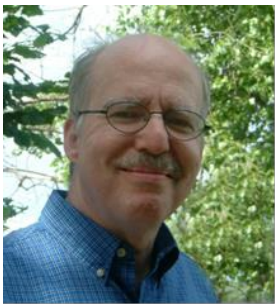
Inter-Society Color Council *News*

Issue 466 Spring 2014

Board of Directors Corner

My name is Mike Brill, and I am bringing you this issue's Board of Directors' column. I joined the ISCC in 1982, served on its Board of Directors from 1992-1995, was ISCC President from 1998-2000, and have returned to the Board for a second term (since 2011). I'm the Director of Research at Datacolor, where I started as Principal Color Scientist ten years ago. I have a Ph.D. in physics from Syracuse University, where my dissertation was *Color Vision: An Evolutionary Approach*. Since then, I have been interested in many theoretical issues in color, including metamerism, color constancy, color differences, and color-appearance modeling. Prior to joining Datacolor, I conducted theoretical research in fields such as underwater acoustic modeling, radargrammetry, photogrammetry, and machine vision. Nowadays I enjoy editing and writing the Hue Angles column, a specimen of which is in this issue of ISCC News.



Most recently, I have helped organize the ISCC's part of the Color, Light, and Appearance Week to be held at the National Institute of Standards and Technology (NIST) on June 16-20. The ISCC Symposium will be held on Wednesday, June 18, and will include the ISCC Annual Luncheon. The program is published on page 4 of this ISCC News. You can also find the program (with abstracts)-------and a registration form------at www.iscc.org/meetings/ST2014/. To attend, you must register ***before June 2***, so as to allow NIST time to process the administrative details for visitors. Don't miss this week of synergy between the ISCC, CIE Division 1, and ASTM E12!

You can also register at a group rate with the conference hotel (the Hilton on Perry Parkway) via http://www.hilton.com/en/hi/groups/personalized/G/GAIGHHF-ISC-20140615/index.jhtml?WT.mc_id=POG.

In observance of AIC's new "International Colour Day" March 21, the ISCC has posted three contributions: An email survey of popular colors, an email survey to determine whether a blue-green patch was judged blue versus green, and a posting of color researchers born in the 19th Century (http://www.iscc.org/resources/HistoricColorScientists.php). The blue-green patch experiment was to present such a patch on a gray background and ask the respondent to pronounce either "green" or "blue" and also state his/her gender. The hypothesis (based on a few test cases) was that men tend to respond "green" more often than women do. This hypothesis was confirmed by the study. Interpretation of the result is still being pondered. Results from the most popular color survey can be found on page 5 of this newsletter.

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	Mr. Kim Vlaun	Artist/Educator

Board of Directors Corner continued

On behalf of ISCC, Paula Alessi has written a great summary of 2013 ISCC activities for the AIC Annual Newsletter. Although we did not have an in-person meeting in 2013, Paula's report shows that a lot went on as we continue forward. This report will be shared with ISCC membership as soon as AIC publishes it.

And ISCC just gained a new Membership Secretary: Joann Taylor has graciously accepted this position, and we express our thanks! She will officially begin in July. For more about Joann, see p. 10.

Finally, I reiterate the request of our last edition of Board of Directors Corner: The ISCC depends on volunteer members to contribute technical, administrative, and creative ideas and energy. We need your help to shape the new ISCC.

Michael H. Brill
Datacolor, Board Member

AIC Interim Meeting 2014, Oaxaca, Mexico.

Color and culture. October 21 – 24, 2014

AIC 2014 INTERIM MEETING 3ER ENCUENTRO MEXICANO DEL COLOR *el color y la cultura*

Theme: Colors, culture and identity: past, present and future

Date: 21 - 24 October 2014

Venue: Hotel Misión de los Ángeles, Porfirio Díaz 102, Reforma, 68050 Oaxaca

Organizer: The Mexican Color Researchers Association (AMEXINC)

Info: aic2014oaxaca@gmail.com

www.aic2014.org

REGISTRATION OPEN!!!

Early payment fee: from September 1st, 2013 to July 31st, 2014

Normal payment fee: August 1st, 2014 – September 30th, 2014

ISCC 2014 Meeting Update

June 2nd Registration Cutoff

Our plans are coming together for a great week of meetings at the National Institute of Standards and Technology. The Inter-Society Color Council centers it all with its Symposium and Luncheon on Wednesday, June 18th. Come for the day or for the whole week.

Here are the answers to some of your questions:

Do I have to be a member of CIE Division 1 or ASTM E12 to attend those meetings?
No, everyone is welcome. Feel free to sit in on the meetings and learn what these groups are doing.

