



Inter-Society Color Council News

Issue 441

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ISCC 2009 Annual Meeting Report

The ISCC 78th annual meeting was held at the Center for Imaging Science at Rochester Institute of Technology, Rochester, New York on June 7, 2009. This year's meeting chair was Dr. David Wyble, Munsell Color Science Laboratory at RIT. The program for the meeting included ten technical talks representing each of the three ISCC interest groups. The conference was well attended drawing a nice mix of ISCC members, MCSL/RIT alumni, and current RIT faculty and students.

The technical program began with a presentation from Dr. Barbara Martinson, University of Minnesota, titled *Practice-based Research Design*. She gave an overview of the style of research in their program. A research effort begins with a source of artwork, and then the student completes an analysis of how science, and psychology of color appearance work together to create

the artists intent, allowing the design aspects to be generalized for teaching purposes, or be applied in other applications. The second presentation was *Color Imaging in the Cultural Heritage Community*, by Dr. Robert Buckley of Xerox Corporation. He discussed two research efforts, CIE TC8-09 and a Mellon Foundation-supported study that together are working towards developing an end-to-end view of color image reproduction for museums, libraries, and archives. The final presentation of the morning was *A Spherical Object-colour Space*, by Alexander Logvinenko, from Glasgow Caledonian University. It outlined a color space he developed that represents the color of objects rather than the illumination. The color coordinate system he developed is illuminate independent, allowing it to predict the effect illumination has on an object color.

After the session, the lunch banquet and annual business meeting was held. The highlight of the banquet was the awarding of both the Nickerson Service, and Godlove Awards. The 2009 Nickerson Service award was given to Philip Hunter of Hunterlab, in recognition of his longtime commitment to the ISCC serving as ISCC Treasurer from 1988-1994, and allowing the ISCC to be co-located at Hunterlab since 1995. The 2009 Godlove Award, went to Dr. Roy Berns of the Munsell Color Science Laboratory at RIT. The Godlove award recognizes exceptional leadership within the color community. The award is a very fitting recognition for both the breadth and depth of Roy's numerous contributions to the fields of color, and imaging science as well as the hundreds of students and researcher he has influenced.

After lunch the technical talks began with an overview of *The Use of Color in Medical Illustration*, by James Perkins from RIT. The main purpose of medical illustration is as an instructional tool, and this presentation provided a fascinating overview of how color is applied to aid in the instructional quality of the illustrations. The second presentation of the afternoon was from Dr. Mark S. Rea of the Lighting Research Center

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at RPI, *A Test of a Two-measure Color Rendering Proposal*. The goal of the research was to develop a practical way to evaluate lighting and rendering intent for broad applications in retail and architecture. The third talk of the afternoon came from Anders Nilsson of the Scandinavian Colour Institute, *Comparing the Steps of NCS and the Munsell Colour order Systems Using the Evolvement of DE Formulas*. This presentation was a detailed comparison of the various color difference equations with regards to uniformity across hue planes for the two different color ordering systems.

The final session of the meeting included four presentations. The first was *Estimating a Donaldson Matrix for Commercial Papers Containing OBA* by an RIT student, Brian Gamm,. The presentation outlined a study to predict a bispectral Donaldson matrix based on measurements from a standard diffuse spectrophotometer, to more accurately measure the color of paper containing optical brighteners. The second presentation was by Dr. Michael Brill of Datacolor. Michael's presentation, *Optimal Pseudocolor and the Longest-Path Problem*, addressed the question, "For a given output-device color gamut, what is the longest non-backtracking pseudocolor curve that follows a strict monotonic luminance in a uniform color space." Dr. Maria Nadal of NIST gave the third presentation titled *Reflectance Factor Measurement Complications Due to Near Infrared Fluorescence*. She addressed the problems associated with the fluorescence of BCRA ceramic tiles. The final presentation was by Fritz Ebner of Xerox corporation. His presentation was, *What is Sustainability and How do our Action Affect It?* This presentation had less to do with color than the others, but it provided some thought provoking conversation about how eco-friendly supply chain solutions could impact color and imaging. It was a very interesting presentation discussing how total resource consumption will eventually need to be factored into the life cycle of a product to determine true cost of a product.

Overall I thought the meeting was very enjoyable, and informative. The diversity in presentations was thought provoking and created many lively side conversations during the breaks. As always ISCC meetings are great way to meet up with colleagues, and to learn about areas of color that may not be part of your day to day responsibility. Finally, I want to thank Dave Wyble and his support group with the MCSL, and ISCC for hosting the meeting.

Scot Fernandez, Hallmark Cards, Inc.

HUE ANGLES

(send contributions to mbrill@datacolor.com)

This year (and hopefully this month) will mark the end of my ten-year chairmanship of CIE TC1-56, during which I found that the laws of color matching are not so simple as Hermann Grassmann thought. Is color science possible without Grassmann's underpinnings? To find out, I look at a little-known corner of history....

