



Inter-Society Color Council News

Issue 485

Winter 2019

SPECIAL ISSUE – Munsell Centennial Color Symposium – Part 2

Editor's Note

This is a Special Issue of *ISCC News* that will complete the summary of the amazingly successful joint ISCC/AIC Munsell Centennial Color Symposium that we held at MassArt in Boston from June 10 – 15, 2018. Part 1 of the summary was published in *ISCC News* #483. Part 2 will feature all aspects of the Munsell 2018 Centennial that were not covered in Part 1. We hope you enjoy this issue and use it either as new information, if you could not attend the Symposium, or as an archival reminder of the magic that occurred throughout that week in June, 2018.

Board of Directors Corner

As President-Elect over the last two years, I have had the opportunity to observe and, whenever appropriate, contribute to the functions of the Council. I am humbled to begin my tenure as ISCC President. As an educator for over twenty years, I remain a steadfast believer in paying homage to predecessors. I am finalizing a book on *Pioneers of Color Science* and not surprisingly, our Council includes many past members (including Presidents) who are on that list. With such an illustrious history, my task

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seems almost overwhelming and the responsibility to maintain the national and international position,



respect, and relevance of the Council almost daunting. I am aware of the opportunities that transitions provide and will serve the Council to the best of my ability. I am

pleased to have a strong core of experienced and enthusiastic Officers and Directors to help me advance our aims and objectives. I also need your help...please reach out to us and share your thoughts and suggestions regarding the future of the Council. Also reach out to colleagues, students, employees and friends and make them aware of the Council and its objectives (Please see <https://iscc.org/Aims>).

Without a doubt, the Council, like many other organizations, has changed its functions and membership since its inception in 1931. The triangle in our logo represents the three arms of Science, Art and Industry and thus the Council's main responsibility is to address the needs of these three domains. The circle encompassing the triangle represents Education, which connects these domains and forms the heart. The activities in these sectors are likely different now from what they were in the 20th Century. Throughout our history, however, we have aimed to address the needs of our members while keeping pace with changes. We continue to do so. Over the last few years, we have witnessed some significant changes in our membership and activities, in concert with the changing needs of our times. What has not changed however, is the diversity in activities and interests of our members who come from myriad disciplines that involve Color. Admittedly, numerous organizations now deal with the highly specialized needs of different sectors. We must therefore

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ISCC EXECUTIVE OFFICERS

Terms end 2020

President	Dr. Renzo Shamey North Carolina State University College of Textiles rshamey@ncsu.edu
President Elect	Dr. David R. Wyble Avian Rochester, LLC PO Box 1210 Webster NY 14580 dave@avianrochester.com
Secretary	Dr. Jean Hoskin sjhoskin1@gmail.com
Treasurer	Dr. Francis O'Donnell The Sherwin-Williams Company fxodonnell@sherwin.com
Past President	Mr. Jerald Dimas Color Communications, Inc. 4000 W. Filmore Street Chicago, IL 60624 USA +1 (773) 475-2575 jerdim@ccicolor.com

ISCC BOARD OF DIRECTORS

Terms end 2019

Mr. Steve Linberg	171 State Street Amherst, MA 01002 steve@slinberg.com
Ms. Maggie Maggio	maggiemaggio@gmail.com
Dr. Anthony Stanton	Carnegie Mellon University stanton@andrew.cmu.edu

Terms end 2020

Ms. Rachel Schwen	The Sherwin-Williams Company +1 (612) 375-7801 rschwen@valspar.com
Mr. John Seymour	John the Math Guy, LLC John@JohnTheMathGuy.com

Terms end 2021

Dr. Lina Cardenas	Pontifical Catholic University School of Design Santiago, Chile Tel: 56 974786494 lina.cardenas@uc.cl
Dr. Danny C. Rich	Sun Chemical Corporation Color Research Laboratory 631 Central Avenue Carlstadt, NJ, 07072, USA O: +1 (201) 933-4500 x1144 M: +1 (973) 580-4326 www.sunchemical.com danny.rich@sunchemical.com
Ms. Luanne Stovall	Artist, Color Theorist Lecturer, University of Texas at Austin lu@luannestovall.com
Ms. Amy Woolf	Amy Woolf Color Consulting, LLC www.awcolor.com info@awcolor.com

Board of Director's Corner continued

embrace the core aim of our Council, which is a source of “cross-pollination” among diverse disciplines. Inter-Society Color Council bridges the gap among those involved in the specification, production and art of color and provides a forum for multi-disciplinary discussions in a unique setting. That is our strength and we shall remain true to that objective. We should also continue to educate and provide training to our members to facilitate communication amongst us. We should address our membership needs. Students should be at the heart of our activities. Thus, in the current age of information technology, we must remain relevant, timely and informative. There are a number of possible avenues that I believe we should explore.