How can I get more information?
Check out the information on the ISCC Website. You can click on the Wednesday Symposium for the complete Symposium Schedule with all the speakers and their extended abstracts. Or click the meeting's home tab to find the invitation with additional details for the week, plus local information such as lists of hotels, area restaurants, driving and airport information, and a Washington DC Metro Map. Most important of all, click on "on line registration" and join us.

Do all the CIE Division 1 Technical Committees meet?
No. But there is a full day on Monday when 12 technical committees have meetings planned. The TCs meeting are:

TC1-63 Validity of the Range of CIEDE2000 (Klaus Richter, chair)
TC1-71 Tristimulus Integration (Changjun Li, chair)
TC1-73 Real Color Gamut (Changjun Li, chair)
TC1-75 A Comprehensive Model of Colour Appearance (Ronnier Luo, chair)
TC1-81 Validity of Formulae for Predicting Small Colour Differences (Klaus Richter, chair)
TC1-82 Calculation of Colour Matching Functions as a Function of Age and Field Size (Jan Henrik Wold, chair)
TC1-85 Update CIE Publication 15:2004 Colorimetry (Janos Schanda, chair)
TC1-89 Enhancement of Images for Colour Defective Observers (Po-Chieh Hung, chair)
TC1-90 Colour Fidelity Index (Hirohisa Yaguchi)
TC1-91 New Meth for Eval the Colour Quality of White-Light Sources (Yandan Lin, chair)
TC1-92 Skin colour database (Kaida Xiao, chair)
TC1-93 Calculation of self-luminous neutral scale (Robert Carter, chair)

Is there time to meet attendees informally?
Yes. BYK, Datacolor, and Konica Minolta are sponsoring a dinner social. Join us Tuesday Evening, June 17th, at the Dogfish Head Alehouse for a special time of networking, meeting new friends and eating good food!! It is part of the registration package.

I've never visited NIST before, can I see what research is going on there?
Yes, Friday afternoon Yoshi Ohno has graciously volunteered to arrange tours of some of NIST's laboratories that are of most interest to attendees.

Whom should I contact if I have more questions?
Ellen Carter at Ellen.Carter@alum.rpi.edu.

What happens if I don't register by June 2?
Then we will miss you.

Tuesday Evening Dinner Social

As fellow participants in the joint meetings, we cordially invite you and your significant other to The Dogfish Head Alehouse for complimentary dinner and ale. Please join us on Tuesday, June 17 from 5:30 – 11:00PM. This is your opportunity to meet with conference speakers and industry leaders. The dinner is kindly sponsored by:

BYK Additives & Instruments

KONICA MINOLTA

datacolor

Preliminary Program for ISCC Bridge Session (June 18, 2014)

INTRODUCTION: 8:00-8:15

COMPUTATIONS: (8:15 – 9:45)

Evaluating Spectrophotometric Uncertainty. Hugh S. Fairman, Resource III, Inc., Tatamy, PA USA; Jack A. Ladson, Color Science Consultancy, Yardley, PA, USA

Toward a Unified Method for Computing Tristimulus Values. Changjun Li, Liaoning University of Science and Technology, Anshan, China

Age- and Field-Size-Parameterized Calculations of Physiologically Significant XYZ Colour-Matching Functions. Jan Henrik Wold, Ivar Farup, Gjovik U. College, Norway

COLOR APPEARANCE: (10:00-11:30)

Virtual Reality as a Surrogate Sensory Environment for Evaluation of Human Luminous Environment. Mojtaba Navvab**,** U. Michigan Ann Arbor MI, USA

Review on One Aspect of Colour Quality: Visual Appreciation. Sophie Jost, Université de Lyon, Ecole Nationale des Travaux Publics de l'Etat, Laboratoire Génie Civil et Bâtiment, Vaulx-en-Velin, Lyon, France

Slope of the Self-Luminous Gray Scale: Independent Converging Evidence. Robert C. Carter, Pennsville, NJ, USA

LUNCH (11:30-12:45)

INSTRUMENTAL ASSESSMENT OF COLOR APPEARANCE: (12:45 – 2:15)

How to Control Color Appearance Within the Interior Automotive Supply Chain. Walter Franz, Datacolor AG, Switzerland

Specification of Gonioapparent Color and Appearance. Larry Steenhoek, Jeff Alspach, Allan Rodrigues (retired), Axalta Coating Systems, Wilmington, DE, USA

xDReflect, a European Joint Research Project devoted to the metrology of the appearance of surfaces. Gaël Obien, Laboratoire Commun de Métrologie LNE-CNAM, La Plaine St Denis, France

COLOR RENDERING (2:30 – 3:45)

