ISCC

Inter-Society Color Council Newsletter

NUMBER 227
November-December 1973

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COLOR REPRODUCTION

Photo by Tom Myers, reprinted from Ranger Rick's Magazine, February, 1972, pg. 7. Copyright, National Wildlife Federation-1972. Reproduction donated by Progressive Color Corporation, Rockville, Md. The legend reads:

"Apes, the hardiest primate next to man, are his closest relatives, but not his ancestors . . ."

COVER DESIGN — DONALD M. GENARO AND VALERIE PETTIS OF HENRY DREYFUSS ASSOCIATES, NEW YORK CITY
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IMPORTANT AIC NOTE FROM CANADA

The Canadian Society for Color in Art, Industry and Science has accepted the invitation of the Inter-Society Color Council to co-host the 1977 Quadrennial Congress of the Association Internationale de la Couleur.

ISCC BOARD POLICY ON DUES

The following procedure concerning dues was formulated and approved at their last 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 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 as of January 1, 1974. 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.

APPLICANTS APPROVED FOR INDIVIDUAL MEMBERSHIP

Applicant	*Member-Bodies and Interests*
Mr. Hans Adler c/o H. Adler Associates, Inc. 175 Fifth Avenue New York, New York 10010	IFT. Consulting Engineer. Color and Surface Structure Matching — Equipment in general and in dentistry. Also a member of the American Society of Sanitary Engineering.
Miss E. Hope Allen Sinclair Lab Lehigh University Bethlehem, Pa. 18015	Research to develop theory based on "First Principles" to replace Kubelka-Munk, metamerism research, and also education and design (Co-ordination of interests to provide instruction in color).
Dr. Byron N. Baer 1222 Old Cooch's Road Newark, Delaware 19711	AATCC, ACerS. Manufacture and service of fiber reactive, disperse and acid dyes. Also a member of the American Association for the Advancement of Science.
Miss Eleanor V. Belenica Martin Marietta Corp. 277 Park Avenue New York, New York 10017	Work relates to textile and paints and is interested in interiors, fabrics, paints, vinyls, art, etc. She is a member of the Illuminating Forum-NYC.
Mrs. Nadine Bertin (Mrs. Bertin Stearns) House & Garden Magazine 350 Madison Avenue New York, New York 10017	CMG. Psychological effects and use of color in all environments (home and products). She is also a member of The Fashion Group and MENSA.
Mr. Bruce Burk The J. M. Ney Company Maplewood Avenue Bloomfield, Ct. 06002	Research and color dealing with porcelain used in dental restorations and the development of specifications for the dental industry.
Mr. Donald K. Burrell 12 Knollbrook Road Rochester, N.Y. 14610	ACS. Interested in measurement/theory and works with color control of pigments and color measurement of pigmented plastics.
Mr. Harold B. Cahn Martin Marietta Corp. 277 Park Avenue New York, New York 10017	AIID, IES. Interiors, fabrics, paints, vinyls, art, photography. He is also a member of the Illuminating Forum-NYC.
Mr. Joseph M. Casey Measurex Corp. 10475 Imperial Ave. Cupertino, Ca. 95014	Instrument design and evaluation for measurement of color and color-difference, in the laboratory and on-line. Inter-instrument correlations. Effects of fluorescence and illuminant metamerism. Application of on-line measurement to colorant control.
Mr. Ronald Lee Connelly, Sr. 7 Limerick Court Greensboro, N.C. 27406	AATCC. Color theory, measurement, and vision. Also the dyeing of textile materials. M.S. under Fred Simon, Clemson, 1970.

Continued

Mr. B. David Connor
221 Nassau Street
Princeton, N.J. 08540

AATCC. Control in measurement and dyeing in the textile industry. With Applied Color Systems.

Mr. Vincent James Crociata
806 Ivy Court
Webster, N.Y. 14580

Development of materials related to copiers, duplicators and photographic systems.

Mr. Thomas E. Cullen
Crompton & Knowles Corp.
Route 208
Fairlawn, N.J. 07410

ACS. Broad in interest. Also a member of American Institute of Chemists.

Mr. Paul E. Duran
6857 Clifton Forge Road
Jacksonville, Fla. 32211

He is a lecturer of Color Photography at Rochester Institute of Technology and is interested in color photography and color education.

Mr. Edward C. Krall
3M Company
Decorative Products Div.
Nevada, Missouri 64772

GTA. Quality and process control, decorative films and simulated wood veneers, instrumental color control.

Mrs. Barbara Marks
2231 East 67th Street
Chicago, Ill. 60649

AIID, NSID. Teaching, designing and experimentation. She is also a member of the Interior Designers Educators' Council.

Mr. Howard S. McCullough
P.O. Box 29811
Atlanta, Georgia 30329

AATCC, FSPT, SPE. Sales of spectrophotometers, colorimeters, and computers for general color problems in all industries.

Mr. Douglas Mogler
Fuller-O'Brien Corp.
450 East Grand Ave.
So. San Francisco
California 94080

ASTM, FSPT. Small color difference calculations, metamerism, color matching, pigment types, colorant formulations, color measuring instruments, and determination of colorant strengths.

Mr. Edgar R. Mowrey
302 Stockton Street
Hightstown, N.J. 08520

Systems for measuring and computing color. With Applied Color Systems.

Mr. Kenneth B. Newman
3481 Dayton-Xenia Road
Dayton, Ohio 45432

SPSE. Reflectance measurements and formulations of pigments using spectral reflectance curve as standard. Gonioradiometric measurement and calibration.

Mr. John W. Nielson
Vice President
Bennett's Paint Factory
P.O. Box 1320
Salt Lake City, Utah 84110

FSPT, NPCA. Quality control of colorants.

Dr. Moses Passer, Head
Dept. of Educational Activities
American Chemical Society
1155 Sixteenth Street, N.W.
Washington, D. C. 20036

ACS. Develop educational courses on the science and technology of color. Dr. Passer is also a member of AAS, AAUP, ASEE, Sigma Xi, American Institute of Chemists, and NEA.

Mr. Keith Peterson
Napko Corp.
5300 Sunrise
Houston, Texas 77021

FSPT. Instrumental measurement and matching of coating products. He is also a member of the American Society for Quality Control.

Mr. W. F. Reiter, Jr.
Owens Illinois Tech Center
1700 N. Westwood
Toledo, Ohio 43607

ACerS. Effects of colorants on various glass matrices.

Mr. Frederick R. Ruckdeschel
773 John Glenn Boulevard
Webster, N.Y. 14580

Specification and computation of color. He is a member of the Instrument Society of America.

Mr. David B. Russell
2058 Eaton Road
Charlotte, N.C. 28205

AATCC. Quality Control, instrument shade matching. With ICI America.

Mr. Clifton R. Sanders
P.O. Box 1026
Route 421
East Sanford, N.C. 27330

AATCC. Quality control measures, color measurements and color differences. He is also a member of the Cosmetics Toiletry and Fragrance Association and the Society of Cosmetics Chemists.

Mr. Mark Sexton
4125 East Sello Drive
Phoenix, Arizona 85018

ASTM. Color measurement, color difference and metamerism. With Honeywell Information Systems, Inc.

Mr. John J. Singer
131 East 31st Street
Holland, Michigan 49423

ACS, SPE. Color matching. With Chemetron Corp., Pigments Div.