C. V. Raman's Explorations in Color Science

Chandrasekhar Venkata (C. V.) Raman (1888-1970) was always interested in the science of color. Indeed, that interest seemed to motivate his Nobel-Prize-winning work in spectroscopy. A 1921 trip returning to India from England made him marvel at the blue of the ocean, and to posit that blue as arising from molecular scattering of light by water molecules, not just reflection of the blue of the sky (as Lord Rayleigh supposed). By 1928, Raman found that blue light through glycerin had a shift to the green, and that the shift was due to quantum transitions in molecular electron states. Raman spectroscopy was soon born, quantum mechanics and the photon theory of light were vindicated, and the Nobel Prize followed two years later.

In 1959, after a fruitful career in optics, acoustics, and the interaction of light with sound waves, Raman turned his attention exclusively to color, including the colors of plants and minerals and color blindness. He used only a pocket spectroscope, some black-and-white photographic film, and a few functional human visual systems. The color-science period of his life was to last more than ten years, and gave rise to many publications in the annals of the Indian Academy of Sciences in Bangalore. I found one book of this work [1] on a shelf in Datacolor earlier this year, and a Google search revealed this work and a lot more, on individual pdf pages from the Indian Academy of Sciences. Even partial retrieval of the work was painful, but it was worthwhile and timely for me.

Here is a quote from a 1966 work [2]:

"It is a remarkable fact that a person endowed with normal vision is capable of recognizing quite small differences in colour if these are presented to him in an appropriate fashion. For example, the two yellow lines in the spectrum of a mercury lamp, whose wavelengths are respectively 5770 Å and 5790 Å and which are of equal intensity when seen simultaneously through the eye-piece of a spectrometer exhibit an observable difference in colour, the

former line appearing of a greenish hue while the latter is a pure yellow. This fact suggested to the author that an arrangement by which the entire continuous spectrum is presented as a series of discrete lines would be a useful device for the study of the spectrum colours and especially for exhibiting the differences in the rate of progression of colour in different parts of the spectrum.

"The idea indicated above can be realized in practice by setting two half-silvered plates of glass in parallel positions before the slit of a wave-length spectrometer and viewing the spectrum of a brilliant source of white light of restricted area normally through the combination. The entire spectrum is then seen as an array of discrete lines or bands in a dark field, their number and spacing being determined by the separation between the plates. By making one of the plates movable with respect to the other, the number of lines or bands seen in the spectrum can be varied within wide limits. [...] A channeled spectrum of 100 bands [...] was presented." (p. 269)

"A remarkable and convincing demonstration that Daltonian vision arises by reason of an abnormal enhancement of the sensation of yellow in relation to other colours in the spectrum..." (p. 270)

This work is experimentally ingenious. I'm especially impressed with Raman's recognition of (and use of) the subtle property of human vision that enhances the discrimination of colors when they are separated by a dark boundary. But something is missing in the description. There's no mention of trichromacy, none of the heritage of Newton, Young, Helmholtz, or Hering. That seems to be true of all of Raman's work. And of course, Grassmann's laws are also absent from the discussion

How could a 20th century physics Nobel laureate devote ten years to color research and write copious articles without once referring to the trichromacy of color vision? Perhaps the answer can be found in

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Raman's famous 1968 lecture, "Why the sky is blue" [3]. Here, Raman recounts the familiar Rayleigh-scattering story, but adds much more. Why don't we see the stars during the day? Because the atmosphere of the earth is a veil that hides them by scattering the Sun's light. Why isn't the sky blue on a moonlit night (for which the same spectrum acts in an attenuated form)? Well, here Raman isn't so sure. He says it's a difficult question why we don't see colors at night. He never mentions rods and cones, or the body of literature that culminated in the same year with Yves LeGrand's second edition of *Light, Color, and Vision*. And yet Raman espouses a holistic philosophy of science: "Ultimately you find that you have to travel the whole field of science before you get the answer to the question: Why the sky is blue?" Another quote reveals how exploratory he is willing to be: "To get any colour, red, green, or blue, you have to take out the yellow. Yellow is the deadly enemy of colour." Later, he seems to be getting closer to opponent-color theory: "It is the reduction of the yellow of the spectrum that is to say the predominance of the blue which is responsible for the blue light of the sky." But here's the final take-home lesson: "I want you to realize that the spirit of science is not finding short and quick answers. The spirit of science is to delve deeper." I will guess that Raman was well aware of rods, cones, and trichromatic theory, but felt he had not been able to delve deeper, to add as much to the vision explanation as he had to the simple one-sentence "Rayleigh scattering" answer to "Why is the sky blue?"

Well, Dr. Raman, I am ready to delve deeper now that TC1-56 is at its end. Simple sound bites such as "linearity" and "trichromacy" aren't going to cut it anymore.

