



Inter-Society Color Council News

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Nov/Dec 2006

President's Column

There is a lot to tell you about in this column: a new member body has joined the Council, a new feature debuts in this issue of the newsletter, the program for the February Special Topics meeting is now in place and a hotel has been chosen for next April's Annual Meeting in Kansas City. In addition, the Board met in early October for the Fall Board Meeting and a strategic planning session.

Let me start by telling you about the new member body. At their Steering Committee meeting on November 2, the ICC voted to join the Council. Founded in 1993, the ICC or International Color Consortium (www.color.org) has over 60 members, mostly companies plus some universities and industry organizations. Its purpose is "to promote the use and adoption of open, vendor-neutral, cross-platform color management systems." With the increasing prevalence of networked digital color, color management has been one of the most active areas in digital imaging over the last decade. We are delighted to have them as a member body and I expect you will hear more about the ICC in future issues.

Debuting in this issue of the newsletter is the feature "Hue Angles," edited by Mike Brill, who is with DataColor and a past President of the Council. The intent is to have this column appear regularly in the newsletter, mining the knowledge and lore stored up in the ISCC and highlighting an interesting fact about color. If



J.C. Nichols Fountain in Kansas City, located at the east entrance of the Plaza District, near the site of the ISCC 2007 Annual Meeting. See page 2 for details.

you have an idea for a column, then I recommend you contact Mike at MB Brill@datacolor.com. The first column is on color

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measurement and wetlands preservation. It describes how Munsell chroma is used to assess whether a piece of property is a wetland or not, which in the United States can have significant implications for land use.

The program for the February Industrial Color Challenges Symposium is now in place. The Symposium, a Special Topics meeting jointly sponsored by the Council and the AATCC, will be held in February 22-23, 2007 in Charlotte, NC. The program and registration form appear later in the newsletter. The program covers a broad range of important problems in the industrial application of color in areas as diverse as automotive interiors, fabrics, textiles, fibers and merchandising. My thanks to Sy Commanday and Frank O'Donnell for their work on the meeting on behalf of the Council. Great job.

The 2007 Annual Meeting is coming together nicely. Thanks to Romesh Kumar, who handles hotel arrangements for most all ISCC conferences, the meeting will be at the Marriott Country Club Plaza Hotel in Kansas City, April 29 through May 1, 2007. We have a great theme for the meeting—Bridging the Creative and Production Sides of Colors—and a great location in the Country Club Plaza: I am looking forward to both.

According to its website, the Country Club Plaza in Kansas City is an “outdoor museum of romantic Spanish architecture and European art.” It was designed in 1922 as the first suburban shopping district in the United States. According to J.C. Nichols, who conceived and developed the Plaza, the reasons for selecting Spanish architecture included the beauty of its design and use of color, and the fact that Kansas City was on the Santa Fe Trail. I recommend you check out the Plaza's website at www.countryclubplaza.com.

Scot Fernandez and Steve Glasscock, both from Hallmark, will be co-chairing the 2007 Annual Meeting. Later on in the newsletter is the meeting announcement. If you are planning to have a paper for the meeting, you have until January 31 to submit it. The 2007 Godlove Award for lifetime achievement in color and the Nickerson Service Award will be presented at the meeting. See the ISCC website and this newsletter for the Calls for Nominations.

The Board got a taste of Kansas City when it held its Fall Board meeting there on Saturday, October 7. All Board members, save one, were able to attend. Some who hadn't been to Kansas City before and weren't sure what to expect were pleasantly surprised by what they found there. A picture taken during a break in the meeting is on page 11 of this newsletter. The day before the Board meeting, we held a strategic planning session.

In preparation, I distributed a two-part questionnaire to gather inputs for the session. Part 1 asked about the ISCC's customers, products and services. It was intended to help develop a shared view of the Council. Part 2 was intended to elicit inputs on our capabilities and the

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Robert M. Boynton 1924-2006

Robert M. Boynton passed away peacefully in his home September 4, 2006 in the presence of his wife and family. He died from bladder cancer, and would have been 82 in October.

Born Oct 28, 1924 in Evanston, Illinois, he earned a bachelor degree in Amherst College in Mass. and a doctorate at Brown University in Rhode Island.

Although his main focus was on the study of color vision using visual psychophysics, he had a variety of additional research interests including physiological optics, light adaptation, and temporal sensitivity. He took his first academic position in 1952 as an assistant professor at the University of Rochester's Department of Psychology soon after completing his PhD with Lorrin Riggs.

In 1963 at age 39 he founded and headed the Center for Visual Science at U of R, which continues to thrive to this day. He and his family moved to San Diego in 1974 where he worked at the UC San Diego Department of Psychology until his retirement in 1991. During this time he also served administration roles, including as an Associate Dean at the Office of Graduate Studies and Research. He was the chairman of the board of editors for the *Journal of Vision Research* from 1982-1986.