Chromaticity of White. Kevin A.G Smet., Geert Deconinck , Peter Hanselaer, University of Leuven, Ghent, Belgium

Assessing Color Rendering Without Test Samples. Lorne Whitehead University of British Columbia Vancouver, British Columbia, Canada

Color Rendering and Museum Lighting: Field Study Based on Refurbishing the Lighting of the Sistine Chapel. Janos Schanda, Péter Csuti, Ferenc Szabó**,** University of Pannonia**,** Veszprém, Hungary

NEW DIRECTIONS (4:00 – 5:00)

Toward a Unified Nomenclature in Fluorescence Spectrophotometry. James E. Leland, Copia LLC Goshen, NH, USA

Evaluation of Targets for Color Calibrating Digital Color Images from Optical Bright-Field Transmission Microscope. Hong Wei, Michael Brill, and Tae Park, Datacolor, Inc. Lawrenceville, NJ USA

AIC International Colour Day March 21, 2014

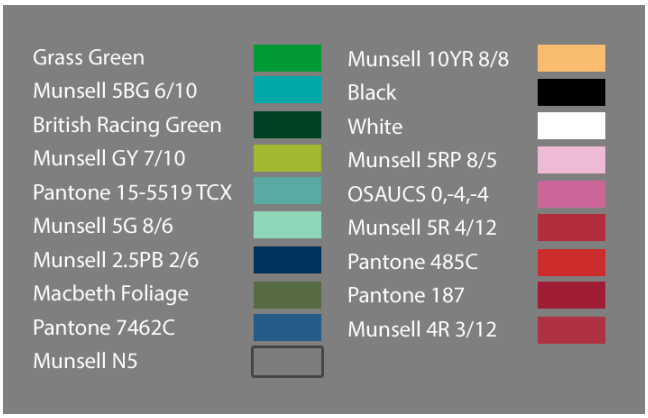
AIC's first annual International Colour Day was a smashing success. Many countries participated in a wide variety capacities.

On behalf of the United States, the ISCC ran an informal survey about currently popular colors in support of AIC International Colour Day. We asked the question:

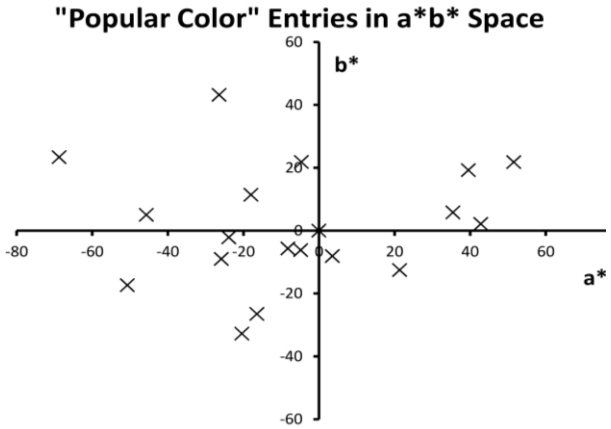
Have you ever thought about what the most popular color is in your everyday work? The ISCC would like to know! This is an informal survey, and just for fun, so please do not stress over your answer.

We received 20 responses (19 unique), which unsurprisingly covered a wide gamut.

Keeping a casual attitude, we converted each entry to approximate sRGB values for ease of casual electronic display. The following graphic shows each one against a neutral gray background.



Entries included several which are clearly red, quite a few that are green, cyan, or blue, plus several neutrals. Plotting their CIELAB values as a* *vs* b* (ignoring luminance) shows that there was only a single entry in the magenta quadrant (OSA-UCS 0,-4,-4), and a single entry in the yellowish b* direction (Munsell 10YR 8/8):



In Taiwan, Professor Tien-Rein Lee composed this clock using the AIC International Colour Day logo: http://www.color.org.tw/?p=906

Activities in other countries featured

- Arts exhibitions, architectural projects, design, decoration, fashion....
- Meetings, debates, scientific events...
- Workshops on the use of colour and light for both adults and children.
- Contests on colour and light design.
- Wearing national or regional identity colours.

For more information on AIC International Colour Day, please visit:

http://en.wikipedia.org/wiki/International_Colour_Day

Increase Online Sales with Orange Buttons

It is interesting to visit http://money.cnn.com/2014/03/20/smallbusiness/boost-online-sales/index.html?hpt=hp_t3 and see how changing button color can increase online sales.

Dr. Roy S. Berns Fulfills a New Dream

Photo of Dr. Roy Berns by Jamie Germano, Rochester Democrat & Chronicle photographer

For years Dr. Roy Berns, a fellow ISCC member, has been leaving a significant mark on the color science community by doing research and publishing articles with his students at the Rochester Institute of Technology's (RIT) Munsell Color Science Laboratory within the Program of Color Science. Recently Roy has had the opportunity to fulfill a new dream. He has been able to share his technology with Sinar to develop a camera–based digital archiving system product for the commercial marketplace.

