Inter-Society Color Council *News*

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IN THIS ISSUE 362

FROM THE PRESIDENT'S DESK

I would like to begin by thanking Hugh Fairman and Danny Rich for the fine job they did in organizing this year's Annual Meeting at the Doubletree Guest Suites in Orlando, FL. Both the ISCC meeting and the Symposium provided lots of interesting presentations and time to get together with colleagues for discussion and fun. Most of the rest of this newsletter is devoted to reports on various activities related to the Annual Meeting.

I would also like to take this oppotunity to thank the outgoing Board members and to welcome the new Directors. Completing their terms on the Board of Directors are Gary Beebe, Joseph Campbell, and Robert Marcus. Speaking for all the officers, I want to say that we appreciate all that they have done. Joe organized the instrument displays at the Annual Meetings for several years, Gary is chair of the 1997 Annual Meeting, and Bob continues as Publicity Chairman and Chair of the Nickerson Service Award Committee. I am happy to be able to report that they will continue to be active in the ISCC community.

This spring's elections bring us three new Directors. Serving until 1999, are Helen Epps from the University of Georgia, James Keiser from E. I. DuPont, and Jack Ladson from BYK-Gardner. Welcome, again speaking for the Officers and rest of the Board, we appreciate their willingness to serve. For those who want to know more about our new Directors, biographical sketches of these Directors were published in Issue 359, (Jan/Feb 1996) of the *Newsletter*.

The ISCC is built through the contributions of its members. At this Annual Meeting, Joanne Zwinkels, Rich Riffel, and Wade Thompson completed thair terms as Chair of the Interest Groups I, II, and III respectively. The Chairmanships were turned over to Michael Brill, Bill Tuting, and Shashi Caan. At each of the Interest Groups an announcementwas made looking for new Co-Chairs. We can report that at this time, Helen Epps will become the Co-Chair of Interest Group I, and Arnold Service is taking on the Co-Chairmanship of Interest Group II. However, we are still looking for someone who would like to serve as a Co-Chair for Interest Group III on Art, Design, and Psychology. Anyone willing to volunteer, please contact Shashi Caan, Richard Harold (Coordinator of Interest Groups), or me.

Other new Committee Chairs are Paula Alessi for Bylaws, Bill Vogel for Contributed Papers, and Roy Berns for Macbeth Award Committee. Anyone who would like to take a more

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active role in the organization, just contact me.

We continue to make progress in communications. Cynthia Sturke, our new Office Manager, helped at the registration at the Annual Meeting. I hope that many of you had the opportunity to meet her in person. Cynthia is pleased to report that the ISCC office fax is now working. The number is 703/318-0514. Also, in the month of May, our own ISCC web page officially went on line. The address is HTTP://WWW.ISCC.ORG. A variety of information can be found on the page including a calender of events, meeting schedules, list of member Societies, lists of Sustaining Members, and highlights of the ISCC *News*. Mail tags are available so that people can communicate with the ISCC office, Board of Directors, and the Web Page Editor for such things as address changes and requests for information. Come visit the ISCC Web site. Also, those companies (or individuals) interested in becoming Sustaining Members, please contact Cynthia at the office.

Ellen C. Carter
President of ISCC

65TH ANNUAL MEETING OF ISCC

The 65th Annual Meeting of ISCC this year was a joint meeting with ASTM Committee E-12 on Appearance. On May 5 and 6, the Interest Groups and ISCC Committees met. They were followed on May 7, by a joint meeting with ASTM Committee E-12 entitled, ***The Symposium on Measurement of Appearance***. The Symposium was followed by ASTM Committee E-12 meetings on May 8-10, on ***Appearance Measurement*** .

Roland Connelly, President of ISCC, welcomed everyone to the Annual Meeting of ISCC. He presided over the first session and introduced the first speaker, Jack Ladson. The meetings are reported in the order of their appearance.

Project Committee 51, Material Standards and Their Use in Calibration and Verification. Ladson, Chairman, stated the significant progress has been made since the last meeting. The definition of the project was accepted by the ISCC Board of Directors. The Board members felt that Technical Report 89-1 needed a revision. Ladson volunteered to Chair the new committee that will update the Technical Report 89-1. The project will deal with the available material standards and methods to calibrate the instruments. A section of the report will define terms and include an up-to-date bibliography. Ladson is looking for volunteers for the Committee.

Dr. Michael Brill receiving the Macbeth Award From Dr. Ellen Carter

Education Committee, presided over by **Dr. Vivianne Smith**, University of Chicago dealt with the vocabulary of color in research, industry and the arts. There were three speakers, one from each of the Interest Groups. **Dr. Alan Robertson,** National Research Council, Canada, introduced many of the basic scientific color terms and distinguished between the ones that are often confused such as chroma and saturation or brightness and lightness. **Mr. Rich Riffel**, Accuracy Microsensors, from Interest Group II, talked about Industrial Applications of Color. He presented examples from industry of how everyone thinks that they speak the same color language until the final product shows otherwise. The color of the product is not what the costumer wanted. The result is that what the designer said, was interpreted differently by production. The final speaker, **Ms Shashi Caan,** spoke representeing Interest Group III, Art Design and Psychology. A special feature of the meeting was two crossword puzzles developed by Hugh Fairman from the vocabularies of Interest Groups.

The next meeting was the **Individual Member Group (IMG)** presided by the Chairman **Jim Cave**, BASF). A new member voting delegate, Mr. Alan Kravatz was selected to represent the group. He will serve a three year term until 1999, as the voting representative.

INTEREST GROUP III - Art, Design and Psychology, was chaired by **Prof. Wade Thompson** and **Ms Shashi Caan.** The first speaker was **Mr. Richard Stoyles**, Milliken & Company. The title of his presentation was **What's Color Forecasting Got To Do With It?** Color and design trends are a reflection of our "Life - Thoughts" and combine many different influences. Some trends are unavoidable as they are a direct result of utilization of equipment and raw materials. Others can be cost driven. Economics, high-tech development and

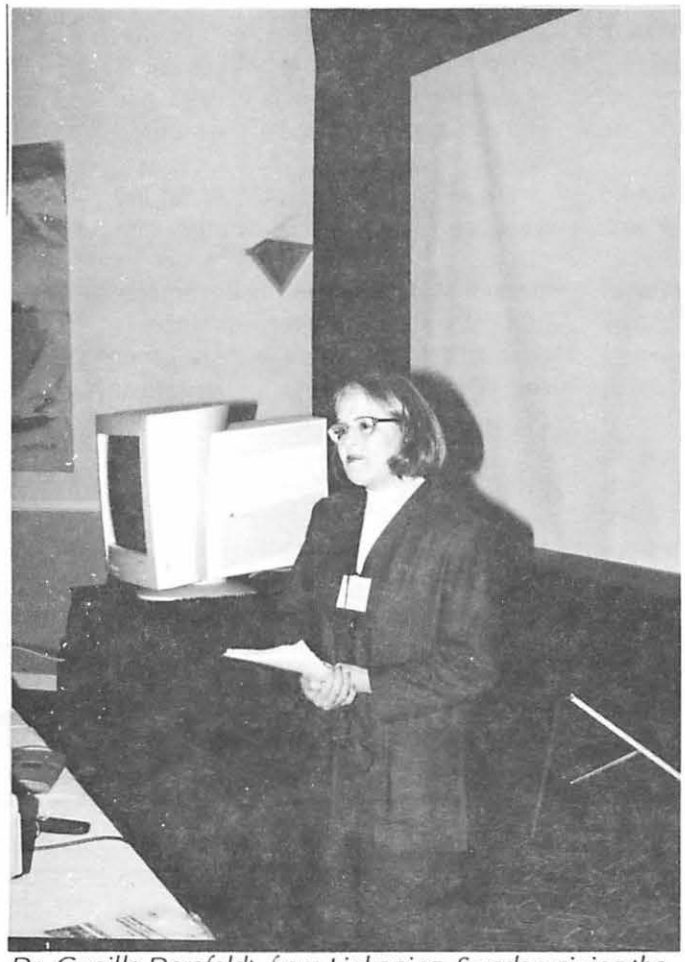
media saturation also play an important role. The challange of competing in international markets is to redifine the concept of "quick response" design and computer-aided design (CAD) linked direct to manufacturing. Custumers want the best for their money and they know what they want. Color forcasting reflects business strategic thinking and in a quickening world, influences events. Events, technology advances and environmental influences are taken into account by The International Colour Authority, who, for more than 25 years, have expertly forecast the trends 36 months ahead for utilization by the world's textile industry.

The next speaker, **Dr. David Burton,** Virginia Commonwealth University discussed **Synchronism: A (Musical) Key to Color.** It is a color theory based on an analogy between color and music developed by Stanton MacDonald-Wright and Morgan Russell in Paris in 1911. Rotation of the twelve colors of the color wheel around the twelve notes on a harmonic music scale (also represented by a wheel) gives twelve "color keys". In MacDonald-Wright's short book, *A Treatise on Color,* he professes that the interval between colors determines their color harmony.

Prof. Young-In Kim, Yonsei University, Seoul, Korea, gave a paper entitled, **An Analysis of Korean Traditional Color *(Saikdong)* and its Application to Korean Color Design.** *Saikdong* is one of the Korean traditional color combinations which has been used in textiles for several hundred years. These colors have been frequently used to represent the image of Korea with its unique harmony of color combinations by using simple parallel strips. The objective of the talk was two-fold.

* The characteristics of *Saikdong* were analyzed in terms of color combination.

* The variations of color combination were reproduced through the CAD system to apply the results of the first objective to the database for Korean color design.



Dr. Gunilla Derefeldt, from Linkoping, Sweden giving the tutorial overview entitled, "Survey of Color Appearance Systems."

Saikdong colors were analyzed from seventeen traditional costumes selected from the National Folklore Museum. The following results were obtained:

* *Saikdong* consists of various combinations of hues. It varies from 3 to 18 hues. The most frequently used hues in *Saikdong* are red, yellow, blue and green in order of dominance.

* Contrast effects in value and saturation are very noticeable in Saikdong .

* The rhythmical arrangement of colors were generated by the asymmetric balance of hues. Those characteristics of *Saikdong* color combinations were applied to create new color combinations for apparel design through CAD simulations.

The next paper was presented by **Dr. Theodore H. M. Prudon.** The title of his paper was **Color in History: Did George Washington See Green?** The study of history and preservation of buildings and artifacts generally sets as one of the goals the accurate and authentic representation of the past. What constitutes accuracy and authenticity is much harder to define and understand. How is accuracy and authenticity in color determined? It is the area where science and technology on one hand and interpretive and design on the other work together. In early historic color studies, field investigations would be conducted that exposed the layering of paint and/or finish colors as found in the building. The green color that is identified and marketed as *Williamsburg Green* is a color that George Washington never saw. The aging of the pigment and the oxidation of the linseed oil was not considered when that color was recreated. The lighting by which the objects were seen was very different from the level and type of lighting expected today. Cultural expectations have changed. For the last four decades we have been dominated by the architecture and design of the modern movement. The subtleties of colors have been lost. Prudon concluded by stating that George Washington did see a green but it is a color different from what we think it is today.

Ms Shashi Caan provided the final and closing remarks of the session. Contents of the session were terrific and more diverse than she could imagine. She stated that color is an integral part of our entire being.

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INTEREST GROUP I - Fundamental and Applied Color Research is chaired by **Dr. Joanne Zwinkels** and **Dr. Michael Brill.** Dr. Zwinkels explained that the format of the session consisted of an invited tutorial lecture and several contributed papers on the topic of color order systems. A color-order system can be defined as a human-engineered, physically exemplified database of color specifications. Examples are Munsell, OSA, DIN, and NCS.

To open the session, **Dr. Gunilla Derefeldt,** National Defence Research Establishment, Linkoping, Sweden gave a tutorial overview entitled **"Survey of Color Appearance Systems."** She emphasized human engineering (arranging the colors in an atlas so that they can be searched and interpreted easily)-a practice that is helpful in science, industry, education and art. Any useful color order system must meet requirements of uniqueness of description , and replicability. Within these constrains, special-purpose color-order systems can be designed according to colorant-mixture rules, etc. However, for more general purposes, Derefeldt emphasized the need to organize the system according to human perception. Two criteria that help users find their way in the atlas database are uniformity of spacing of the colors, and labeling the colors according to cardinal axes that are in accord with human perception. In this context, Derefeldt presented a historical backgroud of color ordering, described the emergence of modern color-order systems and then discussed and compared modern color appearance systems such as Munsell, NCS, DIN, and OSA/UCS. Derefeldt's tutorial was based on a recent review article she wrote [Ref. 1].

Next **Calvin S. McCamy** (Wappingers Falls, NY) discussed the requirements for a physical embodiment of a color-order system in his talk, entitled, ***"The Use of Color-Order Systems."*** For general utility, the color-order system must be mapped in a standard color-measurement space. It is advantageous to use color chips in a readily available color atlas. A complete specification of the color should include tolerances. Color-tolerance sets are useful for production checks and can be prepared from a one-, two-, or three dimensional cascade of similar colors. McCamy emphasized that there are economic advantages to setting tolerances on measured colors on the basis of color-perception attributes of hue, value and chroma, the dimensions of the Munsell color-order system.

Dr. Michael H. Brill, David Sarnoff Research Center, Princeton, NJ discussed how to ensure a minimum amount of metamerism among samples in a color atlas when the illuminant is changed. In ***"A New Figure-of-Merit for Color Atlases: Invariant Chromaticity Ordering,"*** Brill started out by noting that if two different samples are to match when the illuminant is changed, one of these samples must generally cross (in chromaticity space) the line between a third and a fourth sample. Thus the potential of an atlas for metamerism is related to whether the chromaticity ordering of sample (reflectance) triplets can be changed by illuminant from clockwise to counterclockwise, and vice versa. It is mathematically true that the illuminant can affect such a change only if, when the reflectances are treated formally as color-matching functions, the "chromaticity space" that results has a "spectrum locus" that is convex and well ordered in wavelength [Ref. 2]. A viable figure-of-merit for a color atlas is then the fraction of sample triplets in the atlas that have the above convexity property, (CP). Even with a few CP lapses, an atlas will be generally good if the first three principal components of its reflectances have CP (as is true for Cohen's principal components of the Munsell Atlas). Furthermore, if the atlas is made with only three colorants, one does not need to check all the reflectance triplets to verify good behavior: the metamerism heralded by object-color disorder is forbidden if the three colorant-density spectra have CP. This last is a new mathematical result that applies, e.g., when the colorants combine according to Kubelka-Munk or Beer's Law. The property CP can thus be used to design atlases as well as to rate them after the fact. Brill concluded by repeating his definition of a color order system: "A human-engineered, physically exemplified database of color specifications."

A paper entitled ***The Colorcurve System,*** was presented by **Ralph Stanziola,** Industrial Color Technology, Neshanic Station, NJ. Stanziola described the Colorcurve System as a combination of a visual and numerical system comprising four main elements:

- aim points in CIEL*a*b* color space;
- physical representation of the aim points;
- data tables and numerical description of the aim points, and
- computational methods and/or computer software.

The physical embodiment of this system is contained in two atlases: a master atlas with 1229 colors in one-step increments with 18 lightness levels, and a grey and pastel atlas with 956 colors that lie between those in the master atlas. Mr. Stanziola reported on the use and effectiveness of the Colorcurve System, as a simple notational system that can easily be understood by both creative people and industrial technologists. He concluded by stating that the numerical description of each aim point can aid manufacturers in getting acceptable color matches in a variety of materials because it fits in with the procedures used for computer color matching.

