Inter-Society Color Council *News*

Issue 448 Nov-Dec 2010

New Sustaining Member

In October the ISCC Board of Directors approved Sustaining Member status for the Center for Imaging Science (CIS) at Rochester Institute of Technology. This action is to recognize the long term support of the ISCC by CIS. For more than a decade, the ISCC website has been hosted on CIS servers at no charge to the Council. It is no coincidence that the Munsell Color Science Laboratory is housed within CIS. Organizationally MCSL has long been an active supporter of the ISCC, and is the primary connection to CIS through which the web services have been maintained. Thank you, Center for Imaging Science!

Contents

President's Column

I would like to take this opportunity to update you on the recent changes to the Officers of the ISCC. Our annual meeting was just held in Raleigh, North Carolina at the NC State College of Textiles. The theme was "The Colors of Multi-Colored Things". Where else, but at an ISCC meeting, could you have discussions on Feynman, restoration of old masters, weaving and cloud running? The meeting was very successful and I want to thank the organizers for all their hard work. At the annual meeting luncheon we welcomed in three new directors: John Conant, Nancy Kwallek and Nathan Moroney; a new secretary, Ann Laidlaw and a new treasurer, Cameron Miller. Jim Roberts has agreed to complete Ann's term as director as she is the new secretary. Our new president elect is Scott Fernandez. I would like to thank our out going directors and officers for all their contributions. I need to give special mention and thanks to Hugh Fairman who has been treasurer of ISCC since 1996. I am sure when he agreed to be treasurer he was not expecting the job to last 14 years! I would also like to thank Jack Ladson who has been secretary since 2006.

Frank O'Donnell, newly elected president of ISCC with outgoing president, Maria Nadal

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In 2010 we have had two other meetings one in March and one in June. The March meeting was with CORM and was held at NIST. The topic was "Lighting in Artistic, Commercial, and Retail Spaces". The June meeting was with ASTM and C.I.E Div 1. Its theme was "Standards: What they are - What will they be? - What should they be?"

We are planning meetings for 2011. There will be a joint meeting with AATCC in April. The dates proposed are April 28-29, 2011 and the title is expected to be "4M Color Management: Multi-Media, Multi-Material Color Control." Our close ties with AATCC, I am sure, will make this meeting as successful as the one we had in 2007. The ISCC has just become a corporate member of AATCC. For June 2011 we are planning on having our annual meeting in Rochester New York combined with an "Oxford" conference. The "Oxford" conference covers all the latest advances in spectroscopy. All the details for this are still being worked on. We are also investigating having an ISCC Special Topics meeting following CIC next year in San Jose.

This newsletter is also undergoing a change in editorial staff with Dave and Patty Wyble taking the lead. Tek and Mary McKnight are leaving the newsletter in good hands. I think we are all very grateful to both Tek and Mary for all their hard work producing this excellent newsletter over the past years.

All the changes we are making will continue to make the ISCC a vibrant and active organization and I am looking forward to my years as President of our society.

Frank O'Donnell

HUE ANGLES

(send contributions to mbrill@datacolor.com)

Some experiments are fun and not painstaking. Here is one from my student days….

Afterthought on afterimages: Green flashes and green lights

Afterimages from bright lights are usually undesired and hardly ever helpful, but they can tell you something about the visual system. Here's an experiment you can try at home, that shows a remarkable interaction of your two eyes during an afterimage. You will need a strong pen-light overlaid by a green filter, a strong, directed white light (such as a 500-watt fiber-optic projector), a magnifying glass lens, half a ping-pong ball (placed over the right eye), and a white wall under artificial light (incandescent will do). The problem, as you do the experiment, is to explain the afterimage effect.

First of all, hold the green pen-light at arm's length and flash it into your left eye. Then look away at the white wall. The long-lasting dark (negative) afterimage will look magenta at first and then turn bluish purple. This happens whether or not your right eye is open. Closing the left eye or dimming the light on the white paper makes the afterimage turn bright green (positive).

Now repeat, but when you look at the wall with your left eye, shine the projector into your right eye through the half ping-pong ball, producing a uniform field that won't distract you from the left-eye's afterimage. I think you will see the afterimage in the left eye flash bright green for a second and then return to a dark purple appearance. By the way, the projector should be about 3 feet away from your right eye, and you should look at it only through the ping-pong ball.