Sinar is a high-end camera manufacturer based in Switzerland. Their customers are commercial photographers. The workflow for a high-end commercial photographer involves taking pictures and using computer software to make visual adjustments for color improvement and enhancement. This is a painstaking image tweaking process because it requires looking back and forth between the image on the computer screen and the original scene being photographed, adjusting software until the image looks as desired. Such adjustments are prone to human error and are very time-consuming, which can be an efficiency problem for any company.

Roy, and former post-doctoral fellow Francisco Imai, developed and patented a hardware and software solution that works very well for commercial photographers. The heart of the system is a pair of image filters placed in front of a 48-mega-pixel image sensor RGB camera. The image sensor captures separate images for each primary color. Then a computer employs software developed by Roy to reassemble the separate images into a more accurate reproduced image with better color fidelity to the original scene. Roy partnered with Sinar to develop the high-end image sensor camera and controlling software.

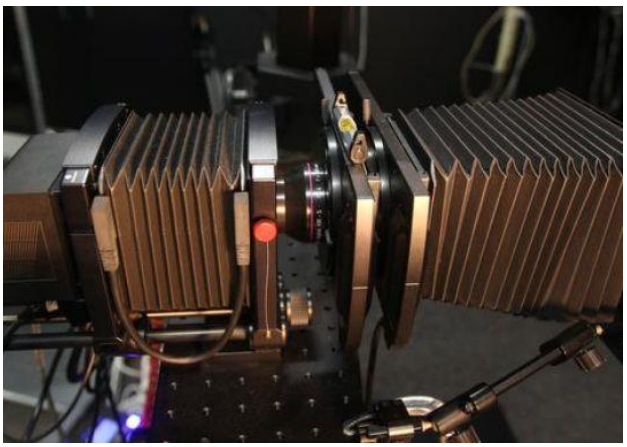


Photo of digital image sensor camera by Jamie Germano, Rochester Democrat & Chronicle photographer

The integrated software and hardware system is called Color to Match (CTM). Details can be found at the Sinar website (http://www.sinar.ch/en/category/products/ctm/). This Sinar product is very similar to a digital archiving system that Roy's research group built by hand for the conservation department at the Museum of Modern Art.

Roy has fulfilled a new dream as high-end commercial photographers are now able to purchase a product featuring his technology to improve their color reproduction workflow. This is a very unique and rewarding experience for a university professor.

2014 Flame Challenge What is Color?

The Alan Alda Center For Communicating Science at Stonybrook University conducts an annual international challenge (Flame Challenge) asking scientists to explain a complex scientific topic in such a way that an 11-year old can better understand it. This year the Flame Challenge topic was What is Color? The judging is done by 11-year old students and takes place from April 30 – May 6. The winners (one with a visual answer and one with a written answer) will be announced at the World Science Festival on June 1st. Please visit http://www.centerforcommunicatingscience.org/the-flame-challenge-2/what-is-color/ for more details on this fascinating endeavor.

Metameric Blacks: A Color Curious Column

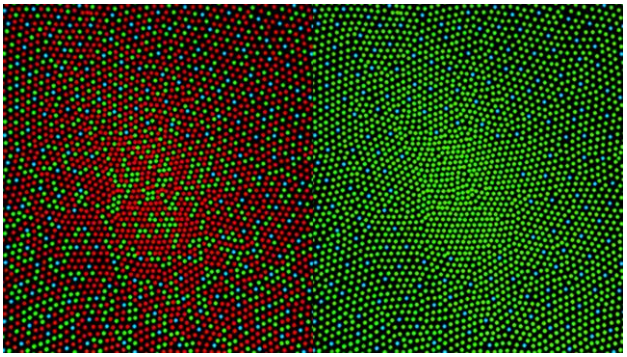
Ever wonder ... "Why are some people color blind?"

Genetics. We are all different in many ways due to genetics. Genetics is the study of how traits are inherited from our parents and earlier generations. For example, you might have red hair, blue eyes, or a hitch-hiker's thumb that you inherited from your parents. Color blindness is one such trait. And just like we might be tall or short due to the genetic codes we inherited from our parents, we might end up with different sorts of color vision.