Since I am an educator, I aim to make education my main priority over the course of my tenure. We have had a number of very informative and interesting webinars over the last two years and we will aim to provide them as regularly as practical. Webinars continue to strengthen our achievements in educating our membership and generate interest in the activities of the Council. Students and educators from different disciplines are invited to take advantage of these events. I call on my colleagues in the higher education sector to (re)establish ISCC Student Chapters. Not long ago, we had several successful ISCC Student Chapters including those at Rochester Institute of Technology (RIT), University of Chicago, and Fashion Institute of Technology (FIT) and for a variety of reasons, these have not continued. A free first year membership could be provided to all active new student members that facilitate this process.

Pending approval from the Board, I shall invite all corporate, sustaining and individual members to participate in funding student activities. Depending on the level of support, these could be “named scholarships” generating legacy and promotion for the founding members.

We will have a long-term strategic planning meeting at the Sherwin Williams facility in Minneapolis during the joint ISCC/TAGA conference in the morning after the Annual Meeting concludes (9 am-12 pm) on Tuesday March 19, 2019. Morning coffee and lunch will be provided for all registered participants (See <https://iscc.org/events>). This will be an open forum for discussions on the current status of the Council and on ideas for the future. Generating a roadmap from these discussions shall be a strategic goal this year. Ideas for discussions may include the level and type of education in the field,

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Board of Board of Director's Corner continued

how we can continue to bridge across color in art, science and industry disciplines and future priorities. Your voice and opinion matter and can make a difference. I would love to hear from you. Please feel free to reach out to me, or any of our officers, and discuss your ideas!

Finally, I am pleased to receive the Council in a healthy form both financially and with new elected officers and board members. Last year was a very successful year and the Munsell Centennial Color Symposium was certainly a memorable event. I would like to thank all who made this possible. I would also like to extend my sincere gratitude and appreciation to Jerry Dimas and John Conant, our past two presidents, for their dedication and contributions to the success of the Council.

Renzo Shamey, *North Carolina State University, ISCC President*

Election Results

The ISCC Board of Directors is proud to announce the election results from the balloting procedure that took place in December 2018. The excellent slate of candidates was approved by 63 voting members of ISCC. (For comparison, we had 40 ballots returned in 2017.)

We have elected four new Officers. Our new President is Renzo Shamey. Our new President-Elect is Dave Wyble. Our new Secretary is Jean Hoskins. Our new Treasurer is Frank O'Donnell. Jerry Dimas becomes our Past-President. They will all serve for two years so their term of office will end December 31, 2020.



President Renzo Shamey



President-Elect Dave Wyble



Secretary Jean Hoskin



Treasurer Frank O'Donnell

Since Jean Hoskin was a member of the Board of Directors, we needed to replace her position. So, we elected four new members to our Board of Directors: Lina Cardenas, Danny Rich, Luanne Stovall, and Amy Woolfe. Their term of service began in January 2019 and will end in December 2021.



Director Lina Cardenas



Director Danny Rich



Director Luanne Stovall



Director Amy Woolfe

These new Directors will be joining the existing Directors: Steve Linberg, Maggie Maggio, Tony Stanton, Rachel Schwen and John Seymour.

Congratulations to the new members of the ISCC Board of Directors! Their contact info is listed on the ISCC website (<https://iscc.org/Board>) and in this newsletter on page 2. Please feel free to reach out to members of the Board of Directors if you have any questions about the Council or if you would like to serve in the future.

Attention ISCC Members
 We hope you have all had a chance to renew your ISCC membership for 2019. The invoices were sent to you online in December of 2018. Your speedy renewal will ensure that you have no interruption in your receipt of online information like this newsletter and other announcements.



TAGA/ISCC 2019 Joint Conference March 16-19, 2019

Mark your calendar now to attend the TAGA / ISCC 2019 Joint Conference at the Millennium Minneapolis Hotel in Minneapolis MN. We will be celebrating the 100th anniversary of the foundation of the Bauhaus School in Germany by focusing on color in art and design education, and featuring the teachings of Josef Albers in webinars and at the ISCC Annual Meeting in Minneapolis in March 2019.