Mr. Leslie Skirvin
33 Plain Street
Fitchburg, Mass. 01420

Working with color and watching it come to life.

Mr. Marvin E. Taylor
Monsanto Co., TC-3
Textiles Division
P.O. Box 2204
Decatur, Alabama 35601

Color measurement, development and instrumentation as related to textile fibers.

Continued

Mr. Mufid A. Tuksal 30205 Rosemond Ct. Franklin, Mi. 48025	Evaluation of finished products as it affects the driver in psycho-physical aspects and meeting required standards (Federal). He is a member of IEEE and SPIE. With General Motors Design Staff.
Mr. Walter F. Zawacki 5668 S. Madison Street Hinsdale, Ill. 60521	SPSE, TAGA. Computerized color matching of printing inks; tone and color reproduction in printing processes; control of color in the various printing processes; color photography. With Continental Can Co.

The following former individual members request reinstatement:

Mrs. Lillian Barber, NSID/IES 1723 Washington Street Hollywood, Fla. 33020	Mrs. Mary L. Meixner 1007 Lincoln Way, Apt. 4 Ames, Iowa 50010

The following applicants are new delegates for CMG (non-voting):

Mr. Walter A. Menn 55 Standish Road Hillsdale, N.J. 07642	Industrial design, color standards and color control.
Mr. Arnis Zebergs 4 Park Avenue New York, New York 10016	CMG. Education and use of color in industry, particularly home furnishings products.

FROM THE PROBLEM COMMITTEE GROUP FOR COLOR SCIENCE AND MEASUREMENT. (PROBLEMS 18, 22, 24, 27, 34 AND 35)

It has been suggested via a circular letter of 9/26/73 to the above named Problem Committee Chairmen to communicate on a quarterly basis with the Problem Group Chairman the activities of their Subcommittees. The objective of this suggestion is to provide a means for more continuous exchange of information and mobilization of help where the help may be needed. The Chairmen of those Problems Subcommittees who replied to the circular letter expressed their favor for such a *modus operandi.* Some of the Chairmen have not replied as yet but it is hoped that they too will express their views on the matter in the near future.

Brief Review of the Activities:

Problem 18: The Chairman is presently reviewing all the projects pertaining to the Subcommittee activities, in particular the activities of Task Force I and II. A report summarizing the results of the Task Force I project is in preparation.

Problem 22: Work on the Catalog of available standards is slowly proceeding. The list is rather short. Request for suggestions from the Committee are being sought.

Problem 34 held a successful meeting on November 8, 1973 with 12 people in attendance. At this meeting the working program was set up. The Subcommittee will soon initiate a test for gathering observer data on seven sets of samples. Those interested in participating should contact the Chairman, Mr. Rolf Kuehni.

Problem 35 held its Subcommittee meeting during the Annual Meeting of the American College of Prosthodontists in San Antonio, Texas in October 1973. The major discussion was on the means of furthering the work of the Subcommittee. Suggested were:

a) The possibility of inserting notices in the ISCC Newsletter and the ACP Newsletter for additional volunteers.

b) Further search for samples of the E. Bruce Clark 60 tab shade guide of the 1930's.

c) Communication with the Industrial Museum of Chicago to ascertain if Clark's 703 tab guide is in their possession.

d) Search for dental manufacturers who might wish to aid in developing the porcelain shade guide tabs.

Franc Grum,
Committee Group Chairman

U.S. NATIONAL COMMITTEE OF C.I.E. ANNUAL MEETING

Fifty members of the U.S. National Committee of the International Commission on Illumination (CIE, from its French name) attended the annual meeting in October 1973. George W. Clark, Vice-President of the USNC-CIE, presided at the two-day meeting which was held at The Pennsylvania State University.

Reports of international activity were given by USNC Committee Chairmen.

Colorimetry (Committee TC-1.3)

Franc Grum, Eastman Kodak Company Research Laboratories, Rochester, N.Y. represented Dr. D. L. McAdam of the same company. Grum reported on the working program for the study of color difference formulae, and the objective of obtaining international agreement on a single formula at the 1975 plenary session of the C.I.E. in London.

Photopic, Mesopic and Scotopic Vision (Committee TC-1.4)

Dr. Jo Ann Kinney, Naval Submarine Medical Center, New London, Connecticut International Committee Chairwoman, related current efforts to write a technical report on photometry for the C.I.E. This report will summarize existing techniques; discuss possible errors in measurement and the reasons for them; and recommend procedures for the measurement of light under a wide variety of applications.

Color Rendering of Light Sources (Committee TC-3.2)

Charles W. Jerome, GTE Sylvania, Inc. Danvers, Massachusetts advised that attention was being focused on the development of a "Color Preference Index" for light sources to supplement the "Color Rendering Index". A subcommittee has been formed to study the specification of the color reproduction properties of light sources used in color photography, color printing and color television.

Fundamentals of the Physical Environment (Committee TC-3.3)

W. S. Fisher, General Electric Company, Cleveland, Ohio spoke about the efforts to work toward international agreement on lighting design practices. He emphasized attempts to assimilate practices that utilize waste heat from lighting systems more efficiently.

Streetlighting (Committee TC-4.6)

Warren Edman, Holophane Company, New York told of the dialogue that is developing concerning visual performance under varying spectral conditions that are found in common street lighting systems. He received a number of suggestions from the attendees concerning the proper method for pursuing this question.

Members of the National Committee represent the United States on an international level in matters dealing with the art and science of light and vision. The committee is supported by seven scientific and technical societies (American Society for Testing and Materials, Association of Edison Illuminating Companies, Illuminating Engineering Society, Institute of Electrical and Electronics Engineers, Optical Society of America, Society of Automotive Engineers, and Society of Motion Picture and Television Engineers).

LETTER TO THE EDITOR:

Regardless of the motives that led the editor of the Newsletter to reprint (in NL 225, Ed.) the Jeffrey St. John diatribe on Picasso (balanced by the one sentence review of a book about the artist?) it should not go unanswered as to its substance.

Poor old St. John is obviously not at home in this century. But would he have been at home in another? What a letdown it was for classicism when impressionism and art nouveau appeared; what letdown it was for the impressionists when Cezanne, Gauguin and VanGogh started to exhibit!

To blame the ills of this world on Picasso's art is like blaming the destruction of Guernica by the fascist forces on the artist's painting of this event, or the French soldiers atrocities visited on the Spanish people on Goya's depictions in his etchings.

To suggest that Picasso fostered hoax and fraud for 40 years on the unsuspecting public is like claiming that Einstein has done the same. Both have crossed barriers, have advanced the "state of the art" and have left most contemporaries behind. But then so have all other great artists and scientists.

Picasso lived from his art and lived well. To insinuate that he painted for wealth and fame alone is demonstrably wrong. Not only did he loathe public attention and live quite secluded but he could have lived as well as he did with one tenth of his artistic output.

If Picasso helped to destroy painting, then Stravinsky helped destroy music, Joyce literature and Planck and Einstein physical science.

The pronouncements, which St. John has for those who do not accept his view of this world, have the eerie ring of similar pronouncements one could hear in certain parts of Europe in the thirties and forties.

Fortunately the life's work of the artist speaks for itself. It is neither affected by St. Johns attacks nor by this defense.

Rolf Kuehni

LETTER TO THE EDITOR:

In the nature of not letting the right hand know what the left is doing, I wish to call to your attention two items in your Number 225, July-August 1973 edition, both on page nine.