In the 1950s and 1960s, he worked on rapid chromatic adaptation, and he introduced the widely-used scheme for assigning numbers to colors based on physiological effects of colored light on the retina. The implication of such work resonates in the psychology of advertising where color and light appeal are prime considerations. MacLeod and Boynton studied chromatic diagrams showing cone excitation by equiluminescence and they published this work in the *J. Optical Society of America* in 1979. His well-known book, *Human Color Vision*, published in 1979 and later updated with a former student Peter Kaiser, describes much of his work.

During his lifetime Dr. Boynton received many awards, including the Inter-Society Color Council's Godlove award

(1981), the Optical Society of America's Tillyer Medal (1971), the Frederick Ives Medal (1995), the Shaker Heights High School Hall of Fame Award (1996), and the Prentice Medal of the American Academy of Optometry (1997). He was elected to the Society of Experimental Psychologists (1971) and to the National Academy of Sciences (1981).

He retired from UCSD in 1991 to pursue his long-standing interests in baseball research. His publication record thereby continued uninterrupted through 2004, with articles such as "Three Hours Instead of Five: Playing a 2000 World Series Game at the 1948 Pace" in the journal *Grandstand Baseball Annual* (2001).

He is survived by his wife Sheleah, and children Sherry, Mike, Neil and Geoffrey and five grandchildren.

Geoffrey M. Boynton, Associate Professor, Systems Neurobiology, The Salk Institute; and Gultekin (Tek) Celikiz, editor ISCC News

President's Column

Continued from page 2

situation we are dealing with. It asked for strengths, weaknesses, opportunities, threats and important issues facing the Council now and over the next three-five years.

At the meeting, we discussed the Part 1 responses. On customers, a major point of the discussion was member bodies. For the discussion on products and services, CR&A and education were the focus. For Part 2, we broke up into four teams to process and prioritize the responses to the different items: processing strengths and weaknesses, opportunities, threats and issues. The teams came back together at the end of the meeting to present their output to the group. I took notes, which have been distributed to the teams for them to review and refine as a record of the meeting. The next step is to develop an action plan based on the team outputs at future meetings. Stay tuned for details in future columns.

*Robert Buckley, President ISCC
Xerox Corporation*

AIC 2006 Interim Meeting

The AIC 2006 Interim Meeting was held October 24-27, 2006, at Misty Hills hotel, in the countryside near Johannesburg, South Africa. It was organized by the Colour Group of South Africa. In the history of the AIC, it was the first meeting in the African continent and the fourth meeting in the Southern hemisphere. Participants from 13 countries (Argentina, China, England, France, India, Italy, Japan, South Africa, Spain, Sweden, Thailand, Turkey, and the United States) presented papers and discussed on various aspects of color in culture and color in fashion.

Please visit the website for a gallery of pictures: www.colourgroupsa.org.za/aic2006/aic_information.php.

Member Item: Roy S. Berns Receives Raymond C. Bowman Award



Dr. Roy Berns received the 2006 Raymond C. Bowman Award, an Imaging Sciences and Technology award that is sponsored by the Tri-State Chapter. The award is given in recognition of an individual who has been instrumental in fostering, encouraging, helping, and other wise facilitating individuals, either young or adult, in the pursuit of a career beginning

with an appropriate education, in the technical-scientific aspects of photography or imaging science.

Dr. Berns was given the award for his dedication during many years of teaching imaging science and technology, and his development of the color science program at the Munsell Color Science Lab at Rochester Institute of Technology. He is the Richard S. Hunter Professor in Color Science, Appearance, and Technology at the Munsell Color Science Laboratory and Graduate Coordinator of the Color Science master's degree program within the Center for Imaging Science at RIT.

He received his BS and MS in textile science from the University of California at Davis and a PhD in chemistry with an emphasis in color science from Rensselaer Polytechnic Institute. His research includes spectral-based imaging, archiving, and reproduction of cultural heritage; spectral modeling of multi-ink printers; and quantifying the optical properties of painting varnishes.

Dr. Berns is active in the International Commission on Illumination (CIE) having contributed to the derivations of the CIE94 and CIEDE2000 color-difference equations, as well as other technical contributions in CRT colorimetry, color tolerances, and spectrophotometry. He has served on the board of directors of the Council for Optical Radiation Measurements and the Inter-Society Color Council (ISCC).

In 1990, Dr. Berns received the ISCC Macbeth award for significant contributions to the field of color. In 1999, he, along with Koichi Iino, received the Society for Imaging Science and Technology Journal Award (science). That year he also received the best paper award from the Society of Plastics Engineers Color and Appearance Division. He has authored more than 150 publications and lectured widely throughout the world. Dr. Berns is an IS&T Fellow. He is currently involved in a joint research program in museum imaging with the National Gallery of Art and the Museum of Modern Art, New York, partially sponsored by the Andrew W. Mellon Foundation.