While not everything about color vision and color blindness is fully understood, the inheritance of color blindness is fairly well documented. Most types of color blindness are considered a sex-linked genetic trait. Genetic means that it is inherited (not acquired from the environment) and sex-linked means that the genes that encode color vision are on the same chromosomes that determine our gender. These genes are on the X-chromosome. Females have two X-chromosomes (one from the mother and one from the father) while males have just one X-chromosome (from the mother) and a Y-chromosome (from the father). Since much information on color vision resides on the X-chromosome, women have two opportunities to inherit full, normal color vision (they must inherit two faulty X-chromosomes in order to become color blind). Males, on the other hand, only have one X-chromosome and therefore only one chance to inherit normal color vision. If they inherit an X-chromosome from their mother that encodes deficient color vision, then that's what they have.

This is why color blindness is so rare in females (less than 0.5% of the population) and far more common in males (about 8% of the population). Women can carry the deficiency without expressing the trait, while men that are carrying the deficiency also have the trait. Life is not fair!

The image shown here is a cartoon illustration of the mosaic of cones in the human retina. Each circle represents a cone photoreceptor. On the left, they are colored in red, green, and blue to represent the approximate wavelengths of light that each type of cone senses and the relative populations of the various cone types. The right side of the image shows the same cone mosaic for a person with a certain type of color blindness, protanopia. Here the protanopic observer has no red-sensitive cones. Instead all of those cones are green sensitive.



Content of this column is derived from *The Color Curiosity Shop*, an interactive website, also available as both English-language and Spanish-language books, 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 <*mark.fairchild@rit.edu*> or use the feedback form at <*whyiscolor.org*>. This specific topic can be found at <*http://whyiscolor.org/Questions/1-7.html*>.

Mark D. Fairchild
Rochester Institute of Technology

Cameron Miller to Receive the ISCC Nickerson Service Award

The Board of Directors is happy to announce that our Treasurer, Dr. C. Cameron Miller, will receive the ISCC Nickerson Service Award during the Annual Business Luncheon at the ISCC Bridge Session on June 18, 2014 at NIST. Please come and congratulate him!

HUE ANGLES

(Send contributions to mbrill@datacolor.com and see http://hueangles.blogspot.com))

Blue snow, eternal winter

The Blue Ice of Antarctica, photo by Brendan van Son [1]

In my neighborhood, a clean and newly fallen snow (one of many this winter) showed a blue color in its concavities---an effect similar to the more grandiose photo above. The sky was gray---as in this photo---so it couldn't be a reflection of the blue of the sky. Furthermore, although I had seen plenty of photographs of blue-looking snow and dismissed them as artifact, this time my direct view denied that excuse.

Why was the snow blue? The main mechanism of the blueness is water's absorption of long-wavelength visible light, leaving the short-wavelength end of the spectrum to reflect to a viewer. Incident light finds a long path length through the snow (or ice), followed by deep scattering from air bubbles. The concavities intensify the blueness through multiple reflections.

Water's absorption of long-wavelength light is familiar to scuba divers, and is responsible for the success of blue-green lasers for undersea communication: red lasers don't penetrate very far into the water.

Seeing the blue snow reminded me of a remark I made about C. V. Raman in an earlier Hue Angles [2]: "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)." Soon after his return, Raman wrote a long paper for the Royal Society that said the sea is blue because of the same kind of scatter as Rayleigh attributed to the sky---so the sea generates its own Rayleigh-type scattering [3, p. 35; 4].

To me, the clarity of images seen through even a large path-length of clean water seems inconsistent with scatter---which incurs haze due to random change of direction of the light. Is the blue of the ice cliff and of my small snow-dimples due to molecular scatter per Raman's thinking in 1922? I don't think so.

Raman's fascination with ocean color ultimately led to his receiving the Nobel Prize for discovering the Raman effect. Can the blue of water or snow be explained by the Raman effect? Again, no---and I think he would have agreed. The Raman effect is much weaker than the blue light from the ice (only one in ten million photons is Raman-scattered, which is even less than the one in ten thousand for Rayleigh scattering from the sky) [5].

Given the weakness of the Raman effect, how can it be observed at all? One needs two tricks.

First, to eliminate the reflected light, illuminate a sample with an excitation wavelength and observe it at a somewhat longer emission wavelength. Raman used the 435.8 nm line of a mercury lamp (with other lines filtered out) as an excitation, and then removed the 435.8 nm line with a further filter after the light had interacted with the sample. What was left was the small portion of the light whose wavelength was altered by the sample. Getting the right filters to do this was not easy, especially in Raman's time and place.

Secondly, to eliminate fluorescence as an explanation, observe whether the wavelength-altered light is polarized. Fluorescence comprises absorption and re-radiation of light, with no memory of the geometry of the incident light. But Raman-scattered light is polarized [3, 6] so the electric field is perpendicular to the plane of the incident ray, scatterer, and detector. Furthermore, unlike in fluorescence, the wavenumber (or frequency) shift of Raman-scattered light is independent of the excitation wavelength [5].