The conference will include:

- **Sunday, 3/17/2019** – keynote presentations <https://www.taga.org/keynotes/>
 - One of the keynotes will connect to the 100th anniversary of the Bauhaus. *Interacting with Color: The Art and Teaching of Josef Albers*, presented by Fritz Horstman, Artist Residency and Education Coordinator, Josef and Anni Albers Foundation
- **Monday, 3/18/2019** – technical presentations, including sessions on Digital Textile Printing and Color Literacy.
 - Papers are listed here: <https://www.taga.org/papers/>
 - Program is listed here: <https://www.taga.org/program/>
 - **The ISCC Annual Meeting will be held during lunch on Monday, 3/18/2019.** The Annual Meeting will include award presentations and annual reports for the ISCC.

The Digital Textile Printing session will feature some of the following color-related presentations:

- David Clark from Huntsman Textile Effects will give a talk entitled *Which Ink Do I Use? – An overview of digital textile ink types and how they're used*
 Abstract: This presentation is a brief overview of the different types of textile inks in the market today and of how they are applied. We will look to demystify the preparation of fabrics for digital printing and also

touch on the post-processing of the prints to ensure great color and durability of the printed fabric.

- Kerry Maguire King from Spoonflower will speak about *On Demand Textiles and the Colorful Challenge of Web to Print*

Abstract: The web to print business model presents a set of challenges for the graphic arts industry in regard to image workflow and color management for digitally printed products. Within the context of a textile operation such as Spoonflower, the system is further complicated by factors including printer platform, substrate type, ink chemistry and finishing requirements. This presentation will highlight some of the unique characteristics of the print-on-demand setting for textile products. The discussion will provide insight into management of repeating surface designs and will feature obstacles and opportunities for technology development that support the fulfillment of customer expectations for textile products purchased via the web.

- Scott Donovan from BleuPrintCreative will give a talk entitled *Managing Color with Digital Textile Printing*.

Abstract: In this presentation we will discuss different factors that influence color management decisions in Digital Textile Printing. We will cover different dye sets, CMYK vs RGB approaches, substrate differences and how other industry's standards have influenced digital textile printing. Workflow approaches to managing consistent color will also be discussed.

The Color Literacy session will feature the following color-related presentations:

- John Seymour (John the Math Guy, LLC) and Maggie Maggio (Smashing Color) will give a talk entitled *The Grand Canyon of Color: How to talk about color across the creative / technical divide*.

Abstract: Why should graphic designers and production artists know about the technical side of printing? Why does it matter? John Seymour will play the part of the frustrated printer and Maggie Maggio will act as the equally frustrated artist in this fun production of "I Couldn't Disagree More". While wading through each other's jargon, they will meet halfway and slowly, with great

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TAGA/ISCC 2019 Joint Conference continued

difficulty, start to appreciate each other's perspective. Little by little, as communication improves, they will begin the process of building a bridge over the great divide.

- Luanne Stovall (School of Architecture and College of Fine Arts at University of Texas) will give a talk about her *21st Century Color Literacy Project*.

Abstract: Advances in science and technology expand our understanding of color and create opportunities for teaching color as a multidisciplinary subject in classrooms from early childhood to higher education. Maggie Maggio and Luanne Stovall propose to share information with participants about the 21st Century Color Literacy Project, a newly formed, long term initiative led by the ISCC to identify misinformation about color in education and promote updated color competencies relevant to 21st century industries and disciplines. The session will address specific problems identified by the ISCC Problems Committee, and review results of a baseline Color Education Survey distributed to colleagues involved in color education (kindergarten to university). This survey is the first step in developing age-appropriate resources for teaching color as a STEAM (Science, Technology, Engineering, Art, Math) subject.

Registration for TAGA/ISCC 2019 Joint Conference

ISCC members, whose membership is current for 2019, may register for the two day program at a cost of \$495. For registration and further information, please visit <https://www.taga.org> (click on "Conference").

