapter is probably one of the last, if not the last contribution he made prior to his death. This paper, as noted above, presents in a beautiful way, the synthesis between basic and applied research.

Peter K. Kaiser
Department of Psychology
York University
Downsview, Ontario, Canada

Reproduced with permission from the *J. Opt. Soc. Amer.*, 1973, *63,* 1498.

The Psychology of Visual Perception. Ralph Norman Haber and Maurice Hershenson. Holt, Rinehart and Winston, New York, 1973. Pp. 398. Price $12.50.

Visual and Auditory Perception. Gerald M. Murch. Bobbs-Merrill Company, Minneapolis, New York, 1973. Pp. 403. Price $9.00, paperbound.

This was a painful review to write because of the great difference in quality between these two books. The volume by Murch is a thorough, nicely documented, profusely illustrated, and well-organized discussion of both the sensory and perceptual aspects of vision and audition. Most of the book deals with vision, but the topics on audition are

nicely integrated. Murch cites the important and relevant literature, presents historical perspective, and gives fair and balanced discussions of a diverse range of topics: signal-detection theory, color perception, pattern perception, gestalt laws, prism adaptation, motion perception, subliminal perception, information processing. Throughout his coverage of these and many other topics, the author maintains a fair yet critical and evaluative attitude that I found highly satisfying. In addition, Murch often refers the reader to review articles for a more-comprehensive discussion of specific topics. There is a glossary of terms, and the bibliography contains 745 references. The reproduction of some figures suffers from out-of-register printing. This book would be a valuable text for an introductory course in (especially) visual perception at the undergraduate and graduate level. I highly recommend it.

Unhappily, in contrast, the book by Haber and Hershenson is shabby: it suffers from innumerable errors of fact, faulty scholarship, poor organization, and a strongly biased point of view, which at times prevents a fair and balanced discussion of topics. Although equal in length to Murch's book, Haber and Hershenson's covers fewer topics at less depth, contains far-fewer illustrations (none in color, many incompletely labeled), has no glossary, and cites only 351 references. The authors announce at the outset that they intend to give no precise definitions of terms but rather let the reader form his own from the context. The effect is to create confusion at best and give the impression of ignorance at worst.

The first section of this three-part book is on sensory organization and contains hundreds of errors: the well-informed reader can find something to upset him on almost every page. This section draws heavily on Cornsweet's superb 1970 book *Visual Perception*, citing it often and reproducing some of its figures, but it has none of that book's virtues. Errors are legion: not even the illustration (Fig. 2.4) of image formation by a simple lens is correct (the peripheral rays are undeviated); the discussion of photometry is hopelessly confused. The millilambert is defined as *the* unit of luminance (the international unit, cd/m^2 is not mentioned), making the later definition of the troland wrong. Indeed the authors do not even realize that the millilambert is defined with reference to a perfectly diffusing surface (see their mirror example, p. 13). The description of the visual system is the antiquated retina-LGN-visual cortex model. No mention is made of the retinal projection to the superior colliculus, or the complexity of reciprocal pathways and interconnections. Haber and Hershenson's entire discussion of the extrastriate cortex is so naive and so brief that I wondered "why bother?." It may be quoted in full: "The striate cortex projects to the association cortex, areas 18 and 19, which integrate other senses with memory and pattern. Other areas of the brain are concerned with language and symbols and these are connected to areas 18 and 19. The hemispheres are also interconnected" (p. 32). Cortical-cell receptive fields are incorrectly defined (p. 43) (inhibition of activity is not mentioned). They repeat the common error that retinal cone density becomes progressively less in the periphery (p. 72). Osterberg's (1935) data (which they do not cite) show no decrease beyond 10 deg. They correctly state that luminance and brightness are not perfectly related but give incorrect reasons: (a) photons of different wavelength have different energy and (b) photoreceptors are not equally sensitive to all wavelengths!! (pp. 66-67).

Murch presents a clear discussion of thresholds, signal detection, and decision theory, whereas Haber and Hershenson's handling of the same material is confusing and inaccurate. For example, they say that any experiment giving a hit rate and a false-alarm rate allows a calculation of sensitivity (e.g., d') and criterion (p. 102), (the slope of the ROC curve cannot be calculated with only one HR-FAR pair); they say that the perceiver can gain more information by relaxing his criterion and suggest that signal-detection theory precludes the calculation of a threshold (untrue, because a threshold is a stimulus level related to some detection criterion). Even the figure (5.13) showing noise and signal-plus-noise distributions is wrong. After discussion the detection of sine-wave flicker and Fourier analysis of wave forms, the authors (p. 145) wrongly conclude, "Thus, square-wave and sine-wave modulation should yield exactly the same data in the middle and high frequency range." (They will not, because the amplitude of their first Fourier components are unequal, a fact not mentioned in their discussion.)

