

# Inter-Society Color Council News

# Issue 474

### **Board of Directors Corner**

Hello ISCC! My name is Dave Wyble, and I am bringing you the Board of Directors' Corner. With Jack Ladson and Renzo Shamey, I was elected to the Board in 2014, and hope to serve out my term



hope to serve out my term though 2017. This is my second time on the Board; I also served from 2008-2011. My involvement with ISCC started in 1998 when I attended the Annual Meeting in Baltimore. My very first professional presentation! Since

then, I have worn a variety of hats: webmaster (1998-present), Annual Meeting Chair (2009) and Technical co-Chair (2012), newsletter editor (2011-2013), Interest Group Chair, Education Chair, and a few others. This year I have the honor of chairing the Annual Meeting in San Diego (more on that later). Most recently I enjoy facilitating the quarterly ISCC webinars we are offering to the community as

#### **Table of Contents**

Board of Directors Corner1
ISCC Board of Directors2
Summary of Third ISCC Webinar2
Election Results
ISCC Annual Meeting Nov 11, 20163
Call for Godlove & Nickerson Award Nominations4
CORM 2016 Annual Conference4
A Blast from the Past: ISCC Newsletter 50 Years
Ago, Number 182 May-June 19665
Meet Your Fellow ISCC Members6
IES Research Symposium III Light + Color7
AIC 2016 Interim Meeting7
Refractions: seemingly random musings on color
Stop and See the Roses8
AIC ECD Study Group Questionnaire
Ancient Snake Skin Help Add Color9
Hue Angles: A Gentle Color Paradox10
Color Research and Application: In this Issue10
Can You Identify the Unknown People?12
ISCC Calendar
ISCC Sustaining Members & Member Bodies14

# Spring 2016

a form of outreach and education.

My interest in color started in the 1980s working in advanced products and technology development at Xerox. I was on a team engineering a new color printer; specifically I was in a group modeling the image quality. Color is a vital part of image quality, so I had to get myself educated. An evening continuing education course at Xerox provided a good foundation, but I needed more, so I enrolled in the graduate program in the Munsell Color Science Laboratory at Rochester Institute of Technology. Before even finishing my first semester I knew that MCSL was the place I wanted to work. After a year or so of negotiation, I resigned from Xerox and started full time at RIT in January of 1997.

The Munsell Lab has been a long-time supporter of ISCC, and I was encouraged to foster that support, quickly taking on the webmaster duties, and attending meetings whenever possible. MCSL still supports the ISCC, and nearly 20 years later, although I now work for RIT part-time, I sit in my RIT office typing this article. Good times.

There are several exciting things going on in ISCC that you should be interested in. First, we have more ways than ever to stay in touch. Our LinkedIn group is where the latest happenings are announced and interesting conversations occur. Also, reading this newsletter, but we both know you already do that. Second, our 2016 elections are completed, and we now have four new members of the Board of Directors. We thank retiring Director Art Springsteen, and welcome the incoming class of 2016: Jodi Baker, Paul Centore, Simon Thayil, and Nurhan Becidyan. Details on the candidates are in the previous newsletter (issue 473). A formal announcement of the election results is found in the current issue. Third, in March we held the latest in our webinar series: "The Right Paint to Help Hide a Helicopter," by John Conant and his Aerodyne colleagues. The subject and timing of the next webinar is still being determined; we expect sometime in early summer.

The last thing I want to highlight is the 2016 Annual Meeting, which will be in San Diego on *continued on next page* 

#### Spring 2016

## **ISCC EXECUTIVE OFFICERS**

Terms end 2016	President Secretary	Mr. John Conant Aerodyne Research, Inc. 45 Manning Road Billerica MA 01821-3976 USA 978-663-9500 fax: 978-663-4918 jconant@aerodyne.com Ms. Ann Laidlaw ACL Color Consulting LLC 136 E. Hill St Decatur, GA 30030 336-420-1998 acl99colors@yahoo.com		
	Treasurer	Dr. C. Cameron Miller Nat'l Inst. of Standards and Technology 100 Bureau Drive, Stop 8442 Gaithersburg, MD 20899 301-845-4767 fax:301-975-4713 c.miller@nist.gov		
	President Elect	Vacant		
	Past President	Mr. Scot R. Fernandez Hallmark Card Inc. 2501 McGee Kansas City MO 64141 USA 816-545-2462 fax: 816-274-7367 <u>scot.fernandez@hallmark.com</u>		
ISCC BOARD OF DIRECTORS				
Term ends 2016	Ms. Paula J. Alessi	Retired Color Scientist 126 Gnage Lane Rochester, NY 14612 585-225-4614 geinhaus@frontiernet.net		
	Mr. Kim Vlaun	Artist/Educator kvlauncolor@verizon.net		
Terms end 2017	Mr. Jack Ladson	Color Science Consultancy 3661 Spring Hollow Lane Frederick, MD 21704 USA 267-981-7112 Jack@ColorScienceConsultancy.com		
	Dr. Renzo Shamey	North Carolina State University College of Textiles <u>rshamey@ncsu.edu</u>		
	Dr. Dave Wyble	Avian Rochester, LLC dave@avianrochester.com		
Terms end 2018	Ms. Jodi Baker	Konica Minolta Sensing Americas, Inc. 101 Williams Drive Ramsey, NJ 07446 201-749-2659 Jodi.Baker@konicaminolta.com		
	Mr. Nurhan Becidyan	Retired CEO & President United Mineral & Chemical Corporation 557 Forest Avenue Paramus, NJ 07652 201-262-8262 nurhanbecidyan@gmail.com		
	Dr. Paul Centore www	w.MunsellColourScienceFor Painters.com Groton, CT paul@isletech.net		
	Mr. Simon Thayil	Under Armour Simonthayi109@yahoo.com		

Board of Directors Corner continued

Friday, November 11. The meeting will be held as a morning workshop within the IS&T Color and Imaging Conference, and followed by a banquet lunch and business meeting. The workshop theme is "Life of a Color" and will have invited presentations describing various viewpoints on the theme. Speakers are still being confirmed, but we anticipate at least four presentations spanning the breadth of ISCC interest For details on the venue visit www.imaging.org/Site/IST/Conferences/CIC/CIC Home.aspx. Note that Annual Meeting registration will be via the Color and Imaging Conference. Friday-only workshop registrations will be available for participants that cannot attend the full conference.