Michael H. Brill, Datacolor

References

1. "Memoirs of the Raman Research Institute No. 137: Floral Colours and the Physiology of Vision", by Sir C. V. Raman (Bangalore, 1963); pp. 57-108.
2. C. V. Raman, The New Physiology of Vision, Chapter XXXIX. Daltonian Colour Vision, J. Indian Academy of Sciences, pp. 267-274 (1966). www.ias.ac.in/jarch/proca/63/00000280.pdf and subsequent pages (last 3 digits in filename).

3. C. V. Raman, "Why the Sky is Blue," Lecture Dec. 22, 1968 at Ahmedabad. [http://dSPACE.rri.res.in/bitstream/2289/1509/1/1968%20\(Dec.%2022\)%20Raman's%20Lecture%20-%20Ahmedabad.pdf](http://dSPACE.rri.res.in/bitstream/2289/1509/1/1968%20(Dec.%2022)%20Raman's%20Lecture%20-%20Ahmedabad.pdf)

Joint Meeting of ISCC/ASTM E12/CIE Div. 1

Standards: What they are.
What will they be?
What should they be?

June 14 – 18, 2010
Princeton University, Princeton,
NJ

We are planning a full week of interesting meetings with three different organizations. ASTM E12 Committee on Color and Appearance will meet on June 14 and 15 for their bi-annual standard committee meetings. The ISCC is holding a Special Topic Meeting on June 16. Finally, CIE Division 1 is holding their technical sessions and committee meetings on June 17 and 18.

For the ISCC Special Topic Meeting, we are now open to receive contributed papers on the title subject of standards. Please send titles and one-page abstracts to either Michael Brill or Jack Ladson at the email addresses below. Further details will appear in the next issues of ISCC News.

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CIC17 Update

The Conference Preliminary Program for CIC17 now can be found at www.imaging.org/conferences/cic17/. The conference will be held November 9-13, 2009 in Albuquerque, New Mexico at the Hotel Albuquerque at Old Town. The early conference registration deadline is Sunday, October 11, 2009.

Dr Bern's Godlove Award Acceptance Speech

First and foremost, thank you ISCC for this tremendous honor and recognition of my life's work. I am so pleased. I am amazed to be joining a list of who's who in color science.

My first contact with Dr. I.H Godlove was reading the two articles on the Munsell Value Scale, written in 1933. This was while I was a graduate student at RPI. Dr. Godlove directed the development of the 1929 Munsell Book of Color and necessary visual experiments such as scaling lightness. It seems that Dr. Godlove was an expert both in visual experimentation and color physics. The 1929 Book of Color was defined spectrally. Those of us active in color matching will appreciate the significance of a spectral standard. In my research, I have sought to incorporate both spectral reproduction and visual experimentation. Color science is always fascinating because of this multi-disciplinary nature. Although I never had the honor of meeting Dr. Godlove, I imagine we would have been close colleagues.

Many years ago, my daughter was very absorbed by the book, "Charlotte's Web," by E.B. White, written in 1952. In the book, Charlotte, a barn spider, introduces Wilbur, a pig, to the Latin phrase, "magnus opus," meaning "a great work." In Charlotte's life, her magnus opus was an egg sac. Her life and her passion for life culminated in propagating her species.

While reflecting on receiving the Godlove award, Charlotte and her magnus opus came to mind. I believe my magnus opus is color science education. This education is direct through our academic programs and industrial education. It is indirect through books and review-oriented publications. I am propagating the species of color scientists. Certainly research is important and I am deriving tremendous satisfaction using color and imaging science for cultural heritage applications. But propagating color science through education is more important to me. I believe Richard Hunter's goal in establishing a professorship at RIT was to advance the color science, appearance, and technology through education.

A question that has been posed to me on several occasions is what is the source of my motivation for this? There has been lots of adversity over the years, particularly at a university driven by tuition dollars and facilities and administrative costs. We are, after all, rather small. Some of my colleagues didn't think color science was a legitimate field of study. Over the years, I have had this recurring bad dream where we would be shut down and I would have to teach introductory chemistry. Somewhere

along the road I decided it was my responsito insure the future of color science.

My road began at my first ISCC meeting as a graduate student. Fred Billmeyer paid for us to go to the meeting. Dr. Billmeyer received the Godlove award in 1993. We took the train to New York from Rensselaer. I remember the energy and how participants were delegates from the various societies, hence inter-society color council. Maybe Frank O'Donnell's memory is better; I think it was spring 1981. Robert Boynton received the Godlove Award that year; at the time I had no idea who he was, but then again, I had no idea who anyone was beyond Fred Billmeyer and Roland Connelly. (I met Roland at a job interview at Ciba Geigy.) But I learned. So many of my heroes I met at ISCC meetings. What struck me was their passion and devotion to the field.