Call for Papers: CORM 2007 Optical Radiation Standards Development for Industry

May 8-11, 2007 Gaithersburg MD

The 2007 Annual CORM Technical Conference will provide a venue for technical interaction and information exchange between participants from standards organizations that develop standards for the optical radiation industry, industrial users of the standards, and National Metrology Institutes. This call asks for industry and standards development organization representatives to address technical aspects of optical radiation measurement standards, practices, methods and the associated development approaches, problems and solutions in the field of optical radiation measurements. Specific issues of interest include, but are not limited to:

Instrumentation:

Calibration and metrology

Broadband and spectral radiometer characterization

Diode array radiometry/photometry

Optical properties of materials (reflectance -diffuse, specular, and retro -color and appearance, gloss, fluorescence)

Photometry, illumination, solid state lighting

Broadband and spectral radiometry

Goniophotometry/radiometry

Detector characterization

Fluorescence light sources

Standard reference materials

Display units

Mathematical statistical analysis of radiometric data

Submit abstracts to one of the conference organizers, Daryl Myers, daryl_myers@nrel.gov or Richard Austin, rlaustin@gamma-sci.com, via e-mail for consideration by **January 31, 2007.**

ISCC Welcomes New Members

<i>Nichole Banner</i>	<i>Angel Rosario</i>
FIT student	FIT student
Brooklyn, NY	New York, NY
amy@amynichole.com	arosario357@yahoo.com
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FIT student	FIT student
Flushing NY	Middle Village, NY
jinnymack@yahoo.com	tziel85@aol.com

HUE ANGLES: A NEW COLUMN

Here is a new column for the ISCC News, devoted to tidbits of interesting lore shared by our members in short essay form. With your help, the column will eventually have enough inputs to appear every issue, but for now it will appear occasionally as new items (and authors) arise. To kick off the column, I present a few words on

Color Measurement and Wetland Preservation

As part of a volunteer team that cleared a walking trail in my neighborhood, I helped to shovel a straight path through a small berm. Seeking to solve another problem at the same time, a member of the party started to use the dirt he removed to fill in a nearby puddle on the trail. After the first shovel-full, someone said, "You're spoiling a wetland," to which the shoveler replied, "Not so: the soil's Munsell chroma is greater than 2.0, so we're safe from the law."

This kind of distinction is serious business in the building industry, which is increasingly finding a shortage of land and also opposition from people who want to protect the vanishing wetlands and their wildlife species. In fact, the United States (Section 404 of the Clean Water Act) legally forbids the filling in of wetlands, and especially new construction on wetlands. Various states have implemented wetland regulations of their own.

To be classified as a wetland, a piece of property need not be wet at the moment, but only on average over time. As evidence for time-averaged immersion in water, one criterion for a wetland is for the soil to have a Munsell chroma less than 2.0, which would indicate the soil has been underwater so long as to fail to oxidize (and acquire colorfulness) from exposure to the air. Soil experts use the Munsell soil color chart to determine the Munsell chroma for this assessment.

The Munsell soil color chart is related to the Munsell Book of Color, an atlas of color designed by Albert Munsell (1858-1918), a painter and color scientist. The atlas, a set of colored reflecting samples pasted into the book, is organized around three basic attributes of color: hue (associated with dominant wavelength), value (associated with lightness), and chroma (associated with colorfulness or departure from neutral gray). On any page of the atlas, the perceived color differences between adjacent samples are designed to be equal to each other.

After the CIE developed its 1931 Standard Observer and Standard Illuminants, the Munsell Color Atlas underwent a renovation, which assigned specific color coordinates to each Munsell notation. Implicit in this renovation was a specific illuminant (Standard Illuminant C) under which the patch and its real-world counterpart were to be viewed. Edward Landa (a Research Hydrologist at the US Geological Survey) reviewed the historical context in a lecture October 4 at Rochester Institute of Technology, titled, "Albert Munsell and his impact on soil science and other natural disciplines.

When you're in the field comparing soil samples with the Munsell charts, you must deal with several problems. First, field conditions make it hard to keep the charts clean for accurate matches. Secondly, the matches that are made depend on the illuminant (and the spectrum of daylight can change from moment to moment, as clouds pass and the sun sets). Thirdly, the soils themselves are often heterogeneous enough to make matches with a color chart very difficult. These problems are bound to result in ambiguous and contradictory assessments of whether a particular soil's chroma is greater than 2.0.

Perhaps future soil experts will use an inexpensive but accurate portable spectrophotometer, held near the soil sample. In that case, the light source would be constant, the instrument aperture would average out the soil granularity that is distracting to human vision, and the light source spectrum and geometry—a controlled property of the spectrophotometer—would be held constant for all observations. The measurement would be objective. You could even assess the chroma threshold inside the instrument, avoiding the need for Munsell charts or the need to keep them clean! Accuracy and reproducibility would, of course, be matters for further research.