As long as the negative afterimage persists, the green flash can be elicited repeatedly by turning the projector light on and off. The flash is the same color as the light occasioning the afterimage (in this case green). The green flash cannot be attributed to stray light entering the left eye from the light producing the uniform field on the right eye: More light in the left eye just makes the afterimage appear darker and more purple. On the contrary, the flash effect is similar to the polarity reversal that happens when light is *dimmed* in the left eye.

So why is this happening, and how can you prove it?

Give up? Well, it seems that when you turn on the light in the right eye, the right-hand iris contracts, and that causes the left-hand iris to contract as well. That dims the light from the white wall by decreasing the pupil diameter. (This effect will be strongest in young people who still have some action in their irises.)

How can I show this? Repeat the above experiment, instead of looking at the white wall, look at a distant white light source through the magnifying glass. Position the lens so its near focal point is in the plane of the pupil, sending light through the middle of the pupil without being affected by the iris. You'll know you have the right distance when the image of the light source floods your whole retina. Now turn on the projector to the right eye, and lo! The green flash will not appear.

It might appear that you need about eight arms to do this, so it is not as casual an experiment as I have led you to believe. But it is not quantitatively demanding, and I published it without incident for a small audience at MIT [1]. As of this year, you can read any of the progress reports on the Web. It costs no money, and the complete obscurity of this unrefereed publication is balanced by its refreshing availability to all, without passing a toll gate. Academic freedom has turned inside out, and we have found an unexpected place where the green light is flashing.

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1. M. H. Brill, Binocular afterimage effect, MIT Research Lab. of Electronics Progress Report, PR 120, pp. 168-169 (1978). [http://dspace.mit.edu/bitstream/handle/1721.1/56698/RLE_PR_120_XXVI.pdf?sequence=1].

Michael H. Brill, datacolor

Joanne Zwinkels Receives Macbeth Award

Maria Nadal presented the Macbeth Award to Joanne Zwinkels during the luncheon of the ISCC annual meeting October 7, 2010. The citation for her award reads, "The ISCC wishes to honor Dr. Joanne Zwinkels with the 2010 Macbeth Award, for the development of the metrology program in support of the international paper trade."

Maria Nadal presenting Macbeth award to Joanne Zwinkels

Dr. Zwinkels' most outstanding achievement is the development of a two-monochromator reference spectrofluorimeter for absolute radiometric calibrations of fluorescent materials over a wavelength range of 250 nm to 1050 nm.

Dr. Zwinkels designed and built the instrument to match CIE and ASTM standards for measurement geometry and achieved a measurement uncertainty that is typically better than 1% at a 95% confidence level. The instrument has enabled NRC to become the first National Metrology Institute in the world to offer calibrations of the color of fluorescent materials and it is now used extensively for the calibration of a variety of fluorescent papers, plastics, textiles and retro-reflective materials.

Full details are to be found in the paper "Instrumentation, Standards, and Procedures Used at the National Research Council of Canada for High-Accuracy Fluorescence Measurements" by J.C. Zwinkels and F. Gauthier in Analytica Chimica Acta 380, 193-209 (1999).

The NRC diffuse reflectance factor scale, which Joanne is responsible for, is based on the NRC absolute reflectometer which is one of only three ISO-authorized reference reflectometers in the world.

During the late 1980s, it became apparent that there was a significant difference between the photometric levels traceable to NRC in Canada and to PTB in Germany. The third authorized reference reflectometer was not in use at time. Joanne took the initiative to organize bilateral comparisons and intense discussions between the two institutes. As a result of careful diplomacy as well as careful science, Dr. Zwinkels and her German colleagues were able to resolve the issue. This was extremely important to the paper industry as the cost of the extra bleaching required to span the difference amounted to at least CDN$100 million per year. As a result of her efforts, Joanne received a personal letter of thanks from the responsible ISO Committee. These two achievements, combined together, provide a complete measurement solution to the paper industry for the measurement of the color, brightness and whiteness of papers

Joanne Zwinkels is a senior research officer with the Institute for National Measurement Stadnards, National Research Council of Canada (NRC). She obtained her PhD in Physical Chemistry from the University of Alberta (1983) with specialization in the infrared optical properties of solids. She joined NRC in 1984 and in 1991 was appointed the Head of the Photometry and Radiometry Group. She has developed new instrumentation, procedures, and reference standards for high-accuracy spectrophotometry, spectrofluorimetry and gloss and her current research activities involve the development of a versatile reference goniospectrophotometer for specular gloss calibrations at several standard geometries and visual appearance characterization of gonioapparent materials.