So, you can see that the blue color of water, ice and snow inspired much science and some ideas that even now are open to debate. Seven busy years separated Raman's marveling at the blueness of the ocean and his discovery (1928) of the effect that bears his name. I recommend Venkataraman's book [3] for a chronicle of those years.

continued on next page

Hue Angles continued

Returning to the seemingly eternal winter of 2014, I hope that by the time you read this column you will be contemplating the greens and yellows of spring.

1. http://www.britannica.com/blogs/2011/02/blue-ice-antarctica-photo/; for other photos see http://www.luminous-landscape.com/essays/blue-icebergs.shtml.
2. M. H. Brill, C.V. Raman's explorations in color science, ISCC News # 441, Sep-Oct 2009, pp. 3-4.
3. G. Venkataraman, *Raman and his Effect* by (Universities Press, 1995, reprinted 2009).
4. C. V. Raman, On the molecular scattering of light in water and the colour of the sea. *Proc. R. Soc. Lond. A* **101** (1922), 64-80. [http://rspa.royalsocietypublishing.org/content/101/708/64.full.pdf]
5. http://www.physics.rutgers.edu/ugrad/389raman/raman.pdf
6. C. V. Raman and K. S. Krishnan. A new type of secondary radiation. *Nature (London)* **121**, 501-502 (1928). [see http://repository.ias.ac.in/28460/1/367.pdf]

Michael H. Brill
Datacolor
(6 March 2014)

COLOR research and application

IN THIS ISSUE, June 2014

Our first article in this issue is directed to the printing industry. In "Recovering Neugebauer colorant reflectances and ink spreading curves from printed color images", Thomas Bugnon and Roger Hersch propose a method to recover the Neugebauer primaries, the ink spreading curves, and the Yule-Nielsen n-value using only tiles extracted from printed color images without any prior knowledge about the reproduction device. Applying optimizations of the Neugebauer primaries allows use of the CMYK Ink Spreading enhanced Yule-Nielsen modified Spectral Neugebauer model without printing predetermined patches. By eliminating the need to print the patches, these calibration procedures broaden the field of use of spectral reflection prediction models. The model can be used when it is impossible or too expensive to print extra patches or when the reproduction device is not available.

There is wide spread use of color in printing of maps for example, and on displays including television, computers, and media devices. Realizing that possibly 5% of the user population does not see colors the same as people with normal color vision, there is now a goal to choose colors that avoid creating a barrier for those with color vision deficiencies. Yi-Chun Chen, Yunge Guan, Tomoharu Ishikawa, Hiroaki Eto, Takehiro Nakatsue, Jinhui Chao, and Miyoshi Ayama report on their study investigating the use of three types of color-enhanced images. In "Preference for Color Enhanced Images Assessed by Color Deficiencies" they discuss the enhancements that are most preferred by each group of observers (protan, deutan, and normal).

Throughout the color industry we have developed various numerical scales to evaluate the quality of a color, such as color difference equations, and the color fidelity index. But we still have the problem of how we convey the relevance of these ratings to users unfamiliar with the rating system? What is good enough for their application? In our next article Peter Bodrogi, Stefan Brueckner, Nathalie Krause, and Tran Quoc Khanh present "Semantic interpretation of color differences and color rendering indices." This semantic interpretation enables non-expert users of light sources to understand the color rendering properties of light sources in terms of common language.

Staying in the area of lighting, "Chromaticity-Matched but Spectrally-Different Light Source Effects on Simple and Complex Color Judgments" is the topic of our next article. With the increasing use of light emitting diodes (LEDs) as common lamps, we are gaining flexibility in the quality of the light. We can choose our lighting to enhance color perception, or improve our own skin attractiveness, or produce the most pleasing color scene rendition. Jennifer Veitch, Lorne Whitehead, Michele Mossman, and Toby D. Pilditch describe an experiment where they show that while one can design several different LED light sources to match the color of a tungsten source, each of the LED sources can have very different results in the tasks mentioned above. This reminds us that this new flexibility can be a boon or a major problem.

In the last issue we discussed the International Commission on Illumination (CIE) technical committee 8.11, which seeks to solve practical problems of CIECAM02.

continued on next page

CR&A In This Issue June 2014 continued

The earlier-posed solutions hinge on adjusting the coordinates for Von Kries chromatic adaptation in CIECAM02, but such solutions seemed unable simultaneously to fit asymmetric matching data and to avoid paradoxical effects of spectral sharpening. Now, in "Chromatic Adaptation by Illuminant-Matrix Products: An Alternative to Von-Kries-Sharpened Primaries," Michael H. Brill and Claudio Oleari discuss a way that offers greater freedom for data fitting. Instead of scaling between an old and a new illumination in a common coordinate system, the new alternative implements adaptation in two stages, one for the input illuminant and one for the output illuminant. Oleari and coworkers earlier introduced the two-matrix solution in the context of color-constancy. The present article applies this structure to chromatic adaptation, and proposes it as a possible solution to the acknowledged problems in CIECAM02.