The second section of the book claims to be an information-processing analysis of perception; a model is presented in Ch. 7, along with a promise that the remaining chapters will discuss how various kinds of information are processed. None of the remaining chapters fulfill that promise. The chapters on form, visual search, selection, and recognition never make reference to the model presented in Ch. 7, except for occasional reassertions that the authors are taking an information-processing approach. The material in this section lacks the clear organization that Murch brings to his treatment of the same topics. Statements of belief and fact are made without discussion of empirical data, whereas Murch carefully supports his assertions with references. In the chapter on recognition, Haber and Hershenson attack Reicher's (1969) interesting finding, replicated by Wheeler (1970), that processing a single letter was more difficult than a word. The authors offer the criticism that the finding is ". . . one which we feel is ungeneralizable to other contexts and hence irrelevant to the theoretical issues to which it is applied" (p. 261). Two paragraphs later they again assert that they feel the finding to be an "artifact of the experimental arrangements" but never explain their specific criticism.

The last section of the book is on space perception. The authors force their discussion into the framework of the old empiricist-nativist controversy, which they chose to call a empiricist-psychophysicist dichotomy. Their material draws heavily upon J. J. Gibson's influential 1950 book *Perception of the Visual World.* Their discussion of the empirical point of view often seems sarcastic and derisive, forcing it into a mold that few contemporary researchers would adopt. Haber and Hershenson put much weight on the role of texture gradients (à la Gibson) and dismiss empirical evidence for the contribution of other cues as being the result of "narrow investigations" (no specific studies are cited). Murch covers the same material more completely and fairly, organizing into tables various facts and theo-

rectical positions (cf. pp. 259-263). He tries to understand various experimental findings, rather than rejecting them. In the coverage of stereopsis, Haber and Hershenson confuse the horopter with the locus of zero disparity (p. 313) and get the concept of corresponding points confused with zero disparity, as well (p. 314).

The chapter on motion perception (Ch. 14) discusses why the world seems stable when we move our eyes. Haber and Hershenson cite almost no modern research, relying heavily on Gibson's analysis of motion in a three-dimensional world. They never deal with or mention that, even when viewing a two-dimensional display, we are able to distinguish between self-produced movement and movement of the display. The discussion of inflow and outflow theories is confusing. Helmholtz is portrayed (p. 334) as a supporter of inflow theory (he supported outflow) and Erich von Holst is given credit for experiments he never performed (the ones Haber and Hershenson describe were either done by Mach and Kornmüller or were predictions made by von Holst).

The discussion of prism adaptation is based on Ivo Kohler's work, with almost no reference to modern theory or research. Murch is, here, again far-more thorough in considering a wide range of experimental data, and in organizing it clearly. Haber and Hershenson's diagram (Fig. 14.2) of prism displacement incorrectly states that the angle of displacement equals one-half the apex angle (it depends on the refractive index of the prism and the angle of incidence of the light).

These multitudinous errors indicate a low level of workmanship, but if they were eliminated, the book would not be satisfactory, because of the strong theoretical polarization, the tendency to reject facts and findings with the theoretical positions that may be spawned them. By confusing facts with theories, by forcing different viewpoints into open conflict rather than attempting a resolution, Haber and Hershenson do no one a service. Suffice it to say that I find their book sorely lacking in qualities that I admire.

Lewis O. Harvey, Jr.
Massachusetts College of Optometry
Boston, Massachusetts 02115
and
Department of Psychology
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

Reproduced with permission from the *J. Opt. Soc. Amer.*, 1974, *64*, 113-114.

CHROMATIC ENERGY

There is urgency in developing new sources of energy. Some talk of solar energy; others of geothermal energy. Few consider the wonders of chromatic energy.

Color is like a smile on a friendly face. It can enliven the spirit and inspire the soul. Beautiful colors impart special appeal to the most ordinary objects. They spark a myriad of fascinating combinations.

What a marvelous source of energy! It can transform a moody mood, make a dull spot bright and bring spring to a hibernating room. Color can make your spirits dance and your heart sing.