The one entitled "Blue-Blindness: Behind School-Day Blues?", a copy from the March, 1973 edition of Woman's Day, was commented on by me in length as part of my paper within the seminar on 'Professional Education in Color for Art and Technology' at the annual spring meeting of the Inter-Society Color Council. Since you also question the use of the term "Blue-Blindness", it would seem to me that you have reached similar conclusions as to its efficacy. It, therefore, seems doubly strange that no reference is made to the analysis I had already presented. I will not repeat this here since my entire paper is published in the Summer 1973 issue of The Journal of Color and Appearance with the one exception as to repeat that with the information provided, and if this is to be taken at face value as to entirety of content as well as its parameters, then the researchers haven't the faintest idea about color.

Further, I was deeply shocked that you should find it fitting to reprint those ill-tempered remarks of Jeffrey St. John's commentary at the death of Picasso. Since his remarks can only be sanctioned under the right of free speech, one could nevertheless argue with him at great length as to the factualities of his remarks, particular when represented by a member of the advocay (sic) school of media journalism. At that, even the CBS Radio and TV Network presented glowing reports of Picasso's contribution, Jeffrey St. John notwithstanding, at least thereby keeping the record straight. Far be it from me to have to come to Picasso's defense, nor resort to consensus quotations, but you seem to have inserted your own opinion of the matter in the guise of another's comments without stating that this concurrence was the reason for its inclusion here. While this may perhaps be self-evident, it nevertheless is a resorting to the subtlest kind of advocacy journalism, at that in the pages of a news letter that, at least to my knowledge is supposed to represent a factual compendium of color with all its ramifications and activities. Would you, therefore, please reprint this letter if for no other reason than to present the other side of these issues.

Herb Aach
Professor of Art
Queens College
of the City University of New York

AIC-COLOR METRICS

The book "Color Metrics," Proceedings of the Driebergen Meeting on color two years ago, was reviewed in the ISCC Newsletter No. 215 (and in No. 220 the Table of Contents were listed. Ed.) I am informed by Pieter Walraven that they still have many copies which they would like to sell in order to transform red ink into black ink. Any additional promotion which you feel would be appropriate in the ISCC Newsletter would be very much appreciated.

C. J. Bartleson, V.P., AIC

Editor's Note: The volume is extremely worthwhile for those interested. (It does, however, cost $27.00.) Extensive information on its contents is available in the above Newsletter references.

R.W.B.

ROCHESTER COLOR GROUP

Informal gathering of a sizeable number of individuals in the Rochester (N.Y.) area who share color as a common interest has been hosted this year by the Graphic Arts Research Center of The Rochester Institute of Technology. The purpose of these gatherings is to bring together those who would like to discuss their thoughts, concepts, and opinions on color in order to improve communication among people sharing this area of interest, and to obtain a better understanding of the subject itself. The meetings are strictly informal without formal organizational structure, dues, or parliamentary formalities, and usually include a sherry hour or a dutch treat dinner. The hope is that such informal gatherings will encourage interchange of ideas among those interested in color, be it in the area of art, industry, or science. All persons interested in such discussions are welcome and invited. Those wishing further information should contact Milton Pearson, Graphic Arts Research Center, Rochester Institute of Technology, One Lomb Memorial Drive, Rochester, New York 14623 or phone 716-464-2789.

GATF 50TH ANNIVERSARY YEAR

A year-long, 50th Anniversary Year Celebration will be sponsored by GATF in 1974.

The Graphic Arts Technical Foundation is a member-supported, non-profit, scientific, technical, and educational organization serving the international graphic communications industries. Its fundamental purpose is to continue the scientific progress of those industries which are basic to one of man's greatest needs – the graphic communications of information, ideas, and knowledge.

GATF is the oldest, continuous organization of its kind in graphic communications. The Foundation was organized as the Lithographic Technical Foundation in 1924, and its focus was primarily on lithography. Its members were lithographers and suppliers to the lithographic industries. In 1963, its Board of Directors, following a two-year Long-Range Planning Study, decided to utilize GATF's unique resources and personnel to do research and provide technical services and other programs for all aspects of graphic communications, and to become involved in the seeking out, delineation, and solution of problems in other printing processes – letterpress, gravure, etc. – rather than only lithography.

This decision was a major one for GATF. As a result, the Foundation's directors also determined that GATF. ought to consolidate its Research and Technical Services Departments, then located in Chicago, and its Administrative and Education Departments, then located in New York, under one roof. After a site study of a number of areas in the United States, they chose Pittsburgh because of its unique facilities and the proposed Center's geographical and functional relationships with them.

These included Carnegie-Mellon University, long-famed for its programs in the graphic arts; the Mellon Institute, one of the major industrial research organizations in the United States; and the University of Pittsburgh, with its varied facilities and programs. Research and educational relationships have been established between GATF and these organizations.

From its small beginnings in 1924, this industry-inspired and member-supported Foundation has grown into one of the world's leading centers for graphic communications research and education. Today, the programs at GATF cover all major graphic processes and their applications, including a host of vital areas such as career and recruitment programs, environmental control, training and educational counseling, occupational health and safety, and typography, to name a few.

The industry, as a whole, benefits from GATF in four basic areas: research; scientific, technical, and craft education; technical services; and technical information. The broad programs encompass a variety of activities within each area.

OSA COLOR VISION SYMPOSIUM–ABSTRACTS

Current State of Knowledge of the Physiology of Human Color Vision. Robert M. Boynton, Center for Visual Science, University of Rochester, Rochester, N.Y. 14627.

The past 20 years, and in particular the last decade, have witnessed startling advances in the physiology of color vision. The hypothesis of Thomas Young, that the initial process of color separation is due to the activity of three broadband resonators, finds its expression in three types of cone receptors, differing mainly in their spectral sensitivities. This conception, which had already been accepted by many as the most-probable basis of the facts of color matching, has been confirmed by the methods of retinal densitometry, direct microspectrophotometry, and intracellular electrophysiology. The opponent-colors concept, first proposed by Ewald Hering, has received direct validation in the electrical responses of cells in the retina, lateral geniculate nucleus, and visual cortex. Of particular interest in recent years has been the interaction between spatial and chromatic aspects of vision, particularly as revealed by the study of receptive fields with wavelength as a parameter. Despite many advances, much remains to be done. In this review, the limitations as well as the strengths of various procedures and conclusions will be discussed. Difficulties stem from (a) methods that produce noisy records; (b) results that, while grossly compatible with human psychophysical evidence, also reveal differences that have been much less discussed; and (c) procedures that have so far successfully been applied only to nonprimates, making uncertain the generality to man of conclusions derived therefrom. Finally, some recent work on primate receptor potentials from the Rochester Laboratory will be described, as it relates to the color vision of man.

Recent Research in Color Perception. Leo M. Hurvich, Dept. of Psychology, University of Pennsylvania, Philadelphia, Pa. 19104.