Finally, **Jean Bourges,** Bourges Color International, NY, discussed the use of a color atlas by the artist, emphasizing that the human engineering of the atlas should depend not only on color perception, but on knowing how to produce particular colors. Standardization of inks in color presses and printers has made it possible to organize an atlas meaningfully according to increments in the color densities of the particular specified inks; hence the atlas can function in the context of "active vision", rather than just passive color recognition. She

discussed the feature of the Bourges color-order system described in her book, *Color Bytes*. This system comprises 20 colors (10 warms and 10 cools), which are unique and fixed, each with its own complement. This color-order system is particularly attractive for teaching art and design concepts, using physically realizable colors for the graphic artist.

As can be seen from the papers, this session started off with fundamental color-research issues (relating to human perception), proceeded through certain technological issues (atlas design and measurement), finally - through art and design - returned to the human perspective.

1. Derefeldt, G., "Colour Appearance Systems," in P. Gouras (ed.), The Perception of Colour, Vol. 6 of Vision and Visual Dysfunction (General Editor: R. Cronly-Dillon), CRC Press, Inc., Boca Raton , FL, 1991, pp.218-261.

2. Brill. M.H. and H. Hemmendinger, "Illuminant Dependence of Object-Color Ordering," *Die Farbe* 32/33, 35-42 (1985/86).

AWARDS LUNCHEON

Dr. James Worthey, NIST, Gaithersburg, MD, introduced **Dr. Michael Brill** the recipient of the **Macbeth Award** for 1996. Worthey stated that Brill received the award for his pioneering and persevering work on the color constancy theory. Beginning with a 1978 publication, Brill developed a "volumetric" model. The emphasis of this model, and in his later work, was to find quantities that remain invariant under a change in lighting. On occasion of this award, James Worthey made a short introductory speech. He described Brill as a scientist who always reached out to learn from other people, and incorporated their ideas into his own work. He recalled the volumetric theory in detail, illustrating the discussion with posterboard parallelopipeds. On a personal note, Worthey recalled racing a car to escape a heavy cloud over Virginia, in an effort to see the annual solar eclipse of May 30,1984. Brill navigated by plotting the eclipse's path onto a road atlas. The chase succeeded as a party of four enjoyed the eclipse under clear skies in Cleveland, NC.

Dr. Brill's complete acceptance speech appears elsewhere in this *NEWS*.

INTEREST GROUP II - Industrial Applications of Color is chaired by **Rich Riffel**, Accuracy Microsensors, Pittsfords, NY, and **Bill Tuting**. The first paper of this session entitled ***Color - Control It in Production and Protect It in Court*** was presented by **Gerald M. Kraai**, Litman, McMahon, and Brown, L.L.C. Kansas City, MO. Kraai stated that color is part of our daily lives - the clothing we wear, the automobile we drive, the products we purchase. It can serve as a form of expression or identity. Yet many take color for granted. Sometimes we wonder why a paint store can't produce a perfect color match (under all lighting conditions) for the favorite color drapery material. At other times we notice that the painted rubber bumpers on the newer automobiles do not seem to be as good a color match for the body paint when viewed in the lighted parking garage at night.

Color can also be used to help us recognize certain products. For instance, suppose you are sitting at a restaurant table and the container that holds sugar packets (which are usually white) also has some blue packets. Without looking closer, what you would expect the blue packets to contain? Or perhaps you are shopping for some insulation material to add to your home, and you notice that some rolls are colored pink. Who might you expect to have been the manufacturer of the material?

Kraai reviewed the basic science of color while trying to address some of the legal questions that have surfaced in the last few years. He pointed out even in the trial of O. J. Simpson, color, (of gloves, photographs and video) was an issue. Judge Lance Ito remarked on Sept. 12, 1995, "The issue of color (and its reproduction in various media) has definitely been brought up."

Anne-Marie Begin presented the paper entitled: ***Assessing Tailored Lighting's Splice™*** and ***Macbeth Spectralight™ Lighting Units*** . The purpose of her study was to determine how well the Colorview's® method of mixing daylight and horizon lamp energy to achieve different color temperatures compares with a Macbeth luminare, factory calibrated for color temperature. To perform this evaluation, they,

1. Measured the A, D65, and Horizon power spectral density curves as described in the Procedure for Visual Evaluation of Interior and Exterior Automotive Trim — Technical Bulletin 3, Revision to SAEJ361.

2. Measured CIELAB coordinates as reflected from BCRA tiles illuminated by D65 and A settings as compared with Hemmendinger Color Lab traceable D65 and A Illuminant coordinates.

The values that were obtained statistically correlated with the Hemmendinger data, both for D65 and A illumination settings. This shows that the small differences in the spectral curves does not effect our visual perception of the colors measured.

Next, **Dr. James E. Rodgers, III**, Monsanto Fibers and Intermediates Co., Pensacola, FL presented a paper entitled, ***Analytical Methodology Considerations In A Comparative Study of Portable Color Measurement Instrumentation.*** He described a program that was implemented to evaluate various portable color measuring instruments for their potential to monitor color parameters on bobbins/cones of textile fibers. Seven portable color measuring units from five suppliers were evaluated. Various color tiles and bobbin sample sets were measured with each instrument. Choice depended on the user's own internal requirements.

Another paper entitled, ***Optimal Geometry for Color Measurement of Faceted Gemstones,*** was presented by **Yan Liu**, Gemological Institute of America. In the past different

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measurement geometries have been used to measure the color of faceted gemstones in the jewelry industry. There is no consistency among the data from the measurement with different geometries. Liu concluded the talk by stating that the results show that the 0/d geometry is optimal for color measurement of isotropic faceted gemstones. Using this geometry, the measured data agree with visual observations.

Another paper entitled, ***Instrumental Measurement of the Visual APIA/PTO/ Haze Color Scale*** was presented by **Gordon Leggett,** Hunter Assoc. Lab.,Reston, VA. The instrumental Measurement of the Visual APIA/PTO/ Haze Color Scale was first proposed in 1892 as a visual yellowness scale. The APHA/PtCo/Hazen metric continues to be actively used today for color quality specification. Leggett reviewed the origin of the visual APHA/PtCo/Hazen color scale, and described suitable methods for the best instrumental correlation of this scale.

POSTER SESSION

The following poster papers were presented:

The Weighting Function for Lightness in the CIE94 Color Difference Model by **M. Melgosa, E. Hita, A. J. Poza** and **M. M. Pérez,** University of Granada, Spain. This poster analyzed the improvements achieved by the CIE94 color difference model when a linear function of the lightness, $S_1 = V_1 + K_2L^*$, is introduced as a weighting function for the lightness difference ΔL^*. They also studied what parametric factors could effect the optimal $S_1(K_1)$function. From a data set of pass/ fail judgments, it has been shown by Witt that this type of weighting function could improve the performance of the CIE94 model (CR&A 19, 273, 1994). The authors compared the weighting functions for lightness proposed by the recent color difference formula. The optimal S functions for the CIE94 model from several experimental data sets {(RIT-DuPont, CR&A, 16, 297,1991); (Coates, *et.al.*, JSOC, 97, 179, 1981); (Brown-McAdam, JOSA., 39, 808, 1949)} are also compared. Their results support the CIE94 recommendations; the observed brightness varied significantly in the test data sets which may be due to local parametric effects. The lightness dependence connection appears to be a non-robust affect related to local parametric effects; perhaps, texture and lightness of the estimates of S_1 and K_1 will be the most important opportunities for improvement of the CIE94 model. A new experimental investigation in relation to specific parametric factors would be useful.

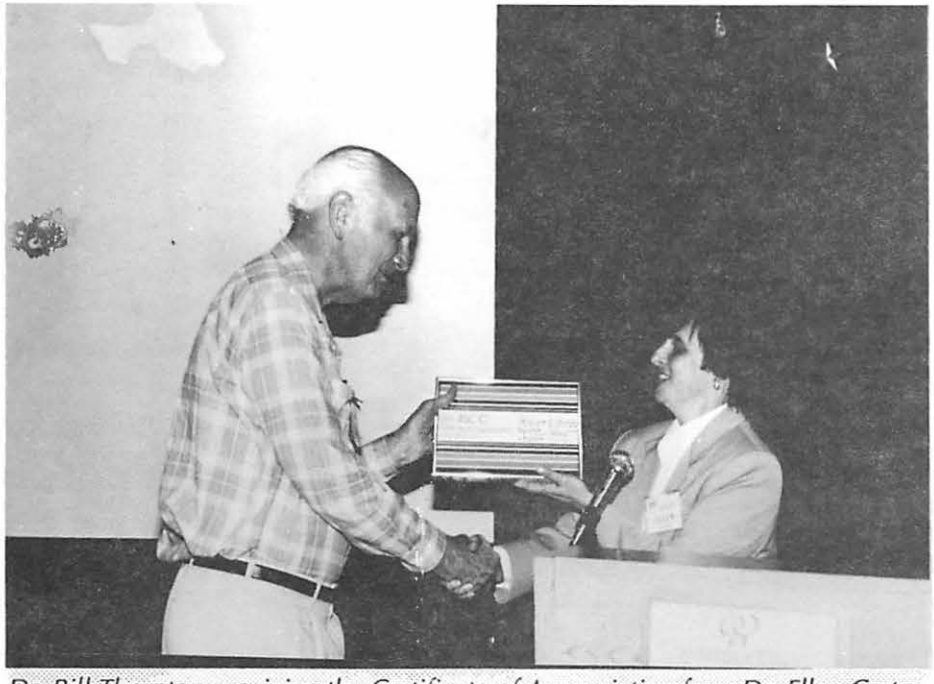
Visual Colour: A Demonstration presented by **Neville S. Smith,** Cleveland, England and **Fred W. Billmeyer, Jr.**, Schenectady, NY, USA. Smith explained that the demonstration program is a Windows compatible computer which converts between the notations of leading color specification systems via the CIE system. Implemented color specification systems include: Munsell, NCS, DIN6164, Colorcurve, OSA/UCS, CIELAB, CIELUV, RAL 840HR, RAL 841GL and BS5252R. Three colorimetric source-observer conditions are supported: C-1931, D65-1931 and D65-1964. Many systems are implemented for conversion for more than one set of colorimetric conditions. In addition, the program provides for color difference calculations using CIELAB, CIELUV, Lab(h), CMC(1:1), CIE94, FMC1 and FMC2. It also provides for spectral data to CIE tristimulus values calculated by using CIE, ASTM E308-95 and the Stearns data sets. This program can be used as a research tool to investigate color metrics of color order systems, to provide the transformation between CIE and color order system notations (Munsell, NCS, etc.), as a teaching mechanism, or as a commercial tool to obtain approximate conversions from color specification systems. The program is commercially available, runs under Window 3.1 or Win95, has full on-line help, and supports batch processing, printing and filing. A demonstration program is available.

Ms. Cynthia Sturke, Office Manager of ISCC helping Hugh Fairman with the registration

DCI-95, A New Color Tolerance Equation and Global Color-Difference Metric, by **Dr. Danny C. Rich,** Datacolor International, Princeton, NJ. CIE Technical Committee 1-28, "Parametric Effects in color Difference Evaluation" and 1-29, Industrial Color Differences have issued reports and recommendations. They describe procedures for modifying the size or spacing of color differences projected onto object color space by the CIELAB

color difference metric. The Modifications compensate for the texture of the object and for local-non-uniformity of the CIELAB metric. These reports, along with the world wide acceptance of the CMC color tolerance equation, have made possible the disclosure of a previously proprietary color tolerance equation. The equation has had many years of field testing with excellent results and several favorable published comparisons against the CMC and the M&S equations.

Within the last two years, several modifications have been added to the Datacolor color tolerance equation.



Dr. Bill Thornton receiving the Certificate of Appreciation from Dr. Ellen Carter

These modifications are both mathematically and psychophysically fundamental. The modifications are not merely empirical adjustments to the local CIELAB spacing, but are indeed, reversible mathematical transformations of the CIELAB metric that derive a more nearly uniform metric for object color space. This results in a color difference metric which conforms to the Weber-Fechner law and is both locally and globally approximately visually uniform. This implies that this metric, unlike CMC, M&S and TC 1-29 allows the interchange of the standard and batch in a color difference space with no change in the predicted color difference.

Rich described the background and basis for this metric, along with a result of calculations that illustrate both the uniformity of the metric and its utility in the setting and evaluation of industrial color difference.

The ISCC is now ON-LINE!!! Was presented by **Rich Riffel,** Accuracy Microsensors, Pittsford, NY. This means that the ISCC has a World Wide Web Home Page. The page contains a variety of information; such as, the Aims of ISCC, Membership information, Announcements, Calender of Events, Member Body information, Sustaining Members, Organization of ISCC, Board of Directors. Information contained in the home page will be revised as necessary. The Page is available via URL http://www.iscc.org. There is a mail tag included which allows one to communicate with the offices of the ISCC or the Board of Directors. As you go surfing by, please evaluate this entry into the modern day information world and let us know what you think of it.

The Luau Banquet

The days activities concluded with a Luau Banquet at the Disney Polynesian Village. Over one hundred from the seminar attended the luau. Disney continued its reputation for excellence in entertainment.

SYMPOSIUM REPORT

Report on **"Measurement of Appearance"** Symposium, Orlando, FL.

Danny Rich and Hugh Fairman organized this seminar on behalf of ISCC and ASTM. Danny opened the symposium with a quotation from Albert Einstein: "The most beautiful experience we can have is the mysterious. It is the fundamental emotion which stands at the cradle of true art and true science." The symposium embraced four broad topic areas:

- Advanced Topics in Appearance Measurement
- Images and Visual Appearance Measurement
- Characterization of Lights Displays and Retroreflectors
- Standards and Methods for Color Measurement

I. Advanced Topics in Appearance Measurement

The first paper by **Dr. Claudio Puebla,** Ciba-Geigy Limited, Grenzach, Germany was entitled: ***Modified Formula for Whiteness Assessment*** . Dr. Puebla described and defined the term "white" from the equations for CIE Whiteness and Tint. Those are the simplified derivations of equations used by Ganz and Griesser. Mathematical treatment of the data can significantly improve agreement between instruments utilizing different calibrations, geometries and spectral sources for the measurement of whiteness and tint. This requires the sample illumination to be stabilized and spectrally fitted to a desired standard illuminant. This improves the matching of different measuring instruments for whiteness. He suggested that the CIE method should be upgraded by incorporating components of this procedure.

Anthony Bristow, Swedish Pulp and Paper Institute, Stockholm, Sweden, presented a paper entitled: ***Non-Linearity in the Measurement of***

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Fluorescence Using an Integrating Sphere . He commented on the differences in fluorescence, whiteness and tint values from addition of Table 6 in *Standard Test method for Computing the Colors of Objects by Using the CIE System,* ASTM E-308. Special attention should be given to the non-linearity of interaction between radiation emitted by the fluorescence test piece and light from the light source. Non-linearity differences exist between sphere and bi-directional geometries.

David Burns, 3M, St. Paul, MN, presented a paper entitled:***Practical Fluorescent Measurement.*** He defined fluorescence and described the mechanism for it, reviewed its applications from biological analysis to visual signaling. The accuracy and reproducibility of measured fluorescent colors requires the use of instruments of greater precision than that required for the measurement of non-fluorescent colors. He reviewed the current ASTM Standards on the measurement of fluorescent samples and concluded that there is a need for better methodology for the colorimetric evaluation of fluorescent materials.