Joanne is active in standards organizations and committees, such as CCPR, CIE and ISO, and professional societies such as ISCC and CORM. She was president of the ISCC (2004-2006), a past member of the ISCC Board of Directors, the Canadian delegate to the CCPR, the NRC liaison to CORM, the Vice President of the Canadian National Committee of the CIE, the Canadian member for CIE Division 2, the Chair of a CIE technical committee on fluorescence measurements, and a member of several CIE and ISO committees on the characterization of spectrophotometers, geometric tolerances for colorimetry, practical daylight simulators and optical properties of paper.

Metameric Blacks: A Color Curious Column

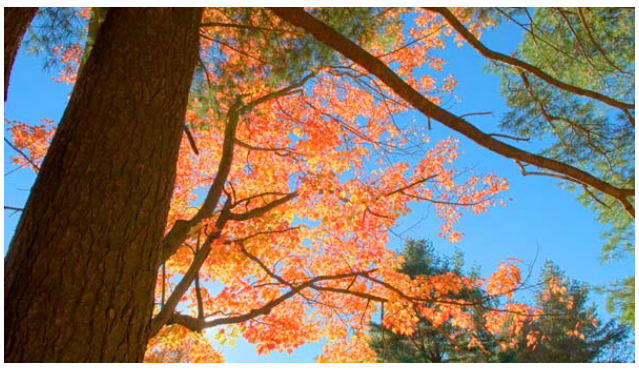
Ever wonder ... "why do leaves change in the autumn?"

There are several reasons leaves change color and function in the autumn. One that is sometimes overlooked is that it is very difficult for trees in northern climates that have snowy winters to bear the weight of snow on their leaves. Losing their leaves in the winter means less snow stays on the trees and they don't need to be so strong to survive until the warm weather in spring.

More often, people focus on the beautiful color changes in leaves that take place in the autumn in many places around the world. Why do those color changes happen? And how?

As the days grow shorter and colder, there is no longer enough light and water for the leaves to use (along with carbon dioxide from the air) to produce the food plants need for survival. The plants switch to stored food and when they shut down their food production by chlorophyll and photosynthesis, the green-colored chlorophyll begins to disappear from the leaves. We often are left to see the colors that are left behind. Many times these colors are simply dull browns and tans. However, some types of trees leave behind bright yellow and orange colors that we can see in the autumn. And some other plants actually start to produce other colors, like purples and reds, in the fall when the chlorophyll goes away. Eventually even these colors fade away as the leaves quit working and sever their connections to the trees. Then some wind or rain comes along and they "fall" off the trees to make room for new leaves in the spring.

The accompanying image shows sunlight passing through the leaves of a sugar maple tree, native to the northeastern United States and southeastern Canada. They produce beautiful brilliant orange colors in the autumn. Read more about changing leaves at www.sciencemadesimple.com/leaves.html.

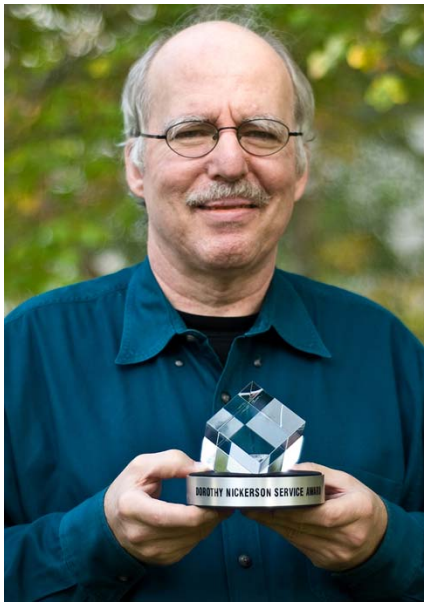


Content of this column is derived from *The Color Curiosity Shop*, an interactive website allowing curious students from pre-school to grad-school to explore color and perhaps become interested in pursuing a science education along the way. Please send any comments or suggestions on either the column or the webpage to me at <*mdf@cis.rit.edu*> or use the feedback form at <*whyiscolor.org*>.

Mark D. Fairchild, Center for Imaging Science

MIchael Brill Receives 2010 Nickerson Award

Rob Buckley presented the 2010 Nickerson award to Michael H. Brill during the luncheon of the ISCC annual meeting in Raleigh, NC on October 7, 2010.