Delineation of wetlands is a more complicated issue than just assessing soil color: A wetland must also pass the tests of specific vegetation and hydrology. However, the soil color is an important component, and there will be increasing demand to be able to assess it more reproducibly.

By the way, for mosquito-phobic readers, I'm told that the Walter Reeds of the future will be able to get exemptions from the wetlands law if yellow fever or the like returns to plague us.

Further Reading:

US Army Corps of Engineers Wetlands Delineation Manual, Tech. Report Y-87-1, Department of the Army, Jan 1987, pp. 23 and 99.

Munsell Soil Color Charts, Kollmorgen Corp, Baltimore, MD, 1975.

New York State Freshwater Wetlands Delineation Manual, July 1995, p. 16.

M. Sánchez-Marañón, M. Melgosa, R. Huertas, J. Hernández-Andrés, J. L. Nieves, J. A. García, J. Romero, *Influence of daylight changes in colour coordinates of a Munsell Soil colour chart*, AIC Colour 05, Granada, Spain, (May 2005), Proceedings Book, pp. 859-862.

Michael H. Brill, Datacolor

**Inter-Society Color Council
2007 Annual Meeting
April 29 – May 1, 2007
Kansas City, Missouri**

The Inter-Society Color Council (ISCC) will hold its 2007 Annual Meeting in the Heart of America in Kansas City, Missouri from Sunday, April 29 through Tuesday, May 1, 2007, at the Kansas City Marriott Country Club Plaza. Known for its fountains, boulevards, barbecue and jazz, Kansas City is also the home of Hallmark Cards. General Chairs Steve Glasscock and Scot Fernandez will be among those representing the greeting card giant at the meeting.

The 2007 theme, “Bridging the Creative and Production Sides of Color,” will explore the complexities of making color easy to use and understand while maintaining a high level of accuracy and capability, especially within reproduction systems. A highlight of the meeting will be the presentation of the Godlove Award, the Council’s most prestigious honor for lifetime achievement in the field of color.

Papers will be presented in each of the ISCC’s three Interest Groups, and there also will be a general poster session. Interest Group III, Art, Design and Psychology, will discuss the challenges encountered by those who create with color, such as the graphic artist dealing with commercial color applications. Interest Group II, Industrial Applications of Color, will explore potential solutions to these issues. The range of topics includes color management, RGB/HSB workflow, multi-color printing, and proofing—both soft and hard—as well as other color-related industrial applications. Interest Group I, Basic and Applied Color Research, will examine the frontiers of color measurement and the latest thinking on appearance characterization.

The intent of the general poster session is to provide a vehicle that could be used by all ISCC members to share state-of-the-art color information. This poster session provides an excellent opportunity to meet and discuss innovative color work with other colleagues attending the ISCC Annual Meeting.

Authors are invited to submit abstracts to either the Interest Group Chairs or the General Chairs. Their contact information and author instructions are available on the 2007 Annual Meeting page of the ISCC website at www.iscc.org. Submissions are due by January 31, 2007.

Please watch the ISCC web site, www.iscc.org, for the latest information on the meeting. The site will be updated as soon as new information becomes available.

If you have questions, please contact Cynthia Sturke at the ISCC Office, 11491 Sunset Hills Road, Reston, VA 20190, 703-318-0263; fax 703- 318-0514; email isccoffice@cs.com.

**Call For Nominations for the 2007
ISCC GodloveAward**

The Godlove Award is the most prestigious award bestowed by the Inter-Society Color Council, and honors long term contributions in the field of color. The Godlove Award was established in 1956 by Mrs. Margaret N. Godlove in memory of her husband, Dr. I. H. Godlove. The Award is usually, but not necessarily, presented biennially in odd-numbered years. The next Award is scheduled for presentation at the 2007 ISCC Annual Meeting to be held 29-30 April, 2007 in Kansas City, MO.

Candidates will be judged by their contribution to any of the fields of interest related to color, whether or not it is represented by a Member-Body. This contribution may be direct, it may be in the active practical stimulation of the application of color, or it may be an outstanding dissemination of knowledge of color by writing or lecturing, based upon original contributions of the nominee. Candidates need not have been active in the affairs of the Council, but they must be current or former members. All candidates must have had at least five years experience in their particular field of color.

Nominations should include:

1. The name and full address of the nominee.
2. A sentence or two giving the specific reason for the award’s bestowal. This will normally form the basis for the citation presented to the successful nominee.
3. A narrative (up to one-page) of the nominee’s contribution and its significance.
4. A curriculum vitae and a publication list for the nominee, as well as any other material deemed useful.
5. The name of the person or Member Body or Award Committee who prepared the nomination with appropriate contact information.

Note: Confidentiality of the nomination is of the utmost importance. The nominating individual/group must ensure that the nomination is not disclosed to the proposed nominee. If any of the above information cannot be obtained without risking disclosure, the information should be omitted from the nominating letter.