Dr. Gorow Baba, Murakami Color Research Laboratory, Tokyo, Japan, presented the paper:***On the Measurement of Total Luminous Transmittance and Haze of Plastics.***

He reported a discrepancy between the numerical results obtained when measuring haze in accordance with ASTM D1003, Method A or B. Baba had some suggestions for this discrepancy and showed some modified equations developed in Japan to eliminate this discrepancy

II. Images and Visual Appearance Measurement

Paula Alessi, Eastman KodakCo., Rochester, NY, presented a paper entitled; ***Color Appearance Model Evaluation for Hardcopy/Softcopy Image Comparison.*** She stated the scope of CIE Technical Committee (TC) 27,*Specification of Color Appearance for Reflective Media and Self Luminous Displays*. She described CIE guidelines. Published to induce international researchers to perform hard copy/soft copy image comparison experiments and provide data to the TC. Six researchers from around the world responded with data and results. Promising color appearance model results were obtained for the CIELAB, von Kries, Hunt, RLAB and BSD models evaluated under different viewing conditions across hard copy and soft copy media.

However, results were inconsistent among researchers. Future work is centered around resolving these inconsistencies.

Andrew F. Rutkiewic, consultant, USA, presented a paper entitled: ***Computer Manipulated Image Standards for Visual Evaluation of the Appearance Properties of Materials.*** When complex images are to be evaluated, existing instrumentation for the measurement of appearance are inadequate. To evaluate the visually progressive change in a single attribute of a complex image, series of photographic images are very helpful. By using computer image manipulation techniques and one or two images, a complete range of accurate stepped images were generated. The use of this computer manipulation to vary, quantitatively, the texture of a surface in two dimensions was reviewed.

Dr. Joann Taylor, Color Technology Solutions, Portland, OR, presented a paper entitled;***Color in Medical Imaging and Telemedicine: A Perspective on Today & the Future.*** Color medical imaging techniques and the problems associated with them were reviewed. Taylor commented on the lack of standards in multi modality images and as a result the difficulty in interpretation. Utilization, purpose and interaction of telemedicine in today's society was reviewed. DICOM provides the industry standards used to specify the color imaging solutions. There are many unanswered questions that lead to more work in this field.

Ms. Paula Alessi receiving the Certificate of Appreciation from Dr. Ellen Carter

Neville S. Smith, Consultant, Stockton-on-Trent, Cleveland, UK.presented a paper entitled; ***Virtual Colour: Communication Standard and Analytical Tool.*** A number of problems with existing color specification systems with their physical exemplification are identified. Developments in computer science, particularly CRT displays provide affordable alternatives to traditional color ranges and atlases. Smith has developed techniques to increase the accuracy of printed colors to their CRT originals. He suggested

that the audience should consider the benefits of an application specific color order system.

III. Characterization of Lights and Displays

The first speaker, **Dr. William A. Thornton,** gave a talk on ***The Derivation of a Standard Illuminant for Triband Fluorescent Lamplight*** . One of the sources included today among those used by colormatchers is the Triband Fluorescent Lamp. It appeared 20 years ago as the latest in the series: Daylight, Incandescent and Cool White Fluorescent. In the 1960's, it was discovered that strongly saturated lamplight SPDs (spectral power distributions) offer particularly pleasant color-rendering and considerably higher perceived brightness per watt of lamplight in an illuminated space. The power-content in these lamplights is concentrated in three particular wavelength regions; near 450nm in the blue-violet, 530nm in the green and 610nm in the orange-red. Over the last 20 years, the triband lamplight has become common in worldwide illumination. Commercial products are routinely viewed in this illumination. The CIE has long listed a single triband fluorescent SPD, F11. However, the triband lamplight has become commercially available in many forms, perhaps 30 or 40 different varieties. Its SPD is not correctly regulated. The intent was to ascertain whether one or more of these varieties yields a possible specification of the Standard Triband Illuminant, and if one or more actual sources used in typical viewing booth. Accurate SPD measurements were made of 26 Triband fluorescent lamplights of five different sizes, manufactured by six of the world's lampmakers from the USA, Europe and Japan. The SPDs of most of the 26 lamplights were remarkably similar. Chromaticity, correlated color temperature, lumen content and efficacy (lumen output per watt extended in the arc) using the 1 nm absolute SPDs were computed. Measured lamplight chromaticities grouped near the Planckian Locus, roughly near 3000K, 3500K and 4000K. The 4000K/Planckian locus region was chosen for a tentative prescription of Triband Illuminant chromaticity. Thornton concluded by stating that the chromaticities of five of the measured triband lamplights, as well as that of the Illuminant F11 lie within a 4-step MacAdam ellipse . These five real lamps have been marketed in the USA. Chromaticity of the average ($x = 0.387$, $y = 0.383$) of the five lamps lie at the center of the ellipse.

Kevin McGuire, Taylored Lighting, Pittsfield, MA, presented a paper entitled, ***Calibration of Lighting Cabinets.*** He started by stating a rule-of-thumb associated with ISO9000, "If you can measure it, calibrate it". The calibration of color temperature and intensity of light booths is becoming a manufacturing requirement. Calibration of light booths is required to validate the original reason why they were developed; to provide standardized lighting for visual inspections. He explained the meaning of color temperature as used in lightbooths. Since color temperature is the generally accepted method of describing daylight in a light booth, adjusting the color temperature becomes a necessity for calibration purposes. Unfortunately there is no simple method for users to recalibrate their instruments or know when its color temperature is out of spec. McGuire described the solution that Taylored Lighting offered.

Dr. Jonathan E. Hardis, NIST, Gaithersburg, MD presented the next paper; ***Obtaining Colorimetric Data from a Visual Display Unit Using Tristimulus Colorimeters.*** He pointed out the fact that ASTM Subcommittee E-12.06 is working to develop standardizing procedures that measure color on display screens. Hardis stated that the most accurate means of measuring the tristimulus values from a display is by using a spectroradiometer. However, tristimulus colorimeters, with colored filters find wide use because of their simplicity and low cost, and the signals from them are used to compute the tristimulus values. Hardis reported that the work of the ASTM subcommittee is an improvement upon the previously published data.

Dennis Couzin, Stimsonite Corp, Niles, IL presented the last paper: ***Angles for Describing Retroreflection.*** A new four-angle coordinate system for retroreflection geometry was described. The geometry consists of orientation and rotation angles which are two of the four coordinates. Orientation angle is a measure of the light source's position about the object's retroreflector axis and rotation angle is a measure of the receiver's position about the line of illumination. The other two angles are entrance angle and observation angle. Optically these four angles are good parameters of the object's performance and will guide improved testing procedures. This is a theoretical model and probably will never have a retroreflectometer based on these angles.

IV. Standards and Methods for Color Measurement

Hugh Fairman, Hemmendinger Color Laboratory, Princeton, NJ, presented the first paper: ***The Use of the Dual Calibration in Hemispherical Spectrophotometry.*** After defining dual calibration Hugh Fairman described the methods of dual calibration. He examined the magnitude of possible error introduced by failure to calibrate in this manner. Dual calibration offers one of the most potent tools to improve the accuracy of spectrophotometry. The error can be as much as ten percent of the specular component at some wavelengths. For some colors, 0.4-0.6% reflectance for glossy specimen, can produce as much as two CIELAB units of absolute error. This method of dual calibration is recommended for all situations where specular component is included in hemispherical measurements.

Paula Knee, National Physics Laboratory, Teddington, UK, presented

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the second paper entitled: ***Uniformity and Thermochromism of Color Standards.*** Excellent precision of modern spectrophotometers for surface color measurement required transfer standards of greater uniformity that are also free of thermochromism. She presented the results obtained in a study of uniformity of surface color standards from six different types of material from six different countries. The data showed that a painted card and a plastic material were more uniform than other standard types of materials. The study also analyzed the effects of thermochromism. The variation in results caused by thermochromism is not a problem with achromatic colors. The error is greatest on colors that have a steep spectral slope.

Dr. Roy Berns, RIT, Rochester, NY, presented the third paper of the session entitled: ***A Practical Technique to Diagnose Spectrophotometric Errors.*** Berns described the reference white, reference black and wavelength errors on colorimetric accuracy. These parameters are simulated for the BCRA Series II tile set. He stated that CIE94 color differences up to 5.2 units could result. The errors were linear with respect to CIELAB differences for each tile. A technique was developed that enabled ΔL^*, Δa^* and Δb^*between a calibrated tile and its measured value to be transformed into estimates of reference white, black and wavelength errors. Berns identified the cyan tile as the most effective tile for this technique. He showed the equations for 45°/0° and 6°/hemispherical geometries. Berns concluded by stating that measuring the cyan tile on a regular basis and transforming its colorimetric coordinates into spectrophotometric error metrics provides a useful method to validate a color-measuring instrument's accuracy and reproducibility.

Jack Ladson, BYK-Gardner USA,Silver Spring, MD, presented the last paper of the symposium entitled: ***Correlating Portable Color Instruments With Bench-Top Units.*** Some users of color measuring instruments desire nearly identical results whether measuring in the laboratory or in the production line. Desired replication can be achieved between the two measurements, by mathematically correlating the results obtained from the portable instrumentation with those from bench top units. Color decisions can be made immediately at the production line using the portable instruments. Ladsen concluded his talk by stating that data can be transferred electronically, inter-factory for instance and results compared immediately.

Danny Rich closed the seminar by summarizing its contents and thanking each one of the participants.

The original report of the 65th Annual Meeting of ISCC and the ISCC-ASTM Committee E-12 joint Symposium were prepared by Mr. Jack Ladson and will be published in its entirety in the October issue of the Color Research and Application.

The editor of ISCCNEWS thanks Mr. Ladson for providing the report for use in this newsletter.

Macbeth Award

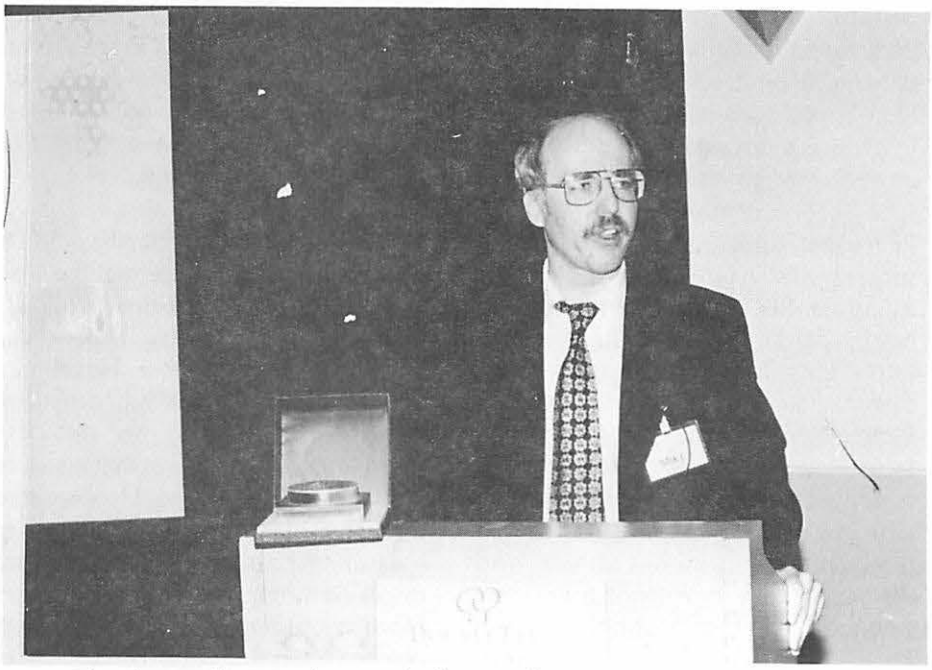
Every two years the ISCC is honored to be able to present the prestigious Macbeth Award. This award was established in 1970 by Norman Macbeth, Jr., in honor of the memory of his father, Norman Macbeth,one of the founding members of the ISCC and founder of Macbeth Daylight Corporation, now part of Kollmorgen. It is presented every second year for outstanding recent contributions to the field of color.

This year ISCC is honored to give this award to Dr. Michael Brill for his singular contribution to the understanding of color constancy

A remarkable fact of human color vision is that a surface's color appearance is stable under conditions of varying illumination. Starting in 1978, Dr. Brill has developed a model which employed a different, ingenious strategy. Dr. Brill's volumetric model does not estimate the illuminant spectral power distribution, but makes use of illuminant invariances to estimate surface reflectances directly. Dr. Brill's theoretical work has been at the forefront of the modern development of color constancy models.

Dr. Brill is a member of the Technical Staff at the David Sarnoff Research Center, Princeton, NJ where he is involved in developing a model for color video-image quality for video encoding.

Dr. Brill has a PhD in Physics from



Dr Michael H. Brill giving his Macbeth Award acceptance speech

Syracuse University. He has been a positive force within the ISCC. He was a member of the Board of Directors (1992-1995). This year he has been elected as the President-Elect of ISCC. Dr. Brill continues to serve on the Editorial Board of Color Research and Application, and was recently appointed as Associate Editor for *Physics Essays.*

Michael H. Brill

I am grateful to the Macbeth Award Committee and to the ISCC for selecting me to receive the Macbeth Award this year. Now I would like to say a few things about the work, and considerably more about my two mentors who inspired it.

I am receiving the Macbeth Award for my work in color constancy—that is, for my attempts to explain the fact that a surface's color appearance is stable under change of illumination. As has been said before, the volumetric model does not estimate the illuminant spectrum, but makes use of illuminant invariances to estimate surface reflectances directly. The model also can be used to estimate illuminant-invariant color *relationships* , as on a multicolored object. This option frees the viewer from needing a set of "reference" objects whose reflectances are known. Recent visual experiments have indeed borne out that more complex scenes have greater color constancy, which points to the constancy of color *relationships* rather than estimation of reflectances one-by-one. Using color relationships, it is (at least theoretically) possible to track multicolored objects through a complicated environment under variable illumination, without estimating the reflectance of any of the object's parts, and without reference surfaces. Human vision may use the model (probably at a cognitive level), and machine vision could definitely benefit by it. This is what I see as the future of the model.

Having made this brief sales pitch, I will say no more about the model itself. Instead, I will talk about a world view of which the model is only the smallest manifestation. This world view is not originally mine, but was born of the larger vision of two of my mentors during the 1970s, when I was doing my doctoral work. I did this work in absentia from Syracuse University under the direction of Professor Jerome Y. Lettvin, who held a joint professorship in Biology and Electrical Engineering at MIT. I also had appreciable unofficial guidance from Dr. Hüseyin Yilmaz, who had earned a physics Ph.D. at MIT and was president of a consulting company called Perception Technology Corporation in Winchester, MA.

Before meeting Yilmaz, I had stumbled around reading vision-science papers for a year or so. Then I joined the Air Force in 1972 (in absentia from graduate school), and got to know Yilmaz in the context of his speech-recognition algorithm. This algorithm was based on an analogy with color vision, whereby vowel sounds comprise a space of a few dimensions similar to tristimulus space. (The speech analogue of illuminant-invariance is speaker-independence.) I was very impressed with Yilmaz's command of several fields of physics and by his integration of these fields with human and machine perception. But I did not understand his unifying perspective until I read an essay he had written for the Boston Colloquium for the Philosophy of Science. Here is the start of that essay:

"Some years ago as a physicist working on quantum mechanics and general relativity, I started to think seriously on the nature of physical science and its theories. My purpose was, of course, to find some general and meaningful concepts through which I might understand the process of science and theory construction better, and hopefully develop some methods and strategies for the construction of new theories in the future. Such an activity, I presume, belongs to the dangerous province of the philosophy of science.