The phenomena of color perception have long intrigued and fascinated the artist, the natural philosopher, and the scientist alike. Among these phenomena are various entopic effects, colored shadows, contrast effects, after images, color mixture, persistence of colors, color blindness, accidental colors, Benham's top, Bezold's spreading effect, and Bidwell's pulsative after image. Prior to the 1950's, the main thrust of laboratory research seeking to analyze and explain the varied perceptual phenomena was based on views that regarded the receptors and photopigments as of primary, if not exclusive, importance. Increasingly in the past few decades, however, the receptors are recognized as only the first spectrally selective processors in a biological chain of complex neural events, and in most current thinking about color coding the opponent-process concept has become dominant. It is thought to provide the key to an understanding of the neural organization that mediates between light reception and the visual percept. The interplay among visual psychophysicists, photochemists and neurophysiologists who work primarily at the cellular level in the retina and higher centers has led to a general acceptance of the opponent-process concept both as a means of translating spectral discriminations provided by three selective absorptions into a three-variable, bimodal color-coding system, and as a principle of spatial interaction and organization crucial to the perception of contours, contrast, and the perceived properties of the visual image as a whole. Against this background, problems that illustrate current research in color perception will be discussed. These include two-color, increment-threshold analyses, issues of luminance measurement and additivity, brightness and hue-scaling techniques, and color specificity in spatial organization and in temporal-response properties.

Color Applications. C. J. Bartleson, Macbeth Color and Photometry Div., Kollmorgen Corp., Newburgh, N. Y. 12550.

The measurement and evaluation of color is of considerable commercial, industrial, and scientific value in many endeavors. Grading of agricultural products, evaluation of gems, matching of textiles, paints, and plastics, control of television, photographic- and printed-reproduction systems represent only a few of the wide-ranging applications of color technology. For over 40 years, international conventions for colorimetry have been very useful for determining quantitative conditions of color match or mismatch. As the ability to specify the conditions of match has improved, it has been more and more apparent that suitable metric methods are also required for useful specification of differences in color. Small differences in color have generally been addressed by so-called "color difference formulas," and large differences in color have been evaluated with the aid of color spaces or color-order systems. In both cases, it is the magnitude of perceived color differences that is of concern, rather than the stimulus conditions that may lead to color match. Lighting and viewing conditions continue to be matters of great practical concern, because visual evaluation remains as the ultimate method of evaluation and arbitration.

Regular Rhombohedral Selection of Colors. David L. MacAdam, Eastman Kodak Co., Research Laboratories, Rochester, N. Y. 14650.

The Committee on Uniform Color Scales, under the Chairmanship of Dr. Deane B. Judd, obtained scale values that represented the perceived magnitudes of 128 differences between nearest neighbors among 59 strategically different colors. Those values were derived from judgments by 76 normal observers, of the relative magnitudes of pairs of those color differences. Those values have been fitted to a formula for color difference that permits representation of the scale values by distances in a euclidean three-dimensional space. In that space, 500 points of a regular rhombohedral lattice, all corresponding to available, fade-resistant paints, have been selected. Colors made from those paints can be arranged in about 1000 series of equally different colors. About 400 of those series will form the rows and columns of about 40 square arrays that correspond to three intersecting sets of parallel cross sections through the lattice. Another 500 or 600 series of equally different colors will form about 40 triangular arrays, corresponding to four other intersecting sets of cross sections. First approximations to 350 of those colors will be shown in representative cross sections and in a three-dimensional model of the space arrangement of 60 of the colors.

COLOR IN THE MIDDLE AGES

Scarcely had people become somewhat more sentitive to colours when they began to attach a deep symbolism to them. Outer appearance was now meant to express inner feelings.

A real colour language was developed and became so popular during the Middle Ages that no one regarded it as a foreign language. Every amorous knight or court damsel could talk the language of colours without an interpreter and had no difficulty in understanding the hidden meaning of any colour:

Green:	First sprouting of love.
White:	Hope of acceptance.
Red:	Bright *flame of love* or the fervent desire for fame and honour.
Blue:	Unchanging faithfulness.
Yellow:	Love rewarded.
Black:	Sorrow and mourning.

Up to the Renaissance colour symbolism was not particularly complicated. But when Sir Isaac Newton added a few further colours to the main ones used till then – red, yellow and green – things became more difficult. Any kind of colour symbolism became almost impossible in the inventive age of Rococo.

All the old basic colours were now mixed gaily and systematically. Yellow-green, for example, was invented and was given the poetical name *merde d'oie* (goose dropping), being appropriately named *caca Dauphin.*

It was also in the 18th century when at a small evening party a lady discovered the body of a tiny insect on one of her snow-white fingernails.

Ecstatically she exclaimed: "Ladies, do look at the colour of this flea! It is black but not black, brown but more than brown. Oh, a superb, a heavenly colour!"

So *flea-colour* (couleur puce) became the latest fashion in the 18th century. All who wanted to make their fortune at court had to wear it. Soon all possible variations appeared and became known by such names as flea's head, flea's leg, flea's belly.

Excerpted from "The Paintbox of Love and Cosmetics" by Carl Brinitzer, The BASF Review, Vol. 23, May, 1973.

THE PROBLEMS OF DESCRIBING AND IDENTIFYING COLORS AND A PHILATELIC SOLUTION

A common problem in laboratory work, especially at the undergraduate level, is the identification and description of colors. Because of the present limited vocabulary it is usually necessary to invent names to describe colors and great difficulties are encountered when trying to distinguish between closely related shades. When working with colored species some sort of a simple color reference scheme would be most useful.

A seemingly unrelated field to chemistry but one that has experienced similar problems in color identification is philately (stamp collecting). Since the difference in shade of a stamp could change its value by hundreds of dollars

Reprinted permission of American Cyanamid Company

the major stamp distributors have issued "color guides" to assist collectors.* These guides, which consist of about 100 different colors, each individually named and arranged in the order of the spectrum, are ideal for chemical purposes since most of the colors and shades commonly encountered are listed in them. Their low cost and compact size make them excellent for use in places such as chemistry departments and analytical laboratories where they can be used as general reference charts to remove much of the personal interpretation presently involved in the identification and naming of colors.

*A popular guide is the "Stanley Gibbons Color Guide for Stamp Collectors," published by Stanley Gibbons Ltd., 391 Strand, London W.C. 2., England, in the form of a 8½ X 5½ in. fold out chart which can be obtained at most stamp dealers.

A. Lasis
York University
Downsview, Ontario, Canada

Reprinted from J. of Chem. Educ., Volume 50, Number 5, May 1973, p. 355.

BOOK REVIEW

SPSE Handbook of Photographic Science and Engineering. Edited by Woodlief Thomas, Jr. John Wiley and Sons, New York, 1973. Pp. xiii+1416, 253 tables, 499 figs. Price $37.50.

This handbook is not merely a collection of data, as may be found in the CRC *Handbook of Chemistry and Physics.* It is not the equivalent, for photography, of Condon and Odisham's *Handbook of Physics.* It is a reasonably successful attempt to duplicate for photography what the *American Institute of Physics Handbook* does for physics. I quote: "... This book is directed at the experienced practicing engineer and scientist. We assume that the user has a basic knowledge of his field.... Almost every section of the handbook contains tutorial and encyclopedic material, but usually not enough for the beginner to learn an unfamiliar field. He must look elsewhere for his education. To that end, however, we have included an extensive guide to the published works in photographic science and engineering (Section 23, Guide to Photographic Information). This material, prepared especially for this handbook, is not available in comparable form elsewhere...."

Sections 1-3: "Radiation Sources," "Radiometry and Photometry," and "Photographic Optics" have for the first time assembled, in one easily accessible reference, material that was widely scattered in the available literature. The classification of lenses, especially the schematics of the lens types and the glossary of terms associated with photographic lenses at the end of Section 3, should be valuable to many investigators. Section 4, "Filters," does a commendable job of covering all types of filters. Section 5, "Radiation Sensitive Systems," is concerned with detectors of electromagnetic radiation. The latter part of this section on information capacity of various detectors is very well done.