TAGA/ISCC Pre-Conference Workshop Josef Albers's Color Experiments with Fritz Horstman

On Saturday March 16, 2019 one day before the beginning of the TAGA/ISCC 2019 Joint Conference, ISCC will be offering a four-hour workshop with Fritz Horstman on *Josef Albers's Color Experiments*. The location for this workshop will be the same venue as that for the TAGA/ISCC Joint Con-

ference, the Millennium Minneapolis Hotel, and the time will be from 1:00 – 5:00PM.

Josef Albers's color course was legendary. The Bauhaus master, who also was director of Black Mountain College and head of the Yale School of Art, taught generations of students to see color in new and unexpected ways. Over a lifetime of teaching, he created a series of exercises that opened up the subject of color. In this comprehensive workshop, a few of these exercises will be explored. There is no pre-requisite of painting or color experience if you wish to participate in this workshop.



Fritz Horstman photo credit Adrien Thiba

Working directly from Albers's teaching notes and student recollections, Albers Foundation educator, Josef Horstman, will lead experiments such as "make one color become two" and "the four color worlds". All materials, including ColorAid paper, will be provided. Participants will be able to take their exercises home.

The fee for this pre-conference workshop is \$75, including materials. Spots are filling up fast, so please register now for this workshop by clicking here: <https://iscc.org/event-3153676>.

ISCC Long-Range Planning Meeting Tuesday, March 19, 2019

The ISCC is holding a Strategic Long-Range Planning Meeting Tuesday, March 19, 2019 the day after the Joint TAGA/ISCC Conference in Minneapolis. This meeting will take place at Sherwin Williams (312 S. 11th Avenue, Minneapolis, MN 55415)

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ISCC Long-Range Planning Meeting continued

from 9AM to 12PM. Coffee and a box lunch will be provided by ISCC.

The ISCC Board of Directors is hosting this event to ensure that the Council stays on track for the long-term needs of the color community. The meeting will be facilitated by the Board of Directors and will be open to all ISCC members and interested parties. Attendees for this no-charge event must register in advance. If you are unable to attend in person, a teleconference link will be provided. Please take the time now to register for this important event by clicking here: <https://iscc.org/event-3159322>.

The purpose of the meeting is to identify and set a path for the future of ISCC. In preparation for the meeting, please be thinking about the following:

- What do we do best?
- What are our strengths and weaknesses?
- What opportunities should we be considering?
- Where do we want our organization to be in one year, or three years from now?
- Do we have the personnel and resources to go there?
- What value does our organization bring to our membership?

Some other topics for discussion are:

- Future meetings. What topics should be addressed?
- What other organizations might we develop relationships with?
- What should the structure of future meetings look like?
- Student/young professional interactions. Should we have student chapters, contests, awards, “young professional” sessions, etc.
- Structure of the ISCC. How can we best get done what the color community needs done? Are project committees the best/only answer? What else can be done?

Please try to attend this very important meeting so that your voice can be heard. If you have any questions or suggestions concerning the meeting, please contact our Past President, Jerry Dimas at jerdim@ccicolor.com. Or call him at 773-475-2575 (direct) or at 312-287-6670 (cell).

Joint ISCC/AIC Munsell Centennial Color Symposium – Part 2

The remainder of this newsletter will be dedicated to discussing the portions of the week-long activities that took place at the Joint ISCC/AIC Munsell

Centennial Color Symposium that were not covered in *ISCC News #483*. Please recall that this Symposium took place from June 10-15, 2018 at Massachusetts College of Art and Design in Boston, MA.

Tuesday Gala Keynote Talk

After the Tuesday evening meal at the Gala (June 12, 2018), our fellow ISCC member and Director,



John Seymour, gave us a delightful light-hearted, but very informative talk on *The Color Name Conundrum*. Thank you John for

sharing it with our readership here.

It's a common argument that my wife and I have. We are at a store or movie or coffee place, and I will comment on another woman's blouse. "Hey, Honey. Look at the woman in the turquoise top. Isn't she cute? ... She smiled at me... And she handed me a card with her number on it." Madelaine will invariably respond with "That's not turquoise!" She may say that it's teal, or aqua, or beryl, but she will never agree on the color name that I chose. I can blather on all I want about how I am a world-famous color scientist who was asked to give a keynote for the Munsell Conference. It won't matter. What do I know about color?



The lady in the allegedly turquoise blouse

This time, I decided that I would win the argument. I started with Merriam-Webster's dictionary since it is an authoritative reference that would show I was using the color name correctly. This dictionary defines turquoise as "a bluish-green color", and follows up with the full and much more explanatory definition "a light greenish blue".