Although red, yellow, green and blue have held special positions in color discussions for centuries, the experimental determination of unique hue began in the middle of the 19th century. In "Unique hues and their stimuli - state of the art" Rolf Kuehni discusses how far we have progressed. He then gives future challenges to clarify the relationship between lightness/brightness and chroma/saturation on the perceived hue of stimuli, to replicate some findings to improve their statistical validity, and to develop valid mathematical models of the path between light absorption in the cones of the eye and the neural correlates responsible for the experience of unique hues.

Moving on to the preservation of culture and art, mural paintings were exceedingly popular in the 16th and 17th centuries in Portugal. One famous artist, José de Escovar, had a workshop in Évora between 1585 and 1622. Our next article discusses the "Analysis of paint layers color differences within a 17th century mural painting workshop in Southern Portugal by Spectra-colorimetry and SEM-EDS." Milene Gil Duarte Casal, V Serrão, M.L. Carvalho, S. Longelin, L. Dias, A.T. Caldeira, T. Rosado, J. Mirão, and António Candeias analyze the material and diagnostic characteristics of the paint layers and pictorial techniques of the Escovar workshop using modern analytical techniques such as visible spectra-colorimetry and scanning electron microscopy coupled with energy dispersive X-ray spectrometry (SEM-EDS) complemented with optical microscopy (OM), micro X-ray diffraction, micro FT-IR and micro Raman spectroscopy.

Before our next article, let us stop to picture a beautiful landscape. Looking at natural scenes, in particular green countryside and beautiful flowers gives us a calming and generally enjoyable experience. Hye Sook Jang, Jongyun Kim, Kiseong Kim, and Chun Ho Pak wanted to know more about just how such scenes affect us. In "Human Brain Activity and Emotional Responses to Plant Color Stimuli" they report on their study investigating the influence of 5 different plant color stimuli on human brain activity by analyzing the data in terms of relative parameters of human brain activity and emotional responses. They believe that their results provide a better understanding of the human visual cognitive responses to different plant colors and contribute to the selection of plants for human–plant research.

We close this issue with a communication from Michael H. Brill discussing the "Definition of Chromaticity Coordinates" in the Communications and Comments column. You may think you know what a chromaticity coordinate is, but do you really?

Ellen Carter
Editor, Color Research and Application

Meet Your Fellow ISCC Members

Meet Joann Taylor, who has recently been appointed to assume the duties of ISCC Membership Secretary. She is a long-time member of ISCC, having joined the organization in 1980. Joann has previously served on the Board of Directors of ISCC and as Member-Body Liaison. She became a member of ISCC while an undergraduate student at RPI, going on to earn a Ph.D. in Color Science/Chemistry at the Rensselaer Color Measurement Laboratory under the direction of Dr. Fred W. Billmeyer, Jr. Her doctoral work focused on the study of the perceptual uniformity of the OSA-Uniform Color Scales.

A native Philadelphian, Joann relocated to the Pacific Northwest US upon graduation, having been hired by Tektronix, Inc. in Oregon. As part of Tektronix Labs she worked on the TekColor™ Color Management System, cross-media color reproduction, television systems and color standards development. She began work as an independent consultant, founding Color Technology Solutions in 1992

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Meet Your Fellow ISCC Members continued

where she has worked with a variety of clients on a broader range of color problems in both the electronic domain and in other application areas. Over the years, Joann has worked in various capacities with other color-related organizations, including IS&T, ASTM and SID. This work has included, among other things, the development of color standards as well as conference organization, including the Color Imaging Conference (CIC).

In addition to her color work, most recently, Joann has dedicated a significant portion of her time to professional genealogy and recently earned a Certificate in Genealogical Research from Boston University. Particular interests include the dating and preservation of vintage photographs, evidence evaluation, and immigration. When the odd moment presents itself, Joann also applies her color sensibilities to the creation of both conventional and art quilts. And one interesting bit of trivia…she is currently (for the fourth time) in the contestant pool for the game show Jeopardy!

Joann has said that being a member of ISCC has provided her a great deal as a color scientist. From her earliest days as a student, where she was inspired by so many established color professionals who were friendly, willing mentors, to the great insight and appreciation its members have brought over the years to both varied applications and unique interests - it has been a fruitful association. She looks forward to helping ISCC to continue to grow and to inspire.

You can contact Joann at joannt@teleport.com.