Section 6, "Latent Image Formation and Properties in Silver Halide Emulsion," is primarily an outline of problems in photographic engineering. The sections on hypersensitization and latensification by chemicals and/or light should be useful to many concerned with obtaining the utmost sensitivity from film.

Section 7, "Color Photography," is a very short introduction to silver halide color photography. In addition to the references, a bibliography of pertinent books has been appended.

Section 8, "Physical Properties of Photographic Materials," is a collection of material that is usually difficult to find on silver halide systems.

Section 9, "Photographic Chemistry," contains much material that is found in photographic texts. The first paragraph summarizes the chemistry of photosensitivity, but it fails to mention the photosensitivity of the alkali halides and alkali metals. The section is virtually restricted to the transition metals of Groups Ib and IIb combined with Group 6a or Group 7a anions. Nonsilver halide processes are summarized in Table 9.2 and the remainder of the section is devoted to silver halide chemistry.

Section 10, "Processing Methods," devotes a short paragraph to nonsilver halide processes. The remainder of the chapter is devoted to practical processing techniques for silver halide film.

Section 11, "Materials of Construction For Photographic Processing Equipment," deals virtually entirely with materials for use in silver halide processing.

Section 12, "Defect and Contamination Control," deals with defects, contamination and their sources. Although short, this material is rarely found in one place. A bibliography is appended to the references for this section.

Section 13, "Safety," is an excellent short chapter on hazards to be encountered with handling photographic materials.

The Sections on Sensitometry, Section 14; Densitometry, Section 15; Colorimetry, Section 16; and Image Structure and Evaluation, Section 17 are excellent presentations of material that many investigators in the field would do well to use frequently. An excellent bibliography is appended to Section 15. Section 16, "Colorimetry," has an excellent discussion of the CIE System. A bibliography is appended to the references. Section 17, "Image Structure and Evaluation," is applicable to all photographic systems although the examples in this section are selected from silver halide emulsions. Graininess, granularity modulation transfer functions, acutance, sharpness, and resolving power are adequately presented. Sections 14-17 are broadly applicable to any photographic system, in contrast to many of the sections which apply only to the silver halide systems.

Section 18, "Projection and Viewing," deals with "... the formation of a bright image on a screen for display, instruction or entertainment or the convenient examination of something too small to be observed directly." The material in this chapter has been assembled in one place for the first time of which the reviewer knows.

Section 19, "Testing and Evaluation," will be difficult for anyone unfamiliar with statistics and its application in the analysis of experimental data. The three tables on the number of observations required; "... for a test of difference between two means," Table 19.6; "... using the Chi square test," Table 19.7; and "... using the F test," Table 19.8 are very useful tables that are usually difficult to obtain. Table 19.10, a table of random digits, should also prove useful.

Section 20, "Photographic Instrumentation—Selected Aspects," briefly covers many aspects, such as Aerial Photography, Photogrammetry, Schlieren Photography, etc.

Section 21, "Microphotography," deals with photography at extreme resolution. Microfilm, COM, microfabrication, and information storage are some of the topics covered in this extremely interesting section.

Section 22, "Holography," is an excellent overview of a very young, growing field. The last ten pages of the section deal with applications in interferometry, character recognition, microscopy, display, information storage, ultrasonic holography, and particle sizing.

Section 23, "Guide to Photographic Information," was specially prepared for this handbook and will probably prove to be the most-used section. In fact, a paperback edition of Ch. 23 would probably be a best seller.

The editors and contributors have done a commendable job of knitting together a rather diverse assemblage of material into a presentable and useful handbook. It does have much material in it that is not readily available in any other single source. However, the publishers should have used a thinner grade of paper and a smaller typeface. The book is unnecessarily thick.

James E. Lu Valle
Business Equipment Division
Research and Engineering Center
SCM Corporation
Palo Alto, California 94304

Reproduced with permission from J. Opt. Soc. Amer., 1973, *63*, 1270-71.

BOOK REVIEW (TRANSLATION BY ? FROM JAPANESE)

Re: **Architecture and Color,** by Waldron Faulkner. Book Review by Masao Inui (Color Communication, 1973, No. 44)

Main comments on the book are:

1. Unique style.
   The author has created a style of his own in expressing his views—no other than a good, professional architecture expert could have this level of achievement. Mr. Faulkner's personality, nicely blended with his views on art, color, and architecture, is also observed throughout the book.
2. Good approach.
   The author's emphasis on the use of color in architecture seems a break from the conventional school. The book can be divided into two main parts: a) Color and architecture—importance of color; selection of architectural material. b) Color as basis in architectural design. This approach not only is excellent from the professional standpoint but also makes the subject easier to understand for the nonprofessionals who may be interested.
3. Lastly, the author's use of Judd's four principles of color harmony (Order; Familiarity; Similarity; and Unambiguity) to further illustrate his views is very effective. For the simple reason that Judd's principles are modern and popular in the present architectural community—thus making the book acceptable to different readers.
4. However, that the author has used Ostwald's theory of color harmony and concluded the book with Mr. Ross's views marks a poor judgment on Mr. Faulkner's part. Because neither Mr. Ostwald's theories nor Mr. Ross's views basically agree with that of Mr. Faulkner's. Thus this conclusion leaves on the reader a strange impression of discord about the book.

REPLY TO REVIEW

Dear Mr. Inui:

I have read with great interest your review in "Color Communication #44" of my book, "Architecture and Color" and am most grateful for your kind words about the style and approach. Also I am pleased that you agree with Judd's four principles of color harmony that I have presented.

However, I am puzzled by your remarks in the last paragraph of the translation that I am enclosing. If I understand it correctly, you question whether Ostwald's theories and Ross's views are consistent with Judd's and mine. This interests me very much because I believe that all these views are ultimately based on the principle that harmony depends on the presence of a common quality (similarity). I wish I might have the pleasure of discussing this with you in person and I thank you for your excellent review.

Very sincerely yours,

Waldron Faulkner

RUTH M. JOHNSTON TO HEAD CIBA-GEIGY'S COATINGS LAB

Ruth M. Johnston has joined the Pigments Department of CIBA-GEIGY Corporation as Manager of the Coatings and Colorimetry Laboratories.

Miss Johnston will be responsible for the testing and evaluation of pigments for the coatings industry. She will also supervise technical service operations on colorimetric problems in the plastics, paint, textile and paper industries.

She is a member of the Inter-Society Color Council, Federation of Societies for Paint Technology, American Chemical Society, Optical Society of America and Colour Group (Great Britain). In 1970 Miss Johnston received the Armin J. Bruning Award from the Federation of Societies for Paint Technology for her outstanding contributions to the science of color.

EXHIBITION ON COLOR IN ART

The Fogg Art Museum at Harvard University is presently organizing an important exhibition entitled *Color in Art*, which will explore color theory, particularly that of Arthur Pope. The show is to be shown there in the spring of 1974 (probably late April to the middle of June) and subsequently will travel to a half dozen museums throughout the country. Concurrently, the Museum of Science in Boston will hold a more general exhibition on color, which may also travel to other science museums and to some of the institutions showing the Fogg exhibition.

For further information write (Mrs.) Suzannah Doeringer, Assistant Director, Fogg Art Museum, Cambridge, Mass. 02138.