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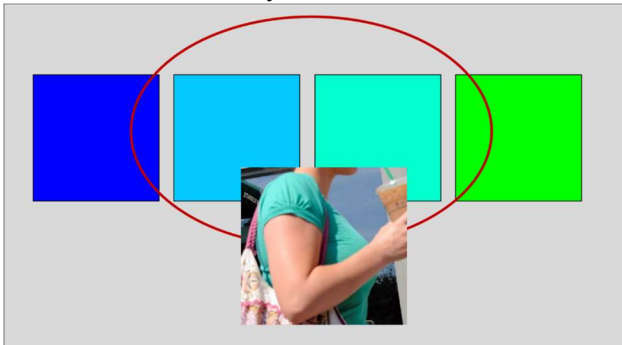
Tuesday Gala Keynote Talk continued

I exercised due diligence and spoke directly with the person who wrote the full definition, Kory Stamper, to help resolve the argument with my wife. She politely (and wisely) declined to get involved. But I could tell that she was agreeing with me.

[As an aside, the exciting thing about attending ISCC/AIC Munsell conferences is that eminent chromo-lexicographers like Kory might be in the audience when they are called out in a keynote address.]

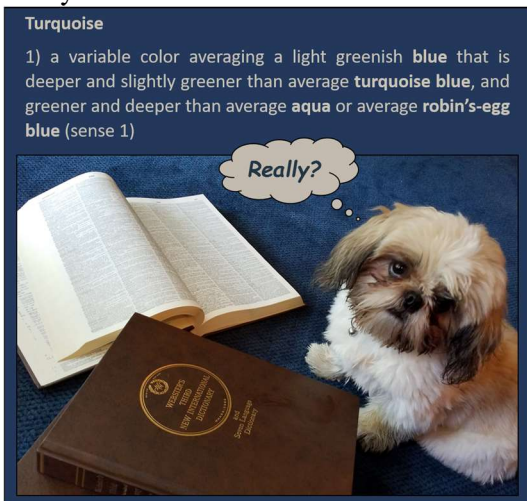
Dictionary.com defines turquoise similarly: “a greenish blue or bluish green color”. The Oxford English Dictionary provides a similar definition but leans more to the greenish side: “a greenish-blue color”. So, it seems we have a consensus between the dictionaries. But more importantly, we have a consensus in which I win the argument!

The image below shows blue, greenish-blue, bluish-green, and green. The blouse is definitely close to bluish-green, so turquoise is indeed an appropriate descriptor of the blouse color. Did I mention that I claim victory?



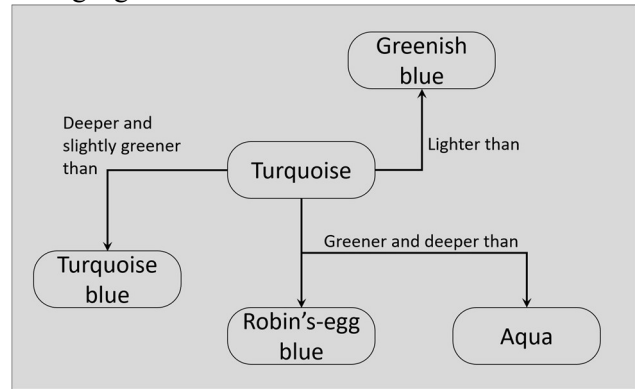
The happy shades between blue and green

But I decided to check one last dictionary, Webster’s Third New International. The definition in this dictionary is at once beautiful and tedious.



My stalwart research assistant suggests that the definition might be a bit too complicated

You can see that our puppy, Mozart, was puzzled when he read it, so I diagrammed the definition out for him (see next image). He thanked me when he saw the diagram and went off to bark a friendly greeting to a squirrel that was outside. By the way, Mozart is not named for Hank “the Tank” Mozart. You will recall that Tank played defensive hatchback for the Green Bay Bruins. His claim to fame is that he scored the winning basket over Jack Nicklaus in the 1968 War of the Roses Tournament. Madeline and I named the dog after the less-well-known Wolfgang “Wolfie” Mozart.



