

Inter-Society Color Council *News*

JUDD MEMORIAL CONFERENCE ON COLOR METRICS

The "Judd Memorial Conference on Color Metrics" sponsored by the ISCC will be held in Williamsburg, Virginia on February 11-14, 1979.

The topics of the conference, color metrics and color difference perception, are fields of color science that are of substantial industrial interest as well as of interest in regard to the development of accurate models of color vision.

The conference will provide an opportunity for workers in this field to present and discuss facts and theories that have emerged since the last major conference on the subject matter, the "Helmholtz Memorial Symposium on Color Metrics" in 1971 in Driebergen in the Netherlands. Further, it will provide a forum for discussion of those areas in the field where knowledge is currently lacking, of the "state of the art" in color difference evaluation, as well as of worthwhile new directions in research. Time will be reserved for open discussion among all attendees.

The plans for the program call for nine invited papers by the following authors: Robert M. Boynton, University of California, San Diego; J. J. Vos, Institute for Perception TNO, Holland; J. Douglas Carroll, Bell Laboratories; Tarrow Indow, University of California, Irvine; David L. MacAdam, Rochester, New York; L.F.C. Friele, Vezelinstitut TNO, Holland; Alan R. Robertson, National Research Council, Canada; Charles D. Reilly, E.I. DuPont de Nemours & Company; Ralph Stanziola, Applied Color Systems, Inc.

In addition a number of contributed papers will be presented.

Details regarding the conference will be communicated shortly in a circular to be mailed to the membership.

Rolf G. Kuehni

MAKE YOURSELF HEARD

The Finance Committee is going to study the question of what should be done about speaker's fees at future meetings. Please send your suggestions to Mr. S. Leonard Davidson, whose address is given on the back page of the *Newsletter*. If you feel more vocal than literate, his telephone number is also there.

47TH ANNUAL MEETING

April 17-18, 1978

Loew's L'Enfant Plaza Hotel, Washington, D.C.

Monday, April 17

9:00 a.m. - Problems Subcommittee Meetings
4:30 p.m.

Problem No.	Title and Chairman	Time
10	Color Aptitude Test: Bonnie K. Swenholt, Chairman	1:30 - 3:00

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18	Colorimetry of Fluorescent Materials: Thomas E. Cullen, Chairman	9:00 - 10:30
22	Procedures and Material Standards for Accurate Color Measurement (including CORMSAG Task Force): Ellen Campbell Carter, Chairman	10:30 - 12:00
25D	Determination of the Strength of Colorants, Dyes Section: Charles D. Sweeny, Chairman	10:30 - 12:00
25F	Determination of the Strength of Colorants, Pigmented Fibers Section: George F. Sonn, Chairman	1:30 - 3:00
25P	Determination of the Strength of Colorants, Pigments Section: Joyce Davenport, Chairman	10:30 - 12:00
27	Indices of Metamerism: Ralph Besnoy and Allen B. Rodrigues, Co-Chairmen	1:30 - 3:00
30	Color in the Building Industry: Waldron Faulkner, Chairman	1:30 - 4:30
32	Color Problems in Photography and Printing: Calvin S. McCamy, Chairman	9:00 - 10:30
33	Human Response to Color: Alexander F. Styne, Chairman	9:00 - 12:00
34	Color-Difference Problems: Ruth M. Rich, Chairwoman	9:00 - 10:30
35	Color and Appearance of Living Tissue: Robert C. Sproull, Chairman	1:30 - 3:00
36	Color Acceptability Standards: Anthony J. Pentz, Chairman	3:00 - 4:30
37	Artists Materials: Joy Turner Luke, Chairman	9:00 - 12:00

ISCC MEMBERSHIP LIST

The new membership list is being prepared for publication. If you have any changes or corrections to make in your listing as it last appeared notify the Secretary, Dr. Billmeyer, at once.

New Problems Open discussion with Problems 3:00 - 4:30
 Committee Chairman and Coordinators
 ART EXHIBIT: "Where Art Meets Science and Technology"

8:00 p.m. - WORKSHOPS: "Color in Use"
 9:30 p.m.