Nominations should be sent to the Chair of the Godlove Award Committee:

Dr. Alan R. Robertson

Visiting Worker

Institute for National Measurement Standards

National Research Council of Canada

1200 Montreal Road, Building M-36, Room 1141

Ottawa, ON Canada K1A 0R6

Tel: (613)993-9347 / Fax: (613)952-1394

E-mail: alan.robertson@nrc-cnrc.gc.ca

The deadline for receipt of nominations is January 15, 2007.

AATCC/ISCC Symposium Program Industrial Color Challenges

February 22-23, 2007, Hilton University Place, Charlotte, NC

This symposium is co-produced by AATCC and ISCC and will cover all facets of industrial color technology including color and marketing, multiangle color measurement, non-metameric color matching, the conditions for proper visual analysis, the benefits of quantitative color assessment, lighting issues, and more. The symposium will also provide an opportunity to network with fellow attendees, discuss color issues, and visit with technology vendors and color suppliers during an evening reception. See page nine of this newsletter or the web site www.aatcc.org for more information on accommodations. A registration form is included with this newsletter.

Thursday, February 22, 2007

8:30 **Welcome and Opening Remarks**

Session I: Color Measurement

Moderator: David Hinks, North Carolina State University

8:45 **Color Perception and Color Difference Estimation are Complex Processes**

Rolf Kuehni, Consultant

9:15 **Best Practices for Measurement of Lighting**

Nick Lena, Minolta

9:45 **Technique for Measuring Optically Brightened Textiles for Color Communication**

Roland Connelly, X-Rite Inc.

10:15 Break

10:35 **Standardization of Gonioapparent Color Measurement**

Allan Rodrigues, DuPont

11:05 **Multi-angles** (industry practices)

Jeff Alspach, DuPont

11:35 **Panel Discussion**

12:00 Lunch

Session II: Color Matching

Moderator: Frank O'Donnell, Sherwin Williams Co.

1:00 **The Coloration of Non-woven Fabrics**

J. Richard Aspland, Clemson University

1:30 **Non Metameric Color Matching for Automotive Interiors**

Jim Harper, TechmerPM

2:00 **Special Problems in Melt Spun Fiber Color Matching**

Sy Commanday, Commanday Color Consulting, LLC

2:30 **What Condition is your Condition In? (An update on Sample Conditioning)**

Chris Hipps, Datacolor

3:00 Break

Session III: Color Research and Management

Moderator: Frank O'Donnell, Sherwin Williams

3:20 **Those Who Dare to Welcome the Challenge**

Ellen Carter, Color Research and Application

3:50 **The Challenge of Color Management Multiples: Brands, Materials and Resources**

Jean Hoskin, Macy's Merchandising

4:20 **The Truth about Color Approval**

Keith Hoover, Lands End

4:50 **Panel Discussion**

5:30 – 7:00 **Reception & Tabletops**

Friday, February 23, 2007

Session IV: Color Communication

Moderator: Sy Commanday, Commanday Color Consulting, LLC

8:30 **Technology for Color Design and Communication**

Ronnier Luo, University of Leeds

9:00 **Digital Color Communication**

Ann Laidlaw, X-Rite Inc.

9:30 **Virtual Color Evaluation – Practical Applications and Recent Developments in Electronic Color and Texture Visualization**

Leslie McIntosh, Datacolor

10:00 Break

Session V: Colorimetry

Moderator: Sy Commanday, Commanday Color Consulting, LLC

10:20 **Controlling Color Difference and Color Inconstancy for Multiple Substrates**

David Hinks, NC State University

10:50 **Review of Current Color Projects in ISO and ASTM**

David Hinks, NC State University

11:20 **A 3D Comparison of Color Solids**

Frank O'Donnell, Sherwin Williams Co.

11:50 **Panel Discussion**

12:15 Lunch

Session VI: On-Going Challenges

Moderator: Ann Laidlaw, X-Rite Inc.

1:15 **Daylight Simulation for Color Proofing vs Daylight Simulation for Display - Two Different Worlds**

Phil Bradfield, Tailored Lighting

1:45 **Authenticity: Tagging and Image Analysis**

Renzo Shamey, NC State University

2:15 **Colorant Legislation & Safety**

Henry Boyter, ITT

2:45 **Panel Discussion**

3:00 **Closing Remarks**

Presentation abstracts are available at

www.aatcc.org/workshops/colorvision.cfm.

Color Research and Application

In This Issue, December 2006

As 2006 comes to an end, we must bid farewell to an inventor and physicist, William A. Thornton, who died this summer. Here in the last issue of the year, Michael H. Brill and Hugh S. Fairman combine efforts to highlight his many accomplishments and to tell us about Bill's life.

Because much of Dr. Thornton's life was dedicated to improving the light by which people work, it is only fitting that the first article in this issue examines "How well can people use different color attributes?" In this article Hongqin Zhang and Ethan D. Montag describe two psychophysical experiments involving color matching and discrimination. They found that observers were significantly better at judging differences than similarities. They conclude that people do not have ready access to the lower level color descriptors such as the common attributes used to define color spaces, and that higher level psychological processing involving cognition and language may be necessary for even apparently simple tasks involving color matching and description of color differences.