The award citation reads, "The Nickerson Service Award will recognize Mike's significant and long-standing contributions to ISCC. His contributions include his tenure as Interest Group 1 chair, followed by his elevation to Interest Group Coordinator, and his active work on multiple conferences on color technology, vision, digital displays and standards, including serving as Technical Chair for several Annual Meetings. Mike's service to the Society ranges from deep administrative support and leadership as President, to his launching of and regular contributions to the "Hue Angles" column in the ISCC Newsletter, and nearly everything in between. Mike has contributed his considerable talent and energy to the ISCC for over 20 years."

ISCC 2010 Annual Meeting Report

The 2010 annual meeting of the Inter-Society Color Council was held October 7 and 8, 2010, at the College of Textiles of North Carolina (NC) State University in Raleigh, North Carolina. The meeting featured 16 oral presentations spanning the broad interests of the ISCC. The Thursday session was devoted to talks from the three ISCC Interest Groups: IG1 (Basic and Applied Color Research); IG2 (Industrial Applications of Color) and IG3 (Art, Design and Psychology) under the general meeting theme of "How to control the color of multi-colored objects." The Friday morning was devoted to the Education Session on topics of color measurement and management.

The meeting opened with an entertaining presentation by the Meeting Chair, Dr. David Hinks, who gave some interesting facts about Raleigh and North Carolina State University. He also welcomed the more than 20 new ISCC members, many attending their first ISCC meeting, including several students from NC State University who also helped with the meeting organization and logistics.

The technical part of the meeting was opened with a Keynote address from ISCC Past President, Dr. Robert Buckley, who gave a talk entitled "*Color in digital preservation, digital in color preservation*." Rob discussed the issues of long term sustainable preservation of images which are susceptible to color deterioration. These issues are being addressed in a CIE technical committee (TC 8-09), chaired by Rob, which is working on recommending a set of techniques for the accurate capture, encoding and long-term preservations of color descriptions of digital images. Rob described the particular case, of JPeG200 (JP2) which is being considered as a preservation archiving format.

The first speaker in the Interest Group 1 Session was North Carolina State University graduate student, Juan Lin, who spoke on the role of texture in the perception and measurement of whiteness. Both visual and instrumental data were presented for bleached woolen textile samples with different surface patterns that indicated that texture influenced whiteness values. This was particularly significant for samples of close L* and tint values.

The next speaker was Michael Brill of Datacolor and meeting Technical Chair, who gave a provocative talk entitled "*Feynman's paint-mixing problems – redux.*" This was a follow-up to Mike's Hue Angles article in the Feb. 2009 issue of ISCC News. Feynman was the recipient of the 1965 Nobel prize for quantum electrodynamics, whose eclectic interests ranged from playing the bongo drums to contemplating the great problems of his day in theoretical physics. The color question asked by Feynman was 'How do you get yellow without using yellow?' Feynman said you can't. Mike probed this question by considering the mixing of a theoretical red and white, under both a Beer's law and Kubelka-Munk (KM) analysis. This simulation did go through yellow---more strikingly with the KM analysis, in which small departures from zero colorant density give much larger chromaticity changes than in Beer's law. Thus, Feynman's intuition was refuted but there was a lively discussion at the meeting as to whether there were real world examples that can be used to convincingly demonstrate this effect. There were several examples given for Beer's law color mixtures but no examples for KM color mixtures could be identified.

Carol Revels, a color consultant and former Gap Color Director, described the results of a round-robin study to assess the ability of experienced color reviewers to provide accurate color difference comments. The results of this study were surprising, showing that the ability to "see" small color differences did not predict one's ability to "describe" these differences. The implications of these inaccurate color comments result in extra work, delayed production, and sacrifice in accuracy. The take-away message is that a combination of visual and instrumental methods is needed to provide the most efficient system for retail color decisions.

The next talk was given by Gang Fang, a doctoral student at NC State University, who described an instrumental assessment procedure for complex multicoloured patterns. The non-contact color capture system that was evaluated employed a commercial digital camera and a high end monitor that were calibrated using in-house developed algorithms. The effectiveness of these algorithms for improving color accuracy was tested using a series of camouflage samples as well as a standard test color chart. These results showed that this camera-based method is a promising approach for the assessment of appearance of objects containing complex colored patterns.