No.	Title	Moderator
1.	Color Quality Control in Industry	Rolf Kuehni
2.	Visual Effects of Colored Light	Joy Turner Luke
3.	The Munsell System and the Universal Color Language (mostly for newcomers)	Kenneth L. Kelly
4.	Light Sources and Surface Color Appearance (mostly for designers)	Edwin K. Robinson
5.	Color Trends in the Home Fashion Industry	Nadine Bertin

Tuesday, April 18

Time

9:00 a.m. - 12:00 m. SYMPOSIUM: Color and Illumination
 Presiding: Dr. William Thornton, Chairman
 Illuminating Engineering Society Delegation

"Color and Illumination -An Introduction" Gunter Wysecki

"Color-Rendering Index" Charles W. Jerome

"Color-Preference Index and Color-Discrimination Index" William A. Thornton

"Coloration by Specific Commercial Light Sources" Alexander F. Styne

"A Look at Color Constancy" Eugene Allen

"Color Appearance" Gerald L. Howett

9:00 a.m. - 12:00 m. ART EXHIBIT: "Where Art Meets Science and Technology"

12:00 m. - 1:30 p.m. LUNCHEON
 Presiding: Mr. Charles W. Jerome, President
 Inter-Society Color Council

1:00 p.m. Dr. Henry Hemmendinger, Hemmendinger Color Laboratory: Citation for presentation of the Macbeth Award to Fred W. Billmeyer, Jr., Rensselaer Polytechnic Institute
 Response by Dr. Billmeyer

1:30 p.m. - 3:00 p.m. ANNUAL BUSINESS MEETING
 Presiding: Charles W. Jerome, President, Inter-Society Color Council

Reports of Officers
 President, Charles W. Jerome
 Vice-President, Franc Grum
 Secretary, Fred W. Billmeyer, Jr.
 Treasurer, S. Leonard Davidson

Reports of Standing Committees
 Finance Committee, S. Leonard Davidson
 Membership Committee, Calvin S. McCamy
 Publications Committee, William Benson
 Problems Committee, Robert F. Hoban

Reports of Workshop Moderators
 Reports of Delegation Chairmen

General Chairman: Alexander F. Styne
 Symposium: William A. Thornton

Art Exhibit: Janina Edwards
 Luncheon Decorations: Joy Turner Luke Janina Edwards

APPLICATIONS APPROVED FOR INDIVIDUAL MEMBERSHIP

April 16, 1978

Mr. Patrick Chassaing 49 Avenue Saint Louis St. Maur, France 94210
 Interaction of light with matter in turbid media; instrumentation for color measurement, (M.Sc. in color science, RPI, 1978.)

Dr. C. G. Crawforth Ciba-Geigy (U.K.) Ltd. Pigments Division Roundthorn Estate Wytheshane Manchester, England
 DCMA. Printing inks, paints and plastics—color match predictions. Member, The Colour Group (Great Britain), The Institute of Printing (U.K.)

Mrs. Eleanor V. De Angelis 3600 N. Peary Street Arlington, Virginia 22207
 Color as it relates to quality or classification of food products, physical standards for visual evaluation of color, and instruments for numerical measurement. Also the stability of color photographs and color fidelity in printing.

Dr. David G. Drennon University of Iowa College of Dentistry 4145 Iowa City, Iowa
 ACP. Color matching and selection relative to tooth color. Environmental conditions and their influence. Member of several dental associations.

Mr. Jean Francois Dubois MRC 217 Rensselaer Polytechnic Institute Troy, New York 12181
 Colorimetry and spectrophotometry, both hardware and software, for use in the paint and textile industries, etc. (M.Sc. in color science at RPI, 1978.)