An Applied Math Guy reads the dictionary

In most dictionary definitions, the lexicographer works to define complex words in terms of more basic words. The Webster’s Third definition of turquoise is unique in that it defines the color relative to other colors which are just as non-basic as turquoise. To really make sense of this tortuous definition of turquoise, I realized that I had to generate similar diagrams for aqua and robin’s egg blue and turquoise blue and greenish-blue, and then for each of the other colors that were called out in those definitions. It only took me three days to generate the following table that delineates the territory of the ten tones in the turquoise tautology. It is clear from this that color names are very precisely defined.

		← Paler	Richer →		
	Robin’s-egg blue (2)			Turquoise green	↑
			Aqua green		
		Eton blue	Turquoise (2)		Greener
		Turquoise blue	Turquoise (1)		Bluer
	Aqua				↓
Aqua blue	Robin’s-egg blue (1)				

A handy reference for color names in the blue-green family

But I still wasn’t happy. The intertwined definitions haunted me. Where Kory is the Steinbeck of chromo-lexicography, whoever wrote the lovely and sadistic color definitions from Webster’s Third was the Faulkner. I simply had to find out who this

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Tuesday Gala Keynote Talk continued

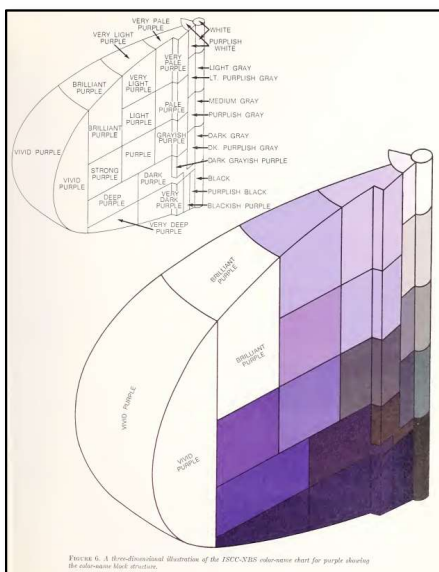
anonymous author was.

Luckily, it didn't take long. The list in the front of the dictionary of contributing experts provided me with the answer. It had to be Isaac Godlove.

[As an aside, the exciting thing about attending ISCC/AIC Munsell conferences is that the audience will recognize the names of prominent researchers in color when their names are mentioned in a keynote address. Let me tell you, the cheers were deafening! Everyone recognized that Godlove was the third author of the seminal paper "Neutral Value Scales. I. Munsell Neutral Value Scale" from the *Journal of the Optical Society of America* in 1933.]

Of course, some of the people cheering also recognized that Godlove was the director of the Munsell Research Laboratory from 1926 to 1930. What an enormous coincidence that he should get mentioned in the keynote at the Munsell Conference! A few chromo-historians in the crowd actually knew that Isaac Godlove was the chair of the ISCC Committee on Measurement and Specification in 1933. (Note again the coincidence that the ISCC was one of the organizers of the Munsell Conference!)

While Godlove was chair, a group of pharmacists approached Godlove about the need for a definitive guide to color names. This eventually led to the National Bureau of Standards runaway best seller "Color – Universal Language and Dictionary of Color Names", which became a Broadway play of much acclaim. This absolutely delightful standard carved the Munsell Color Space into 267 regions (called Centroid Colors) and gave each region an intuitive designator like "bG 159", along with a euphonious name like *brilliant bluish green*.



A hue slice from the NBS standard on color names

As if that wasn't enough to earn a prominent spot in my bookcase, the authors dug through all the available color naming guides (like Maerz and Paul, Plochere, and Ridgway) to determine the Munsell coordinates for each of the color words that were defined. As a result, the NBS standard further provides two lists: 1) a list that goes from common color name to the appropriate Centroid Colors in Munsell space, and 2) a list that provides all the color names that have been associated with each of the 267 Centroid Colors.

I was ecstatic. I quickly saw that this book provided a solution to the recurring argument that I had with my wife. The solution is astoundingly simple. Whenever I am within earshot of Madelaine, I just have to go through four simple steps before I utter any color names.

Step 1: Measure the color in question. For example, I called up the woman in the turquoise top, explained the situation, and met her at Starbucks with my spectrophotometer so I could measure her shirt. She understood my predicament perfectly and agreed to share a Starbucks with me. Her shirt measured CIELAB of 86, -47, -4. Her name is Teal, by the way.

Yes, it's a bit of a bother for me to carry a colorimeter with me at all times, but what color scientist worth his or her salt doesn't carry one for the occasional color measurement emergency?