"I am sure everyone considers such matters from time to time and my impressions of how to proceed were really quite nebulous. At first I seemed to feel that a thorough study of modern physical theories and the latest developments in particle physics and field theory might provide valuable clues. Gradually, however, I got discouraged from this view, mainly because these fields were still quite unsettled and rapidly evolving. If we are looking for clues of permanent value, I felt, we should be studying structures which have already evolved permanent features. By this criterion, however, we might just as well give up the whole physical science as a topic to study since hardly anything in it is more than three hundred years old.

"Apparently, then, we must study cognitive structures much older than modern science, yet exhibiting features somehow meaningfully resembling modern science. Possibly, a study of the elementary perceptual phenomena could be the thing to do. I felt that the phenomenon of color perception would be a convenient starting point in this respect because in its long evolution the human eye must have assimilated some permanent features of light and radiation in the environment. The sun is therefore more than a billion years, practically unchanged. The structure of the earth and its atmosphere, the biological environments, and natural objects were essentially the same or very nearly so during the whole evolutionary history of color vision. It should then be reasonable to assume that the dire necessity of survival must have instilled into the structure of color perception of living beings some permanently relevant features of this environment. These features, whether conscious or not, should manifest in our daily lives as cognitive acts because such features would be part of an overall inner model we, as organisms, build regarding the environmental niches in which we live and survive.

"Thus, if we hold color perception as a kind of unconscious and ancient science, its study might be revealing with regard to the philosophy of science. With intent to learn something about how to do science from elementary perception, I therefore started to study

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the method by which the human eye perceives colors and colored objects." [H. Yilmaz, *Perception and the Philosophy of Science*, essay presented to the Boston Colloquium for the Philosophy of Science, 28 October 1969]

Many physicists have spent some time in color science, including Newton, Maxwell, Helmholtz, Rayleigh, and Schrödinger. Even as a graduate student, I had the impression that these great scientists had viewed color as an interesting sidelight, or even as a youthful dalliance (as in the case of Schrödinger), but not as a significant career path. Not so for Dr. Yilmaz, as his essay amply illustrates.

After only three months in the Air Force, I returned to graduate school. Very soon, I had to seek dissertation advice outside Syracuse. I would have been delighted to study color science with Yilmaz, but my department required that the advisor have a university affiliation and preferably a prestigious one. It was for this reason that Yilmaz introduced me to Jerome Lettvin, from MIT. By fortunate coincidence, at Syracuse I'd heard Lettvin give a fascinating talk based on his essay, "The Colors of Colored Things", which was famous at MIT but unknown elsewhere. Like Yilmaz, Lettvin had a teleological view of perception, but his emphasis was on the interaction of engineering and biology. Within a year I moved to Boston, and began a dissertation under his direction. In the process I attended every Lettvin lecture I could. I learned about everything from physiology to psychiatry and mythology. [Here's an example: "In Freudian psychiatry, everything reminds you of sex, but in Greek mythology, sex reminds you of everything."] Lettvin was the closest I have seen to a modern Renaissance man. The only negative effect of my attending his lectures was that I became impatient and restless at anyone else's lectures.

Soon it came time for my dissertation defense, in August of 1974. Certain critical phone calls from my committee on the eve of the defense led my subconscious mind to lock me out of my apartment, whereupon I visited Lettvin to get help preparing my defense speech. Lettvin saw I was in no condition to compose golden oratory, so he dictated to me a preface justifying the dissertation, which I dutifully wrote down. More than his published work, this justification conveyed to me the essence of his views on color-vision research. Let me share excerpts of it with you now:

"The basic problem of color vision is to decide what the process *is* viewed from the point of view of *purpose*. There are too many ways of describing a complex process (especially biological) if you do not know its purpose. (By 'purpose' I do not mean anything too deep; the purpose of a kidney is to excrete, etc.) We want to know the purpose of color vision.

"My notion of purpose is an engineering goal—a device is built to the specifications of some consumer. This is different from determining the purpose of a finished product after the fact. The purpose gives rise to a set of engineering rules for a device to be useful to machines that imitate animals. The problem, then, could be phrased as follows: On the sixth day God subcontracts color vision to some engineering firm. What would be the specifications?

"I don't know what color vision is, but have built a model for what I think it *should* be, and examined it for aptness.

"Here, then is how God might have laid it out. There is a fair amount of light. Objects are distinct by form, and two similar forms can be distinct by an extension-free variable expressing the nature of the surface. This variable, distinct from form and texture, we'll call *color*. (Color is extension-free because we can imagine a red point but not a square point.) If the boundaries of the light are not coincident with those of objects, then we can evaluate the extension-free quantities if we know the form.

"[Let us] take some colored papers, of the same texture and size, and differing only in their abilities to reflect light [...] Given a table covered with pieces of paper, the problem is to track *one* of these as the papers are shuffled and the illumination is changed from time to time and from place to place. The only [constraint] is that boundaries in the lighting are *not* coextensive with boundaries of what is lighted. Under these circumstances, we want the *optimal* system for tracking the sheet of paper.

The problem is addressed in part by Lynette Linden's thesis, which extends the notion from sheets of paper to areas in a retinal image of the three-dimensional world. From Euler's theorem, all graphs are decomposable into third-order vertices by expanding a vertex point into a circle. All vertices are third-order, except (i) from accidents of viewpoint (resolved by head movements); (ii) from cosurficial boundaries such as the cleaved end of a rock; and (iii) from partial transparency obscuring a boundary or shadow. In general, in a view of the world, the number of higher-order vertices is small (of order zero) as verifiable from a photo taken of any scene. The Euler theorem is important to vision because a star point seen through any ocular medium goes into a blur circle (hence even the higher-order vertices are naturally decomposed into third-order vertices).

"Under these circumstances, the maximum amount of information from a scene whereby to compare surfaces arises only from places where surfaces bound each other. Even without appealing to the physiology of lateral connections, we are constrained by the arbitrariness of the light distribution to do a comparison across a boundary. The highest number of comparisons, given by the Euler theorem, is three. [...]

"Helmholtz, in discussing color constancy (that is, apparent persistence of color attributes to particular objects under change of illumination), remarked that it was as if one 'subtracted' the color of the illumination from the colors seen. This was a metaphor, unrealizable since light

illuminating an object is not necessarily the same as the light illuminating me: I have no way of determining it.

"I'm taking as my engineering goal this vague and difficult-to-test color constancy as the point of my construction. [...] As applied to the problem set out by Le Bon Dieu, there are the following constraints. There can be no absolute judgment of reflectance without knowing the light incident on a surface (and this is unknowable by visual information). The light reflected can have *any* action spectrum since one can take any surface and illuminate it with a light [with] a particular action spectrum. Even with the luxury of a wavelength-by-wavelength comparison across boundaries, all I could talk of would be *relative* reflectance across a boundary (as in spectrophotometry).

"The *subjective absolute* we call the *color* of an object (by which we mean to imply some quality of reflectance of the object) cannot even with the best apparatus be determined as an absolute *in situ*. Nonetheless, it is useful to suppose a *relational* quality of the surface with respect to surfaces around it can be transformed into such a subjective absolute. [...]

"There are very practical reasons for taking the relativistic [relational] approach, the most compelling of which is experimental: In Land's symphony of color contrasts, he shows that an area from which a fixed light composition emerges can be seen as any hue of the rainbow (pretty much), depending on the surround. It cannot be so that subjective color is a simple rigid transformation from Newton's space (such as ICI space).

My problem, then, is to account for these judgments, and I've chosen the synthetic route. My procedure is to suppose a trihedral vertex (three pie-wedge areas coming to a point). These areas each have a characteristic reflectance I *cannot* know. [...] We want to set up a system that considers the ordering of these three areas. [...]

"Because I have decided to look for the source of subjective invariance ('color constancy') in limitations on illumination and reflecting surfaces encountered in man's evolution, this thesis is not pure science in the sense of laying down immutable laws. It is a kind of engineering trickery by which we give an imagined consumer what he asks for. I imagine a *science* of color vision *will* deal with exact composition of pigments and the nature of synaptic transmitters (whatever they are), but in this thesis I'll be concerned only with strategy, and will give an example of how this strategy can be accomplished." [J. Y. Lettvin, Aug. 6, 1974]

I used this text in preparing for my dissertation defense, but I did not read it verbatim, because it wasn't my work. Now, I feel it is time to share Lettvin's words with my friends in the ISCC. They are words of a great thinker, who has had a subtle and unrecognized influence on several fields including color science.

In Lettvin's words lay a nascent idea from which I developed the volumetric theory: the comparison of multiple areas in the visual field to produce illuminant-invariant judgments. My thesis work—and my later numerical experiments with color gamuts—screamed "volumetric theory" to me, but I could not find the right path to completion until I had rejoined Yilmaz in 1977 to work at his company. I had already written the preliminary paper (which was published the following year). But I did not see how to turn the theory into an object-color recognizer—until I read a speech-recognition report Yilmaz had written for the Air Force in 1976. In it was a version of the algorithm I was looking for. This algorithm removed the speaker's modulating spectrum from a mis speech sounds in the same way as I sought to remove the illuminant spectrum from object color. Yilmaz himself insisted that this algorithm had more resemblance to his color theory (in which chromatic adaptation was a Lorentz transformation) than to my volumetric theory. But I saw it differently. All I did was reverse Yilmaz's color-speech analogy after Yilmaz had added value in the speech-recognition domain.

So you can see, the volumetric idea, among others, evolved through my interactions with Yilmaz and Lettvin. Neither of my mentors has enjoyed popularity in the color-science community, but I think the time has come to acknowledge their contribution. Many of the AI researchers at MIT, and also the psychologists who have recently popularized the notion of "natural computation", have benefited from the early work (especially Lettvin's). I've even seen a few trihedral vertices marching across the landscape from a central depot in Lettvin's lab.

More important than this retrospective is the fact that, even now, I can go back and read the words of Yilmaz and Lettvin, and be inspired all over again to a mission that is sure to exceed my grasp.

Michael H. Brill

NEW OFFICERS OF ISCC

The ISCC Board of Directors met Saturday, May 4, 1996, in Orlando, FL before the Annual Meeting and approved the following officers and the three new Directors that were elected by the voting members and delegates of ISCC.

President:	Dr. Ellen C. Carter
Pres. Elect:	Dr. Michael H. Brill
Secretary:	Dr. Danny C. Rich
Treasurer:	Mr. Hugh S. Fairman
Past Pres:	Mr. Roland L. Connelly

New Board Members for three year term (1996-1999) are:

Dr. Helen H. Epps
University of Georgia
Mr. James R. Keiser
DuPont Automotive Products
Mr. Jack Ladson
BYK-Gardner USA

The addresses and phone numbers of the elected officers and new Board Members are listed at the end of this newsletter.

OBITUARY

WILLIAM J. KIERNAN

PAST PRESIDENT OF ISCC (1962-1964)

William J. Kiernan died March 4, 1996, at the age of 87. He suffered from Rumatoid Arthritis. Kiernan was born in Brooklyn, NY but lived in the Gibson section of Valley Stream, NY, before moving to Florham Park in 1947. His wife, Laura, still resides at 38 Beechwood Road, Florham Park, NJ 07932 (tel: 201/ 377-4332).

Kiernan was an officer of ISCC for nearly a decade, serving successively as Director 1958-1960, Vice-President 1960-1962, President 1962-1964, and Director 1964-1966. In addition to ISCC, Kiernan was very active in ASTM Committee D-1 on Paint and E-12 on Appearance, serving three two year terms (the statuary limit) as chairman of the latter. For this and other accomplishments, ASTM honored him with their award of Merit in 1972.

Kiernan was a 1936 graduate of New York University. He worked as a research chemist with Bell Labs in New York until 1947, when he became supervisor at Bell Labs in Murray Hill section of Berkley Heights, a position he held until retirement in 1971. Kiernan had responsibility for the paint used on telephone equipment including the color. Telephone equipment had habitually been painted black, but Kiernan succeeded in changing the color specification to a much more pleasing blue-gray that is still being used. He was also responsible for the acceptance or rejection of the colors specified for other types of telephone equipment such as telephones, public telephone booths and signs indicating their location.

In addition to his wife, Laura, Kiernan is survived by two daughters, Claudia Sena of Long Beach Island, NJ, and Madeline Okner of Lake Mohawk; a son William of Cos Cob, CT; seven grandchildren and one greatgrandson.

Harry K. Hammond III
June 10, 1996

REPORT OF THE PROJECT COMMITTEE 50

Commercial Lamp Light SPDs

Project Committee 50 met Monday, May 6, 1996 at ISCC 1996 Annual Meeting in Orlando, FL. Dr. Danny Rich, acting chair conducted the meeting.

CWF lamp lights are rapidly being replaced by newer lamps lacking CIE specification. The Project Committee is going to collect SPD (spectral power distribution) data of new lamps, and intend to quantify, tabulate and publish the data. However, there are several questions, such as "which lamps are important?" and " who can provide tabular data?"that need to be answered before ISCC can distribute the data. The following items were discussed:

Stanziola noted significant differences between actual CWF lamps and nominal SPD. Rich has purchased lamps from different parts of the country, then averaged.

Berns suggested increased activity in spectroradiometry by instrument manufacturers. Simon noted an effort at Clemson University regarding low-cost spectroradiometry for graphic arts. Spectral differences between different simulators of D50 were noted. McCamy noted the complexity of collecting spectroradiometric data.

Saltzman commented on the need for standard lamps and reiterated Bob Hunt's suggestion to measure lamps, not to standardize illuminants. Saltzman also cited McDonald's paper documenting that Marks&Spencer's use of triband lamps saved energy and expenses, but cost their suppliers millions.This paper was provided to the Editor of CR&A for possible republication. (McDonald was one of the principal developers of the CMC equation.) Saltzman stated that Lamps are used for viewing, users can't be responsible for performing their own independent calibrations due to the complexity noted above. Standardization is needed.

Yglesias commented on additional use of lamps as decorative objects themselves not just to view other objects. For example, the Paris Opera House required specific tubes as part of the architecture.

Rich Riffel wanted to learn if the differences between CWF and new triband lamps are greater than the differences among existing CWF lamps. If not, then this problem cannot be solved. Rich noted the differences in SPD curve between Philips TL84, Osram Dulux and CWF. All are approximately 4100K lamps, but have great enough differences in curves that they can not all be considered the same.

Thornton noted that the efficiency of CWF is what has been outlawed. He believes that the same SPD exists in other sources. He recommended against obtaining data from lamp makers.

Stanziola noted that the industrial users of CWF for critical color matching already experience more problems than users of daylight.

Acting chairman D. Rich also recommends that after two years of questions about the validity, that this committee be disbanded for lack of technical feasibility.