- Dr. Edward A. Duffy
Allied Chemical
Corporation
Fibers Division
P.O. Box 31
Petersburg, Virginia 23803
- AATCC, AChS. Computer color matching and color control.
- Mrs. Rose E. Dumas
3146 East 157th Street
Cleveland, Ohio 44120
- FSCT. Custom color matching, control, and ceramic glazes and colorants.
- Miss Inge Fiedler
Art Institute of Chicago
Michigan Avenue at
Adams Street
Chicago, Illinois 60603
- ASTM. Relating aspects of color theory to work on the chemical and physical aspects of the various artists' pigments and the techniques artists use. Member several art conservation societies.
- Mr. Bruce Hammersla
1141 N.W. 50th
Seattle, Washington 98107
- Color formulation, color matching, colorimetry.
- Ms. Jacqueline Levine
938 Armstrong Avenue
Staten Island, New York 10308
- Color in the field of interior design.
- Ms. Maxine Davis Marc
Pinwheel Systems
John N. Schaedler, Inc.
404 Park Avenue South
New York, New York 10016
- No information provided except that Ms. Marc represents her company.
- Mrs. Bonnie E. A.
McKenzie
53 Chelsea Avenue
Toronto, Ontario
Canada M6P 1B9
- CMG (pending). Interested in colour as an agent affecting behaviour and well being in micro-built environments. Understanding of the basis for current colour decisions in environments for the purpose of broadening it to include considerations for behavioural and well being effects. (M.Sc. student in environmental studies, York University).
- Dr. E. Richard McPhee
University of Michigan
School of Dentistry
- ACP. Dental ceramics; light and color technology in dentistry. Also member of several dental societies.
- Mrs. Betty Lou Millikin
Hercules, Inc.
Box 519
Washington, Pennsylvania 15301
- AChS. Interest in pigments.
- Mr. Bryan Powell
Federal Engineering
Australian Broadcasting
Comm.
GPO Box 487, Sydney
2001
N.S.W. Australia
- IES, SMPTE. Colour rendering indices of illuminants in television and photography. Colour vision and reproduction of colour in photography and television. Member, The Colour Group (Great Britain).
- Dr. Gary S. Rogoff
348 Susquehanna Road
Rochester, New York
14618
- ACP. Esthetics of veneering materials (ceramics, plastics) for dental restorations, color matching, porcelain shade control, etc. Member several dental societies.
- Dr. Ronald G. Presswood
902 Frostwood, No. 108
Houston, Texas 77024
- Perception and color matching for dental ceramics. Teaching and research on the clinical implications of color in dentistry and its relation to esthetic restoration. Member several dental organizations.
- Mr. Mathias J. Schuler
E.I. du Pont de Nemours
& Company
D&C Technical
Laboratory
Chemicals, Dyes &
Pigments Dept.
Wilmington, Delaware 19898
- AATCC, AChS. Instrumental measurement, computer shade matching, and other computer involvement with color, sorting, metamerism, solution applications, small color differences, standard depth of shade, etc.
- Dr. Wolfgang Walter
GTE Sylvania, Inc.
100 Endicott Street
Danvers, Massachusetts 01923
- IES. Design of illuminants and color rendition. Member, American Physical Society.

THE MYCOLOGICAL SOCIETY OF AMERICA

The Mycological Society of America was founded in 1932, originating from the Mycological Section of the Botanical Society of America. The Constitution of the Society was adopted December 28, 1932 at Atlantic City, New Jersey. William H. Weston, Jr., Harvard, was the first President. From the beginning, the Mycological Society of America has been an open organization, welcoming into its membership anyone—American or foreign—with an interest in fungi. There are currently about 1,400 members from every conceivable discipline or specialty dealing with fungi. Professional mycologists from industry, education, and government, as well as amateur mycologists, are included in the membership.

The official journal of Mycological Society of America is *Mycologia*. *Mycologia* is published bimonthly by New York Botanical Garden. The Editor-in-Chief is selected by Mycological Society of America and is aided by an Editorial Board composed of members of the Society. The Managing Editor is a staff member of the New York Botanical Garden. Publication in *Mycologia* is open to any member of the Society.

Activities of Mycological Society of America include an annual meeting either in conjunction with American Institute of Biological Sciences or alone. In 1977 the Society was host for the Second International Mycological Congress in Tampa, Florida. Meetings in 1978 will be held at University of Georgia, Athens.

Mycological Society of America is pleased to become affiliated with Inter-Society Color Council and looks forward to a long and mutually beneficial relationship.

Jack D. Rogers
President

SYMPOSIUM ON COLOR INSTRUMENTATION DRAWS 201 REGISTRANTS TO CLEVELAND

A total of 201 enthusiastic registrants took part in the Symposium on Color and Appearance Instrumentation, held March 14-16 at the Marriott Inn, Cleveland, Ohio. Interest was extremely high, and attendees (including representatives from Canada, Mexico, Argentina, and France) crowded the lecture halls and workshops throughout the 2½ day event.

The Symposium, sponsored by the Federation of Societies for Coatings Technology in conjunction with the Manufacturers Council on Color and Appearance and the Inter-Society Color Council, was held in response to the numerous recent developments in color matching programs and instrumentation for the coatings industry.

Lectures and workshops focused on four major topics:

Gloss and Appearance Measurement; Color Difference and Quality Control; Spectrophotometry; and Colorant Formulation. Total Systems Installation was discussed at the closing session.

At the workshops, registrants were afforded the opportunity for "hands-on" demonstrations of newly developed instrumentation by the following companies: Applied Color Systems, Inc.; Byk Mallinckrodt Chem. Prod.; Diano Corp.; Gardner Laboratory, Inc.; Hunter Associates Laboratory; IBM Instrument Systems; Macbeth Div., Kollmorgen Corp.; Philips Electronic Instruments, Inc.; and Tintometer U.S.A.

Open Clinics were scheduled following the afternoon sessions to allow more time for those wishing to pursue additional inspection of equipment and discussions with representatives from the supplier firms.