The Board of Directors works very hard behind the scenes to make this organization the best it can be, which means that it best meets the needs of you, the membership. We cannot evaluate or improve our performance without any feedback from you. Please take the time to help by any of a few simple measures: email a newsletter author about their contribution; call or email a Board member about a concern or suggestion; or perhaps start or contribute to an online discussion in our LinkedIn group. If you want to step up further, there are always places to dive in. Don't believe that because something seems to be covered that there might not be a need for help.

Dave Wyble, Avian Rochester, LLC

## Summary of Third ISCC Webinar

Our spring webinar, "The Right Paint Color to Help Hide a Helicopter" was presented by Mr John Conant,



Aerodyne Research, Inc on March 29. John's research at Aerodyne sits at an interesting crossroads between atmospheric illumination models and landscape color (typically in the realm of remote sensing), and color perception. Since the color of an object is dependent on the

light source and the background, these fields must be brought together to accomplish the goal of helicopter concealment. John did a great job connecting these topics, and held the interest of all participants for the 45 minute presentation. Thanks John!

The slides from this talk are available online. Visit <u>iscc.org/resources/SeminarSeries.php</u> for more information.

Our next webinar will be in early summer. If you have an idea for a future webinar, or would like to give one yourself, please email <u>seminars@iscc.org</u>.

# **Election Results**

Congratulations to our four new Directors elected to serve on the Board by you, our membership! Please join me in welcoming Jodi Baker, Nurhan Becidyan, Paul Centore and Simon Thayil to the Board of Directors. They will serve on the Board until the end of the year 2018. Their contact information along with that of other Board members is found on page 2 of this newsletter and on our website.



Top left: Jodi Baker, Top right: Nurhan Becidyan Bottom left: Paul Centore, Bottom right: Simon Thayil

# ISCC Annual Meeting Nov. 11, 2016

We are excited to announce that the 2016 Annual Meeting will be co-located with the Imaging Science and Technology (IS&T) Color and Imaging Conference (CIC), in **San Diego, California**. CIC will be November 7-11, and **our Annual Meeting** will be within CIC as a Friday morning workshop, November 11.

While the workshop will serve as our Annual Meeting, it will be open to any regular CIC attendees. There is also a workshop-only registration for those who do not wish to attend the entire week. The morning workshop will be followed by the ISCC Business and Awards Meeting and then a luncheon.

The theme of the workshop will be *Life of a Color*. We have tentatively scheduled four presentations spanning much of the breadth of ISCC mem-

bership. It will begin with a description of the creative design process:

Leslie Harrington (CAUS) will present *The Design* of a Color



3

Leslie will walk through how a brand color is originally selected, and then the associated strategic decisions: how to align the color with a product/brand's attributes/voice; what are the customer segmentations and geographical

positioning; and finally trend influences and competitive landscape.

Once a color has been defined, we need to make sure that everyone is looking at the same color: **Max Derhak (Onyx Graphics)** will present *The Management of a Color* 



Color management is the process by which colors are represented, communicated, transformed and reproduced using a device independent color representation. Traditional color management has used only CIEXYZ

colorimetry based on a single observer and single illuminant. Max will describe a system that accounts for a complete color process from light sources onto objects captured through color matching, and provides the means to add perceptual aspects of color.

Now that color is accurately communicated, the industrial processes can begin:

Ann Laidlaw (ACL Color Consulting LLC) will present *The Manufacturing of a Color:* 



The color of a consumer product may begin as inspiration or whimsy. Ann follows the path of a color from the creative process through development, approval, and manufacturing. The use of robust electronic and physical color standards and consistent procedures is crucial to managing accurate color with on-

time deliveries, especially when products are fabricated from multiple materials and when multiple products are merchandized together.

Finally, for all of the above to have any effect in the world, the color muse be seen by an individual:

continued on next page

ISCC Annual Meeting Nov. 11,2016 continued Mark Fairchild (RIT) will present The Perception of a Color



Mark will trace the fate of a photon from the surface of an object to the point a color appearance is experienced in the brain.

There are a number of unique aspects of this meeting. First, since the meeting is wholly within the Color Imaging Conference, the main-CIC at-

tendees are also encouraged to attend. This will present an opportunity for ISCC to tell its story to individuals who perhaps have never even heard of us! Also, we feel that the presentations and resulting discussions more completely represent the ISCC constituency than perhaps has been achieved in recent years. Addressing the breadth of our membership is always a goal, but has proven an elusive one for many years. So artists, designers, scientists, industrialists and educators with an interest in color, come one come all to this unique ISCC workshop on *Life of a Color*.

Look for more information in future newsletters and in ISCC email communications. We hope to have many of you participate in this great opportunity to increase awareness of ISCC.