Ann C. Laidlaw

NEW MEMBERS

The following is a list of new members as approved by the Board of Directors

Dr. John Richard Aspland
Clemson University, School of Textiles
Clemson, SC 29634-1307
particular interest: color; color measurement, match prediction, shade sorting

Dr. David Burton
Virginia Commonwealth Univ.
P. O. Box 842519
Richmond, VA 23284-2519
particular interest: color theory, history of color

Ms Regan W. Chichester
26 Rock Street
Cold Spring, NY 10516
particular interest: psychological effects, visual perception, color education and applications within design and art.

Mr. Richard Cryer
Etchings, Ink
469 Riversville Rd.
Greenwich, CT 06831
particular interest: fundamental research on color

Ms Tricia Hilliard
944 Oakland Ave.,Rm B-5
Indiana, PA 15101
particular interest: the effects color has on fashion design, i.e., particularly why color changes through the season

Mr. Shawn A. Johnson
PPG Industries
10800 South 13th St.
Oak Creek, WI 53154
particular interest: spectrophotometric measurements, software-based color adjusting and analysis, visual interpretation of color, color education

Mr. Ian Kenchington
Tennessee Electroplating
164 Viar Rd, Box 244
Ripley, TN 38063
particular interest: color matching/measurement (visually/spectrophotometric) of automotive exterior parts

Mr. Kenneth Larson
Kesign Design Consulting
10519 Yarmouth Avenue
Granada Hills, CA 91344
particular interest: use of color in interior, motion picture set design, keeping current on trends especially film of the future

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Ms Tracey P. Moorer
BASF Corp.
26701 Telegraph Rd.
Southfield, MI 48034
particular interest: applied research, color theory and industrial application

Dr. Vaclav Prchal
Faculty of Chemistry
Technical University BRNO
VESLARSKA 230
CZ-63700 Brno
CZECH REPUBLIC
particular interest: color quality control, color matching

Ms Archana Szpak
Ford Motor Company
6626 Kings Mill Drive
Canton, MI 48187
particular interest: color control and color matching



BIRTHDAY CELEBRATION OF INTEREST!

- We have two scientists born under the sign of Cancer.
- Both are celebrating a birthday in July (and only a few days apart)
- Both have the first name of David.
- If there was a Color Hall of Fame - both would be recognized.

Yes, dear friends - they need no introduction.

Dr. W.David Wright

whose 90th birthday falls on July 6th. His contribution to color was printed in the May/June 1996 issue of ISCC*NEWS*.

Dr. David MacAdam

whose 86th birthday falls on July 1st. Among his accomplishments in color who can ever forget the MacAdam Ellipses.

We, the Members, Officers and the Board of Directors, wish both of you a very Happy Birthday.

God Bless You Both.

COLOR RESEARCH AND APPLICATION

IN THIS ISSUE, August 1996

The first two articles in this issue are from Japan. For the past several years, Dr. Yoshinobu Nayatani and his co-workers have been studying color appearance, in particular the effect of illuminance level on the equivalent lightness of chromatic object colors. While first described for aperture colors, the Helmholtz-Kohlrausch effect, that is, the phenomenon that there is an increase in brightness or lightness when the purity of a color stimulus is increased, also is apparent in object colors. In 1994 Dr. Nayatani reported on two approaches to quantify the Helmholtz-Kohlrausch effect for object colors and examined the prediction of the effect with a color appearance model. However, non-linear color-appearance models are quite complex to use. In this issue, Yoshinobu Nayatani and Motohiro Nakajima report on a study to develop a model by using the CIELUV space to predict H-K type effects. In "prediction of the Helmholtz-Kohlrausch Effect Using the CIELUV Formula," they reported computational procedures for estimating the various effects that are simple and easy to use while still producing results similar to those of the non-linear color appearance model.

The second article, "Prediction of the Helmholtz-Kohlrausch Effect (VCC method) using the Swedish NCS System" focuses on the variable chromatic color (VCC) method of quantifying the Helmholtz-Kahlrausch effect. In this method the lightness of the chromatic sample is varied (holding the chromaticity coordinates constant) until the chromatic sample is deemed a match to the achromatic reference sample. In this study Yoshinobu Nayatani and Motohiro Nakajima derived the predictive equation of the VCC method using the CIELUV formula on the basis of the colorimetric values of the Swedish NCS colors directly. Then they compare results found with this equation to those of the earlier theoretical equation.

Moving to research done in Great Britain, since 1991 there have been a series of five artictles in this journal reporting on the development of a large data base of visual experiments in color matching performed at the Loughborough University of Technology Computer-Human Interface (LUTCHI) Research Center. These articles described the quantification of the color appearance using experiments involving the magnitude estimation method of evaluating a single color stimulus in a simple viewing field. However, in many applications there are confounding parameters: the visual fields are complex, and the color images are in different media such as color monitors and electronic printers. In order to extend the data base to include complex images, Mei-Chun Lo, M. Ronnier Luo, and Peter A. Rhodes used two techniques to assess the color reproduction quality of the complex images, binocular memory and simultaneous matching techniques. In "Evaluating Colour Models' Performance Between Monitor and Print Images" the results are reported and used to compare the performance of different color models.

The next article in this issue also deals with appearance, but it is restricted to a very specialized colorant, metallic flakes. For the past fifty years automobile manufacturers have been adding metallic flakes to some of the coatings for automobiles. This procedure has grown in popularity because of the fascinating luster and color changes that occur when the angle of view is changed. With highly mobile objects, such as a car, the effects can be striking. The science of the color measurement and formulation involving these special pigmets is still evolving. C. S. McCamy describes the "Observation and Measurement of the Appearance of Metallic Materials." In "Part I. Macro Appearance," Mr. McCamy discusses the terminology and methods of measurement including the new instrumentation available. He then goes on to describe the program in the United States to standardize the data collection, particularly the work done in the committee on Appearance of the American Society for Testing and Materials (ASTM).

The final article in this issue, "Color and Nighttime Pedestrian Safety Markings," also relates to an ASTM committee. The ASTM subcommittee E12.08 on High Visibility Materials produced a standard for specifying the nighttime visibility of retroreflective markings for pedestrians. While retroreflective markings do help motorists see pedestrians at night, they are only helpful if the pedestrians choose to wear them. In order to be appealing to users, the standard allows great freedom in designing the retroreflective markings including the use of color. It is true that color can increase conspicuity as well as fashion appeal. However, the use of luminance as the measure of conspicuity could discourage colored markings because one gets greater luminance from whites. In their article, William Venable and W. N. Hale describe the dimensionless "color factor" to use in relating the perceived conspicuity of colored retroreflectors to the costumary luminance measurements.

In this month's Color Forum, Michael H. Brill poses the question, "Do Tristimulus Values Have Units?" Dr. Brill reviews the various forms tristimulus values take, which include values having units of power or others with no dimensions at all. Then he discusses the quandary that this can bring about.

As the use of the CIE 1976 color-difference formulae grew, many people preferred to calculate the values in terms of lightness, chroma, and hue components rather than lightness, a*, and b*. In 1991, Robert Sève presented a "New formula for the computation of CIE 1976 hue difference." In 1992, Michael Stokes and Michael Brill contributed a note on "Efficient computation of ΔH*ab". However, efficient the computation is, it is not convenient with small computing

(Continued→)

devices because it requires a test of the sign of the number. In the Communications and Comments section of this journal, Dr. Robert Sève presents a "Practical Formula for the Computation of CIE 1976 Hue Difference," that does not involve a sign test.

Ellen C. Carter
President, ISCC
Editor
Color Research & Application

LETTER OF APPRECIATION

I received the following letter from Dr. Stephen Wright, son of Dr. David Wright, in response to the article that Dr. David Wright had written some years ago about the CIE Standard Observer in Textile Chemists and Colorists and I had the privilege of publishing it in the ISCC *News* recently.

Gultekin Celikiz
Editor

3, Pewley Bank,
GUILDFORD
Surrey, GU1 3PU.
Tel: 01483 564021.

19 May 1996

Dear Gultekin Celikiz

Dr. W David Wright

In the May/June 1996 edition of Inter-Society Color Council *News* you carried an article, about, and by, my father Dr. D.W. Wright. His 90th birthday falls on 6 July this year and he was delighted to read the article and to have confirmation that his work 65 years ago is still valued.

For the record, and in case it is of interest to other readers of *News*, may I bring you up to date on his personal details? His wife, Dorothy,- my mother - died in 1990 but for the next 5 years he continued to take an active interest in all aspects of colour science. Then last year my elder brother, David, died of cancer and this devastating blow compounded the effects of age and made it difficult for my father to handle his own affairs. He now lives in a retirement home near Guilford and enjoys frequent contact with members of his family and former colleagues. In particular he is looking forward to a one day conference on "Colour Vision Mechanisms", and dinner on 2 October at Imperial College being organised by Professors John Barbur and Keith Ruddock to mark his 90th birthday.

My father has moved from Pilgrim Wood. Would you please send copies of the *News* to the address at the head of this letter I will also put this address on the Membership Application form when I send his subscription.

Yours sincerely,

Stephen Wright (signed)
Dr. S.J. Wright

RIT MUNSELL COLOR SCIENCE LABORATORY EXPANSION

The demand for color science graduates, color science research, and industrial education in color technology continues to increase. Rochester Institute of Technology's Munsell Color Science Laboratory ended its first year, 1984, with two faculty (Franc Grum and myself) one secretary, and two students. At the close of the 1995 academic year, there are still two faculty (Mark Fairchild and myself). However, we have three staff, three visiting scientists, six full-time graduate students, thirteen part time graduate students, two seniors, and four new students on the way beginning this fall. In addition, our research funding has increased ten fold during our first decade.

In order to maintain quality and plan for the future, we have made several administrative changes and increased the number of faculty associated with the Laboratory. As the Richard S. Hunter Professor, it has been my responsibility to educate students and industrial technologists, mentor graduate students, engage in applied and explorative research, coordinate the Master's degree in color science, and direct the Munsell Science Laboratory. As we have expanded, it has become exceedingly difficult to carry out all of these tasks effectively. Fortunately, Mark Fairchild has come to my rescue on an as needed basis. Clearly, a more permanent solution is required. Accordingly, I have appointed Dr. Mark Fairchild as the Director of the Munsell Color Science Laboratory. This appointment takes effect on July 1, 1996.

As director, Dr. Fairchild's primary responsibilities will consist of managing our research efforts, supervising staff, managing various budget centers, and overseeing the health of the Laboratory. He will be aided by Colleen Desimone, our administrative assistant, Lisa Reniff,

staff scientist with responsibilities to maintain our facilities, and a computer programmer to be hired. Mark will also maintain his individual research and teaching responsibilities. With this change, I will have more time to expand my research interests in multi-spectral color reproduction and engage in more color outreach activities as the Hunter Professor. My other responsibilities will remain unchanged.

In order to enhance our research capabilities, we will be adding three faculty to the Laboratory. The first is Dr. Jonathan Arney, Associate Professor within the Center for Imaging Science. Dr. Arney's research interests include optical properties of paper, microstructure of halftone images, image enhancement and restoration, and color reproduction. He teaches courses in image analysis and color reproduction in the Imaging Science curriculum. The second is Dr. Ethan Montag, Research Assistant Professor. Dr. Montag is completing a two-year postdoctoral position with the Laboratory and has been recently promoted. His research interests include color vision, color gamut mapping, color appearance, and industrial color tolerance psychophysics. Montag will also teach courses in the Color Science master's curriculum. The third faculty member will be hired during the 1996 academic year filling the newly established Xerox Professorship in Color Imaging Systems.

It is our expectation that these administrative and personnel changes will have very positive benefits to the Laboratory's stated objectives of providing education in color and appearance, maintaining a state-of-the-art facility for spectral, colorimetric, and geometric measurements, and effectively interacting with industry.

Roy S. Berns
Richard S. Hunter Professor in Color Science, Appearance and Technology
Director, Munsell Color Science Laboratory
May 28, 1996

NEWS FROM MEMBER BODIES

COLOR AND APPEARANCE DIVISION (CAD) SOCIETY OF PLASIC ENGINEERRS

The CAD had very successful RETEC in September 95 at WILD Dunes in Charleston, SC. Over 500 attendees were present for the two day meeting where the following papers were presented:

Toxic Use Reduction Approach to Formulation
Robert Swain, Chroma
Improved Performance of Enhanced Ultramarines in Colour Concentrate Production
Dr. Christian Duhayon, Holliday Pigments
Heat Stability Testing of Organic Pigments
Mark Freshwater and Heiiner Ohleier, Hoechst
Dispersive and Distributive Mixing for Carbon Blacks in Polymers
M.C.Yu, Cabot
A Unique, Highly Transparent, Yellow Pigment for Polyolefin Fibers
Roger Reinicker, Ciba
An Anthology of Color Measurement Error Mechanisms
David L. Spooner, rhoMetric Associates
Heavy Metal Free Color Concentrates for Engineering Resins
Harnish S. Jani, Plastics Color-Chip
A Journey Through FDA Requirements for Polymer Colorants
Donna Jackson, Eastman Chemical Company
Advances in Equipment Design for Color Compounding
David Kapper, Kobellco Stewart Bolling
Improving Colour Control in Automotive PVC
Don Nickell, Canadian General
A Complete Solution for Computer Color Formulation
David Mowery, MacBeth
Dyes for Performance Applications
Wolfgang Karnath, Bayer
Rapid Evaluation of Pigment Color
Dr. Frederick Simon, FTS, Inc.
Effect of Optical Brighteners on Polymer Color Properties
Daniel Jervis, Eastman Chemical Company
Efficiently Blending Colorants/Additives
Gary R. Hovis, Conair
Colorant Selection Criteria for New Product Development
Bruce Greer, Harwick Chemical
In Search of the Perfect Color
Denise Holl, Ampacet Corporation
Fluorescent Colorants for Special Plastics Applications
Dr. Romesh Kumar, Hoechst Celanese
Embracing the Challenges of the Future at Ciba Pigments
Eric Gubler, Ciba

(Continued→)

Development of Cerium Red Pigment: An Alternative to Heavy Metals
Joseph Golowski, Rhone-Poulenc
TiO2 in High Temperature Film Applications - How to Control the Lacing Mechanism
Holly Hanson, SCM
New Ultramarine Pigments Line
Jose Mas, Nubiola SA
Weathering of Black, Thin-Gauge Polyethylene Films
Drs. Prakash Patel and Rodney Taylor, Ampacet/Columbia Chemicals
Hindered Amines Effects on Dispersion
Steven Goldstein, BASF

The conference was dedicated to the memory of John "Jack" Graff, Jr., who passed away recently. Jack had participated in every aspect of CAD and will be missed by all his friends. His family was present for a luncheon presentation.

New officers for 1996 are as follows:

Chairman	George Rangos	Cerdec Corp.
Chairman-Elect	Gary Beebe	AtoHass America's
Treasurer	Terry Golding	Reed Spectrum
Secretary	Aram Terzian	EM Industries, Inc.
Technical Program Chair	Austin Reed	DuPont

The 1997 RETEC will be in St.Louis on 9/30/96 - 10/2/96. The theme will be "Promoting the Science of Coloring Plastics". The site will be the Hyatt Regency . Contact Jim Fischer (314-523-4350 or Rick Addis (216-929-4213).

The CAD continued its support of educational endeavors contributing $20,000.00 to Terra Community College for their coloring of Plastics Program in 1995. Also $7,500.00 was paid to the RIT Consortium on color difference.