Most of the equipment shown at the workshops was developed in the last three years, and registrants were eager to take advantage of the "working meeting" environment to ask questions, discuss problems, and submit samples.

General Program sessions were under the direction of Ruth Johnston-Feller, Color Consultant, who chairs the FSCT Inter-Society Color Council Committee. She was assisted by Dennis Osmer, of CIBA-GEIGY Corp., and Bob Marcus of PPG Industries, Inc.

Charles Leete, Executive Director of the Manufacturers Council on Color and Appearance, handled the arrangements for the workshops and instrument operations.

Reprinted from the *Federation Newsletter*, No. 73, April 1978.

NEWS OF MEMBER-BODIES

Color related publications of Member bodies

Journal of the Society of Motion Picture and Television Engineers, 1976-1977

The Shadow Mask Color Picture Tube: How It Began, April 1977.

A Chroma-Key System Insensitive to Variations of the Background Illumination, March 1977.

Color in Motion-Picture Industry, July 1976.

A New Direct-Reading Three-Color Meter, February 1976.

Journal of Applied Photographic Engineering, 1976-1977.

Trends and Techniques in Copy Preparation, Vol. 3, 179.

Visual Qualities of Surface Texture and Their Reproduction, Vol. 3, 167.

A New Digital Color Recording System, Vol. 3, 154.

Simple Contrast-Enhancement Viewer for Film, Vol. 3, 150.

Digital Processing of Mariners 10 Images of Venus and Mercury, Vol. 3, 82.

A Statistical Method for Image Classification and Tone Reproduction Determination, Vol. 3, 74.

RADC's Research in Color Image Interpretation, Vol. 3, 67.

Pulsed-Xenon Densitometry, Vol. 3, 4.

Narrow Band Densitometry, Vol. 3, 1.

The Epiphytology of Late Blight of Potato Monitored by Sequential Color Infrared Aerial Photography, Vol. 2, 207.

Comparison of Objective and Subjective Measurement of Gamma, Vol. 2, 183.

Photographic Science and Engineering

Monobath Color Processing, Vol. 20, 238.

Color Gamut Obtainable by the Combination of Subtractive Color Dyes. III Hypothetical Four Dye, Vol. 20, 199.

A Fundamentally New Imaging Technology for Instant Photography, Vol. 20, 155.

Journal of Technical Association of the Pulp and Paper Institute, 1976

Optical Properties of Paper as Affected by Wet-End Chemistry, No. 3, 77.

Study of Light Scattering Coefficient of Various Filler Pigments, No. 12, 103.

Interpretation of Paper Reflectance based upon morphology, No. 10, 102.

Methods to Measure Variations in Surface and Diffuse Reflectance of Printed and Unprinted Paper Samples, No. 4, 102.

Journal of Food Technology

Instrumental Techniques for Color Measurements of Food, No. 10, 52.

Use of Color Measurement in Quality Control of Foods No. 10, 62.

Physical Measurement as Predictors of Visual Appearance, No. 10, 74.

Tomato Color Standards Need Revision, No. 11, 50.

Rapid Measurement of Egg Yolk Color, No. 11, 58.

AIC MIDTERM TOKYO SYMPOSIUM '79 "COLOR APPEARANCE"

Tokyo, Japan — August 15-16, 1979

The Color Science Association of Japan will be the host for the AIC Midterm Symposium on Color Appearance to be held in Tokyo, August 15-16, 1979, just prior to the CIE 19th Session, Kyoto '79. All participants will stay in Fairmont Hotel, situated near the Imperial Palace. The symposium is to provide intense discussion on the selected topics by researchers active in color science.

The role of color is immensely increasing in our everyday life, and the demand for qualitative and quantitative treatments of color appearance is as great as ever. Color appearance, however changes greatly and in a complex manner depending upon circumstances, and a simple solution has not yet been derived. The Symposium is planned to search for possible solutions through presentations of papers and discussions on the main theme as well as on some subthemes, such as Color Difference, Color Adaptation, Color Space, Color Atlas, and Color Signals.

The Symposium consists of three scientific sessions of three hours each. In each session three or four persons will present survey lectures or talk about recent developments, and the remaining time will be open to participants for free discussion.

Preprints and Proceedings will not be published. However, *Acta Chromatica* plans to publish abstracts of the papers and discussions.

The registration fee for participants is expected to be ¥2,500 (appr. \$10.5) excluding the accommodation fee. No registration fee is charged to accompanying persons.

All inquiries and correspondence should be addressed to Mr. Akira Kodama (Secretary of Color Science Association of Japan).

c/o Japan Color Research Institute
1-19 Nishi-Azabu 3 chome, Minato-ku Tokyo 106, Japan.