David R Wyble, *Avian Rochester, LLC*. 2016 Annual Meeting Chair and Workshop Organizer (585) 259-5956 dave@avianrochester.com

### Call for Godlove and Nickerson Service Award Nominations

As most of you know, ISCC has three significant awards that are given out to deserving recipients. The Nickerson Service Award is presented as the occasion arises for outstanding, long-term contributions towards the advancement of the Council and its aims and purposes. The most recent recipient of the Nickerson Service Award was Rolf Kuehni in 2015. The Macbeth Award is given for one or more recent outstanding contributions in the field of color. The award is usually, but not necessarily, presented biennially in even-numbered years, when deserving candidates have been nominated. The next recipient of the Macbeth Award will be announced in the summer newsletter and will receive the award at the 2016 Annual Meeting in San Diego co-located with CIC-24 . The Godlove Award is the most prestigious

award bestowed by ISCC because it honors longterm contributions in the field of color. The award is usually, but not necessarily, presented biennially in odd-numbered years, when deserving candidates have been nominated. The last recipient of the Godlove Award was the late Anna Campbell Bliss in 2015. Thankfully, she was able to receive the award before her passing. For a more detailed description of all awards and a listing of past recipients, please visit <u>http://www.iscc.org/functions/awards.php.</u>

Each Award has an Award Committee associated with it. Each Award Committee convenes when nominations of deserving candidates are received.

2017 is the next odd-numbered year when we would like to have a Godlove recipient. So the Board of Directors is calling for nominations for deserving candidates of the Godlove Award. Since the Nickerson Service Award can be given in any calendar year, the Board of Directors is also calling for nominations for any deserving candidates of the Nickerson Service Award.

The Board of Directors has gone to a rolling submission process for all Awards. This means that Award Committees are always receiving nominations. Each selection process will then be based on the nominations in hand at the appropriate time when each committee convenes. To accommodate the rolling submission process, there is one common nomination form for all Awards. It can be found at http://www.iscc.org/UniversalNominationForm.pdf.

Instructions for filling out the form and submitting it are clearly outlined on the form.

Please consider submitting a Godlove or Nickerson Service Award nomination based on the candidate's qualifications. Since we do have a rolling nomination process, if you have a deserving candidate for the Macbeth Award in mind, please submit the candidate and they will be considered for 2018.

# CORM

## 2016 Annual Technical Conference

The CORM 2016 Annual Technical Conference and Business Meeting will be held in Gaithersburg, MD – in cooperation with the National Institute of Standards and Technology (NIST) from May 15-18. The conference themes include solid state lighting, optical properties of materials, display metrology, UV radiometry, current research activities at NIST, NRC and CENAM and a special session for emerging professionals. CORM is an ISCC Member Body. We encourage all members to attend. For more information on meeting details, please go to http://www.cormusa.org/2016 Conference Informat.html

# A Blast from the Past: ISCC Newsletter 50 Years Ago

Number 182 – May - June 1966 on ISCC website

This 1966 issue is 44 pages long. It is a summary of the 35<sup>th</sup> Annual Meeting that took place back in the good old days at the Statler Hilton Hotel in the great City of New York. This meeting was a huge success with 156 registrants and 171 banquet attendees.

The meeting featured a "charming" lecture on geology. "Dr. Paul D. Lowman, Jr. of NASA's God-



dard Space Flight Center achieved the unusual by teaching his audience a great deal about the synoptic geology, by arousing enthusiasm for a contribution of space flights to our geologic knowledge, and by showing us a large number of fascinating and beautiful color photographs made from the Gemini II space flight.

https://en.wikipedia.org/ wiki/Gemini\_2#/media/ File:Titan-3C\_MOL-Gemini-B-Test\_3.jpg The meeting also featured a panel discussion on "Instrumental Approaches to Color Formulation" with Max

Saltzman as the moderator. The speakers were:

"1. Dr. Gunter Wyszecki - National Research Council of Canada 'Precision and Accuracy of Color Measurement'

2. Miss Ruth Johnston - Pittsburgh Plate Glass Company 'Advances in Instrumentation for Colorant Formulation'

3 Dr. Edwin Stearns - American Cyanamid 'Application of Instrumental Colorant Formulation Techniques - Session I'

4 Dr. Fred Billmeyer - Rennselaer Polytechnic Institute 'Theoretical Advances in the Principles of Colorant Formulation'

5 Frederick Simon - Union Carbide 'Application of Instrumental Colorant Formulation - Session II'."

The secretary, Ralph Evans, reported that the membership consisted of 217 Member-Body delegates and 550 individual members making a total of 767 ISCC members in 1966. The other interesting task that the ISCC secretary did back in the day was to send the entire membership reprints of articles published by ISCC members. **That is amazing!!!** The following reprints were sent out to all members in 1966:

"1. 'Precision of Color Measurement with the G. E. Spectrophotometer I. Routine Industrial Performance,' by Fred W. Billmeyer, Jr., and 'An International Comparison of Working Standards for Colorimetry,' by A. R. Robertson and W. D. Wright; reprinted from <u>Journal of the Optical</u> <u>Society of America</u>, pages 694-717, June 1965. 2. 'Color Symposium,' by Norman Macbeth, John N. Ott, Dorothy Nickerson and Charles W.

Jerome, and Deane B. Judd; reprinted from <u>Il-</u> <u>luminating Engineering</u>, pages 253-278, April 1965.

3. 'The Aesthetics of Color: A Review of Fifty Years of Experimentation,' by Victoria K. Ball, from <u>The Journal of Aesthetics and Art Criti</u> <u>cism</u>, XXIII/4, Summer 1965, pages 441-452.

4. 'A Universal Color Language,' by Kenneth L. Kelly, reprinted from <u>Color Engineering</u>, pages 2-7, March-April, 1965.