The final talk in the IG1 session was given by Joel Trussell, a professor in the Electrical and Computer Engineering Department of NC State

University. His talk was on the estimation of maximum color error via spectral simulation. To evaluate possible color errors with new device models or processing algorithms, it is often more efficient to use simulated spectra rather than the measurement of large numbers of physical samples. However, the accuracy of this approach depends upon the quality of the simulated data as representative of realistic spectra. In this study, 1000 artificial reflectance spectra were generated by three different methods: a statistical method, an artificial neural network, and a set theoretic approach, and these were compared with a real data set comprising 170 samples. All three methods gave comparable average color differences, but the statistical "copula" approach gave the smallest maximum color difference.

After the IG1 session, the lunch banquet and annual business meeting were held. The highlights of the banquet were the presentations of an Honorary membership, the Nickerson Service and Macbeth Awards. The Honorary membership was presented to Rolf Kuehni with citation read by Mike Brill that recognized Rolf's tireless contributions to the ISCC over four decades in color education. The 2010 Nickerson Service award was presented to Mike Brill of Datacolor, with citation read by Rob Buckley, that recognized Mike's wide-ranging contributions to the Society from administrative and technical support, to leadership as President, to his launching and regular contributions to the "Hue Angles" column of the ISCC Newsletter. The 2010 Macbeth Award was given to this reporter, Joanne Zwinkels of the National Research Council of Canada, with citation read by ISCC President, Maria Nadal. The Macbeth Award recognized my contributions to the advancement of spectrophotometric instrumentation and standards for the field of color and appearance measurement, notably for the color measurement of fluorescent materials.

After lunch, the technical talks in IG2 and IG3 were given. The first talk in the IG2 session was given by Meeting Co-Chair, Ann Laidlaw of X-Rite. Her paper on color tolerances in black and white explored the question of how to set appropriate tolerances that are not too tight or too loose. Ann outlined various strategies taken in industry and their possible consequences, including undermining credibility. The "best practice" recommendation was to select a pass/fail threshold with very low false negatives and then select a marginal threshold with very few false positives. This talk generated a lively discussion, highlighting the differences in requirements between dyers and color analysts and the underlying problems of communication and need for early color education.

Daniel Gazda of Wyle Integrated Science at the Johnson Space Center gave a talk on colorimetric solid phase extraction using color to monitor spacecraft water quality. His introductory comment to this subject was that "measuring color really is rocket science." Colorimetric monitoring is used in space to analyze water and food samples to ensure water quality and support crew health. This paper described the application and in-flight results of a colorimetric solid phase extraction (CSPE) technology for ensuring safe, effective levels of biocides, such as silver and iodine, in potable water systems and its potential application to both spacecraft and terrestrial environments. There was an interesting follow-up discussion about physiological changes from space travel, including changes in visual function due to changes in the shape of the cornea.

The final talk in the IG2 session was given by Gabriele Kigle-Böckler of BYK-Gardner, who gave a presentation on objective mottling control at the line with new and innovative testing technologies. Mottling is a very specific appearance aspect that is important to the automotive industry and is described as a cloudiness of metallic coatings where you have irregular areas of lightness or color variation. She described how this undesirable paint defect was evaluated by psycho-physical experiments and the results of these visual studies were used to design an objective metric for quantifying mottling effects and defining limits for production QC. The results of these experiments were used in the design of a new testing instrument, the cloud-runner, which objectively measures these mottling defects. Representative results were shown for white and black pearl and silver finishes.

The first paper of the IG3 session was given by Rolf Kuehni of NC State University. This was the first of two tutorial talks given by Rolf and was entitled "*A brief history of yellow, red, and blue as chromatic primaries in painting.*" This was a retrorespective view of the evolution of generating color by using different primary colorants. This survey started with Aristotle in 384-322 BC, who identified the same 5 chromatic species that Munsell used in 1907 to build his color order system, namely:

Continued on page 9

Color Research and Application IN THIS ISSUE, December 2010

We open this issue with an article by Garrett M. Johnson, Xiaoyan Song, Ethan D. Montag, and Mark D. Fairchild. They begin by reviewing both theoretical and practical opponent color spaces. While the human visual system does not have spatial filters as such, they are widely used in image processing and gamut mapping. If the filters are not independent (i.e., orthogonal) they can produce unwanted artifacts in an image when performing linear spatial filtering for image difference metrics, image quality assessment, and image encoding/compression. In their article, "Derivation of a Color Space for Image Color Difference Measurement," the authors present the derivation of a new color space and corresponding spatial filters specifically designed for image color difference calculations. They suggest using the data they present as guidance for the development of orthogonal color spaces and contrast sensitivity functions.