Organizing Committee

Hikaru Masaki, Chairman
Munehira Akita Mitsuo Ikeda Tarow Indow
Genro Kawakami Hiroshi Kansaku Akira Kodama
Akira Shibamoto Yoshinobu Nayatani
Takashi Hasegawa Sachie Minato Leo Mori

REPRINTS AVAILABLE

"Polypropylene fiber—A Superstar whose time has come." by design and color consultant James May traces the growth and ultimate acceptance of polypropylene fiber (with color references and preferences). The cover story was published in the February 1978 issue of *Carpet & Rug Industry* magazine and free reprints are available by writing to Hercules Incorporated, Hercules Tower, Wilmington, Delaware 19899 Attention: Mr. Sam Watkins, Home Furnishings Division.

LIBRARY OF CONGRESS

Pictorial Resources in the Washington, D.C. Area is an illustrated guide to the picture collections of governmental, international, and private organizations. The 297-page hardbound book is priced at \$5.75.

Papermaking: Art and Craft traces the history of papermaking and production from its earliest form in the Orient to the present. The illustrated, 96-page publication is priced at \$5.

PRODUCTS AND SERVICES

Color Science Seminars

Basic Color Science, June 5-6, 1978.

Advanced Color Science Applications, June 7-8, 1978.

Faculty

Frederick T. Simon, Course Chairman, J. E. Serrine Professor, Department of Textiles, Clemson University.

Robert F. Hoban, Head of Optical Department, Sandoz Color and Chemicals, Honover, NJ.

Gary E. Beebe, Color Scientist, Owens Corning Fiberglas, Granville, Ohio.

Roland L. Connelly, Burlington Corporate Research and Development, Greensboro, NC.

Edward L. Cairns, Color Specialist, E. I. duPont deNemours, Pigments Technical Laboratory, Wilmington, Delaware.

Robert A. Funk, Graduate Student, Clemson University.

James F. Leuck, Graduate Student, Clemson University.

Sylvia Ki, Graduate Student, Clemson University.

Selby Branham, Graduate Student, Clemson University.

Ms. D. Lynn Bennett, Registrar, Office of Professional Development, 112 Serrone Hall, Clemson University, Clemson, SC 29631. Phone (803) 656-2200.

1978 Program in Color Technology at Rensselaer

Principles of Color Technology, June 12-16, 1978

Color Technology for Management, June 19-20, 1978

Advances in Color Technology, June 26-30, 1978

Faculty—Principles of Color Technology and two other color courses being offered are under the direction of Dr. Fred W. Billmeyer, Jr., professor of analytical chemistry at Rensselaer Polytechnic Institute. Professor Billmeyer will be assisted in the course by Adjunct Professor Max Saltzman, recently retired after a distinguished industrial career in color technology. Professors Billmeyer and Saltzman are widely known as co-authors of the book "Principles of Color Technology," used as textbook in the course.

Office of Continuing Studies, Rensselaer Polytechnic Institute, Troy, New York, 12181. 518/270-6442.

COLOUR IN ART, DESIGN, SCIENCE AND INDUSTRY—BRIDGING THE GAP (Concluded from last issue)

The second group of papers were presented under the general heading of 'Colour in the Visual Arts.' The first paper, by Prof. S. Rees-Jones of the Courtauld Institute of Art, argued that the painter is someone who thinks in terms of the pigments that are available and not in terms of colour scales. Though the artist is deeply involved in many aspects of colour—the physical, physiological, and psychological—communication between him and the scientist is, but for a few exceptions, non-existent. In the Colour Group's Report on Colour Terminology' (1948) we read of the failure to establish the basic requirement for communication: agreed definitions of the terms used by the artist. Very sensibly, the authors concluded that for the artist 'colour terms are ultimately of little use, because of the aesthetic values of a painting and particularly its colours, are inherently incommunicable by means of speech.' Other philosophers however have not been so readily deterred; down the years there has been no lack of systems for classifying and ordering colour destined to be imposed on the artist but most, now, are inevitably forgotten. Examples were shown of how an artist can obtain the colour he requires using various techniques of over-and under-lay and by mixture with white. Pointilism uses colours unrelated to the object and relies on the eye to form the correct colour. Thus, not only does an artist now know how to apply uniform colour scales, he has no need for them.