Problems Subcommittees were in full swing in 1966. Fourteen of them met at this Annual Meeting:

No. 2 – Color Names

No. 7 - Survey of American Color Specifications

No. 10 – Color Aptitude Test

No. 15 – Definition of Color Terms

No. 16 - Standard Methods for Mounting Tex-

tile Samples for Colorimetric Measurement

No. 17 - Color in the Building Industry

No. 18 - Colorimetry of Fluorescent Materials

No. 20 - Basic Elements of Color Education

No. 21 – Standard Practice for Visual Examination of Small Color Differences

No. 22 – Procedures and Material Standards for Accurate Color Measurement

No. 24 – Catalog of Color Measuring Instruments

No. 25 – Determination of the Strength of Colorants

No. 26 – Determination of Sets of Maximally Different Non-Fluorescent Colors

No. 30 – Color in the Building Industry

Another important part of the 1966 ISCC life blood were its Member Bodies. Twenty two of them reported at this Annual Meeting: American Artists Professional League, American Association of Textile Chemists and Colorists, American Ceramic Society, American Institute of Architects, American Institute of Interior Designers, American Oil Chemists' Society, American Psychological Association, American Society for Testing and Materials, Color Association of the United States, Color Marketing Group, Dry Color Manufacturers' Association, Federation of Societies for Paint Technology, Gravure

continued on next page

#### A Blast from the Past continued

Technical Association, Illuminating Engineering Society, Industrial Designers' Society of America, National Association of Printing Ink Makers, Optical Society of America, Society of Motion Picture and Television Engineers, Society of Photographic Scientists and Engineers, Society of Plastics Engineers, Technical Association of the Graphic Arts, and Technical Association of the Pulp and Paper Industry. It is interesting to see how the Member Body composition has changed significantly from 1966 to 2016. Some of the same Member Bodies remain, some are no longer in existence and some new ones have joined the ISCC family.

Paula J. Alessi, ISCC News Editor

### **Meet Your Fellow ISCC Members**

My name is Danny Pascale. When I graduated in Engineering Physics, in the late 70s, I realized that I had received a comprehensive science and engineering education but nothing enough to be called a specialist in anything! This is when I started a seemingly never ending continuing education process, first



In Chevreul lab, Paris, 2007

with graduate studies in the photosensitivity of optical fibers, making Bragg filters, then as a research associate where I participated in sensor design and laser development for laser-matter interaction studies.

Doing research before the Internet involved many hours/days/weeks rummaging book shelves in a good science library. In the same period, personal computers became affordable and, as an early adopter with a brand new Apple II +, I started my computer technology education on the side.

After a few years in pure science I decided to work in the industrial world, where I continued doing research, albeit of a more applied type. With time, research transformed into product design and engineering management, at first for military simulators, and later for consumer products.

In the meantime, computers got more powerful and you could even have displays with more than 16 colors (!), as well as color scanners, color printers, and digital cameras. I experimented with these technologies and quickly realized that predictable results were not a given. My first systematic trials involved scanning a ColorChecker and printing it, with the goal of obtaining a "perfect" reproduction. Of course, getting a matching print was a daunting task, a polite way to say I did not succeed at first!<sup>1</sup> And this is how my interest in color science began, looking for and understanding the mathematics linking XYZ to RGB.

In parallel, the Internet had arrived and it could eventually be used to find useful information. So instead of spending weeks in a library, I could spend weeks searching on the Internet. This XYZ to RGB pilgrimage was slow and arduous, and I could not find, at the time, any simple procedure for the conversion, so much so that I decided to write a tutorial on the subject and offer this document freely on the web (it must have filled a need since this pdf has been downloaded several hundred times each month from 2003 until now). Based on this new found knowledge, I decided to write a software program to facilitate and illustrate conversion between many RGB spaces in common use at the time.

Sensing that this software could be useful to others, it became the first BabelColor product, with the Internet providing the platform on which I built the business. Soon, other "tools" were grafted, and another program was added, with the original convertor now being a tool amongst others. These products intended audiences are graphic designers, printing presses color managers, color-management consultants, photographers, and lighting specialists.

Deciding what "tools" to add starts by making a short list from a mix of customer requests, my perception of specific user needs, and "stuff from the left field", the last of which can better be described with an example. A few years ago, I conceived a color list generator for the OSA Uniform Color Scale (UCS) and one can import from and export to this color space. This development happened after my being presented wonderful books of color patches by Mrs. Joy Turner Luke, a fervent and long-time advocate of both the Munsell and OSA UCS color systems in which she invested a lot of time and efforts. This work is my small contribution to increase awareness about the OSA UCS, a color system un*continued on next page* 

#### Meet Your Fellow ISCC Members continued

known by most of my customers!<sup>2</sup>

My involvement in the field of color coincided with an alignment of planets of sorts, with the concurrent democratization of digital imaging, personal computers, and the Internet. In recent years, the advent of solid-state lighting has reinvigorated the sector of color science involved with evaluating the color rendition of light sources, with the goal of replacing the outdated Color Rendering Index (CRI). We are seeing a world wide effort (for ex.: CQS, CRI2012, GAI, IES TM 30-15, etc.) in trying to reach a consensus, or, more precisely, a consensus on many aspects of the question. This is one of my current subjects of interests.

#### Danny Pascale dpascale@babelcolor.com

www.babelcolor.com

- Some years later, I printed and sold, for a time, a Munsell Color System Catalog with 1700+ patches with 95% of the patches within 2 DeltaE\*CIEDE2000 of the published references.
- 2. Here is the link to an app note I wrote on the OSA UCS:

http://www.babelcolor.com/index\_htm\_files /AN-7%20The%20OSA%20UCS.pdf

# IES Research Symposium III: Light + Color Metrics, Perception, Preference, Vision



The Illuminating Engineering Society's recent symposium on Light + Color was held April 3-5, 2016 in Gaithersburg MD. It was the third in their bi-annual symposium series. The symposium attracted lighting designers and specifiers, colorists, and academic and industrial scientists. The presentations were arranged in pairs around the four themes of the conference: Metrics, Perception, Preference, and Vision.