Our next article also deals with comparing or matching of colors. In most common life tasks we do not compare color samples side by side; rather we decide the acceptability of a colored material in terms of some color that is remembered, such as ripe tomatoes. Some people are much better at retaining and identifying a color than others. Does this capability degrade as we age? Joaquín Pérez-Carpinell, Vicente J. Camps, Mario Trottni, and Carmen M. Pérez-Baylach studied "Color Memory in the Elderly" by comparing two groups of observers: one 60 to 84 years of age, and the other 20-27 years old. Read their article to see the conclusions about color matching as a function of age and gender.

In our first two articles we talked about an observer's capability to judge colors and their differences. In early color difference research, the luminance level was held constant. F. Carreño, J. M. Ezquerro, and J. M. Zoido are interested in the theoretical evaluation of how the color matching functions influence the average ability of a set of observers when judging luminance thresholds and the influence of luminance level on the thresholds. In "Theoretical Analysis of Inter-observer Variability of Luminance Thresholds" they report at high intensities the thresholds are independent of the observers, but not so at low or moderate luminance levels.

For the rest of the articles in this issue we move into three other areas of color science. First let us look at electronic displays. In "Expanding Display Color Gamut beyond the Spectrum Locus" Rodney L. Heckaman and Mark D. Fairchild show us how a richer visual experience of lightness, chroma, brightness, and colorfulness can be realized on displays. They demonstrate how a striking gamut expansion in perceptions can be accomplished by

understanding the power of adaptation.

Moving to industrial color control, an important issue has always been metamerism. Metamerism is a necessity for matching materials in different media, i.e., a color in a textile to the painted wall near it. However, colorists seek to minimize metamerism so that a product will appear the desired color and colors will continue to match no matter what the light source. Now color formulators use computer color matching programs to calculate the amount of colorants needed to produce a desired color. In those calculations the formulator often looks at the predicted match under several illuminants to assess the amount of metamerism present in the formulation. In our next article Shahram Peyvandi and Seyed Hossein Amirshahi describe how to determine "The Metamerism Potentiality of a Color Recipe." Using one-constant Kubelka-Munk equations, they examine small perturbations in a colorant formulation. Then they show that the quantitative value of the metamerism potentiality of each formulation can reasonably predict the metamerism indices of applied formulations.

The Kubelka-Munk equations mentioned in the previous article are an application of the broad topic of radiative transfer in turbid media. Kubelka-Munk analysis has worked well in many applications, but not all. Our final two articles are deeper analyses of turbid media. Alexander A. Kokhanovsky and Leonid G. Sokoletsky team together in the study of "Reflection of Light from Semi-infinite Absorbing Turbid media." In Part I: Spherical Albedo, Drs. Kokhanovsky and Sokoletsky discuss approximations for the spherical albedo, study the possibility of deriving the spectral absorption coefficient of pigment particles from spectral reflectance measurements, and discuss the problem of color optimization from these calculations. Generally we can think of the albedo as the reflectance (that is, the ratio of the reflected flux to the incident flux), and spherical albedo as the reflectance of a surface when the incident radiation is isotropic, or as the average of the plane albedo over all angles, or as the effective reflectance of the surface. In the second article "Reflection of Light from Semi-infinite Absorbing Turbid Media, Part II: II. Plane Albedo and Reflection Function," the same authors study the accuracy of a number of simple approximate equations for the reflection characteristics of a semi-infinite light scattering media. They found that the angular effects can not be ignored, and choose the best solution for the nonlinear integral equation for the reflection function. They point out that the results obtained can be used for both direct and inverse calculations of the light scattering problem.

We have three book reviews in this issue. Richard Young reviews the 2nd Edition of *Detection of Light: From the Ultraviolet to the Submillimeter* by G. H. Rieke. Then we have two reviews of the same book, *Understanding Color: An Introduction for Designers, 3rd Edition*, by

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Linda Holtzschue. While both reviewers are educators, they come from different disciplines. Roy S. Berns is a color scientist, and Marilyn Read is involved with interior design and the human environment. As you will see, their points of view differ.

This year marked the 75th birthday of the CIE Standard Observer as well as the 75th Anniversary of the founding of the Inter-Society Color Council. In May, a week of meetings in Ottawa, Canada combined several activities focusing on these milestones. In this issue we have two items relating to the festivities. First, Michael Pointer reports on the joint symposium entitled "75 Years of the CIE Standard Colorimetric Observer." Second, we have a news item about David Brainard Receiving the ISCC Macbeth Award. Finally, we end the journal year, and this issue, with our Annual Index.