My first experience presenting a paper was at an ISCC meeting at the project committee meeting on metamerism. I was terrified. I was trying to convince the group that we should use a chromatic adaptation transform if we are going to calculate color differences for non-daylight illumination using CIELAB. The overhead projector died during this and I had to hold up my transparencies in front of a piece of paper. I was hoping my hands didn't shake too much. Rolf Kuehni, who will be speaking tomorrow and received the Godlove award in 2003, was sitting in the front row with his legs extended and his arms folded over his chest. I just knew that he was going to ask a difficult question. And he did! At that point I fainted. Just kidding. Attending ISCC meetings had a profound effect on my view of color science.

One ISCCer in particular had a large impact on my passion, Henry Hemmendinger. He was very generous with his ideas. I think that Henry got me started really thinking about spectra. My dream job during the dark days of getting my doctorate was to work for Henry, finish his experiments, and write them up for publication. Henry received the Godlove award in 1997.

Another source of inspiration was Dorothy Nickerson; she received the Godlove in 1961. Fred Billmeyer and I spent an afternoon with Miss Nickerson in her apartment in the DC area discussing the history of the Munsell Book of Color. Her love of color science was infectious.

But I think the pivotal point was attending the AIC Midterm Meeting on Color Order Systems in Kungälv, Sweden, in the summer of 1983. There were about 50

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participants, most extremely passionate. Here was where I realized that color science was infinitely interesting. At the meeting, there were industrial scientists and engineers, academics, national laboratory scientists, studio artists, and designers. There were more points of view than participants. I was able to relate to both the scientists and artists, having been raised in a family where my mother was a professional studio artist and my father was a building contractor. I also experienced my first really scary job interview; fortunately, I didn't know it was a job interview. Gunther Wyszecki, apparently, decided that Franc Grum should hire someone young, rather than another early retiree from Kodak. Dr. Wyszecki received the Godlove award in 1979. Over sherry, Dr. Wyszecki asked me about my research. According to Dr. Nayatani, who was a part of the conversation, I was too conciliatory to Dr. Wyszecki when he started probing the weak points of my research. I'd like to think I showed proper respect. Either way, I passed the screen test and my first day on the job at RIT was for the inaugural symposium of the Munsell Color Science Laboratory, 25 years ago.

So, what advice can I offer at this moment of reflection? Find your passion. Everything else follows.

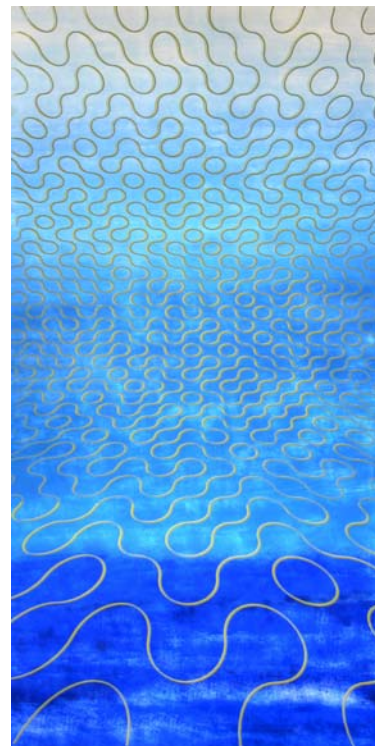
If I have been successful, it is for four reasons. The first is having a supportive family. My wife Susan has been a silent partner in my career. (The silent part is metaphoric.) She has given me much-appreciated advice and been a wonderful traveling partner to the many fantastic color conferences around the world. The second reason for my success is my good fortune in being surrounded by excellent faculty, staff, and students. I cannot do what I do alone. The third reason is financial. In particular, the Hunter Professorship enables me to engage in research not otherwise possible. The fourth reason is the most important. It is all of you, the community of color people. When I first started at RIT, I tried an experiment. I asked for help. I admitted I didn't know the answers to many problems, although I was hired to profess. I found that most people gladly shared their knowledge. I still ask for help and I am gladdened that I still receive answers. A friend recently wrote, "The best teachers know that they are always students, approaching things with, what the Zen teachers refer to as "beginner's mind" rather than "expert's mind." I hope to always have a beginner's mind.

Thank you again for this tremendous honor.

Roy S. Berns
June 2009

Member News: Bliss Art Exhibition

A current exhibit at the Salt Lake City Arts Council, Finch Lane and Park Galleries, features Anna Campbell Bliss, a longtime ISCC member. Her career has spanned decades, earning accolades and critical acclaim. For this exhibit, she is addressing both art and architecture, through an abstract tradition of painting and printing, expanding into three-dimensional concepts, computer generated screens and laser etching. As she prepares for the show, she observes, "Being both artist and archi-



Study for Water Wall,
Mixed Media
by Anna Campbell Bliss

tect, the need for communication has been a major concern in my research and in the art I have created. My work over the past sixty years has drawn upon a wide range of interests and visual explorations seeking to make connections: between nature and the constructed environment; the intuitive and predetermined process; poetry and math; and between the computer and the great tradition of artistic experimentation."