Donald Holder made a keynote presentation on Sunday evening that demonstrated fascinating examples of the effects of strategic lighting in theater. The sessions the next day were held at NIST, and attendees were afforded the opportunity to tour several labs related to photometry, vision science, spectrophotometry, and calibration. Attendees were also able to view posters and discuss the work with authors during the symposium. Michael Royer and Randy Burkett's joint presentation in the Metrics session included details of the TM-30 methods and visual examples in architecture. Steven Shevell and Ray Murray each gave presentations in the Color Vision session. The presentations included effects that played with observers' color perception, and guided the audience through the evolving story of classic brand color. The Color Perception session featured presentations by Mark Fairchild and Kevan Shaw and included both theory and experience of light and color. Monday evening featured tabletop exhibits by many sponsors and a unique introduction to the sensory world of cyborg by Neil Harbisson. The final session on the closing morning of the symposium included a session on Color Preference with presentations by Kevin Houser on the IES TM-30 metric as related to preference and Malcolm Innes's storytelling with architectural lighting. The symposium closed with a general discussion by the attendees of the issues around lighting including commercial and regulatory issues.

Several of the symposium presenters and attendees were active ISCC members. The IES is a long-time Member Body of the ISCC.

#### Ann Laidlaw, ACL Color Consulting LLC

## AIC 2016 Interim Meeting

The Chilean Color Association is hosting the AIC



2016 Interim Meeting in Santiago, Chile from October 18<sup>th</sup>-22<sup>nd</sup>. The aim of this meeting is to share experiences regarding the use of color in images, objects and space, from different perspectives and disci-

plines, thus contributing to a better user experience, continued on page 9

# *refractions*

seemingly random musings on color

## Stop... and See the Roses

In the arts, a distinction is often made between looking and seeing. Looking is referred to as a passive act where we simply glance or ascertain something with our eyes, whilst seeing is a more active process and involves paying attention to and being aware of what we see. In short, there is a difference between what we look at and what we actually see, or are aware of. According to Rolf Kuehni, in his book Color Ordered<sup>1</sup>, we are aware of only 1/250,000 of all the visual information passing from the eye, to the brain. To put that in context, if all the visual information that we take in is equal to the 100 yards of the football field, we are conscious of only 1.5% of an inch of it! Quite simply, we are missing a lot. Though the visual system tends to focus on what is most necessary and important - seeing more can enhance our awareness and provide added richness of the visual world. The image below is a good example – when you look at it, what do you see? (\* the answer is at the end of this article)



Fig. 1 Ambiguous image

Another example is the Fed Ex logo. Can you see the hidden symbol in it? The symbol was put there intentionally by its designer in 1994. If you look at the Arabic version, it is easier to see, because the letters are ambiguous: To people who don't read Arabic, anything recognizable will stand out.



Fig. 2 Fed Ex logo in English and Arabic



What applies to these examples, also applies to color. Take shadows for example. Historically speaking, most Europeans thought of shadows as variants of black or grey. This is evident in the art of the last several millennia. So, when Claude Monet and the Impressionist painters began painting colored shadows – people were not only puzzled; they were shocked. To depict such things undermined their trust in all that was good and true in art. Painting had an honorable tradition, defined by the great Art Academies of Europe. The Impressionists challenged this tradition, through their technique, subject matter, and color. What Monet did was to educate people about seeing color in the world – to make us see rather than simply look. By adding greens, blues and violets to his shadows (Fig.3), he challenged received notions of color, and habitual ways of thinking.





Fig. 3 Claude Monet, Haystack series (1891) Depicting the how colors change in different lighting conditions

As anybody who works with color knows, we can train and develop our ability to see color. For the *continued on next page* 

#### Stop...and See the Roses continued

Impressionists, this happened at a cultural scale. How did they discover this? They simply went outside and observed. Nearly all landscape painting before the 19<sup>th</sup> century was done indoors, in the artist's studio, based on sketches and notes. When artists went outside to observe the changing effects of light and shadow they paid attention to atmosphere, and changing light throughout the day and the year. And they saw color where others didn't.

One common technique used in art schools is to ask students to concentrate on a single color for an entire day. By focusing on yellow for example, not only do they notice traffic lights and road signs, they suddenly see yellows everywhere and in great variety. They see it in clothes, shoes, cars, houses, animals, reflections: Lemon yellow, golden yellow, earthy yellow, fluorescent yellow. They become acutely aware of being surrounded by yellows that they never noticed before. And this is one of the great things about the aesthetics of color - when we look for it, we become more immersed in the world - we see more, we notice more, we connect more. Aesthetics has become a sub-branch of philosophy and very opaque to understand. But we can return to its original meaning (aesthesis in Greek) by considering its use in our everyday language. The word anaesthetic for example, refers to going to sleep, and closing down the senses. Aesthetics therefore becomes a way to wake up, to see more and to feel more, and to fully experience the visual richness of our ordinary, daily experience. Color can connect us to our world.

Not only can we learn to see color, but in turn, color can teach us to see.

(\*Answer – a cow looking at you!)