Gary Beebe

AATCC INTERNATIONAL CONFERENCE AND EXHIBIT

AATCC International Conference and Exhibition will be held Sept. 15-18, 1996 in Nashville, TN. There will be 17 technical sessions featuring over 70 formal presentations along with a poster session consisting of over 30 posters which will be available for viewing Monday 3-5 PM and Tuesday 9-5 PM.

A popular feature of AATCC conferences since 1940, the Intersectional Technical Paper Competition provides local sections the opportunity to contribute original research findings. Papers are judged on originality, scientific value and presentation. Result of the competition is announced at the Awards Luncheon at noon on Monday. Herman and Myrtle Goldstein student paper competition is conducted under the auspices of AATCC's Textile Education Committee. Rules are similar to Intersectional Technical Paper Competition and the result of this competition is also announced at the Awards Luncheon.

Among the 17 technical sessions one is always reserved to color science. This year the Color Science session will be on Tuesday, Sept. 17, 9:00 AM to noon. The following papers will be given.

- *The Demise of CWF-An Opportunity for an Improved Standard Illuminant;* Mr. Keith D. Hoover, Polo/Ralph Lauren R&D Center.
- *Changes in Cool White Fluorescent Illumination and Their Effects on Visual and Instrumental Evaluation of Textile Products;* Mr. Nick Lena, Macbeth Division of Kollmorgen
- *Application of Digital Signal Processing, Fuzzy Logic and Neural Nets to Computational Color;* Dr. H. Joel Trussel, North Carolina State University.
- *Light Sources and Illuminants-How Do You Get There From Here?* Dr. Danny C. Rich, Datacolor International.

The Welcoming Reception from 6 p.m. to 8 p.m. on Sunday, Sept. 15, will be held in Ryman Exhibit Hall 1. The traditional Dinner Party will be on Tuesday at 7:30 PM. An after dinner show beginning at 9 PM will feature Crystal Gayle, a country music singer with almost three dozen hit records to her credit.

Exhibits will be located in Ryman Exhibit Hall 1. A broad range of machinery, equipment, dyes and chemicals for the wet processing industry will be on display throughout the conference.

The Awards Luncheon at noon on Monday Sept. 16 will feature the presentation of The Olney Medal for outstanding achievement in textile chemistry, The Harold C. Chapin Award for service to AATCC and The Henry E. Millson Award for invention The results of the Intersectional and Student Paper Competitions also will be announced and prizes awarded.

Each registrant will receive a copy of the official book of papers. Full registration for the conference for AATCC or Canadian ATCC Members is $175 and $230 for non-members. Student registration is $25. Spouse program is by pre-registration only at a cost of $100.00 per person. Interesting special events are planned for the spouses such as Horticulture and Self-Awareness Seminars and visit to Belle Meade pre-Civil War mansion of what was once a 5300-acre plantation, and Cheekwood, one of the South's most beautiful private estates.

Report On Activities of AATCC RA36 Color Measurement Committee

Research Committee RA36 on Color Measurement met Thursday, May 9 at the Marriott Inner Harbor in Baltimore, MD. Several items of business were discussed, including the publication of an updated, second edition of *Color Technology in the Textile Industry* . The first edition is out of print and from the contents of the book, the second edition will also be a good one! A training video for visual color evaluation methods is being prepared. TCR (technical committee on research) and committee letter ballots on several methods are due for review. Test Method 173 on *CMC: Calculation of Small Color Differences for Acceptability* is due for updating and addition of precision and bias statements based on round-robin trials. RA36 committee members were advised of upcoming meetings relating to color measurement. Discussion of the need for tabulating new non-CIE lamps intended for retail settings was continued and members were encouraged to attend the ICE in September, in Nashville. Persons interested in considering a test method for determining the sun protection provided by textiles were invited to an organizational meeting to follow.

Ann C. Laidlaw
Chair-person of RA36

AATCC Workshop
Introduction to Textile Testing - August 22-23, 1996
University of Rhode Island,
Kingston, RI

Rhode Island will be the site for a training program on the fundamentals of textile testing. The program will consist of demonstrations and discussions of approximately 30 AATCC procedures for evaluating colorfastness and physical properties. The colorfastness tests which will be discussed include crocking, light, washing and perspiration. Tests for evaluating physical properties include dimensional change, skewness, barré, soil release, water repellency and resistance, appearance retention and wrinkle recovery. Emphasis will be placed on how to properly conduct and interpret the tests. Registrants will be involved in hands on participation. Sessions will also be conducted on basic color theory and fiber identification. Participants will be shown how to use the AATCC Gray Scales for Staining and Color Change, the AATCC Chromatic Transference Scale and the Xenon Reference Fabric. This workshop is an intensive overview of the majority of tests needed to operate a textile Laboratory. It is designed for those responsible for product evaluation, specifications, and quality control of fibers, yarns, fabrics, garments and carpets.

The registration fee is $560 for nonmembers and $495 for individual and corporate members of AATCC and includes luncheons, breaks, and a copy of the 1996 *AATCC Technical Manual.*

Overnight accommodations are available at the Holiday Inn, Junction 1 & 138 West, Saunderstown, RI 02874, TEL: 401/789-1051. Reservations should be made directly with the hotel and attendance at the AATCC workshop should be specified to receive the group rate.

To register or for further information, please contact Peggy J. Pickett, P.O. Box 12215, Research Triangle Park,. NC 27709-2215, TEL: 919/549-8141, FAX: 919/549-8933.

Peggy Pickett

HUMAN FACTORS AND ERGONOMICS SOCIETY

SANTA MONICA, CA - HFES announces the Society's 40th Annual Meeting to take place September 2-6, 1996, at the Philadelphia Marriott Hotel in Philadelphia, Pennsylvania.

Fourteen hands-on workshops are geared toward professionals at all levels. Topics include human factors/ ergonomics approaches to accident investigation, usability evaluation, anthropometry (human body measurement), design for all ages and capabilities, and design and use of questionnaires.

More than 80 lecture, panel, symposium, poster, and demo sessions will also be offered. Technical program highlights include the following (dates and times are tentative):

"Implementing the ANSI S365 Standard for Control of Work-Related Cumulative Trauma Disorders" (Friday, 10:30 a.m.)

"Psychosocial Considerations in Upper Extremity Musculoskeletal Disorders" (Tursday 3:30 p.m.)

"Global Planning for Ergonomics and Human Factors" (Thursday 8:30 a.m.)

"New Methods for Modeling Human-Machine Interaction" (Wednesday 8:30 a.m.)

"Organizational Bridges from Research to Practice: Cases in Medical Practice" (Wednesday 8:30 a.m.)

"The Pathology of Everyday Things" (Wednesday 1:30 a.m.)

"Bridging the Research/Practice Gap" Thursday 10:30 a.m.)

(Continued→)

"Review of HFES/ANSI 200 Software Ergonomics Standard Content, Status, and Issues" (Tuesday 1:30 p.m.)

Tours of local technical facilities include the Three Mile Island nuclear power Plant and Harley-Davidson's assembly facilities and museum.

Nonmembers are welcome. To obtain the registration and preliminary program materials, which include details about reserving travel and accomodations, contact HFES via the World Wide Web at http://www.hfes.vt.edu/hfes/ or at P.O. Box 1369, Santa Monica, CA 90406-1369 USA; 310/394-1811, fax 310/394-2410.

HFES is a multidisciplinary professional organization of more than 5100 persons in the United States and throughout the world.

Members include psychologists, engineers, designers, and scientists, all of whom have a common interest in designing systems, tools, consumer products, and equipment to be safe and effective for the people who operate and maintain them.

HFES

SECOND INTERNATIONAL DISPLAY PHOSPHORS CONFERENCE CALL FOR PAPERS

The Call for Papers for the Second International Conference on the Science and Technology of Display Phosphors, mailed to 12,500 display, materials, and phosphors professionals on March 15, reveals a rapidly maturing and remarkably successful technical conference. The conference - to be held November 18-20 at the Hyatt Islandia Hotel, 1441 Quivira Road, San Diego, CA - is sponsored by the Phosphor Technology Center of Excellence (PTCOE) headquartered at the Georgia Institute of Technology, the U.S. Defense Advanced Research Projects Agency (DARPA), and the Society for Information Display (SID). The first Phosphor Conference, held last November in San Diego, surprised its organizers by drawing almost 200 people, nearly half of them from outside North America.

"Phosphors are the materials that convert the energy of electrons or ultraviolet radiation to visible light," said Christopher Summers, Director of the Phosphor Technology Center of Excellence at Georgia Institute of Technology and chair of the conference's program committee. "Phosphor R&D is accelerating all over the world because several display technologies will rise or fall depending on the availability of appropriate phosphors. For example, whether field-emission displays will have the lifetime of LCDs, and whether they will allow the batteries in laptop computers to last as long as with LCDs, will depend on the development of appropriate phosphor. The payoff for this research is therefore very large," he said.

Papers are requested in the following areas:

- Phosphor growth and synthesis
- Physics and Chemistry
- Screening, including the chemistry of coatings and screening technology
- Device technologies - including electroluminescence, field emission displays and cathode-ray tubes and photoluminescence

Investigators wishing to present papers at the Second Phosphor Conference should submit their abstracts prior to June 24 to Jay Morreale, Palisades Institute for Research Services, Suite 1006, 201 Varick Street, New York, NY 10014.

Tel: (212) 620-3371
Fax: (212) 620-3379

Karen Braun

THE COLOR ASSOCIATION OF THE UNITED STATES

Color comes in various forms, many of which are living. On a rainy and cold Easter Sunday this year, a brightly colored betta fish arrived at my apartment. Colored neon blue and deep maroon, he came housed in a 1950's Coca Cola syrup dispenser. We named him Basil, and gave him a visibility prominent location on the dining room table. There we can see him constantly as he circles around his green plant and dives down disappearing against the near-matching electric blue pebbles - a living tribute to how delightful color can be.

He has changed my perception about color in my life. I who love white walls, white sheets, white towels, curtains and blinds, and chrome kettles *sans* high-tech primary accent, now see differently. I've brought out an array of brightly colored Harlequin bowls and cloth napkins to complement Basil's saturated hues. Recently at my health club, I spotted a neon orange swimsuit, and thought "Why not for me?" Yes, I could liven up my lap-swimming pool navy suit with a splash of color. And why not bring out my anthurian red Hawaiinan shirt too. Thanks Basil.

Margaret Walch, CAUS Associate Director

Women's Forecasting Notes: CAUS Women's Forecast for Spring/Summer 1998 celebrates the instinctual experience. The Forecast's six groupings are based on light themes: 1. Aurora Borealis, with dreamy tonal purplish hues mimicking the extreme northerly and southerly latitute lights;2. Summer Sunset, with orange reddish hues; 3. Cool Reflections, which includes a bluish white, aqua blue and deep navy; 4. Spring Dawn, which

takes a fresh look at the lightness of yellow and green tones; 5 and 6. Shadows and Penumbra, two columns playing upon tonal brown and bluish tones respectively. The absence of a single defining color or bright hues is significant, indicating a low-impact sensibility where gentility prevails.

Members of the Women's Committee: Barbara Arlen, *Barbara Arlen Assoc.*; Eleanor Douglas, Eleanor *Douglas Analyst*; Roseann Forde, *DuPont*; Sally Jenkyn Jones, *Forstmann*; Deanna Littell, *Kaspar Inc.*;Elaine Monroe, *Elaine Monroe Assoc*; Mary Beth Moore, *Langenthal Corp*; June Roche, *Milliken*; Monika Tilley, *Tilley Ltd.*; and Carol Zimmerman,*Merkley Newman Harty.*

Men's Forecasting Notes: The color groupings for CAUS Men's Spring/ Summer 1998 take their names from leading global textile centers, a reflection of the functionality in male's dress. Elegant casual clothing creates the standard from which business, weekend and formal wear will evolve; difference between the categories is minimal -a sign of the simplification of dress. The Committee foresees color selection to be a vital component of men's fashion as color choice will be used to interest the consumer and inspire style variation.

Color will find presence in the unexpected. Silk-tie Red, which introduces the Forecast in Column I (Como) evokes the surge of energy which color provides. The redding of tans and taupes offers further variation within this range that can adapt to all areas of life.

The continued interest in various greens, as shown in Column II (Manchester) responds to the color's natural assurance and its style versatility.

Column III (Bonwire) illustrates the importance of golden ochers. An easy complement to denim, the sun-bleached feel offers a sophisticated option within a familiar dress mood. The lightness in color provides a sensitive break from the more serious shades of green and brown which are currently enjoying popularity. A column of cool and elegant blues called Carolina conveys the continued comfort of casual denim colors. Consumers may not seek to stray from the easy dressing that has swept the market, therefore slight variations in blue will provide subtle choices within the realm of denim wear.

Column V (Osaka) offers a cleansing freshness of tonal whites coupled with grays that can translate into sporty and elegant stories, simultaneously or independantly. Worn in multi-layered shirting, the fluid elegance of white on white illustrates the sense of pureness and ease that will attract the male consumer.

In a time when a casual mood has inspired the dress of the American male at work and at weekend dinner parties, color will evolve in sync with the functionality of dress. Color will offer subtle changes to engage the consumer and convey nuances of style without compromising the continued demand for easy dressing.

Members of the Men's Committee : Matthew Batanian, Mary Fulton, *Burlington Klopman;* Jo-Ann Goldberg, *REH&H*; Ben Gomes, *CFS Trends;* Elaine Gross, *EGI;* Michael Levine, *Burlington Industries;* Jamie McFate, *Structure;* John Forster-Moore, *I. C. Isaacs Co.*; Art Okun, *Dan River Mills;* James Siewert, *Hoechst Celanese.*

Tea-Colored Hair

"... to be young in Japan these days, at least young at heart, is to dye one's hair brown - or, as it is called in Japan, *chapatsu*, or tea hair. Of course, there are youthful black heads left in Japan, but those people might as well wear white socks and crew cuts and signs saying, "Kick me."

"Young people say that brown hair promotes an image of casualness and informality, while black hair conveys seriousness. Both men and women said that as a result, there is a tendency to look for brown-haired dates but black-haired spouses."

Nicholas D. Kristof, "Young Japan is Dyeing (It's Anything but Natural)." The New York Times. April 29, 1964.

RISD: Art School Attire

I started my serious formal education at the Rhode Island School of Design as a graphic designer. As a student all I saw my sophomore year was black and white. I switched my major to textiles my junior year. The feedback I received within the department was that I needed to push colors. Quite honestly it was hard. I am of a generation that has embraced the gray scale as standard attire. White to Black and everything in between, has structured expressions of sophistication or moods of the tortured artist. Only in the last two years in textiles have I enlarged my spectrum of colors to include yellows, brighter blues, greens, reds and other colors. I have begun to see a shift with other people of my age as well. My new view of color has given me a more positive outlook on life. I realize the full implications of what color can do, and that colors can make all the difference in our lives.

Wook Kim, CAUS summer intern and RISD Graduate '96

Exhibitions

At The Museum at F.I.T., June 17 through July 31, "Design 21: Fashion for the 21st Century," there will be an exhibition of fashion by 50 students from around the world who have designed clothing reflecting their cultural heritage. F.I.T.'s winner, Mimi Wong, who was born in China and grew up on Long Island, features a long coat made from recycled cotton rag rug with Snapple bottle top closures.

At the Museum of Modern Art, through September 3,"From Bauhaus to Pop: Masterworks by Phillip Johnson."

Reminder: Presentation on Interiors Color Forecast 1998/1999: Thursday, August 22, 12-1 pm, CAUS Office. Clippings available.