John Gage of the University of East Anglia showed that many artists could be considered as optical engineers. The late antique and Byzantine artist was working at a time when it seemed appropriate to assimilate the discoveries and procedures of the natural sciences no less than in the nineteenth century. Several of the optical phenomena appealed to by the Neo-Impressionists in their pursuit of a scientific aesthetic were familiar to late antiquity and were exploited by mosaic workers from those times until the Renaissance. Mosaic was not among the many sources cited by the Neo-Impressionists and their early critics because the practice of mosaic during the nineteenth century did not make use of, or direct attention to, these phenomena. Both Byzantine mosaicists and

Divisionist painters were preoccupied with luminosity, and their methods of achieving it are sometimes related. More often they are not, and this is due to other aspects of their respective aesthetics, which have also received little discussion. It is hoped that a juxtaposition of the work of these two media and periods will help to clarify the phenomenological characteristics of each.

Philip Rawson, curator of the Gulbenkian Museum of Oriental Art, University of Durham continued with the theme that it was not important for an artist to know what colour is; he is concerned with what it means. Using slides of a great number of paintings it was suggested that colour has a physiologically existing effect. As the eye moves over a painting a harmonious effect should be created in the mind of the viewer. Some paintings have a coloured border e.g. Indian paintings with red or yellow borders. This is to create excitement before actually viewing the scene. Figures in the scene take on the colour we want them to have so that they have substance and form and remind us of something.

The theme of symbolism was again taken up by Keith Critchlow in a paper concerning Islamic Art. It was shown that the shapes and forms used in the design and decoration of an Islamic mosque could all be traced to Islamic teaching and culture. Western society perhaps finds such symbolism difficult to assimilate because there is no continuing dominant culture. A most stimulating talk during which it became obvious that we in the West have lost sight of the deeper meanings of colour.

Francis Pratt from the University of Stirling discussed a series of paintings designed to draw attention to changes in appearance due to variations in lighting conditions and viewing positions. The structure of the paintings is based on very thin stripes of alternating complementary colours. The project consists of making a series of surfaces (paintings) composed of 36 squares (1-5/8" x 1-5/8") each of which is itself composed of alternating stripes (1/32nd") of two complementary colours. The stripes are constructed so that one of each pair of colours is raised marginally above the other with the result that dramatic changes occur to the appearance of the surface with changes in angle of viewing or illumination.

Issues raised by the project include effects of light sources on the appearance of surface colours and the perception of equal brightness in complementary pairs.

This technique of using visual effects as a direct art form was also taken up by Michael Kidner (Royal College of Art). He showed paintings of after images and stripes of optically vibrating colour. This early work has led him to consider systems of colour and the consideration of whether, in sequences of coloured shapes it was the colour or the form that dominates the visual impression.

The second day started with the subject of 'Colour and Design.' Jim Birchall of the Textile Design Unit at the Royal College of Art discussed the difficulties involved in making the decision as to choice of colour for a particular product. Theoretically the designer has a choice of all possible colours but this is quickly narrowed down by the choice of a particular atlas or standard series of colours. While colour atlases may contain many colours, industrial concerns often limit their range of colours for products to a relatively small number. The choice then becomes one, not only of colour, but of colour combination, contrast e.g. light graphics on a dark background or vice versa, and shape e.g. of an electronic instrument housing.

Audrey Mitchell, a colour practitioner spoke to the title 'Colour in Fashion.' 'Fashion is dead—long live clothes. This quotation from a 1968 magazine probably marked the end of a period of some 120 years of more when 'the colour in fashion' could be said to be recognisable and important. The writer was assuming that 'fashion' applied only to the clothing and allied trades. The word 'fashion' should be all-embracing, meaning not only clothes but other spheres where colour now plays a big part in furnishings and domestic items and consumer goods. Design and colour go very much together and there is no such thing as a 'new colour'—only a new way of providing and using it.

Until the middle of the nineteenth century the Court set the fashion for clothes and furnishings and only the aristocracy could afford to be 'fashionable.' Clothes had to be worn for warmth and protection by the great mass of the people, with scant regard to colour. The aristocracy wore fine silks and satins imported from the Middle and Far East and from nearer home—these were already dyed, sometimes in gorgeous colours. But beginning in 1856 an increasingly industrialised nation obtained far greater and more subtle control than ever before over colour for personal use. Prior to this date all colours for textiles and other materials derived from natural sources—the murex whelk, madder plants, logwood, woad, safflower, dragon-tree—and other picturesque sounding materials. But in 1856 William Henry Perkin, produced almost by accident mauvine or aniline purple, now known as Perkin's mauve. He was knighted for his work in founding the modern synthetic dyestuffs industry and lived until 1917. Other synthetic dyes followed, notably Magenta in 1859, named after the battle. The great upsurge of purples and mauves in the Victorian era came from this discovery. Purples became high fashion again in the late thirties when Schiaparelli, reigning over Paris (haute couture), introduced strong purples—following them with a light magenta she called SHOCKING PINK, which has become an enduring colour name.