Bliss is a graduate of Wellesley College and earned her Masters of Architecture at Harvard University Graduate School of Design. At the University of Minnesota's School of Art, she worked with Josef Albers. Her awards and honors are many; among them a Mid-Career Fellowship from the American Academy in Rome (1984); named an honorary alumna at the University of Utah's College of Fine Arts (2004); and a Pollock Krasner Foundation Award (2007).

Bliss's work has been on exhibit around the world; she has written and been published in professional and scientific publications, and has been commissioned for several public art projects, including at the Salt Lake International Airport. The work shown above was part of the publicity for the exhibit. See www.iscc.org/meetings/ST2009/ForeignVisitors1260.pdf



Joint Meeting of ISCC/CORM

“Lighting in Art, Commercial, and Retail Spaces”



October 13-14th, 2009 Green Auditorium, NIST

The Council for Optical Radiation Measurements and the Inter-Society Color Council are announcing a joint meeting entitled “Lighting in Art, Commercial and Retail Spaces” to be held on October 13-14, 2009, at the Green Auditorium at NIST. The conference will be applications based and feature a field of experts from the fashion, security, commercial, and conservatorial fields as well as experts in the field of lighting.

Session I -- The Use of Lighting in Commercial and Artistic Spaces

- *Gordon Anson (National Gallery of Art)* on Exhibition Lighting: Calculating the Complex Interaction of Space and Object
- *Christopher Maines (National Gallery of Art)* on Predicting and Quantifying Damage
- *Steven Weintraub (Art Preservation Services)* on Artist’s Intent and the Determination of Color Temperature Preference and on Cognitive Elements of Illumination
- *Gregory Paul (Focus Lighting)* on The Experience of Lighting in The artistic, Commercial, and Retail Spaces: The Metric of Success
- **Panel Discussion** on Color Constancy and the Qualitative Experience of Color Perception

Session II -- Vision and Aesthetics

- *Yaniv Morgenstern and Richard Murray (York University)* on Statistical Regularities in Natural Illumination and their Role in Human Perception of Shape from Shading

Session II, Continued

- *Terry McGowan (Lighting Ideas, Inc.)* on Functional and Decorative Lighting-What’s The Difference and Why Is It Important?
- *Mark Rea and Jean Paul Freyssinier (Lighting Research Center)* on A Test of a Two-Measure Color Rendering Proposal
- *Gersil Kay (Conservation Lighting International)* on Oh Say, Can You See?
- *Yoshi Ohno (NIST)* on Experiment on Color Rendering Preferences

Session III -- Practical Aspects of Display Lighting-Measurement and Security

- *Richard Murray (York University), Yaniv Morgenstern (York University) and Wilson Geisler (University of Texas, Austin)* on an Omnidirectional Photometer for Measuring Ambient Light
- *John Reginaldi (Pilar Services, Inc.)* on Security Lighting
- Presentations from *Michael Grather (Luminaire Testing Laboratory)* and *Cameron Miller (NIST)*

The conference will also include tours of the NIST facility. Presentations will be available to attendees on a memory stick as part of the conference fee.

Security: As a U.S. Government facility, NIST requires that all attendees must pass a security check. U.S. citizens will be required to show some form of government-issued photo ID. Foreign citizens must submit documentation to NIST; this form is available from the ISCC web site. All attendees must check in at the main gate of NIST to receive a temporary badge allowing entrance to the site.

Housing: There is no specified hotel for this meeting. A list of suggested hotel/motels will be published in a future issue of ISCC News and is now available on the ISCC (www.iscc.org) and CORM (www.cormusa.org) websites.

Registration: A registration form is included with this newsletter and it is available on the ISCC and CORM websites (www.iscc.org and www.cormusa.org). All attendees must be pre-registered.

Contacts for the Joint ISCC-CORM Meeting are:

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Color Research and Application IN THIS ISSUE, October 2009

Recent advances in retinal imaging have made it possible to measure the spectral sensitivities of individual cone cells and also the distribution of the types of cones in the retina. Because many of the color models assume no differences in the retina, now is a good time to re-examine the models of color vision in light of these measurement advances. In “Comparison of Color Vision Models Based on Spectral Color Representation,” Tuija Jetsu, Ville Heikkinen, Anahit Pogosova, Timo Jaaskelainen, and Jussi Parkkinen describe experiments, in which four different vision models are evaluated. They found that the four models: the De Valois and De Valois model, the Ingling Tsou Model, the Guth Model, and the Bumbaca and Smith model performed quite differently. Do not miss their analysis.

As humans age, the lenses of their eyes become afflicted with cataracts. These cataracts cause perception to take on a hazy or foggy appearance, which affects not only a deterioration of acuity, but reduced discrimination and an uncomfortable change in color perception. Mitsuo Ikeda and his co-workers have been studying the effects of aging in the human visual system. In our next article Dr. Ikeda and Pontawee Punggrassamee, and Tomoko Obama describe the “Size effect for color appearance simulating cloudy crystalline lens of elderly,” which they studied using special goggles that simulate the effects of cataracts.