1. Kuehni, Rolf G. and Schwarz, Andreas. 2008 Color Ordered: A Survey of Color Order Systems from Antiquity to the Present. Oxford University Press: New York. p.4

Carl Jennings University of Hawai'i

AIC 2016 Interim Meeting continued

improving usability, and also to improve life quality in our cities. The conference theme is "Color in Urban Life: Images, Objects and Spaces". Topics that will be addressed during the week long meeting are Color and the Environment, Architectural Color Design, Color in Product Design, Color in Communication Design, Color and Well-Being, Color in Urban Cultures, Color Aesthetics, Color Perception and Color Education.

ISCC members are encouraged to attend this week long meeting in sunny Santiago, Chile. The preliminary programme is set and can be found along with more meeting information at info@aic2016.org.

# AIC Environmental Color Design (ECD) Study Group Questionnaire

Some members of the AIC Environmental Color Design Study group are studying the symbolism of colors and especially how culture impacts this symbolism. Their study will be conducted in more than fifteen countries in order to have a worldwide vision of colors and their symbolism. The study is based on a questionnaire. It would be very helpful if ISCC members could represent color symbolism within the United States by taking 10 minutes of your time to complete this important global questionnaire. It can be found in English at

http://enquetes.univlorraine.fr/index.php/765754?lang=en Please feel free to share this questionnaire with your friends, family and colleagues. Thank you very much!

Dr Muriel Jacquot Maître de Conférences HDR ENSAIA, InnoCIM http://ensaia.univ-lorraine.fr/fr/content/equipeinnocim Université de Lorraine 2, avenue de la Forêt de Haye TSA 40602 54518 - VANDOEUVRE CEDEX

### Ancient Snake Skin May Help Scientists Add Color to Extinct Creatures

The fossilized skin of an ancient snake is helping researchers fill in colors of ancient creatures that once could only have been imagined, a new study published in Current Biology suggests. Previously, melanin found in some fossil vertebrates gave limited indication of colors, but a 10-million-year-old snake skin has retained chromatophores, structures associated with pigments. "Instead of just getting the stuff that hangs around the longest in a decaying animal, we actually have all of the color producing mechanisms preserved," said Maria McNamara, lead author of the study.

The Christian Science Monitor (4/1)

# **HUE ANGLES**

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

#### A Gentle Color Paradox

In my recent web-browsing, I ran across an exercise for students [1]: "If the wavelength of the green line of mercury is 546 nm in a vacuum, what is it in water? In heavy flint glass? [410 nm, 331 nm]."

This awakened me to a question I have not seen posed by color science. Would the color of a light change as drastically as suggested by the wavelengths in the above paragraph? [Strictly speaking, of course, the waves have no intrinsic color, but I use loose terminology for convenience, with the understanding that the only meaningful connection is a *cetera paribus* color match.]

The effect of wavelength shift would depend upon the context. Surely placing a piece of flint glass in air between a mercury-line lamp and a human viewer would not influence the wavelength of light arriving at the eye. Although the wavelength 546 nm would change to 331 nm while the light was within the glass, it would change right back to 546 nm as soon as it re-entered the air. Then it would change to its value of 410 nm upon entering the aqueous medium of the eye and photoreceptor system. (Of course, the light's frequency would always be the same.) But we wouldn't notice any change due to the 546to-410 nm transition because we always see through the same aqueous medium (with the same refractive index) embedding the photoreceptors. 546 nm as measured by a spectroradiometer is hence calibrated to be identical to 410 nm as incident on our photoreceptors.

But suppose we change the refractive index of the material abutting the eye's photoreceptors and see if the color of the refracted light changes. Even though abutting the photoreceptors with a nonwaterlike substance seems impossible with real eyes, it is an option with cameras whose photosensors are embedded in the chosen refractory material; also, visual prostheses in the future could have this option.

So, under these circumstances, would the color of a light change as drastically as suggested by the wavelengths recited in [1]? If the color did not change, then for this weird situation one should compute tristimulus values with frequency rather than wavelength as the integration variable: light does not change frequency when passing through a transparent medium. Perhaps someone has already tested the idea with cameras. I await the impact of the idea once prosthetic eyes are abundant.

[1]. HQ Fuller, RM. Fuller, and RG Fuller, Physics Including Human Applications. Harper and Row, 1978. Revised electronic version copyright 2009 by RG Fuller.

http://physics.doane.edu/hpp/Resources/Fuller3/pdf/ F3Chapter\_19.pdf exercise 2, p. 436.

Michael H. Brill *Datacolor* 



## IN THIS ISSUE, August 2016

The human eye is marvelously capable of adapting to the light levels making it possible for a person to discover and recognize what is in a visual scene. In order to learn more about this capability, the human eye's sensitivities to luminance and chromatic differences are commonly investigated using two methods: 1) threshold for detection and 2) scaling for evaluation. In our first article, "A neurophysiologically-based analysis of lightness and brightness perception," Thorstein Seim and Arne Valberg analyzed psychophysical, achromatic luminance threshold and scaling data. They found that a cone-based hyperbolic response function can be used to predict both psychophysical, achromatic thresholds and lightness scaling. Also it is possible that the "Crispening Effect" is due to a lateral mechanism, resulting in a visual response component that is added to the cone output response. The state of adaptation is strongly dependent on the luminance of the test and the surrounding fields.

Some of our most exciting colors seen in nature (and man-made) are structural colors created by diffraction or interference. In our next article H. J. Swatland investigates how to measure the "Interfer-

continued on next page

#### CR&A In This Issue August 2016 continued

ence colorimetry of starch granules." Starch molecules, which are important in botany, archeology and food science, have are been studied microscopically for nearly 200 years. However, the consistent color analysis is particularly difficult using a microscope. Swatland used a tilting compensator to generate interference colors, then he measured the color by spectrophotometry with the chromaticity calculated by the weighted ordinate method. He found the diameter of starch granules had a strong effect on their chromaticity, but after comparing with color coordinates of 3 different color charts there was a reasonable correspondence between the subjective terms used to describe interference colors, and those used for the CIE diagram. Developing these measurement and calibration techniques are especially important for the automated analysis of stained microscope slides in human pathology.