The Industrial Revolution and the coming of the railways were the turning point for the wider implications of fashion colours. More and more people travelled, and, as social life developed, clothes were not only functional for those outside the aristocracy but became an indication of wealth and status. Only today do we have a true democracy in design and colour.

The synthetic dyestuffs industry has continued to play a very great part in producing fashion colours both in the narrow sense of clothing and in the development of synthetic dyes for man-made fibres and plastics of all kinds. A major discovery came in 1928—a chemist at Imperial Chemical Industries produced Monastral Blue and other important dyestuffs followed—not new colours but chemical processes which enormously increased the availability of particular colours—those were Caldeon Jade in 1920 and Alcian Blue in 1948. As industry became more sophisticated in mass production, many factors other than the hue itself influenced colour in fashion. Fastness to light and washing, for example, had to be considered. In 1956, just 100 years after Perkin's discovery, ICI produced Procion dyes, which provided extraordinary brilliance for some materials and led to the 'colour explosion' of the sixties. Although over seven thousand chemically different dyes have been marketed since 1856, new ones are appearing today at a greater rate than ever before. The choice of colour for 'fashion' has become almost limitless and therefore all the more difficult to choose and forecast, particularly as it is so psychologically linked with the mood of the people and world-wide events.

After a short break H.L. Glog of the Building Research Station discussed the dimensions of colour in architecture. He distinguished two different modes of colour appearance. In one, the object mode, colour belongs to objects, and is definitely located and remains approximately constant under differing lighting conditions. In the other, the illuminant mode, colour appears self-luminous, divorced from objects and changeable. Scenes commonly contain both modes with parts transitional between them, but in general the object mode predominates and, with it, colour constancy. Thus samples of colours and materials give a very good idea of the colour appearance to be expected in or on a building, and we can get down to study the colour attributes or dimensions of significance architecturally.

Studies in this direction form the basis of a framework published in BS5252 : 1976 for co-ordinating colours for architectural use. Hue, lightness, and saturation were taken as basic dimensions of colour in the object mode and the Munsell system (hue, chroma, and value) as best available means of scaling these dimensions. When series of colours offering choice of hue without other variation were sought, however, they could not be found consistently without the help of two further dimensions—greyness and weight. The BS 5252 framework, containing 237 colours, organises colours for the first time in terms of hue, greyness, and weight and is a tangible result of alliance between the science and the art of colour in the architectural context.

D.P. Bickman of the National Environmental Research Unit then considered the use of colour in maps. He outlined the use of maps in such fields as geology, ecology, hydrology, agriculture, and demography: typical subjects of thematic cartography. Many of the basic elements are either linear in their nature or are portrayed by lines. However, in complex maps, discrimination between kinds of line becomes necessary and colour coding offers a natural solution. The object of mapping these various subjects is to analyse them geographically. Over the years some of these subjects have developed a complex analytical taxonomy—e.g. the 500 classes assumed by the Geological Survey 1" maps, each of which has its separate colour code. Colour seems to have established itself as an essential and natural instrument in contemporary cartography. 19th century cartography was based on black and white cop-plate techniques.

There were idiosyncracies in individual craftsmen, and it was slow and expensive. Nevertheless, it implanted conventions still clearly recognisable and a fine-line quality that remains a pace-setter. 20th century cartography is predominantly based on lithography which makes coloured areas feasible and mass production cheaper. Colour conventions became widely, even rigidly, accepted, e.g. by international scientific groups seeking some elements of a common language than can keep pace with an expanding taxonomy. Problems, however, exist, e.g. in the legibility of complex colour codes on minute islands of colour.

Present day cartography often assumes the map to exist as a carefully structured data base within a computer: representations of it can be fast, cheap, manifold, and inter-active. Examples of line printer maps, CRT maps, and microfiche maps rarely demand extravagance of colour since the computer can 'speak back' to answer queries, at least for desk use. High accuracy flat bed plotters drawing directly with a beam of light on to film offer new graphic flexibility of styles or scales. Data bases also make the links with mathematical modelling techniques in predictive cartography.

Donald Pavey from the Royal College of Art completed this section by outlining his technique of 'colour games.' He had early concern about the most effective ways of using colour in art and design. This led to pioneering new ways of teaching colour (and art and design generally) to juniors outside the educational system. An experimental art and design workshop was made available by the School Liberal Studies at Kingston Polytechnic. This inevitably led to a gaming situation in which invention, puzzle-solving, a communication network, and group generated art and design had top priority. The objective of the games, however, is always the achievement of an art-work or spectacle—in which the organisation of colours and visual data generally is one of the main targets, but no one wins and no one loses. The principles involved are so universal that the games are currently being played by groups from many different levels of the educational spectrum.