Ellen Carter

Editor, Color Research and Application

New IS&T Award

IS&T has announced the establishment of the HP Image Permanence Award. Sponsored by the Hewlett-Packard Company, with participation of The International Institute for Conservation for Historic and Artistic Works, and carrying a cash prize of \$10,000, the HP Image Permanence Award recognizes outstanding contributions to the advancement of the longevity of photographic and fine art images created via modern digital methods.

More information, including the due date for the 2007 award and a link to a recent press release are at www.imaging.org/membership/h_and_a/allawards.cfm.

Reminder: Nickerson Service Award Nominations

You are invited to nominate a person for the 2007 Nickerson Service Award. Please contact the chair of the Nickerson Service Award Committee, Ellen Carter, 21 Castle Drive, Pennsville, NJ 08070 or by email at Ellen.Carter@alum.rpi.edu. Nominations must be received before December 31, 2006.

The Inter-Society Color Council's Nickerson Service Award was established in 1980 to recognize outstanding long-term contributions toward the advancement of the Council and its aims and purposes. The contributions may be in the form of organizational, clerical, technical, or other services that benefit the Council and its members. Candidates for the award must be members of the Council and must have been active in the affairs of the Council. Recent past recipients include Ellen C. Carter -2003, Ralph Stanziola – 2004, Gultekin Celikiz – 2005 and Mary McKnight - 2006.

R•I•T Color Science Masters Program Offers Graduate Scholarships

The R•I•T Masters of Science Degree Program in Color Science is seeking highly qualified applicants for Fall 2007. Scholarships and assistantships are available for those who qualify. Funding can consist of up to full tuition and a 12-month stipend (up to \$40,000/per year). The deadline to be considered for funding is February 15, 2007.

The Rochester Institute of Technology Chester F. Carlson Center for Imaging Science offers students a unique opportunity to earn a M.S. Degree in Color Science with the Munsell Color Science Laboratory, a pre-eminent academic laboratory dedicated to color science and imaging in the United States.

For more information see: www.mcs.l.rit.edu or contact: Colleen M. Desimone, Rochester Institute of Technology, Munsell Color Science Laboratory, 54 Lomb Memorial Drive, Rochester, NY 14623. Phone: 585-475-6783, Email: Desimone@cis.rit.edu

PIA Affiliates Announce High Efficiency Bottom-line Printing Seminars

Four PIA/GATF (Printing Industries of America/Graphic Arts Technical Foundation) Affiliates. The seminars will be held in Nashville, TN with PIAS on Dec. 5, 2006; with PIA of MidAmerica in Dallas, TX on Dec 6, 2006; with on Dec. 12, 2006 in Chicago, IL, and conclude with PGAMA on Jan. 24, 2007 in Columbia, MD.

Most printers have heard a lot about the Job Definition Format (JDF), web-to-print, and process automation, but for many it seems like technologies that are always not quite ready for the shop floor. These seminars, entitled "High Efficiency Bottom-line Printing," will show what is achievable today by presenting an under-the-hood look at how a print job is originated and progresses through automated workflow and business processes.

These seminars are sponsored by diiron, Duplo, Kodak and Objective Advantage and presenters will include Gareth O'Brian, Mark Wilton, James Harvey, and Si Nguyen. Contact information is: PIAS - Kyle Eldridge, email: keldridge@pias.org, phone: 800-821-3138; PII - Brett Mense, email: bmense@pii.org, phone: 312-580-3044; PGAMA - Roman Budzinski, email: roman@pgama.com, phone: 410-319-0900; and PIA of MidAmerica - BJ Irvin, email: BJI@pamidam.org, phone: 214-630-8871.

Accommodations for AATCC/ISCC Symposium

Overnight accommodations are available at the Hilton Charlotte University Place, 8629 J.M. Keynes Dr., Charlotte, NC, telephone 704-547-7444, for the February 22-23, 2007 Industrial Challenges Symposium. The group rate is \$119 and reservations can be made directly with the hotel. Reservations must be made by January 28, 2007 to ensure room availability.

CALENDAR

Please send any information on Member-Body and other organization meetings involving color and appearance functions to:

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11491 Sunset Hills Road, Reston, VA 20190
703-318-0263 tel 703-318-0514 fax
isscoffice@cs.com website: <http://www.iscc.org>

2006

- Nov 6-10** **Color Imaging Conference, CIC14**, Society for Imaging Science and Technology (IS&T) and the Society for Information Display (SID), Scottsdale, Arizona, 703-642-9090, www.imaging.org/conferences/cic14/
- Nov 14-16** **AATCC Fall Committee Meetings**, Radisson Hotel-RTP, Research Triangle Park, NC, 919-549-8141, www.aatcc.org
- Dec 4-14** **The Second International Joint Conferences on Computer, Information, and Systems Sciences, and Engineering (CISSE 2006)**, Institute of Electrical & Electronics Engineers (IEEE), e-conference, www.cisse2006.org/