Applications of Arthur Pope's Color Theory

Arthur Pope graduated from Harvard University in the class of 1901. After that, he taught fine arts at Harvard and from 1945 to 1948 was Director of the Fogg Museum.

Mr. Pope's theory and practice of teaching greatly influenced many of his students. His aim was to create an understanding of the principles underlying representation in the terms of drawing and painting, so that distinguished works of art, executed in a variety of ways, for varying purposes, could be understood. He stressed the fact that, in order to understand fully the development of art—and therefore all its ramifications—each step of the creative process had to be understood. Consequently, he began his instruction with the smallest element, the dot. Then he developed "dots" into lines, lines into curves, until all culminated in "form drawing."

Professor Pope published several books explaining this development, among which are *Art, Artist and Layman*, *Titian's Rape of Europa*, and *The Language of Drawing and Painting*. In this last book he expounded his theory of color and the "working color solid". His color order system combines remarkable simplicity and easy comprehensibility with sophistication. One of its great virtues is that it stresses relative intensity rather than absolute intensity, yet it also gives full consideration to varying degrees of darkness. For color education and for the purpose of achieving a basic comprehension of color relationships, the Pope working color solid has recently shown itself, in work now in progress concerning absolute intensity, to be superior to both the Ostwald and Munsell systems.

Professor Howard T. Fisher, founder and first Director of the Laboratory for Computer Graphics and Spatial Analysis at Harvard University, has recently been studying Mr. Pope's color solid. With the aid of the computer, Mr. Fisher developed a number of refinements which have overcome the limitation of the color solid in dealing only with relative intensity. He split the exterior cylinder of the Pope solid at yellow and then spread it out, so as to give a sort of Mercator map of the entire world of color. The width of the map represents variable hue, the height of the map represents variable darkness or value, and absolute intensity is shown by contouring, or by other computer methods.

These recent developments make Mr. Pope's work startlingly timely. Coupling these with the basic ideas behind Mr. Pope's teaching ideas, one finds a vital body of work.

Arthur Pope's WORKING COLOR SOLID

This memorandum, being written at the suggestion of Miss Agnes Mongan of Harvard University's Fogg Museum of Art, will attempt to appraise briefly the significance of Professor Arthur Pope's work relative to "color space".

First to highlight matters very briefly:

Mr. Pope's color order system combines remarkable simplicity and ease of comprehension with subtlety and sophistication. This most useful combination is achieved through the concept of a "tempered scale", whereby a single degree of darkness, out of the several degrees which may actually exist in any color gamut, is chosen as representative of the maximum intensity for each hue. This is comparable in function and significance to the musical tempered scale upon which all keyboard instruments depend.

As a means for achieving a basic understanding of color relationships and the nature of the principal factors involved, the Pope color solid is without doubt the most useful that has ever been developed. It is presented in terms of the twelve "logical hues", those typically most useful when thinking about color. These have long been a part of our cultural tradition, and are easily named: red, orange, yellow, green blue, purple—and their intermediates (red-orange, yellow-orange, etc.). It gives full consideration to varying darkness (or "value"). It portrays intensity (or "saturation") in *relative* terms, that is, as a percentage of the maximum intensity for each hue—an especially useful feature when color is being considered in relation to art. (A recent extension of the Pope system now makes it possible to show also the full facts as to *absolute* intensity or "chroma".)

The value and importance of Mr. Pope's work may best be appreciated through comparison with the corresponding work of the two most noted color specialists of modern times: Albert H. Munsell and Wilhelm Ostwald.

Munsell (1859-1918) was an American painter and art teacher who became deeply interested in color and spent most of his life working with it. His system, almost certainly the world's best known and most widely used for color appearance, has for many years dominated color thinking in the United States. (In dealing with the physics of color, in contrast to its appearance, the C.I.E. system is that most widely employed.)

Ostwald (1853-1932) was a distinguished German scientist and recipient of the Nobel Prize who became involved in the complex problems of color and worked intensively upon them during his later years. His color system has been widely known and used, particularly in Europe.

Both of these men were deeply interested in disseminating information regarding their concepts and work, and both wrote and travelled extensively to that end. In addition Mr. Munsell was the founder of the Munsell Color Company, today as for many years an important source for color information and consultation, as well as for color samples of great variety. In contrast Mr. Pope spent his professional life as a teacher of art, and looked upon his color solid as little more than a useful teaching aid. His writings on color space and what he called the *working color solid* were extremely brief, though characterized by remarkable clarity.

The Ostwald System

In his work concerning color, Mr. Ostwald attempted to be both scientific and definitive, but, as is now well recognized, he was unsuccessful in achieving either of those goals. This failure was in consequence of his entire system depending upon certain initial assumptions necessarily of an arbitrary nature and resulting in the system being incapable of embodying all possible colors. In addition a serious limitation of the Ostwald color solid, from both a scientific and practical viewpoint, is that it contains no uniform darkness scale or "dimension" (except for grays, which was based on a now discredited logarithmic scale).

In the Ostwald system relative intensity only is represented.

(It may be noted that some who are especially familiar with the Ostwald system feel that its method of organization makes it particularly useful to artists and designers working to establish possible color schemes.)

The Munsell System

In comparison with Ostwald's work, that of Munsell has proved to be definitive as well as far sounder from a scientific viewpoint. Although hues of a somewhat questionable nature were chosen as initial assumptions, a fully definitive system of identification for all possible colors is provided in terms of hue, "value" (darkness) and "chroma" (intensity or saturation). With a uniform darkness dimension incorporated as a basic feature of the Munsell solid, there is no possibility of this crucial color variable being slighted. The darkness scale employed in the Munsell system, although of a subjective nature, is superior to that used by Ostwald. (Unfortunately, in terms of Munsell swatch books, it accounts for a substantial overemphasis being placed upon darker colors with a corresponding underemphasis upon lighter colors. In an effort to minimize this difficulty, an additional intermediate level has for certain hues been added toward the lighter end of the scale.)

In the Munsell system, absolute intensity only is represented.

Munsell's portrayal of color space is asymetrical in general and highly irregular in its exterior form. As a further complication, the exterior form can change significantly depending upon several variables: the precise sampling locations employed, the nature of certain assumptions made (such as whether the color finish is glossy or matte), and possible changes over time (such as new developments in pigment chemistry). Due to such variables, there is no fixed conformation for the Munsell solid, and its form is therefore difficult to grasp and all but impossible to remember except roughly—even for those who work regularly with it.

Sometimes it is an advantage to have stressed variables such as those just mentioned, if they happened to be the principal subject of study or of particular concern. For such purposes, the Munsell system may perhaps prove useful, since differences would be emphasized. However, recently developed refinements in the Pope system, shortly to be mentioned, would make the latter even more effective.

In an effort to overcome the complicated appearance of the Munsell solid, various drawings (and at least one model) have been made to show how it would appear if its rough exterior were to be smoothed (in a sense "tempered") through enclosure within an all-enveloping surface. Studied in combination, two or more such representations, as seen from opposite directions, can serve to make more comprehensible the general form of the Munsell solid. However, when the smoothing employed is not based on any systematic interpolation or alternative rigorous procedure, such a presentation is inevitably a misrepresentation of Munsell color space in several respects, particularly as to intensities.