Our next article, “Analyzing the perceptual space in a new physiological color vision model” by Elisabet Chorro, Francisco Miguel Martínez-Verdú, Dolores de Fez, Pascual Capilla, and Maria José Luque aims to determine whether a good color difference formula can be obtained from ATTD05, which is a neural multistage color vision model. The ATTD model is based on the three post-receptoral channels of the human visual system: the luminance, red-green and blue-yellow channels. ATTD05 is a neural model that tries to predict the perceptual descriptors of colors under different viewing conditions, following the stages of the visual system. The authors describe a perceptual version of the ATTD model defined in terms of brightness, hue, colorfulness and saturation. Then they compare the new color space with CIECAM02, CIEDE2000 and other color spaces. In particular they look at visual uniformity and the ability to predict color differences.

This leads us into two more articles related to color difference evaluation. Rolf Kuehni discusses the “Variability in estimation of suprathreshold small color differences.” He points out that the data from two recent experiments show that both inter-observer and intra-observer variability is surprisingly large, leading him to question whether humans are equipped to make reliable and uniform estimates of small color differences. He discusses how well we can actually do in this task.

There is an uncertainty associated with every point of color difference data. How can we use this to help us in evaluating the performance of color difference equations? This is a topic of research at the Munsell Color Science Laboratory (MCSL) at Rochester Institute of Technology. Shizhe Shen and Roy S. Berns present a thorough and well explained study of the uncertainty of color difference data and the probability of over- or under-fitting by equations in their article “Evaluating Color Difference Equation Performance Incorporating Visual Uncertainty.” Also there will be more to come from MCSL in a future issue of this journal concerning this and related issues.

In our final article of this issue Rajeev Ramanath describes a series of experiments relating to color observed on display systems. While most displays will produce most common colors, how they do it depends on the primaries chosen for the display. The choice of primary has a large influence of how much observer metamerism exists. One study described uses the CIE 1931 2° observer as a reference observer and compares the colorimetric performance of six observers, as representative variations from this standard observer on eight different displays. Dr. Ramanath believes that the primary causes of this range in observer metamerism across displays is related closely to two characteristics of the spectral power distribution curve of the primaries: their smoothness, which he expresses as multimodality, and their narrow-band nature, which he expresses in terms of their full-width at half maximum (FWHM). In “Minimizing Observer Metamerism in Display Systems” describes how to these factors as a means of assessing the susceptibility to observer-to-observer variations between various modern display technologies.

Again in this issue we have to say good bye to two people who have been associated with the journal: Anders Hård, Associate Editor from Sweden

from 1986 to 2005 and Leo Hurvich, who was Vision Editor from 1992-3. We close the issue with three book reviews, two forthcoming meeting announcements, and one new item. Michael Brill reviews the book, *Single-Sensor Imaging*. Silviu Pala discusses *Automotive Lighting and Human Vision*, and finally Danny C. Rich gives a detailed evaluation of *Color Imaging Fundamental and Applications*. Do not miss the information on the 17th Color Imaging Conference or the Fogra Colour Management Symposium. Finally the Society of Dyers and Colourists announces that they have produced a new set of metamers.

Ellen Carter

Editor, *Color Research and Application*

CGIV2010/MCS'10 Call for papers

IS&T, and ISCC member body, has announced that the CGIV2010/MCS'10 Call for Papers. The deadline for submitting abstracts is **November 15, 2009**. A PDF of the Call for Papers can be found at <http://www.imaging.org/ist/Conferences/cgiv/index.cfm>

CGIV2010/MCS'10—the Fifth European Conference on Colour in Graphics, Imaging, and Vision and the 12th International Symposium on Multispectral Colour Science—will be held June 14-18, 2010 in Joensuu, Finland.

Tracks for the technical sessions at this event are listed on the web site, www.imaging.org/ist/Conferences/cgiv/index.cfm

CGIV 2010 is introducing a new feature: workshops instead of the typical short courses. These workshops may take a number of forms, with the common goal of providing a forum for intensive, collaborative discussions (not lectures) and/or hands on work about actual topics in color science. Suggestions for workshop topics are being solicited. More details are in the Call that can be found the web site

Puzzle Feature

The solution for the July/Aug Puzzle is

"Mere color, unspoiled by meaning, and unallied with definite form, can speak to the soul in a thousand different ways," by Oscar Wilde.

There is no puzzle this month.

Anni Berger-Schunn (1928 – 2009)

Anni Berger-Schunn, a well-known German color scientist, author, and member of the ISCC, passed away on July 12, 2009. Born as Anni Tews on Jan. 25, 1928, she studied physics at the Technical University of Berlin and received her PhD there in 1956, with a dissertation in optics. She joined Bayer AG in Leverkusen shortly thereafter, and began her professional career in colorant quality control.