The fourth section of the symposium was entitled 'Colour in Industry.' P.J. Staples of Windsor and Newton, considered the necessary properties of pigments and then outlined the history of durable pigments for artists. The main properties that should be possessed by a pigment and that it should have strong colour, it should be capable of being ground down to a fine powder, it must not be soluble in the media, it must not have harmful chemical reactions to the media or substrate, and it should be fast to light.

The history of durable pigments started with the cave painters from pre-Christian era using earth pigments, chalk, carbon black, and animal fats. Egyptian painters introduced malachite, Egyptian blue (frit), cinnabar, orpiment, madder root, and gum-arabic; the Greeks introduced vermilion, white lead, red lead, massicot, fresco, and possibly oil painting; the Asians introduced Lapis Lazuli; the Byzantines introduced Gold leaf, egg tempera, and gesso; the Italians introduced various earth colours, siennas, umbers, and terre verte, and the Flemish and Germans introduced Flake white, cremnitz white, and oil painting.

Many pigments were discovered in the 19th and 20th century due to the rapid development in the knowledge of chemistry.

The subject then turned from pigments to dyes, and Keith McLaren of Instrumental Colour Systems outlined the progress of the production of dyes.

Clays were used for colouring textiles in paleolithic times, and, whilst this could not be described as 'dyeing,' dyed textiles 5-6,000 years old have been found at the sites of pre-historic lake villages. Indigo has been dyed continuously since 2,000 BC though its future depends on the continued popularity of "blue jeans." Natural dyes from hundreds of other plants and from animals, of which Tyrian Purple was the most famous, were augmented by mineral substances from the mid-18th Century and then replaced by synthetic organic dye-stuffs (coal tar or aniline dyes) from 1856 onwards, though cochineal was still specified for the uniforms of the Brigade of Guards as recently as 1965 and logwood is, even today, still being dyed on an industrial scale. The number of synthetic dyes is staggering, about two million have been synthesised in laboratories whilst eight thousand are marketed by the ton and, until quite recently, four new dyes were marketed every week, on average. This large number is almost entirely unconnected with the problem of achieving the million or more surface colours which the trained eye can perceive as different, colour printing of paper gets by with four whilst colour photography manages with only three—the subtractive primaries

magenta, yellow, and cyan. Modern industry demands such an enormous range of dyes because of the different chemical characteristics of natural and man-made fibres, the significantly different methods of dyeing, and, most important of all, the fact that dyes vary widely in colour fastness and cost.

The symposium ended with a time of open discussion. Subjects discussed ranged from the application of the Land two colour phenomena as an art form to the emotional response evoked by using a round, as opposed to a square, test stimulus in a colour scaling experiment; from the use of a framework of colour such as BS 5252 to the limitations placed on an industrial designer by sources than colour e.g. financial considerations. Many other facets of the subject were mentioned; some even 'bridged the gap' between art and science!

The Symposium was brought to a close by Alan Cuthbert (Wimbledon College of Art), Chairman of the organising committee. He thanked all those who had contributed to the Symposium and helped to make it such a success, especially the speakers, and Hans Brill, the librarian of the Royal College of Art, who had done so much to make the event possible. The response of the 230 people who attended the Symposium suggested that it had been a success. It should encourage The Colour Group to organise further such meetings and perhaps introduce a more even balance between art and science in its monthly meetings.

M.R. Pointer—Research Division—Kodak Limited—Harrow, Middx.

Reprinted from the newsletter of The Colour Group (Great Britain), June 1977. Thanks to Walter C. Granville.

1. Any person interested in color and desirous of participating in the activities of the Council for the furtherance of its aims and purposes . . . shall be eligible for individual membership (By-Laws, Article I, Section 2). Application forms for individual membership may be obtained from the Secretary (address given above).
2. The Council re-affirms its community to interest and co-operation with the Munsell Color Foundation, an independent private foundation devoted solely to the advancement of color knowledge in science, art, and industry. It serves as Foundation Associate of the Inter-Society Color Council. The Council recommends and encourages contributions for the advancement of these purposes of the Munsell Color Foundation. For information, write to S. L. Davidson, NL Industries, P.O. Box 700, Hightstown, N.J. 08520.
3. 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.

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

Send *Newsletter* items to Editor:

Dr. William Benson
618 Constitution Ave., N.E.
Washington, D.C. 20002
202-546-1016

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