The Munsell system claims to permit sampling at visually equal spacing within the color solid, but, for reasons too complex to consider here, this goal is achieved only approximately and in part. While such a goal in terms of hue, darkness and intensity concepts is impossible to achieve, the Munsell system almost certainly represents the nearest approach to a solution so far developed.

The Munsell system, in combination with the very extensive research which has been carried out in terms of it, has been responsible for numerous important contributions to the study of color. This has resulted primarily from its value as a definitive tool for the measurement and specification of color in terms of visual and psychological factors.

(It may be noted that the Munsell system offers a practical advantage when actual color samples, in terms of evenly numbered steps of absolute intensity or "chroma", are to be assembled, in that it provides the necessary physical space to make this possible.)

The Pope System

As an introduction to the world of color, as a teaching aid, as a means for achieving a thorough understanding of color interrelationships, and as a mental construct to facilitate thought regarding color, the Pope solid is clearly superior to the Ostwald and Munsell solids.

It portrays the twelve "logical hues"—those most easily named, remembered and dealt with. This is in contrast to the Ostwald system with its twenty-four hues, difficult to name or remember, or the Munsell system with its ten hues so arranged that, contrary to traditional practice, reds-to-yellows are allocated only half as much space as yellows-to-blues or blues-to-reds. Judged by common practice, as appraised by the National Bureau of Standards, the blue in the Munsell system is decidedly greenish, even greener than the standard blue-green or "cyan" employed in the half-tone color printing process. As a point of minor confusion, in the Munsell system orange is referred to as "yellow-red".

As originally developed, the Pope system employed a subjective darkness scale, never mathematically defined. In close consultation with Mr. Pope and with his enthusiastic concurrence, this has now been corrected, so that the span between white and black is divided objectively into percentage units. The white of typical good white paper is given the rating of 0% darkness, while the black of typical good black pigment is given the rating of 100% darkness. Intermediate points in terms of equal percentages are located at equal distances.

The basic Pope solid, like the Ostwald solid, showed only relative intensity. In contrast, as previously noted, the Munsell solid shows only absolute intensity. By a very simple and easily comprehended extension of the Pope system, recently developed by the writer, it is now possible to show absolute intensity in addition—while still building upon the basic simplicity of the Pope system. Any of several scoring systems may be employed for the purpose.

Thus the virtues of the Pope and Munsell systems may now be combined, making it possible to draw upon the vast wealth of data available under the Munsell system, without sacrificing the basic simplicity of the Pope system. In the process, relative or absolute intensity, or both, may be represented.

All of the colors and color identifications in any system portraying *relative* intensity must necessarily be dependent upon the intensity of those colors against which comparison is to be made. This is the price that must be paid to show relative intensity, to achieve simplicity, and to avoid variability in the exterior form of the color solid. Dependence upon the intensity of a starting color can only be avoided when dealing with absolute intensity, and if avoided, the exterior of the color solid must necessarily vary with the color gamut, and also be irregular, as with the Munsell solid.

For each hue in the Pope system, the color at the "control point" (the point at the outer apex of each constant-hue triangle) would represent the maximum intensity for the particular color gamut under consideration. Once established, it serves as the basis for all of the intensities, *but not for the darknesses,* for all variations of that entire hue. In contrast, for each hue in the Ostwald system, the color at the control point serves as the basis for all of the intensities *and also* all of the darknesses for all variations of that entire hue. Even more serious, with the Ostwald system the darkness of the color used at the control point necessarily represents a choice among the alternative darknesses which may be available, and as a basis for all variations of a hue no convincing argument can be made for the use of one more than another.

In the light of the recent developments mentioned, it need no longer be a question of having to choose between the Munsell and Pope systems, with their respective advantages and limitations. Now with the slightly modified and extended Pope system, it is possible to present all of the facts available from the Munsell system in far simpler and clearer graphic terms than ever before. The virtues of the Pope system—from the viewpoint of simplicity, clarity, and ability to show relative intensity—are fully retained, but now are combined with an objective darkness scale, better and more limited tempering, and the ability to show absolute intensity when desired. In the process, full cross-reference to, or conversion from, Munsell notation (or the C.I.E. system used by color scientists) is possible.

As a further and most important graphic feature, all three of the basic variables of color space—hue, darkness, and intensity (either relative or absolute)—may be simultaneously shown, seen, compared and studied. This is achieved, in terms of two-dimensional displays on paper, by the simple expedient of vertically slicing and then spreading out the exterior surface of the enclosing cylinder of the Pope solid—somewhat in the manner of a Mercator projection for the mapping of the globe, though, in terms of the cylindrical coordinates employed, without its distortions.

This development, now perfected as a simple addition to the Pope system (and capable of being mapped by computer), makes possible an entirely new level of color space comprehension. For showing color relationships and the differences existing among color gamut variables, this new procedure can prove particularly advantageous.

The special virtues of the Pope solid have always resulted to a major degree from the employment of the concept of tempering. Better and more limited tempering has now been achieved and agreed upon in consultation with Mr. Pope. Based indirectly upon the Munsell "value" scale, the tempering now approaches an irreducible minimum, while benefiting to some extent from the Munsell relationship. (For those who may be interested, the extent and full detail of the tempering can easily be shown by graphic means.)

It is hoped that this brief consideration of the Pope *working color solid* may serve to provide the information which Miss Mongan had in mind. Should there, however, be any questions or possible differences of opinion as to anything that has been written, it would be a pleasure to have the opportunity to go into greater detail on any points.

Howard T. Fisher
Harvard University

For possible reference, listed here all in one place are the newly developed refinements and extensions applicable to the Pope system:

Refinements

- A wholly objective darkness scale (corresponding to the internationally recognized reflectance or "Y" scale of the C.I.E. system),
- Better tempering of more limited scope,
- The ability to include all possible colors,
- The ability to make clear by graphic means the precise nature of the tempering in relation to any specified color gamut,
- Full convertibility with Munsell and C.I.E. notation.

Extensions

- The ability to show absolute as well as relative intensity (pursuant to any desired scoring system: "chroma", "L,a,b", "purity", "percentage of MacAdam limits", etc.),
- The ability to display total color space so that its limits may all be seen, studied and compared at one time (to whatever degree of refinement desired).

PRODUCTS AND SERVICES

Omission

In the last issue No. 226, September-October, 1973, under "Products and Services" the address for Diano's Chromscan Bulletin 347 was inadvertently omitted. My apologies. The address is: Diano Corporation, 75 Forbes Boulevard, Mansfield, Mass. 02048.

PRODUCTS AND SERVICES

NEW BOOK: "The Measurement of Appearance"

For this textbook, Richard S. Hunter, President of Hunterlab, has drawn on his 45 years of experience and research in the field of appearance measurement to discuss its many attributes such as color, gloss, luster, haze, texture, distinctness of image, opacity, yellowness and whiteness.

The book is divided into three parts:

Part I describes the bases of the science of appearance—light and the way it interacts with objects, color, gloss, color vision of the average human observer, illuminants and specimen examination conditions.

Part II discusses the development of psychophysical scales for evaluating appearance attributes, numerical specifications which agree with the way the average human observer evaluates appearance, color and color systems, color difference, gloss and other factors.

Part III describes instrumentation for appearance measurement, optical and geometric designs for different conditions, instrument calibration standards, specimen preparation and measurement techniques.

This book will be of great value to anyone involved with object appearance measurement. It is now available from Hunterlab in soft cover form for $12.50 plus postage.