Dr. Berger-Schunn's research spanned many areas of color technology. In 1959, she developed the Berger whiteness formula for assessing whiteness of materials based on reflectance measurement and tristimulus-value calculation. Still at Bayer AG, she furthered implementation of optical measurement for colorant quality control by transmittance and reflectance measurement, and investigated issues of measuring fluorescent colorants. With her supervisor Andreas Brockes and her colleague Dietrich Strocka, she also investigated color-difference formulas, metamerism, and artificial daylight illumination and its UV content (1960-1975). In the mid- to late 1980s, she was involved in developing standard test procedures for assessing colorant quality.

Besides about 30 peer-reviewed articles, Dr. Berger-Schunn authored or co-authored several books on color technology. In 1964, with A. Brockes, she wrote the special issue of Bayer Farben-Revue *Farbmessung in der Textilindustrie* (Color measurement in the Textile Industry), with revisions in 1971 and 1986. Then, in 1991, the first edition of her book, *Praktische Farbmessung*, (Göttingen: Muster-Schmidt Verlag) appeared, and a second edition followed in 1994. In 1994 an English translation was published by Wiley in New York under the title *Practical color measurement*. Its subtitle, "A primer for the beginner; a reminder for the expert," aptly describes the niche of the book. Also in 1994, Muster-Schmidt Verlag published, as *Grundlagen der Farbtechnologie*, Dr. Berger-Schunn's German translation of F. W. Billmeyer and M. Saltzman's *Fundamentals of color technology*, 2nd Ed.

A long-time member of the ISCC, Dr. Berger-Schunn participated in many annual meetings and had many friends in that organization. She is survived by five children, 9 grandchildren and 9 great-grandchildren.

CALENDAR

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

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2009

- Sep 27-Oct 2** **AIC 11th Congress**, Sydney, Australia, Organizer: Colour Society of Australia, Contact: Nick Harkness, www.aic2009.org
- Sep 29-Oct 1** **Color and Food: From the Farm to the Table, AIC Interim Meeting**, Mar del Plata, Argentina, Organizer: Grupo Argentino del Color, Contact: María L. F. de Mattiello gac@fadu.uba.ar.
- Sep 30-Oct 1** **AATCC Color Management Workshop**, AATCC Technical Center, Research Triangle Park, NC, www.aatcc.org/programs/workshops/colormgt.cfm.
- Oct 13-14** **ISCC/CORM Special Topics Conference on Lighting in Art, Commercial and Retail Spaces**, National Institute of Standards and Technology, Gaithersburg, MD, ISCC - 703-318-0263, www.iscc.org; CORM - www.cormusa.org
- Oct 15-16** **CIE-USA and CIE-Canada technical and administrative meetings**, National Institute of Standards and Technology, Gaithersburg, MD
- Oct 18-20** **2009 CAD RETEC**, SPE Color & Appearance Division, Hyatt Regency, Savannah, Georgia, specad.e-xyn.com/index.php?navid=121
- Nov 9-11** **Seventeenth Color Imaging Conference**, The Society for Imaging Science and Technology cosponsored by the Society for Information Display (SID), Albuquerque, New Mexico, 703-642-9090, www.imaging.org
- Nov 13-17** **CMG 2009 Fall International Conference**, New Orleans, Louisiana, www.colormarketing.org/Visitors.aspx?id=1232&
- Nov 15-17** **IES Annual Conference**, Illuminating Engineering Society, Seattle, Washington, www.ies.org
- Dec 15** **Colorimetry Workshop**, Berlin University of Technology, "Veranstaltungen (meetings)" at www.li.tu-berlin.de

2010

- Jan 20-22** **ASTM E12, Color and Appearance**, Embassy Suites Hotel; Ft. Lauderdale, FL, www.astm.org.
- Mar 14-17** **TAGA 62nd Annual Technical Conference**, The Horton Grand Hotel, San Diego, California, www.printing.org/taga
- May 16-20** **ANTEC™ 2010**, Society of Plastic Engineers, Marriot World Center, Orlando, Florida, specad.e-xyn.com/index.php?navid=124

CALENDAR, Continued

- May 23-28** **SID 2010 International Symposium, Seminar, and Exhibition**, Washington State Convention and Trade Center, Seattle, WA, www.sid.org/conf/sid2010/sid2010.html
- Jun 14-18** **Joint Meeting of ISCC/ASTM E12/CIE Div. 1, Standards: What they are--What will they be?--What should they be?**, , Princeton University, Princeton, NJ, isccoffice@cs.com
- Jun 14 - 18** **CGIV 2010: 5th European Conference on Colour in Graphics, Imaging, and Vision**, Society for Imaging Science and Technology, Joensuu Yliopisto and University of Eastern Finland, www.imaging.org
- Oct 5-7** **Joint Meeting of AATCC and ISCC, 4M: Multi Media - Multi Material: Color Control**, College of Textile, North Carolina State University, isccoffice@cs.com