Calendar

May 13-16	**IS&T Archiving Conference,** Berlin, Germany, www.imaging.org/archiving
May 14-16	**2014 Models in Vision (MODVIS),** St. Pete Beach, FL, http://www.conf.purdue.edu/modvis/
May 16-21	**Vision Sciences Society, "VSS 2014",** Tradewinds Island Resort, St. Pete Beach, FL, http://www.visionsciences.org/st.pete_beach_info.html
May 22-23	**Asia Pacific Coatings Focus2014,** Shanghai, China, www.cdmc.org.cn/2014/apcf
Jun 1-6	**SID Display Week**, San Diego Convention Center, San Diego, CA, www.sid.org/
Jun 16-17	**CIE Division 1 on Color and Vision**, NIST, Gaithersburg, MD, http://www.iscc.org/meetings/ST2014/
Jun 18	**ISCC Bridge Symposium,** NIST, Gaithersburg, MD, http://www.iscc.org/meetings/ST2014/
Jun 19-20	**ASTM E12 Color and Appearance,** NIST, Gaithersburg, MD, http://www.iscc.org/meetings/ST2014/
Jun 24-27	**2014 12th International Conference on New Developments and Applications in Optical Radiometry (NEWRAD 2014),** Dipoli Congress Center in Otaniemi, Espoo, Finland, http://newrad2014.aalto.fi/index.html
Jun 30-Jul2	**GFINC & ICISP Color Imaging and Applications,** Cherbourg, Normandy, France, www.stlo.unicaen.fr/icisp/2014
Jun 30-Jul2	**GFINC & ICISP Multispectral Color Science,** Cherbourg, Normandy, France, www.stlo.unicaen.fr/icisp/2014/mcs2014.php
Aug 24-28	**ECVP 2014 Symposia,** Belgrade, Serbia, http://ecvp2014.org
Sep 7-11	**IS&T NIP30,** Sheraton Philadelphia Downtown, Philadelphia, PA, www.NIP_DF@imaging.org
Sep 11-12	**X Conferenza del Colore,** Università di Genoa, Genoa, Italy, http://www.gruppodelcolore.it
Sep 14-16	**SPE CAD RETEC 2014 Conference,** New Orleans Marriott, New Orleans, LA http://www.specad.org
Oct 10-12	**2014 OSA Vision Meeting,** Philadelphia, PA, http://www.osavisionmeeting.org/2014/conf
Oct 21-24	**AIC Interim Meeting, The Color and The Culture,** Hotel Misión de los Ángeles, Oaxaca, Mexico, www.aic2014.org
Nov 2-4	**2014 IES Annual Conference Art Science and Practice of Illumination,** Pittsburgh, PA, http://www.ies.org/ac
Nov 3-7	**IS&T Color and Imaging Conference,** Boston, MA, http://www.imaging.org/ist/conferences/cic
2015	
Jan 28-29	**ASTM E12 Color and Appearance**, Sheraton, New Orleans, LA
Feb 8-12	**SPIE/IS&T Electronic Imaging Symposium,** San Francisco, CA, http://spie.org/electronic-imaging.xml
May 19-22	**AIC Midterm Meeting, Color and Image,** Toyko, Japan, www.aic2015.org

ISCC Sustaining Members

Sustaining Members of the ISCC are organizations who support the mission and goals of the ISCC through financial or other support. With our Member Bodies, Sustaining Members also provide a critical connection to the color community. If you feel your company or organization should support the ISCC in this way, please contact the office for more information about member benefits.

Avian Technologies	www.aviantechnologies.com	603-526-2420
Datacolor	www.datacolor.com	609-895-7432
Hallmark	www.hallmark.com	816-274-5111
Hunter Associates Laboratory, Inc.	www.hunterlab.com	703-471-6870

We could still use your help!

ISCC has positions in the organization that need filling including Directors and others. We can help identify a place for you depending on your skills and desires. Contact Nomination Chair Frank O'Donnell, fxodonnell@sherwin.com

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ISCC Member Bodies

At its foundation, the ISCC is composed of many related societies. These societies, our Member Bodies, help the ISCC through small annual dues as well as maintaining a relationship with each organization's individual members. We frequently hold joint meetings to further the technical cross-pollination between the organizations.

If you belong to one of our member body organizations, we encourage you to work with ISCC and your society to further the connection. Contacting the ISCC President is a good place to start. If your organization is not on this list and you think it should be, the ISCC office can provide you with details about membership.

Or use our new online application: www.iscc.org/applicationForm.php

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)
Illumination Engineering Society of North 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 for Imaging Science and Technology (IS&T)
Society of Plastics Engineers Color and Appearance Division (SPE/CAD)