Color rendering is currently a "hot" topic in Division 1 of the Commission Internationale de l'Éclairage (CIE). The technical committee (TC) 1.69 - Color rendition by white light sources has been examining metrics for the evaluation of various sources. In our next article, "Color Rendering: Beyond Pride and Prejudice" Jean Paul Freyssinier and Mark Rea follow up on their earlier article "Color rendering: A tale of two metrics." [Vol. 33:192–203 2008] by presenting the results of a study was conducted to determine whether sources, both warm and cool, with high color rendering index scores (above 80) and gamut area index values (above 80 and less than 100) were judged better than ones with high levels of just one or the other indices. They conclude that evaluation of a source must be at least a two-step process.

Another relatively new technical committee in Division 1 of the CIE is TC 1.77 on the Improvement of the CIE Whiteness and Tint Equations. Although predating the formation of this TC our next article, "Quantitative Evaluation of Perceived Whiteness Based on a Color Vision Model" could be of interest to that committee. Rather than considering the CIE Whiteness index, Ichiro Katayama and Mark D. Fairchild report on a perceived whiteness evaluation index developed by Dr. Katayama, which was defined on the basis of a color vision model with a focus on the brightness-enhancement effect of color components that are included in approximately white objects and light sources. They then compared this new index to 17 other whiteness indices for performance on test samples.

Unique hues are fundamental colors that appear pure, that is they seem to be composed of only one color with none of the adjoining colors on a hue circle mixed into the color. For example, unique red seems neither yellowish nor bluish, but rather only red. While the concept of unique hues is simple, various procedures have been used to identify the exact hues that appear unique. Given the importance of the unique hues as theoretical constructs and the interest in the nature and sources of individual differences in them, identifying which tasks can characterize them most reliably seems like a worthy question and is the topic of our next article. Renzo Shamey, Michael Sedito, and Rolf G. Kuehni compared unique hue settings from two different tasks. In one task the observer was shown the full ordered hue circle of Munsell chips and had to pick the hue. In the other they were shown individual chips in random order and had to scale the relative hue components. Please read "Comparison of Unique Hue Stimuli Determined by Two Different Methods Using Munsell Color Chips."

In the April issue of this journal Ralph W. Pridmore formulated the nonspectral mechanisms for color constancy, in the second part of a series of articles on "Color Constancy from Invariant Wavelength Ratios. Now in this issue, we have Part III, "Chromatic adaptation theory, model, and tests." In this article, Dr. Pridmore describes a new approach and method for predicting color constancy by a colorimetric model of chromatic adaptation. The success of the model is tested using the measured shifts of color perception for different known datasets, collected independently and using different methods. Furthermore Dr. Pridmore states that there is a secondary aim for the article: "to progress the research of color constancy by presenting a physiologically plausible theory and a remarkably simple model rather than a practical commercial model."

Our final article for this issue and year examines the "Color Characteristics of Costumes for Korean Folk Festivals and Color Consciousness of Koreans." In this article Ji Young Kim after an extensive review

Continued on page 9

of the use of color in folk festivals and games, concludes: 1) Costumes for festivals such as folk games and folk plays had a sacred meaning as ritualistic robes; 2) The colors seen in Korean folk festivals originated from shamanism rather than from the philosophy of yin/yang and five elements; 3) Five element colors in costumes for Korean folk festival were used as a means of circulatory thinking, freeing the person from the reality of one's daily lives; and 4) The color consciousness of Koreans was vividly illustrated in their costumes for folk festivals.

Beginning with this volume we forgo our annual index, bowing to the reality of limits on our printed space and the ease of searching for material on the Color Research and Application website.

Ellen Carter
Editor, Color Research and Application

ISCC 2010 Annual Meeting Report *Continued from page 7*

yellow, crimson, purple, green and blue, that were ordered between white and black according to lightness. It was interesting to note that through the ages, the identification of these important primary colours has been largely based on beliefs rather than experiments, such as the idea that they are related to the 4 alchemical elements: fire, air, water and earth; or that there was a correlation to the 7 musical tones. The belief that there were 3 perceptual color primaries: yellow, red and blue originated in the 17th Century and this idea has continued to be perpetuated in the popular media, although painters have long known that these choices for primaries are limiting and that the largest gamut of colors is produced by yellow, magenta and cyan.