2007

- Jan 23-25** **ASTM E12, Color and Appearance**, Embassy Suites Hotel; Ft. Lauderdale, FL, www.astm.org
- Feb 22-23** **ISCC and AATCC Joint Special Topics Conference on "Industrial Color Challenges,"** Hilton University Place in Charlotte, North Carolina, Ms. Kim Nicholson, AATCC, 919-549-3535, nicholk@aatcc.org, 610-832-9585, www.aatcc.org
- Apr 24-26** **An International Conference on Colour Harmony**, Sponsored by the Hungarian National Colour Committee and the International Foundation Light and Colour, Budapest, Hungary, aic.kee.hu/colour-harmony
- Apr 29-May 1** **ISCC 2007 Annual Meeting, Bridging the Creative and Production Sides of Color**, ISCC, Kansas City, Kansas, 703-318-0263, www.iscc.org
- May 7-11** **Identifying Geospatial Solutions, ASPRS 2007 Annual Conference**, Tampa, FL, 301-493-0290, www.asprs.org
- May 8-11** **"Optical Radiation Consensus Standards and Industry,"** Council for Optical Radiation Measurement Annual Meeting in conjunction with NIST, Gaithersburg, MD, www.corm.org
- May 21-24** **Archiving 2007**, Society for Imaging Society and Technology, Arlington, VA, 703-642-9090, www.imaging.org/conferences/archiving2007/index.cfm
- Jun 4-6** **Color Cosmetics Summit 2007**, Intertech-Pira, Hilton Singapore Hotel, Singapore, 207-781-9617, www.intertechpira.com
- Jun 27-29** **ASTM E12 Color and Appearance**, Waterside Convention Center; Norfolk, VA, 610-832-9585, www.astm.org
- Jul 4-11** **The 26th Session of the CIE**, Beijing, China, www.cie.co.at/news/news76.pdf
- Jul 12-14** **AIC 2007 "Color Science for Industry," "Midterm Meeting of the International Color Association**, Hangzhou, China, www.aic07.com

2008

- Jan 23-25** **ASTM E12 Color and Appearance**, Embassy Suites Hotel; Ft. Lauderdale, FL, 610-832-9585, www.astm.org

2008, Cont.

Jun 15-18 **AIC Interim Meeting, Colour – Effects and Affect**, in Stockholm, Sweden, Swedish Colour Centre Foundation, Contact: Berit Bergström, berit.bergstrom@ncscolour.com

2009

Sept 20-25 **AIC 11th Congress**, Sydney, Australia, Organizer: Colour Society of Australia, Contact: Nick Harkness, www.aic2009.org



The ISCC Board of Directors at their Fall Meeting in Kansas City. From the left front moving clockwise: Cynthia Sturke, Jim Roberts, Scot Fernandez, Maria Nadal, Britt Nordby, Steve Glasscock, Frank O'Donnell, Michael Vrhel, Sandy Austin, Hugh Fairman, Joanne Zwinkels, Jack Ladson, Nurhan Becidyan; Rob Buckley behind the camera, Jerry Dimas traveling on business.

Photograph credits: page 1 - Highwoods Properties, page 3 - Don MacLeod

Publications Available from ISCC Office

Color and Light by Fred W. Billmeyer Jr. & Harry K. Hammond., III.

Authorized reprint from: ASTM Manual 17, Copyright 1996, ASTM International, 100 Bar Harbor Dr., W. Conshohocken, PA 19428.

\$5 ea or 20 copies/\$50.00

Demystifying Color by Bob Chung, 11 pages. Discusses and explains ten myths about color. ... \$5 ea or 20 copies/\$50.00

Proceedings-9th Congress of the International Colour Association, AIC Color 01 Rochester,

Allan Rodrigues, Ed., papers given at technical sessions

\$75*

Guide to Material Standards and Their Use in Color Measurement (ISCC TR-2003-1)

\$50*

*Plus shipping and handling

Advertising Policy

The ISCC advertising policy for the ISCC News is as follows: Pre-paid color-related advertising will be accepted 30 days in advance of the publishing date.

The rates are:

\$ 100 business card-size ad

\$ 250 1/4 page ad

\$ 500 1/2 page ad

\$ 1,000 full page ad

The editor reserves the right to determine the acceptability of the advertising. A 20% discount is available for a yearly contract.

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All submissions must be in English. Please submit materials by the first of each even numbered month. Materials submitted later may be printed in the following issue.

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PPG Industries, Inc.	www.ppg.com	724-274-3532

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 American Society for Photogrammetry & Remote Sensing (ASPRS)
 The Color Association of the United States, Inc. (CAUS)
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 Optical Society of America (OSA)
 Society for Information Display (SID)
 Society of Plastics Engineers, Color & Appearance Div.(SPE)
 Society for Imaging Science and Technology (IS&T)
 Technical Association of the Graphic Arts (TAGA)

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AATCC/ISCC Industrial Color Challenges Symposium

February 22-23, 2007

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