The Color Association of the United States
409 West 44th Street
NY, NY 10036

COLOR MARKETING GROUP ELECTS NEW PRESIDENT

Melanie C. Wood, CMG President 1997-1998

Alexandria, VA - The Board of Directors of Color Marketing Group (CMG), The Association for International Color Directions™, has selected a new president for calender years 1997-98. President , **Melanie C. Wood, CMG***, Mannington Mills, Inc., Salem, NJ, will begin her term of office on January 1, 1997. As president, she will be responsible for planning and implementing programs that deliver value, benefit and services to CMG's members.

A member of Color Marketing Group since 1978, Ms. Wood is currently Vice President, Strategic Planning and serves as a member of CMG's Executive Committee and the Board of Directors. She has also served CMG as Chairman of the Program Planning Committee and the Education Saturday Committee, both of which are vital to the planning and implementation of CMG's semi-annual conference.

Melanie Wood is Corporate Vice-President, Design, for Mannington Mills. She has been with the company for 12 years and currently oversees design directions of four divisions of Mannington: Mannington Resilient Floors, Mannington Carpets, Inc., Porcelanite/Mannington Ceramic Tile and Mannington Wood Floors. Ms. Wood is widely recognized as a color and design professional who travels and speaks extensively on these subjects.

Jennifer Freedman
703/ 329-8500

FEDERATION OF SOCIETIES FOR COATING TECHNOLOGY

Dr. David R. Bauer, Senior staff Technical Specialist in the Manufacturing Systems Dept. Of the Ford Research Laboratory, in Dearborn, MI will present the Joseph J. Mattiello Memorial Lecture during the 73rd Annual Meeting of the Federation. The Annual Meeting will be held at the McCormick Center North in Chicago, IL, from Oct 23-25. Dr. Bauer's lecture will be given on Friday, Oct. 25.

The lecture commemorates the contributions of Dr. Mattiello, former President of FSCT (1943-1944). Dr. Mattielo was instrumental in expanding the application of the sciences in the decorative and protective coatings fields. He was Vice President and Technical Director of Hilo Varnish Corp., Brooklyn, NY, when he died in 1948.

The lecturer, chosen from among those who have made outstanding contributions to science, is selected to present a paper on a phase of chemistry, engineering, human relationships or other sciences fundamental to paint, varnish, lacquer, or related protective or decorative coatings.

Dr. Bauer joined the Ford Motor Company in 1977 as a member of Polymer Science Dept. To work on high solids coatings. Previously he was a Post-Doc. in the Chemistry Dept. of the University of Illinois. He received a BS in Chemistry from California Institute of Technology in 1971 and a PhD in Chemical Physics from Stanford University in 1975. He currently directs long-term research in the area of paint application, characterization, and evaluation.

Dr. Bauer is the author of over 90 papers in the area of paint and plastics research. He has made over 80 presentations on the work in these areas. He has carried out research in the areas of cure and network structure in high solids coatings, flow control and coating rheology, polymer photodegradation and stabilization, plastics characterization and recycling, and coating service life prediction.

Dr. Bauer is on the review board of the JOURNAL OF COATINGS TECHNOLOGY and *Polymer Degradation and Stability*. He is active in the American Chemical Society and has served as Chairman of the Polymeric Materials Science and Engineering. He is also a member of Sigma Xi (past chair of the Ford Chapter) and the Society of Plastics Engineers. He has been an organizer and chair of symposia at ACS National Meetings.

Dr. Bauer's Mattiello Lecture will describe recent work in the area of prediction of coating service life.

FSCT Annual Meeting

The theme for this year's Annual Meeting technical program is "Innovation and Insight." The technical program will include:

- *Roon Competition Papers* - detailing original research presented for the first time;
- *APJ/Voss Award Competition Papers*- a selection of FSCT Constituent Society papers developed by the Society's technical committees;
- *International Papers* - consisting of the latest advances in coatings development contributed by professionals from around the world;
- *Technical Focus Lecturer* - presented by an individual honored for

on-going work in critical technical areas.

The Annual Meeting will be presented in conjuction with the FSCT International Coatings Expo and the newly offered Coatings Technology Conference, October 22-24.

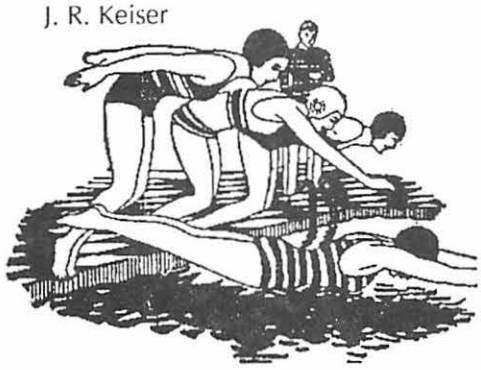
Federation of Societies for Coatings Technology
492 Norristown Rd., Blue Bell, PA 19422-0292
TEL: 610/940-0777
FAX: 610/940-0292

DETROIT COLOUR COUNCIL

The May meeting of the DCC was held at the Hyatt Regency-Dearborn. Ms Kyoko Monden , a Ford color and Trim designer, presented a very informative and interesting talk, entitled "COLOR IN THE PEOPLES REPUBLIC OF CHINA." Her colorful slide presentation not only covered the Shanghai Auto Show, but also dealt with the cultural differences and issues involving color in China. Her candid photographs of scenes throughout the different provinces gave the audience a better understanding on how color is used and, more important, which colors are "good" and which are "bad."

September 10, 1996 Meeting
"The 10 Year Car - Performance of Colored Materials"
MSU Management Education Center
Troy, MI
Contact: **Jim Keiser**
810/583-8345

J. R. Keiser



AIC COLOR 97 KYOTO THE 8TH CONGRESS OF THE INTERNATIONAL COLOUR ASSOCIATION

Dear Colleagues, On behalf of the Organization Committee, it is our great pleasure to invite you to the 8th AIC Color Congress to be held from May 25 to 30, 1997, in Kyoto, Japan. We believe the Congress will provide an ideal opportunity for the lively exchange of information and knowledge on various aspects of color between the participants. There will also be ample opportunities to enjoy traditional Japanese culture in the ancient capital, Kyoto. We trust that your stay in Japan will be most enjoyable. We look forward to seeing you in Kyoto.

Yoshinobu Nayatani (Signed)
Professor
Osaka Electro-Communication University
Chairperson, Organizing Committee

For further information contact Ms Paula Alessi at Eastman Kodak Co.
TEL: 716/477-7673
FAX: 716/722-1116
E-mail: pjalessi@kodak.com
(There will be more information about AIC in the next ISCC *NEWS* .)

BOOK REVIEW

During the Annual Meeting in Orlando, FL two books on Color came to my attention that are worth reviewing. One of the books was an ASTM E-12 Sponsored book,"ASTM Standards on Color and Appearance Measurement" 5th Edition, 1995, xx+692 pages, $99 List; $89 ASTM members. This edition continues the series as originally conceived by Richard S. Hunter former Chairman of the Committee E-12.

This is a must book for anyone who is serious about color, color measurements and specifications. This new edition contains many of the latest ASTM standards as well as ISO and ISO/CIE standards for a variety of materials and products such as acoustical materials, petroleum products, paints, plastics, traffic marking materials and pavement surfaces. There are 22 ASTM standards that have been revised from the last edition.The following is a list of test methods that are new (•) or revised (†) standards

TEST METHODS

D156† Saybolt Color of Petroleum Products (Saybolt Chromometer Method)

D589• Opacity of Paper

D1003† Haze and Luminous Transmittance of Transparent Plastics

D1535† Specifying Color by the Munsell System

D1746• Transparency of Plastic Sheeting

D1889† Turbidity of Water

D2616† Evaluation of Visual Color Difference with a Gray Scale

D2805† Hiding Power of Paints by Reflectometry

D4061† Retroreflectance of Horizontal Coatings

D5326† Color Development in Tinted Latex Paints

E810† Coefficient of Retroreflection of Retroreflective Sheeting

E1477• Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers

E1651 • Total Luminous Reflectance Factor by Use of 30/T Integrating Sphere Geometry

E1696• Field Measurement of Raised Retroreflective Pavement Markers Using a Portable Retroreflectometer

E1709•Measurement of Retroreflective Signs Using a Portable Retroreflectometer

E1710•Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer

F1048• Measuring the Effective Surface Roughness of Optical Components by Total Integrated Scattering

PRACTICES

E275† Describing and Measuring Performance of Ultraviolet, Visible, and Near Infrared Spectrophotometers

E308† Computing the Colors of Objects by Using the CIE System

E691• Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E805† Identification of Instrumental Methods of Color or Color-Difference Measurement of Materials

E808† Describing Retroreflection

E809† Measuring Photometric Characteristics of Retroreflectors

E811† Measuring Colorimetric Characteristics of Retroreflectors Under Nighttime Conditions

E1164† Obtaining Spectrophotometric Data for Object-Color Evaluation

E1478 • Visual Color Evaluation of Transparent Sheet Materials

E1541• Specifying and Matching Color Using the Colorcurve System

E1708• Electronic Interchange of Color and Appearance Data

SPECIFICATIONS

D3208† Manifold Papers for Permanent Record

D4280† Extended Life-Type, Nonplowable, Prismatic, Raised, Retroreflective Pavement Markers

D4383† Plowable, Raised, Retroreflective Pavement Markers

D4956† Retroreflective Sheeting for Traffic Control

GUIDES

D5531• Preparation, Maintenance and Distribution of Physical Product Standards for Color and Geometric Appearance of Coatings

E1499• Selection, Evaluation, and Training of Observers

E1682• Modeling the Colorimetric Properties of a Visual Display Unit

F923† Properties of High Visibility Material Used to Improve Individual Safety

TERMINOLOGY

E253•Sensory Evaluation of Materials and Products

E284• Appearance

• New to this edition
† Revised

For a person who is familiar with the older edition of ASTM Standards on Color and Appearance it needs no introduction. For someone new in the field of color, the information one can obtain from the revised edition is tremendous. Everything one wants to know about color seems to be collected in one volume. I highly recommend this volume. As they say in some quarters, "I would take this book with me to a desert island!"

For further information or to order-write:

ASTM Customer Service
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959

The second book that was brought to my attention was **"PRACTICAL COLOR MEASUREMENT"** by Anni Bergen-Schunn. Probably most of you know her name by her publication in the *Bayer Farben Revue*, "Color Measurement in the Textile Industry," with Dr. Andreas Brockes and Dr. Dietrich Strocka. This is probably one of the most widely read texts of its class in the world. When I presented color workshops or discussed color measurements with my students at the Philadelphia Textile College, I always looked forward to receiving those booklets to distribute them to my students. As everyone knows, things change and those booklets are no longer available. However, Dr. Anni Berger-Schunn has written a book called Practical Color Measurements. With the assistance of another color expert, Max Saltzman, the book was translated from German to English.

For those of you who are not familiar with Anni Berger, let me explain, Dr. Anni Berger-Schunn is former Chief of Quality Control of the dyestuff and pigments division of Bayer AG in Leverkusen,Germany. She is a member of the Deutche farbwissenschaftliche Gesellschaft, the Gesellschaft für angewandte Optik and the Inter-Society Color Council.

Practical Color Measurement tells you everything one needs to know about the principles and limitations of computerized color measurement. There are a number of real life examples based on the practical knowledge that was gained by Anni Berger-Schunn through many years of experience.

Names of some of the chapters in the book are: Description of Perceived Colors with the Aid of Numbers, Calculation of Color Difference, Metamerism, Color Measurement Systems, Measurement of Fluorescent Samples and Whiteness, Correlation between Reflectance (Transmittance) and Colorant Concentration, Examination of Colorant Strength and Computer Color Matching, Influence of the Sample on the Accuracy of Color Measurements, Symbols and Terms, Formulas, Bibliography.

This book contains an abundance of information within its 175 pages. This is a different book than the first one I reviewed. It addresses itself to different people - it is a primer for the beginner and a reminder for the expert. I highly recommend this book. The book is a Volume in the Wiley Series in Pure and Applied Optics. It was published in

1994 and sells for $54.95.

This book can be ordered from:
John Wiley & Sons, Inc.
Attn: E. Covington
605 Third Avenue
New York, NY 10158-0012

To order by phone call toll free: **1-800/US-WILEY (1-800/879-4539)**

Gultekin Celikiz
Editor ISCC news

MEMBERSHIP APPLICATION CONFUSION

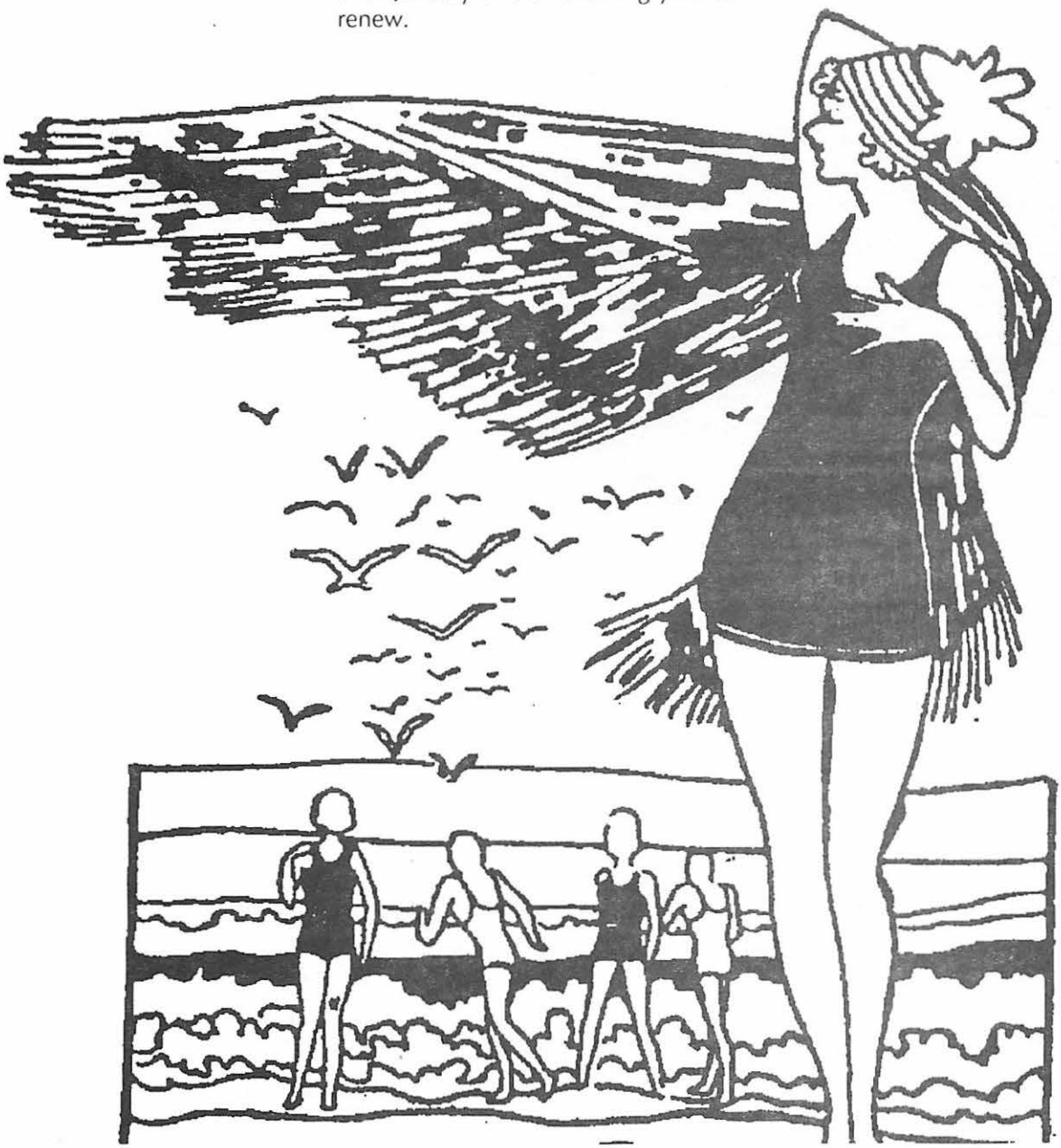
It seems that the "Membership Application" that we have been inserting into the *NEWSLETTER* caused some confusion. Inquires have been made to ISCC office regarding membership renewal as result of this insertion. Members receive their renewal application according to calender year, e.g. November and have until January of the following year to renew.