Color surmounts language barriers. It reveals the treasures of the ages and the mysteries of ancient pasts; yet it is as fresh and as contemporary as the moment which it accompanies. It adjusts to changing times as nothing else we know. Color is indeed wondrous. It gives us hope and inspiration and with its many variations enables stylists to compensate for material limitations and restrictions by interpreting basic items in endless variations.

Color is one of our greatest blessings. It surrounds us in abundance. It is available to everyone to possess and to appreciate. It is not something which one country can hold and deny another. No one needs to worry about governments sharing their supply or depending upon international agreements to make it available. So long as the sun rises each day, to bring us light to see, we will be able to enjoy color. It is one of nature's finest gifts. How the heart sings, with the joy that color brings!

Midge Wilson

MORE TO ENERGY THAN COLOR

As the energy crisis grows more serious each day, many people may soon be shouting "Stop the world, I want to get off!" But a University of Cincinnati physicist says we could alleviate the crisis not by stopping the world, just by slowing it down a little. Dr. Isay Balinkin says that the energy generated by the Earth's rotation is prodigious, enough to power millions of homes, businesses and industries, if it could be harnessed.

Dr. Balinkin, professor emeritus of experimental physics at Cincinnati and an internationally-known authority on light and color, honorary member of ISCC, has coined a name for that form of energy, "geodynamic." To give an idea of how much energy is involved, he explains: "If we wanted to stop the Earth completely from rotating, we could extract electrical power valued at two thousand-billion-billion dollars, at a rate of three cents per kilowatt hour."

Professor Balinkin estimates we would only need about three one-hundred-millionths of the turning energy, enough to slow the Earth's rotation about one second per year. "No one should object to that," he notes, " and ecologically the energy produced would be absolutely clean." If we could make a pulley by wrapping a giant belt around the Earth and a station in space, it would be easy to capture the rotation energy, and our problems would be over. Since that's impossible, the trick is to find a device here on Earth that moves independently of the planet's rotation, drive that device with the Earth's spin, then derive power from it.

Two such devices. Dr. Blankin points out, are the pendulum and the gyroscope. The plane of a swinging pendulum remains stationary as the Earth shifts in relation to it, he explains. Using the Earth's rotation to drive a pendulum that was moving through a magnetic field, for example, would create electricity. The rotation force would

be similar to the escapement mechanism in a clock that transfers the gravitation energy to the pendulum and helps it overcome friction. There would be major engineering problems involved in transmitting the Earth's spin to power-producing devices, Dr. Balinkin admits. Other physicists who have listened to his new concept agree it is theoretically sound, however. His main point, he said, is to demonstrate one of the many sources of energy that surround us that could be used when fossil fuels and other limited resources run out.

The resources we could tap include nuclear, solar and geothermal power, blue coal (wind power) and white coal (water power), as well as geodynamic power. Scientists have warned for the past decade that we should begin developing those resources, he said. If the current embargo on Middle Eastern oil forces us to employ new sources of energy, it may prove a blessing in disguise. The Middle Eastern nations may find they "are choking the goose that lays the golden eggs," Dr. Balinkin warns. So in the short run, and with winter upon us, what does he advise us to do about the energy situation? "As for me," he answers, "I'm going to Florida for a month."

PRODUCTS AND SERVICES

CIE Report on Photometry of Luminaires for Street Lighting

The International Commission on Illumination (CIE) has just published a Report of the CIE Technical Committee on Luminaires. Prepared by experts from many countries during the years 1968-1973, this report deals with Photometry of Luminaires for Street Lighting.

The primary object of CIE Publication No. 27 is to recommend the adoption of test procedures which will give acceptable results in determining and reporting the photometric characteristics of luminaires used for street lighting. The recommendations are intended to provide a basis for uniform national standards, and to give guidance to industrial photometric laboratories in the selection of test apparatus in the conduct of tests, and in the presentation of luminaire performance data.

The increasing use of computers in lighting calculations has made it desirable to include specifications for a standard system for presentation of the light distribution of a luminaire.

The requirements described relate to the directly measured photometric characteristics such as: Distribution of luminous intensity, light output ratio and ballast lumen factor.

This report, accordingly, is of value not only to those engaged in work concerning photometry of luminaires for street lighting, but also to those who are to evaluate the measuring results.