The previous article pointed out some of the complexities of spectrophotometric measurement in different situations. So in our next article an alternate approach is used to measure, model, and render the surface appearance of a given material. Duck Bong Kim, In Yeop Jang, Han Kyun Choi and Kwan H. Lee present a method for spectral recovery and representation of spectral bidirectional reflectance distribution function (BRDF) from multispectral reflectance measurements, in which they can render real appearance materials over a 3D model with accuracy and efficiency. In "Recovery and representation of spectral bidirectional reflectance distribution function from an image-based measurement system", three steps 1) spectral BRDFs recovery, 2) the compression, and 3) its representation are presented. The capability of the method is demonstrated by applying it to sample materials and achieves data compression down to several hundredths of times while maintaining the accuracy in colorimetric and spectral domains.

In the automotive industry and elsewhere, often hand-held multi-angle spectrophotometers are used on assembly lines to check the appearance of gonioapparent coatings. However, these instruments are sensitive to angular errors which can be the result of positioning or measurements too close to the specular angle. In "Model-based corrections of geometric errors in multi-angle measurements of gonioapparent coatings," Kenji Imura and Yoshitaka Teraoka discuss the application of numerical corrections for colorimetric errors caused by positioning error and irregular geometry in multi-angle measurements of gonioapparent coatings. Remaining on the topic of the color of automobiles, Omar Gómez, Esther Perales, Elísabet Chorro, Francisco J. Burgos, Valentín Viqueira, Meritxell Vilaseca, Francisco M. Martínez-Verdú and Jaume Pujol compare "Visual and instrumental assessments of color differences in automotive coatings." They studied the correlation of the visual (using a directional lighting booth) and instrumental assessment (using the BYK-mac multi-angle spectrophotometer and PR-650 tele-spectroradiometer) of the color differences between pairs of similar samples (solid, metallic, and pearlescent). They showed that the use of tele-spectroradiometry is a realistic way for testing the visual and instrumental correlation in automotive coatings.

Moving from cars to plastics, our next article examines the "Influence of ageing on the gloss, color, and structure of colored ABS." The terpolymer acrylonitrile-butadiene- styrene knowns as ABS is widely used for pipeline installations, construction of machines and chemical equipment. However, its polymers are potentially subject to degradation from many factors such as solar radiation, heat, wind, the occurrence of residual stress, or chemical actions of water, pollution, oxygen, ozone, and bases. Elżbieta Bociąga and Milena Trzaskalska report that UV ageing contributes to significant changes in the degree of gloss (decrease), luminance (fading) and offset values of the parameters *a* and *b* in the direction of red and yellow.

The Kubelka-Munk model is widely used in computer calculations predicting the color, or batch adjustments of colored materials. Using this model, measurements over black and over white backgrounds are often needed. However, this can lead to problems when the materials are translucent. In the "Note: Calibrating low-scattering samples using Kubelka-Munk model," Michael H. Brill and Ya Qi Li propose two alternative computational forms that can be used in the near-transparent limit to avoid the numerical instability that occurs as one approaches a division by zero in the calculations.

We have had many articles as our understanding of the use color terms around the world expands. Just this year in the first issue Dimitris Mylonas and Lindsay MacDonald discussed "Augmenting basic colour terms in English" and in the second issue Eric Kirchner, Saeideh Gorji Kandi, and Hosein Saeedi made "An attempt to reconstruct the meaning of al-Tusi's color words." Now in this issue Giulia Paggetti, Gloria Menegaz and Galina V. Paramei discuss "Color naming in Italian language." When the basic color terms in the Italian language were *continued on next page* 

#### CR&A In This Issue August 2016 continued

compared to English color terms, two outcomes are specific to Italian: (1) naming of the area between 'red' and 'purple' is highly refined and (2) the fact that both *azzurro* and *blu* perform as basic color terms thus dividing the blue area along the lightness dimension.

For our last two articles we deal with more seasonal issues. First, many readers are using sunglasses this time of year. The assessment of scattered light in lenses, sun-glasses and eye protection has been carried out various ways around the world. There is no international standard. Haze, a wide angle scatter, is measured in the United States, and Australia, while light diffusion is used in Europe. "The assessment of scattered light in ophthalmic materials" is addressed by Stephen J. Dain and Gloria S-C. Yuen. In an effort to move toward an international standard, they evaluated several variations of both types of measures and found they were highly correlated and could be corrected by scaling factors. This study provided the basis to adopt haze as the measure of light scattering in ISO 12311 Personal protective equipment — Test methods for sunglasses and related eyewear.

The second seasonal article is "Exploring compatible facility colors and associated colors for outdoor recreational spaces" by Chia-Kuen Cheng, Yin-Chieh Lee and Li Shen. An important issue in environmental design and planning has been how to coordinate the color of facilities or buildings with the environment in which they reside in order to enhance that environment's visual quality and use experience. Thus the authors explore compatible facility colors and the associated colors in different outdoor recreational spaces. They found that while people considered certain colors with various places such as rivers, the buildings were not considered in the same way. Often building color was associated with its use or purpose, such as bright colors for theme parks, or historical heritage sites were associated with low-saturation colors and so forth. Also, color meanings can be extremely different in different cultures.

We close this issue with a book review and a brief mention of a new CIE publication. Rolf Kuehni, our Emeritus Editor, reviews *On the Genealogy of Color, A Case Study in Historicized Conceptual Analysis* by Zed Adams. Also there is a notice of the publication of the closing report from CIE technical committee 1.55 on Uniform Color Space for Industrial Color Difference Evaluation, titled CIE Publ. 217:2016 Recommended Method for Evaluating the Performance of Colour-Difference Formulae.