The second talk in this session was given by Roy Berns of RIT who described his work with the curatorial and conservation staff of the Van Gogh Museum in Amsterdam to reconstruct the original colors of Vincent Van Gough's "The Bedroom". There are significant color changes between Van Gough's written descriptions of this painting and its current condition, particularly to the wall, door, and floor colors. From chemical analysis, it has been determined that the original geranium red lake pigment used in this painting has largely faded away. By using Kubelka-Munk theory to calculate the absorption and scattering of this colorant and modelling the change of color between the present and 1888, Roy was able to mathematically generate a rendition of the restored image that was in good agreement with the original description of this work and with the views of the curator staff.

In his second presentation, Rolf Kuehni gave a tutorial entitled "*A brief history of the color circle.*" This historical survey started in 1629 with the first representation of colors in circular form and this arrangement continues to be the accepted format for demonstrating the continuity and closedness of hue percepts. The main developments in the hue circle have been the use of equal perceptual increments or steps of equal perceptual distance.

The last talk in the IG3 session was given by Carl Jennings who teaches art and creative thinking at the University of Hawaii. His presentation entitled "*Revisioning color*" explored the phenomena of "boundary colours" which are colors that arise when you look at light-dark boundaries through a prism. Goethe argued that the clearly perceived distinct, rather than continuous color bands, dependent upon the boundary orientation, were not explained by Newton's physical theory of light and color. Jennings described a new theory, known as channel theory, and its mechanism of trichromatic polarity or trichrolarity, that provides a simple and elegant explanation for unifying boundary colors and other color phenomenon that have not yet been fully explained. This was a very provocative and wonderfully illustrated presentation that challenged the audience to reassess their most basic assumptions about the perception of color.

After the end of the talks on Thursday, the attendees and their guests enjoyed the opportunity to partake in a hands-on textile printing activity, and a southern hospitality barbeque dinner, generously sponsored by X-Rite Pantone. The next day, several of the attendees proudly wore their crimson red t-shirt creations, sporting both the ISCC logo and the meeting venue at NC State University. This educational and fun activity was captured in a photo essay by David Hinks and will be posted in the near future at the ISCC web-site: www.iscc.org.

The next morning was devoted to the Education Session, Chaired by Dave Wyble. The first tutorial was given by Larry Steenhoek of Dupont Performance Coatings, entitled "*Measurement and specification of gonioapparent color.*" The basic principles, terminology, instrumental measurement, and new directions and standardization issues were discussed with emphasis on automotive coatings. The

Continued on page 10

Continued from page 9

second tutorial was given by Roland Connelly of X-Rite, entitled "*Do's and don'ts of color instrument correlation studies: How to get meaningful results.*" This presentation provided valuable information to companies, organizations or anyone who is setting out to evaluate the level of agreement between different instruments in measuring color. Practical advice on setting realistic goals, designing experiments, and analyzing results was given as well as tips on avoiding common mistakes. The final tutorial was jointly presented by David Hinks and Nancy Powell of NC State University, in a talk entitled "*Color Management of Textiles.*" This presentation reviewed strategies to enhance the process from "concept to consumer" and identified some of the best practices in applying color science to the design and management process. This was very a tactile and wonderfully illustrated presentation that included physical representations from automotive applications, and fashion and home furnishings that brought to life the key points of the tutorial.

To summarize, the 1½ day meeting included excellent technical sessions providing an overview of current research activities and advances in color as it relates to art, science and industry, as well as an excellent color education session, that provided an in-depth exploration of selected topics in color history, measurement and management. The meeting also attracted several new members and provided all attendees with ample opportunities to network, to renew friendships, and to form new connections with colleagues from diverse fields with a common interest in color. The members of the conference organizing committee are to be commended for their hard work in putting together a highly enjoyable and productive meeting.

Joanne Zwinkels, reporter

Acknowledgement: Joanne Zwinkels wishes to acknowledge Ann Laidlow's timely and careful review of this report.