COLORCUBES FOR SALE: HANDS-ON TUTORIAL ON COLOR MATCHING AND ORDERING

The ISCC Office has a supply of ColorCube 3D puzzles for sale at a price of \$15 (less than \$29.99, the price on www.colorcube.com) + \$5 S/H. The ColorCube (Spittin' Image Software, US Patent 5,364,795) has two stages of assembly, each of which teaches something different about color. The first is color-matching: each of 64 small cubes is made of two pieces that must be color-matched from a set of 128 pieces. The second is color-ordering: The small cubes assemble into a large 4 x 4 x 4 cube, ordered

according to the percentage of cyan, magenta, and yellow (C, M, Y) colorants in each small cube (white being the base color that makes up the difference between C + M + Y and 100%). The ColorCube is an excellent educational tool, and assembles into a robust and aesthetically pleasing final product. Of course, you can also assemble the cube pieces into other creative designs. The box proclaims: "for ages 10 to 110."



Publications Available from ISCC Office

ISCC 76th Annual Meeting Program and Abstracts, ISBN 978-1-4243-4273-0 \$25.00*

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.
\$5 ea or 20 copies/\$50.00

ISCC 75th Anniversary Commemorative CD and Pin \$30*

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 requires pre-paid color-related advertising 30 days in advance of the publishing date. The rates are:

\$100 business card-size **\$250 1/4 page**

\$500 1/2 page **\$1,000 full page**

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 15th of each even numbered month.

ISCC Sustaining Members

Avian Technologies	www.avianttechnologies.com	603-526-2420
BYK-Gardner USA	www.bykgardner.com	301-483-6500
Color Communications, Inc.	www.ccicolor.com	773-638-1400
Datacolor	www.datacolor.com	609-895-7432
Hallmark	www.hallmark.com	816-274-5111
Hewlett-Packard Company	www.hp.com	650-857-6713
Hunter Associates Laboratory, Inc.	www.hunterlab.com	703-471-6870
IsoColor Inc.	www.isocolor.com	201-935-4494
Pantone, Inc.	www.pantone.com	201-935-5500
Xerox Corporation	www.xerox.com	585-422-1282

ISCC Member Bodies

American Association of Textile Chemists and Colorists (AATCC)
American Society for Testing and Materials International (ASTM)
American Society for Photogrammetry & Remote Sensing (ASPRS)
The Color Association of the United States, Inc. (CAUS)
Color Marketing Group (CMG)
Color Pigments Manufacturing Association (CPMA)
Council on Optical Radiation Measurements (CORM)
Detroit Colour Council (DCC)
Federation of Societies for Coatings Technology (FSCT)
Gemological Institute of America (GIA)
Graphic Arts Technical Foundation (GATF)
Illumination Engineering Society of N. America (IESNA)
International Color Consortium (ICC)
National Association of Printing Ink Manufacturers (NAPIM)
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)

Meeting of CIE/USA and CIE/Canada

Oct. 15-16 , 2009

NIST Green Auditorium

CIE/USA and CIE Canada will meet following the joint ISCC-CORM meeting to be held on 13-14 October 2009. CIE/USA and CIE Canada will hold their Technical conference on Thursday, Oct 15 from 9:00 to 16:00. A call for papers will be put out within a month on subjects related to the various divisions, but focused on Applications, i.e., CIE Divisions 3, 4, 5 and 8 concerns. On Friday morning the CIE/USA and CIE Canada administrative committees will meet separately for about two hours.

Details of this meeting will be included in later editions of ORN.

ISCC/CORM 2009 Joint Meeting
Lighting in Artistic, Commercial, and Retail Spaces
October 13-14, 2009
NIST Green Auditorium
Gaithersburg, MD

Last Name/First Name _____

Badge Name _____

Affiliation _____

Address _____

City _____ State/Prov _____ Country _____ ZIP/Postal Code _____

Tel. (Include Int'l Code) _____ Fax _____

E-Mail _____

Registration Fees: (USD) \$150.00 (Includes meeting, breaks and electronic copy (USB drive) of presentations and abstracts)

Students (Copy of valid student ID must be included) \$75.00

Total Amount Due (USD) \$ _____

Cut-off Date for registration: September 25, 2009. No refunds after this date.
On-site registration will not be available.

Payment Method

- Check or money order payable in U.S. Funds on a U.S. Bank to "Inter-Society Color Council"
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Note: As a result of current political events around the world, all attendees for the 2009 CORM_ISCC meeting at NIST, Gaithersburg MD must be pre-registered. No on-site registrations will be accepted. Government issued photo identifications must be presented at the main gate to be admitted to the conference. International attendees are required to present a passport and are required to complete the Foreign National Visitors Form (NIST1260 -- a copy can be found at www.iscc.org/meetings/ST2009/ForeignVisitors1260.pdf). Attendees must wear their conference badge at all times while on the NIST campus.