Ellen Carter

12

Editor, Color Research and Application

# Can you Identify the Unknown People in this Image?

Rolf Kuehni sent the following image from the 1979 ISCC Williamsburg Conference on Color Discrimination Psychophysics to share with the membership. Unfortunately, we don't know who everyone is. Please help us identify the unknown people.



Here are our color science friends listed from left to right: Alan Robertson **Richard Ingalls** Marjorie Ingalls Rolf Kuehni 1 ? 2?Chuck Reilly 39 David MacAdam Ralph Stanziola Klaus Richter Tarow Indow 4?Danny Rich 5? If you know who 1-5 are, please contact me, the Edi-

tor of this newsletter at <u>geinhaus@frontiernet.net</u>. Once everyone has been identified, the image will be republished in the newsletter for all to see.

A big thanks goes out to Rolf Kuehni for sending this image. If any other members have similar images to share, please forward them to the Editor. They will be published and posted on our website.

Paula J. Alessi, ISCC News Editor

Calendar			
2016			
May 13-18	16 <sup>th</sup> Annual Vision Sciences Society Meeting, TradeWinds Islands Resort, St. Pete Beach, FL, Info: <u>http://www.visionsciences.org/myvss</u>		
May 15-18	2016 CORM Annual Meeting, NIST, Gaithersburg, MD, Info: http://www.cormusa.org		
May 22-27	SID Display Week, San Francisco, CA, Info: http://www.displayweek.org		
May 30-Jun1 Multispectral Colour Science, Trois-Rivières, Québec, Canada Info: <u>http://icisp-conf.org/mcs2016.php.html</u>			
May 31-Jun3 12 <sup>th</sup> International Conference on "Light and Color in Nature", University of Granada, Granada, Spain, Info: <u>http://www.ugr.es/local/lcnature2016</u>			
Jun 29-30	ASTM E12 Color and Appearance, Chicago Marriott, Chicago, IL		
Jul 12-13	Visual Image Interpretation in Humans and Machines, Bailbrook House Hotel, Bath, Somerset, UK, Info: <u>http://www.viihm.org.uk/home/events/third-workshop/</u>		
Jul 22-23	2016 ACM Symposium on Applied Perception, Anaheim, CA, Info: http://sap.acm.org/2016/cfp/php		
Aug 19-22	2 Archiving 2016, National Archives, Washington, D.C., Info: <u>www.imaging.org/archiving</u>		
Aug 28-Sep1 39 <sup>th</sup> European Conference on Visual Perception (ECVP), Barcelona, Spain, Info: http://www.ub.edu/ecvp			
Sep 5-9	CIE Expert Symposium on Appearance and CIE Division 1 Meeting, Prague, Czech Republic,   Info: ciecb@cie.co.at. Includes:   Sep 5 Tutorial on Basics of Goniospectrophotometric Reflectance Measurements   Sep 5-7 CIE Expert Symposium on Appearance   Sep 8 CIE Division 1 TC Meetings   Sep 9 CIE Division 1 Main Meeting		
Sep 14-16	4 <sup>th</sup> Progress in Colour Studies Conference (PICS2016), University College London, London, UK., Info: lindsay.macdonald@ucl.ac.uk		
Oct 8-10	<b>3<sup>rd</sup> VISART workshop on Computer Vision and Art Analysis @ECCV 2016,</b> Amsterdam, The Netherlands, Info: <u>http://printart.isr.ist.utl.pt/visart/</u>		
Oct 18-22	AIC Interim Meeting Color in Urban Life: Images, Objects, and Spaces, Santiago, Chile, Info: <a href="http://www.aic2016.org">www.aic2016.org</a>		
Nov 7 -11	24 <sup>th</sup> Color and Imaging Conference (Special Topic: Mobile Color), San Diego, CA		
Nov 11	Info: <u>www.imaging.org/color</u> ISCC Workshop (Life of a Color) and Annual Business and Awards Meeting, co-located with CIC 24, San Diego, CA, Info: http:// <u>www.imaging.org/color</u>		
2017			
Oct 16-20	AIC 13th Congress, International Convention Center, Jeju, Korea, Info: www.color.or.kr		
Oct 23-25	CIE 2017 Midterm Meeting, Jeju Island, Korea, Info: <u>www.cie.co.at</u>		
Oct 26-28	CIE Division 1 and 2 Meetings, Jeju Island, Korea, Info: www.cie.co.at		
2018			
Oct 1-5	AIC Interim Meeting, Colour and Human Comfort, Portuguese Colour Association, Lisbon, Por- tugal		

# **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 Technologieswww.aviantechnologies.com603-526-2420Datacolorwww.datacolor.com609-895-7432Hallmarkwww.hallmark.com816-274-5111Hunter Associates Laboratory, Inc.www.hunterlab.com703-471-6870

We could still use your help!

ISCC has positions in the organization that need filling. We can help identify a place for you depending on your skills and desires. Contact Nomination Chair Scot Fernandez, <u>scot.fernandez@hallmark.com</u>

## ISCC News Issue #474, Spring 2016 Editor: Paula J. Alessi

(585)225-4614 geinhaus@frontiernet.net

Editor Emeritus: Prof. Gultekin Celikiz

(215)836-5729 gcelikiz@yahoo.com

# **ISCC Member Bodies**

At its foundation, the ISCC is composed of many related societies. These societies, our Member Bodies, help the ISCC maintain 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 Colour Association Environmental Colour Design Study Group (AIC - ECD) 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)