We apologize for any confusion we may have caused. However, do not let that "Membership Application" go to waste; give it to someone, to a friend who is not a member of ISCC.

ISCC OFFICE

Ms. Cynthia Struck, the new ISCC office manager will be in the office from 9:00am - 12:00 noon, Monday through Friday.

She can be reached at:
Phone:(703)318-0263
Fax:(703)318-0514



PLEASE NOTE THAT THE ISCC OFFICE WILL BE CLOSED THE WEEK OF AUGUST 5, 1996.

GENTLE REMINDER!

All appropriate information submitted to this NEWS publication is the full and complete responsibility of the sender.

This publication and the ISCC assumes no responsibility for information changes and inaccuracies.

Thanks,
The Editor

CALENDAR

Please send information on Member Body and other organization meetings involving color and appearance functions with dates, places, and information source to:

Harry K. Hammond, III
or
John Peterson
BYK-Gardner, USA
2435 Linden Lane
Silver Spring, MD 20910
Phone: 301-495-7150
Fax: 301-585-4067

1996

IESNA ANNUAL CONFERENCE
Aug. 5 - 7
Renaissance Cleveland Hotel
Cleveland, OH
Information: IESNA Headquarters
Phone: (212) 248-5010

GATF COLOR MEASUREMENT WORKSHOP
Aug. 8 - 9
Graphic Arts Technical Foundation
4615 Forbes Ave
Pittsburgh, PA 15213
Information: Amy Mangis
Phone: (412) 621-6941
Fax: (412) 621-3049

AATCC CONFERENCE AND EXHIBITION
Sept. 15-18
American Association of Textile Chemists and Colorists
Opryland Hotel
Nashville, TN
Information: AATCC
Phone: (919) 549-8141

SPIE / IS&T
Sept. 24 - 26
Advanced Imaging Networks
Berlin, Germany
Information: IS&T Conference Manager
7003 Kilworth Lane
Springfield, VA 22151
Phone: (703) 642-9090
Fax: (703) 642-9094
email: info@imaging.org

JERMOV
Oct. 9 - 13
Joint European Reasearch Meetings in Ophthalmology and Vision
Montpellier, France
Information: Chairman Congres
43, Place Vauban
BP 9173
34042 MONTPELLIER
Cedex 1 (France)
Phone: +33 67 15 99 00
Fax: +33 67 15 99 09

IS&T / OSA
Oct. 20 - 25
Conference on Optics & Imaging in the Information Age
Rochester Riverside Convention Center
Rochester, NY
Information: IS&T Conference Manager
7003 Kilworth Lane
Springfield, VA 22151
Phone: (703) 642-9090
Fax: (703) 642-9094
email: info@imaging.org

IS&T 12th INTERNATIONAL CONGRESS
Oct. 27 - Nov. 1
Advances In Non-Impact Printing Technologies
Hyatt Regency San Antonio
San Antonio, TX
Information: IS&T Conference Manager
7003 Kilworth Lane
Springfield, VA 22151
Phone: (703) 642-9090
Fax: (703) 642-9094
email: info@imaging.org

CMG FALL CONFERENCE
Nov. 3 - 5
Color Marketing Group Conference
Sheraton Seattle Hotel & Towers
Seattle, WA
Information: Katie Register
Phone: (703) 329-8500
Fax: (703) 329-0155

AATCC NATIONAL COMMITTEES AND COUNCIL
Nov. 19 - 21
Reasearch Triangle Park, NC
AATCC information:
Phone: (919) 549-8141

IS&T / SID's FOURTH COLOR IMAGING CONFERENCE
Nov. 19 - 22
Color Science, Systems & Applications
Radisson Resort
Scottsdale, AZ
Information: IS&T Conference Manager
7003 Kilworth Lane
Springfield, VA 22151
Phone: (703) 642-9090
Fax: (703) 642-9094

ASTM COMMITTEE D-20 ON PLASTICS
Nov. 18 - 21
New Orleans, LA
Information: Mrs. Katherine Morgan
Phone: (610) 852-9500
Fax: (610) 832-9555

1997

ASTM COMMITTEE D-1 ON PAINT
Jan. 26 - 29
Fort Lauderdale, FL
Information: Scott Orthey
Phone: (610) 832-9717
Fax: (610) 832-9555

ASTM COMMITTEE E-12 ON APPEARANCE
Jan. 26 - 29
Fort Lauderdale,FL
Information: Bode Buckley
Phone: (610) 832-9740
Fax: (610) 832-9555

IS&T / SPIE
Feb. 9 - 14
Electronic Imaging Science and Technology
San Jose Convention Center
San Jose, CA
Information: IS&T Conference Manager
7003 Kilworth Lane
Springfield, VA 22151
Phone: (703) 642-9090
Fax: (703) 642-9094
email: info@imaging.org

TAGA ANNUAL CONFERENCE
May 4 - 7
Technical Association of the Graphic Arts Annual Technical Conference
Montreal or Quebec City, Canada
Information: Karen Lawrence
Phone: (716) 475-7470
SID '97
May 12 - 16
Boston, MA
Information: Lauren Kinsey, SID
1526 Brookhollow Drive, Suite 82
Santa Ana, CA 92705
Phone: (714) 545-1526
Fax: (714) 545-1547
email: socforinfodisplay@mcimail.com

IS&T 50th ANNUAL CONFERENCE
May 18 - 23
Hyatt Regency Cambridge Hotel
Cambridge, MA
Information: IS&T Conference Manager
7003 Kilworth Lane
Springfield, VA 22151
Phone: (703) 642-9090
Fax: (703) 642-9094
email: info@imaging.org

COLOUR '97
May 26 - 30
8th AIC Quadrennial Meeting
Colour '97 Executive Committee Meeting
May 25
Kyoto International Conference Hall (KICH)
Kyoto, Japan
For futher informationplease contact:
Ms Paula Alessi
Eastman Kodak Co.
Phone: (716) 477-7673
FAX (716) 722-1116
email: pjalessi@kodak.com

ISCC ANNUAL MEETING
Sep. 14 - 17
Inter-Society Color Council Annual Meeting with Color and Appearance Division of Society of Plastics Engineers
Marriot Inner Harbor Hotel
Baltimore, MD
Information: Gary Beebe
Phone: (215) 785-8497

AATCC CONFERENCE AND EXHIBITION
Sep. 28 - Oct. 1
American Association of Textile Chemists and Colorists
Marriot Marquis
Atlanta, GA
Information: AATCC
Phone: (919) 549-8141

OSA ANNUAL MEETING
Oct. 11-19
Optical Society of America
Long Beach Convention Center, Long Beach, CA
Information: OSA
Phone: (202) 223-0920
Fax: (202) 416-6100
email: mtg@osa.org

IS&T 13th INTERNATIONAL CONGRESS
Nov. 2 - 7
Advances In Non-Impact Printing Technologies
Sheraton Seattle Hotel
Seattle, WA
Information: IS&T Conference Manager
7003 Kilworth Lane
Springfield, VA 22151
Phone: (703) 642-9090
Fax: (703) 642-9094
email: info@imaging.org

IS&T / SID's FIFTH COLOR IMAGING CONFERENCE
Nov. 16 - 19
Transforms and Transportability of Color
Radisson Resort
Scottsdale, AZ
Information: IS&T Conference Manager
7003 Kilworth Lane
Springfield, VA 22151
Phone: (703) 642-9090
Fax: (703) 642-9094
email: info@imaging.org

1998

TAGA ANNUAL CONFERENCE
May 3 - 6
Technical Association of the Graphic Arts Annual Technical Conference
Chicago, IL
Information: Karen Lawrence
Phone: (716) 475-7470

SID '98
May 17 - 22
Anaheim, CA
Information: Lauren Kinsey, SID
1526 Brookhollow Drive, Suite 82
Santa Ana, CA 92705
Phone: (714) 545-1526
Fax: (714) 545-1547
email: socforinfodisplay@mcimail.com

ASTM COMMITTEE E-12 ON APPEARANCE
Jun. 16 - 18
Saint Louis, MO
Information: Bode Buckley
Phone: (610) 832-9740
Fax: (610) 832-9555

AATCC CONFERENCE AND EXHIBITION
Sept. 22-25
American Association of Textile Chemists and Colorists
Convention Center
Philadelphia, PA
Information: AATCC
Phone: (919) 549-8141

OSA ANNUAL MEETING
Oct. 3-9
Baltimore Convention Center
Baltimore, MD
Information: OSA
Phone: (202) 223-0920
Fax: (202) 416-6100
email: mtg@osa.org

1999

TAGA ANNUAL CONFERENCE
May 2 - 5
Technical Association of the Graphic Arts Annual Technical Conference
Philadelphia, PA
Information: Karen Lawrence
Phone: (716) 475-7470

SID '99
May
San Jose California
Information: Lauren Kinsey,SID
1526 Brookhollow Drive, Suite 82
Santa Ana, CA 92705
Phone: (714) 545-1526
Fax: (714) 545-1547
email: socforinfodisplay@mcimail.com

AATCC CONFERENCE AND EXHIBITION
Oct. 12 - 15
American Association of Textile Chemists and Colorists
Convention Center
Charlotte, NC
Information: AATCC
Phone: (919) 549-8141

2000

SID 2000
May
Toronto, Ontario
Canada
Information: Lauren Kinsey
SID
1526 Brookhollow Drive
Suite 82
Santa Ana, CA 92705
Phone: (714) 545-1526
Fax: (714) 545-1547
email: socforinfodisplay@mcimail.com

AATCC CONFERENCE AND EXHIBITION
Oct. 1-4
American Association of Textile Chemists and Colorists
Marriott World Center
Orlando, FL
Information: AATCC
Phone: (919) 549-8141

2001

AATCC CONFERENCE AND EXHIBITION
Oct. 7-10
American Association of Textile Chemists and Colorists
Sheraton Hotel
Boston, MA
Information: AATCC
Phone: (919) 549-8141

JOBS WANTED!

This Section is intended to help ISCC members that are in need of, and are looking for employment. Here is an opportunity to use the resources at hand.
There is no charge for this servce. However the restrictions are as follows:

1. This service is for ISCC members' use only.
2. No more than 50 words may be used to describe yourself.
   (Not including name address and/or telephone number).
3. If you are using a P.O. Box, you must supply a complete address.
4. No Agency representing member(s) is allowed.
5. Neither the ISCC *News* nor the editors are responsible for any errors.
6. You must advise us in writing when you have obtained employment.

We hope this new section will be of value to you, the ISCC member. If you have any suggestions/criticisms, please send them to the editor. Let's make this work!

ISCC NEWS EDITOR: Gultekin (Tek) Celikiz

Send photo material (black and white if possible) to:

Editor, ISCC News • Gultekin Celikiz •1309 Paper Mill Rd, Erdenheim, PA 19038-7025

Please send all other materials on diskette as follows to the above address:

MS DOS-ASCII, (3.5"- 1.44 Meg); MACINTOSH– (Most formats) (3.5"–1.44 Meg, 800K or 400K).

Phone: (215) 836-5729

If necessary, fax material to (215) 836-0448

E-mail: celikizg@hardy.texsci.edu

Please note: the deadline for submission of material is the 1st of each even numbered month. Material received after the 1st will not be printed until the following issue.

All submissions must be in English.

meeting reports

photos

contributions from members

OFFICERS 1994-1996

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President	Dr. Ellen C. Carter	2509 N. Utah Street, Arlington, VA 22207	ecarter@capaccess.org	(703) 527-6003	
Pres. Elect	Dr. Michael H. Brill	David Sarnoff Research Ctr, CN 5300, Princeton, NJ 08543	mbrill@sarnoff.com	(609) 734-3037	(609) 734-0245
Secretary	Dr. Danny C. Rich	Datacolor International, 5 Princess Rd., Lawrenceville, NJ 08648	73700.3514@compuserve.com	(609) 895-7427	(609) 895-7461
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Past-Pres.	Mr. Roland L. Connelly	SheLyn, Inc., 1108 Grecade Street, Greensboro, NC 27408	73041.2772@compuserve.com	(910) 274-1963	(910) 274-1971

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1994-1997				
Mr. Michael A. Hammel	3782 Bonny Rigg Trail Roswell, GA 30075	mahammel@ix.netcom.com	(770) 587-5120	(770) 587-5128
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1995-1998				
Ms. Cynthia A. Brewer	PSU Dept. of Geography, University Park, PA 16802	cbrewer@essc.psu.edu	(814) 865-5072	(814) 863-7943
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Prof. Wade Thompson	1910 East Cardinal St., Springfield, MO 65804		(417) 882-2553	(417) 883-5830
1996-1999				
Dr. Helen H. Epps	University of Georgia, 300 Dawson Hall, Athens GA 30602	hepps@hestia.fes.uga.edu	(706) 542-4913	(706) 542-4862
Mr. James R. Keiser	DuPont Automotive Products, Detroit Colour Council 945 Stephenson Hwy, Troy MI 48007-2802		(810)583-8345	(810) 583-8316
Mr. Jack Ladson	BYK-Gardner USA 2435 Linden La. Silver Spring, MD 20910	jladson@gatekeeper.bykgardnerusa.com	(301) 495-7647	(301)585-4067

ISCC MEMBER-BODIES

American Association of Textile Chemists and Colorists (AATCC)
American College of Prosthodontists (ACP)
American Society for Testing and Materials (ASTM)
American Society of Interior Designers (ASID)
American Society for Photogrammetry and Remote Sensing (ASPRS)
The Color Association of the United States, Inc. (CAUS)
Color Marketing Group (CMG)
Color Pigments Manufacturers Association (CPMA)
Detroit Colour Council (DCC)
Federation of Societies for Coatings Technology (FSCT)
Gemological Institute of America (GIA)
Graphic Arts Technical Foundation (GATF)
Human Factors & Ergonomics Society
Illuminating Engineering Society of North America (IESNA)
National Artists Equity Association (NAEA)
National Association of Printing Ink Manufacturers (NAPIM)
Optical Society of America (OSA)
Society for Information Display (SID)
Society of Plastics Engineers, Color & Appearance Division
Society for Imaging Science and Technology (IS&T)
Technical Association of the Graphic Arts (TAGA)
Technical Association of the Pulp and Paper Industry (TAPPI)

SUSTAINING MEMBERS

Pantone Color Institute
Color and Appearance Technology

BYK-Gardner
Labsphere