Mark Your Calendars
April 27 - 29, 2011

For an ISCC and AATCC joint meeting,

4M Color Management: Multi-Media, Multi-Material Color Control

Hilton Charlotte University Place
Charlotte, North Carolina

Rolf Kuehni Receives ISCC Honorary Membership Citation

At the business lunch of the ISCC in Raleigh on October 7, the ISCC bestowed Honorary Membership on Rolf G. Kuehni. Honorary Membership in the ISCC is reserved for members who have "rendered signal service to the Council or to those fields served by the individual Member-Bodies of the Council, in such manner as to aid in accomplishing the objectives of the Council."

Michael H. Brill presented Rolf with the award, after a brief speech. Besides describing Rolf's extensive qualifications (see ISCC News # 447 for this material), the speech included the following personal highlight:

Michael Brill presenting honorary membership award to Rolf Kuehni

"On a personal note, I met Rolf at the AIC Monte Carlo meeting in 1985. He strongly disagreed with my poster paper. Because he was soon to be the Editor-in-Chief of *Color Research and Application*, I thought I was doomed never to publish there. But, although Rolf debated vigorously with me in that journal, he was willing to publish my view with which he disagreed. In general Rolf gave fair hearing to a diversity of views."

After accepting the award, Rolf suggested that a complete list of Honorary Members be posted on the Web. Such a posting has since been made, at http://www.iscc.org/functions/HonoraryMembers.php.

Photo Credits

Photos on pps. 1, 2, 4 and 10 by Cynthia Sturke; p 5, Michael Brill

CALENDAR

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

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2010

Nov 7-9	**IES Annual Conference,** Illuminating Engineering Society, Fairmont Royal York Hotel, Toronto, Canada, www.iesna.org/ac/index.cfm
Nov 8	**ICC-DevCon 2010**, Sheraton Gunter Hotel, 205 E. Houston Street, San Antonio, Texas, www.color.org/DevCon/devcon10.xalter
Nov 8-12	**CIC18, 18th Color Imaging Conference**, Society for Imaging Science and Technology, San Antonio, TX, 703/642-9090, www.imaging.org/ist/Conferences/cic/index.cfm

2011

Feb 2-3	**ASTM E12, Color and Appearance,** Baltimore Marriott Waterfront, Baltimore, MD www.astm.org/COMMIT/COMMITTEE/E12.htm
Mar 22-24	**2011 AATCC International Conference,** American Association of Textile Chemists and Colorists, Charleston, S.C., www.aatcc.org/ic/2011/index.cfm
Apr27-29	**4M Color Management: Multi-Media, Multi-Material Color Control,** Inter-Society Color Council (ISCC) and American Association of Textile Chemists & Colorists (AATCC) Meeting, Hilton Charlotte University Place in Charlotte, North Carolina, www.iscc.org
May 16-19	**Archiving 2011,** Society for Imaging Science and Technology, Salt Lake City, Utah, www.imaging.org/IST/conferences/archiving/
May 15-20	**50th International Symposium, Seminar, and Exhibition,** Society for Information Display, Los Angeles Convention Center, Los Angeles, CA, www.sid.org/conf/sid2011/sid2011.html
Jun 7-10	**2011 AIC Midterm Meeting, Interaction of Color and Light**, Zurich, Switzerland, Organizer: Pro/colore, www.aic2011.org

Passing the Torch and Moving On

Starting with the January/February 2011 issue of the ISCC newsletter, I am relinquishing my role as editor. It has been a great privilege sharing information with you. I wish our new editors, Dave and Patty Wyble (newsletter@iscc.org) best wishes.

Gultekin Celikiz, editor

ISCC Sustaining Members

Avian Technologies	www.aviantechnologies.com	**603-526-2420**
BYK-Gardner USA	www.byk.com/instruments	**301-483-6500**
Color Communications, Inc.	www.ccicolor.com	**773-638-1400**
Datacolor	www.datacolor.com	**609-895-7432**
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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**
RIT's Center for Imaging Science	www.cis.rit.edu	**585-475-5944**
Xerox Corporation	www.xerox.com	**585-422-1282**
X-Rite Incorporated	www.xrite.com	**616-803-2113**

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)

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)

The Society for Color and Appearance in Dentistry (SCAD)

Society for Information Display (SID)

Society of Plastics Engineers, Color & Appearance Div. (SPE)

Society for Imaging Science and Technology (IS&T)

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.

Issue # 448 **Nov/Dec 2010**

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All submissions must be in English. Please submit materials by the 15th of each even numbered month.