Copies of CIE Publication No. 27 may be obtained at $7 each from Mr. Louis E. Barbrow, Secretary U. S. National Committee CIE, c/o National Bureau of Standards, Washington, D. C. 20234. Payment should accompany the order.

CIE Report on Tunnel Lighting

The International Commission on Illumination (CIE) has just published international Recommendations for Tunnel Lighting Publication No. 26.

The aim of these recommendations is to lay down the fundamental principles which govern the lighting of tunnels, and to recommend certain well-established values and techniques.

They are described in accordance with recent research and experience, so that they may serve as a basis for countries desirous of issuing a code of their own, or of revising an out-of-date code.

Experts from many countries have contributed to the drafting of these recommendations, which have also been approved by the Committee for Road Tunnels of the Permanent Association of Road Congresses (PIARC).

Copies of CIE Publication No. 26 may be obtained at $8 each from Mr. Louis E. Barbrow, Secretary U. S. National Committee CIE, c/o National Bureau of Standards, Washington, D. C. 20234. Payment should accompany the order.

Seminar: Color Reproduction for Engineers

A three-day seminar on "Color Reproduction for Engineers" will be offered by the Graphic Arts Research Center at Rochester Institute of Technology April 24-26.

It will provide a fundamental understanding of color reproduction for engineers involved in the design or improvement of color systems in graphic arts, photography, television or any other electro-optical graphic display field.

Because more and more emphasis is being placed on color and color reproduction systems, William Siegfried, training director of the Research Center said, those involved in the design, improvement or control of such systems need to have an understanding of the fundamentals. Without such an understanding, design of new systems are haphazard and the results often disappointing. In fact, the trial and error approach is much too slow and costly.

The seminar will start with an overview of the color reproduction process, followed by detailed study of the elements of such a process and their interactions with one another. Emphasis will be placed on developing the ability to analyze the deficiencies of a reproduction in terms of their causes and a knowledge of what action is necessary to correct these deficiencies.

Write or call William Siegfried: Graphic Arts Research Center, Rochester Institute of Technology, One Lomb Memorial Drive, Rochester, New York 14623, (716) 464-2758.

A Graphic Arts Experience at RIT

The Rochester Institute of Technology, Rochester, N. Y., will conduct its annual Graphic Arts Experience for high school sophomores and juniors from June 23 to 27. Participating students live on campus, attend classes, visit local industry, and have an opportunity to exchange ideas about careers, schools, and life, itself. Journal '73, a 16-page brochure of 45 photos, names of participants, high schools,

and industry sponsors, shows some of the events at the 1973 program. Journal '73 is free upon request.

The GAE program has two major areas: graphic arts and photography. Students can stay with one of these two majors OR they can include one of three options: Communications Design, Packaging, Newspaper Production Management.

This four-year old program provides opportunities for both students and industry. Students are exposed to the various areas of graphic communication to help them select a career. And industry, by sponsoring or supporting the program, has a chance to encourage students to decide on a career in graphic communications.

Participating students pay only $85. Industries contribuate $100 for each student. RIT will assign contributions to students if an industry does not have a particular student(s) to sponsor.

For more information send for the free Journal '73. Contact William Siegfried, Training Director, Graphic Arts Research Center, Rochester Institute of Technology, One Lomb Memorial Drive, Rochester, N.Y. 14623. Phone (716) 464-2758.

Course: Principles of Color Technology, American Chemical Society

This course is designed for industrial scientists, engineers, and technologists concerned with the description, measurement, and specification of color. Its purpose is to introduce the principles of the science of color and to apply them to typical problems in industrial color technology. The main divisions of the course are the visual perception of color, the quantitative descriptions of color, the measurement of color, and applications of color science in color matching and color difference assessment. The minimum background required for the course is a B.S. degree in science or engineering, or several years experience in industrial color technology. May 15-17, 1974, Statler Hilton Hotel, Boston, Massachusetts. Given By: Dr. Fred W. Billmeyer, Jr., Professor of Analytical Chemistry, Rensselaer Polytechnic Institute. To obtain information, write to Department of Educational Activities, American Chemical Society, 1155 16th Street, N.W., Washington, D.C. 20036.

Program in Color Technology at Rensselaer

A summer program of three intensive courses in color technology is being offered by the Rensselaer Color Measurement Laboratory at Rensselaer Polytechnic Institute. The first course, Principles of Color Technology, will be conducted from July 8-12. Color Technology for Management, will be held July 18-19, and Advances in Color Technology, is scheduled for July 22-26. A fourth course, Coloring of Plastics, is being offered April 2-4.