Hunter Associates Laboratory, Inc.
9529 Lee Highway
Fairfax, Virginia 22030
Attention: Ms. Margaret Burns, Director, Education & Information

Lehigh University Announcement

Lehigh University's Consortium for Color Technology will sponsor a three-day course followed by a one-day symposium on the general topic of colorant formulation by advanced methods. The course will run from May 6 through May 8, 1974, and the symposium will be held on May 9, 1974.

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, Bethlehem, Pa. 18015.

Understanding and Measuring pH

New GATF Audio-Visual Presentation

Although pH measurement in lithography has become commonplace since the development of simple, line-operated pH measuring devices, the significance of the term pH remains a mystery to many lithographers. (pH is a chemical term to represent the acidity or alkalinity of a material, and is of great significance in lithography.)

To help the lithographer in understanding pH, GATF has developed an audio-visual package entitled "Understanding and Measuring pH". AV 8 demonstrates the concept of pH and its scale by comparing it with the familiar ruler. Numerical pH values are explained, emphasizing the degree of acidity or alkalinity they represent.

The presentation describes various types of pH measuring devices, showing how they are used, and including the care and maintenance of electric pH meters. Also depicted in the AV are: (1) the effects of hard water on the pH of a solution; (2) how to prepare and measure pH of a fountain solution for a lithographic press using alcohol; and (3) the methods of measuring pH of paper and paper coatings and how they can affect ink drying.

Although some portions of the presentation relate specifically to the lithographer, the information and techniques demonstrated for measuring pH are applicable to any school science program.

AV 8, "Understanding and Measuring pH," is comprised of 58 color slides, an illustrative narrative, and discussion notes that included behavioral objectives. A comprehensive coverage of pH and its importance to the lithographer, AV 8 may be purchased by GATF members for $27.50 and by non-members for $55.00. Reel-to-reel sound tapes are being sold for $8.50 to GATF members; $12.00 to non-members. GATF member price for standard tape cassettes (audible cue) is $4.80; non-members $8.00.

To receive AV 8, contact: Order Department, Graphic Arts Technical Foundation, 4615 Forbes Ave., Pittsburgh, Pa. 15213.

Hunterlab's Latest Colorimeter—D25D3

The new D25D3 achieves fast color measurements by displaying three digital values simultaneously—L,a,b or CIE X,Y,Z, or a third triple scale. The third scale can be Y,x,y; Rd,a,b; or ANLab cube root L,a,b scales. When three reference values of any of these scales are placed in Memory, the instrument will calculate and display color difference from the reference — $\Delta L, \Delta a, \Delta b$, $\Delta X, \Delta Y, \Delta Z$ or the third scale deltas. The "Read Memory" button recalls and displays the values stored in Memory. Also available are any three of the following single-dimension scales: Yellowness, Whiteness, Haze, Tomato Color, or Z% (Blue Reflectance). The BCD output when coupled to a printer, key punch, or directly interfaced to a computer, provides even faster data collection and elminates possible error in recording data.

For more information, contact:
Hunter Associates Laboratory, Inc.
9529 Lee Highway
Fairfax, Va. 22030
Attention: Marketing Department
Telephone: 703/591-5310

Materials Show "True Colors" Under New Lighting Controls

Allowing colors to be seen as they actually appear under a constant source of quality illumination is the prime feature of the newly introduced SpectraLight Color Matching System by the MACBETH COLOR & PHOTOMETRY DIVISION of Kollmorgen Corp.

The company says it's a "matchmaker," designed to radiate lighting conditions from 2300K to 7500K. In addition, the new unit—called the SPL 75—offers ultra violet lighting, either independently of the other illuminations or in combination with them.

It is expected that the SPL 75 should be useful in color industrial operations where rigid quality control tolerances are required, in areas such as textiles, paints, plastics, paper, inks, pigments, dyestuffs, glass, ceramics, wood and metals.

For more information, contact: Sales Manager, MACBETH COLOR & PHOTOMETRY DIVISION of Kollmorgen Corp., Box 950 Newburgh, N. Y. 12550.

Fibre Optics Colorimeter

Designed as a process control tool for color in paint manufacture, a newly-developed instrument uses fibre optics connections between the colorimeter's light source, detector and digital readout display, and a "remote" sensing head used for in situ measurements. A single fibre optic light guide transmits light from the stabilized light source to the sensing head where it illuminates the sample at normal incidence. The standard sensing head uses eight light guide collectors arranged in a circle around the illuminated spot to receive light diffusely reflected through an angle of 45 degrees. Applications include color control during manufacture of plastics, inks, bulk chemicals, and wherever precise remote color measurement is needed in manufacture. Contact Paint Research Association, Waldegrave Rd., Teddington, Middlesex, England.

Reprinted from J. of Paint Technol., Vol. 45, No. 585, October 1973.

Opacimeter Bulletin Available from Diano Corporation

Diano Bulletin 355 describes the Diano BNL-1 Opacimeter which reads both printing opacity or TAPPI defined contrast ratio in seconds without further computation. According to Diano, the BNL-1 is an invaluable aid in the production of higher, more consistent quality papers since it helps reduce waste (Broke & Fillers), increases profit margins by lowering manufacturing cost and eliminates customer complaints.

A copy of Bulletin 355 can be obtained by writing: Diano Corporation, 75 Forbes Blvd., Mansfield, MA 02048.

CONCLUSION

ISCC SYMPOSIUM ON PROFESSIONAL EDUCATION IN COLOR FOR ART AND TECHNOLOGY

Abstracts of Papers

Annual Meeting, May 1, 1973
Statler-Hilton Hotel, New York

Survey of Courses on Applied Color and Appearance Science by the Instrument Manufacturers, Charles G. Leete, Manufacturers Council on Color and Appearance, Vienna, Virginia

An astonishing number of the instrument manufacturers offer a wide variety of educational opportunities in the color and appearance field. Availability ranges from written material to scheduled seminars, clinics, workshops, etc., as well as custom presentations. In general the courses have limited enrollment so as to maximize the students' involvement. However, over one thousand students are educated by the manufacturers offering the courses several times each year.

"If you can't come to us, we will come to you" seems to be the current trend as the manufacturers not only offer training at or near their plant locations but have taken to the field to present regional courses, and even in-company presentations. Course length and content varies considerably. The prospective student has a choice of courses ranging in length from a half-day up to a full week or longer. Many of the manufacturers use their own personnel to teach; others supplement with outside invited experts; and another variation is the joint course sponsored and conducted by two or more of the instrument manufacturers. In custom situations a manufacturer is often asked to assist in a course sponsored and taught primarily by the user of the equipment.

Course coverage includes basic fundamentals of color and appearance, calibration and maintenance for specific instruments, color formulation techniques, color and appearance applications for a given industry, and, of course, the custom presentations designed to meet specific requirements of the users.

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COLOR REPRODUCTIONS

Largely through the kindness and interest of Mr. Charles Dyker of the Progressive Color Corporation, Rockville, Maryland, we have been able to provide (at no cost to the ISCC) color inserts for our first four issues in the new format. I had hoped this would stimulate others to contribute in the same way.

A continuation of the color inserts will depend on members of the ISCC. The Committee on Publications will answer inquiries or assist where possible, but the initiative (and follow-up) for getting new inserts will depend on the cooperation of individuals, delegations, or the organizations with whom they are associated.

R. W. Burnham
Editor

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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.