The courses are under the direction of Dr. Fred W. Billmeyer, Jr., Professor of Analytical Chemistry at Rensselaer Polytechnic Institute. Assisting Professor Billmeyer will be Max Saltzman, recently retired as Manager of Color Technology, Allied Chemical Corporation and Adjunct Professor of Chemistry at Rensselaer.

For further information contact the Office of Continuing Studies, Color Technology Program, Rensselaer Polytechnic Institute, Troy, New York 12181, Telephone: (518) 270-6442.

GATF Conference Proceedings

The complete proceedings of three Graphic Arts Technical Foundation Conferences on Paper Performance, Air Quality Control in the Printing Industry, and Advances in Color Reproduction, are now available.

Conference Proceedings are available to GATF members for $10.00 per copy; to non-members for $20.00 per copy. To order, contact: Order Department, Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

NBS-MCCA Sponsors Program on Testing, Appearance

The Manufacturers Council on Color and Appearance and the National Bureau of Standards, U. S. Department of Commerce, will sponsor a one-day meeting Thursday, April 25 on "Performance Testing on Color and Appearance Instrumentation" to discuss what the current NBS-MCCA Color and Appearance Collaborative Reference Program is accomplishing and to exchange ideas and suggestions on additions or modifications.

The meeting will be held on the grounds of NBS in Gaithersburg, Md. Registration will be open to participants in the Collaborative Reference Program and non-participants who have interest in the program or color and appearance instrumental measurements in general.

Program information and registration materials may be obtained from Charles G. Leete, Meeting Co-ordinator, Manufacturers Council on Color and Appearance, 9416 Gamba Ct., Vienna, Va. 22180. (703-938-4345).

Coloring Of Plastics, April 2 to 4, 1974, Rensselaer Polytechnic Institute, Troy, New York. Sponsored by: Plastics Institute of America

This course provides complete coverage of the most important aspects of coloring plastics, from the initial selection of colorants to the final quality control.

The course is designed to be useful to personnel in research, production and sales, but of particular interest to those directly concerned with the production of colored compositions. Particular attention will be paid to problems of quality control and the judgment of production for satisfactory color.

After an introduction to color and appearance technology, the appropriate use of instrumentation for color measurement in plastics is discussed. The difficult subject of color matching is discussed from the point of view of maximum application of color technology both through purely visual techniques and with the use of instrumentation. These sessions are followed by an evening Open House at The Rensselaer Color Measurement Laboratory, at which the instrumentation previously discussed is demonstrated.

The actual coloring process is then reviewed in a series of discussions, starting with the selection and properties of colorants, and the requirements for getting good dispersion of colorants in various types of plastic. The particular

problems of color processing are then discussed with respect to the two major categories of production, molded parts and film products.

The important judgment of the quality of colored plastics is discussed from several points of view: The visual judgment of quality, including standardized nomenclature; the calculation of color differences from instrumental measurements; and the establishment and maintenance of production tolerances.

For additional information, please contact Mr. Albert Spaak, Exec. Sec'y; Roman Kuchkuda, Ass't. Exec. Sec'y or PIA Secretaries, Plastics Institute of America, at Stevens Institute of Technology, Hoboken, New Jersey 07030. Area code 201–792-1839 or 792-2700, ext. 365.

Projection Platemaking: The New Publication System. March 31, April 1,2, 1974, Castle Hill, Ipswich, Mass. For further information: Contact – Institute for Graphic Communication, 520 Commonwealth Ave., Boston, Mass. 02215, Tel. (617) 267-9425.

Purpose: To explore in depth those new and emerging techniques, equipment and systems which produce printing plates by projection through film or from the copy.

The emphasis will be on the effect of the technology on current processes and procedures within the printing and publishing industries. Advantages of projection platemaking will be thoroughly discussed, including materials savings, labor savings and improved information retrieval. Cost analyses will be presented to demonstrate the cost effectiveness of this new approach whereby a two hour task by traditional methods is transformed into a fifteen minute effort. The role of automation in eliminating the last remaining labor intensive step, that of manual "stripping", will be fully described. A critique of the various approaches to projection platemaking will be presented including automated camera/projection systems, ultraviolet and visible light systems (both single shot/miniature film flat and step-and-impose microfilm systems). The role of new plate developments in fostering the growth of these new systems will be explored. Case studies of current projection platemaking operations will be presented. Market forecasts will be provided for these new systems which many predict will eventually dominate.

Lehigh Consortium

The final details on the course and symposium to be sponsored by Lehigh University's Consortium for Color Technology on the general topic of colorant calculations by advanced methods have been released. The course will run from May 6 through May 8, 1974, and the symposium will be held on May 9, 1974.

The course will cover topics such as commonly used algorithms for colorant formulation computer programming, and the application of Mie and radiative transfer theories to various kinds of colorant calculations. The afternoons will be devoted to solving a problem in colorant theory involving Mie and radiative transfer (multi-channel) calculations. Four computer terminals will be made available for use of the class. A basic knowledge of color theory such as would be obtained in one of the widely-available elementary color courses is pre-supposed. The participant should be familiar with elementary calculus, but no other mathematical preparation is required.

The symposium will be a full-day meeting, with three papers plus discussion period in the morning and the same in the afternoon. The morning session will be devoted to present practice in colorant formulation. The speakers will be E. L. Cairns on determination of K and S; Don Andrade on the use of Saunderson K2 for compensating for the effects of PVC in paints, and Roland Connelly on problems of colorant formulation in the textile industry. The afternoon will be devoted to advanced developments. Milton Kerker will discuss Mie theory, L. W. Richards will discuss multichannel calculations, and Eugene Allen will describe the research program of the Consortium.

Both course and symposium will take place at the newly-constructed Jennie H. Sinclair Conference Center at Lehigh University. The course and symposium will be under the supervision of Dr. Eugene Allen, director of Lehigh University's Color Science Laboratory, part of the Center for Surface and Coatings Research.

New Opacimeter

The DIANO BNL-2 has been introduced as the only commercially available digital readout opacimeter which conforms to TAPPI Standard T425, generally accepted as the government and industrial specification for opacity.

Through a combination of simple push-button operation and a digital readout, the BNL-2 permits even an unskilled operator to read TAPPI opacity or printing opacity easily, in seconds, without the need for error prone computations. Actually an advanced model of the reliable Bausch & Lomb Opacimeter, all readings obtained using the BNL-2 correlate directly with any readings taken on its predecessor.

For complete information, contact Midwest Technical Center, DIANO Corporation, 1866 Production Drive, Louisville, KY 40299. (502) 491-2467.

Munsell's Latest Color Charts – Color Cascade

Munsell Color offers a comprehensive new set of color scales which show the outside gamut of a set of high-permanence ink colors. Through the use of multiple-film printing techniques they have achieved in this collection a number of very high chroma colors and it is said that this is the most extensive color gamut of any available set of reflecting colors. A large portion of the 768 colors fall outside the gamut of the current high gloss Munsell Book of Color.

Color scales are shown for 48 hues spaced throughout the spectrum. Each hue scale has sixteen steps, half going from the most vivid color in either direction, toward black and white. Reflectance data are available for Sources "A" and "C", plus Munsell notations for "C". The Color Cascade, is said to be especially useful where extensive gamut coverage of high saturation colors is important. The colors effectively cover the accessible gamuts of color television and color photography, and it is particularly pointed out that for the first time a col-

lection of reflecting materials have sufficient saturation to match the more vivid colors of flowers. Color samples are 1¼" x 1¾"; two hue scales per page permit edge-viewing. $35.00 plus postage. Sample page available upon request.

Munsell Color
Macbeth Color & Photometry Division
2441 N. Calvert Street
Baltimore, Maryland 21218

COMMITTEE ON PUBLICATIONS

Robert W. Burnham, Chairman
Milton J. Pearson
Ruth M. Johnston
Donald Genaro
William Benson
Robert T. Kintz

Send *Newsletter* Items to Editor:

Dr. Robert W. Burnham
Eastman Kodak Company
Research Laboratories, Bldg. 81
Rochester, N.Y. 14650

Other Correspondence to Secretary:

Dr. Fred W. Billmeyer, Jr.
Department of Chemistry
Rensselaer Polytechnic Institute
Troy, N.Y. 12181

Treasurer:

Mr. Warren B. Reese
Chapel Hill Apts.
Apt. 612 West
1550 Worcester Rd.
Framingham, Mass. 01701

NOTE:

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 Christian Rohlfing, Cooper-Hewitt Museum, 9 East 90th Street, New York, New York 10028.