Step 2: Convert from CIELAB coordinates to Munsell designation. One *could* make use of the *Munsell Renotation Data*. The official version is conveniently available on the RIT website to do the approximate conversion, but several people have written software that does this. Harold Van Aken (of Wallkill Color) provided a piece of software as a freebie in honor of the Munsell Color Conference. (Yet another astounding coincidence.) Paul Centore has graciously provided an open source conversion, and Danny Pasquale sells an inexpensive tool called PatchTool that provides this function among others. The CIELAB coordinates of Teal's allegedly turquoise blouse were thus converted to 5BG 8.5/9 in Munsell notation.

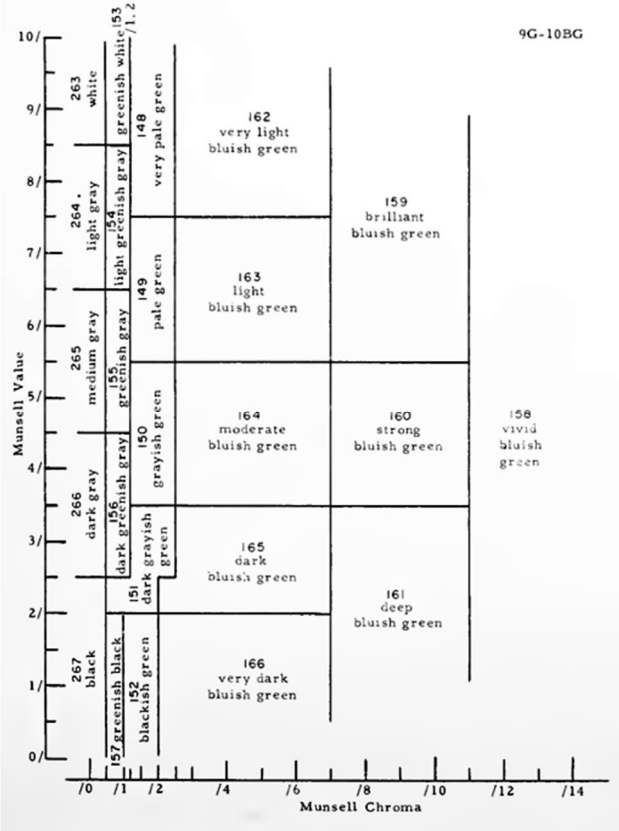
[As an aside, the exciting thing about attending ISCC/AIC conferences is that two of the three people who wrote software for this conversion (Paul and Danny) were actually in the audience for the keynote.]

Step 3: Convert from Munsell designation to Centroid colors. It goes without saying that it is pretty quick and easy to leaf through the diagrams (like the one on the next page) in the NBS standard to

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Tuesday Gala Keynote Talk continued

find the Centroid corresponding to any Munsell designation. In this case, the Centroid Color is 159. Yes, it's a bit of a bother to carry the NBS standard with me, but it's a small price to pay for me to prove that I am right in an argument with my wife.



Conversion from Munsell Designation to Centroid Color

Step 4: Look up the color names listed under the Color Centroid. In the case of Centroid 159, the list is rather short. It includes Beryl Green, Bewitch, Blue Green, Bluish Green, Bright Aqua, Bright Aqua Green, Bright Emerald Green, Bright Green, Bright Jade Green, Bright Turquoise, Bright Turquoise Green, Chill, Crest, Du Barry Blue, Festival, Green, Ice Boat, Light Emerald Green, Lilted Green, Naid, Persian Green, Picturesque, Pool Green, Promised Land, Salome Blue, Song of Norway, Sprite, Sulfate Green, Turquoise Green, Venetus, Venice Green, ... and of course, Turquoise. I win!

The fact that this particular color has 32 valid names shows that our assignment of color names to physical colors is not nearly as precise as Godlove and Webster's Third would have us believe. We need a system like Munsell or CIELAB (or NCS or RAL or Pantone) in order to accurately communicate colors. That's an important thing to realize, but the more important takeaway from the research presented here

is that I won the argument!

May you enjoy arguing with your significant other as much as I do.

John Seymour, *John the Math Guy, LLC*

Remainder of General Session on Art Wednesday, June 13, 2018

Picking up where we left off in *ISCC News* #483, we will complete summarizing the talks from Wednesday's General Session focused on Art. Please recall that this day was dedicated to Joy Turner Luke, the recipient of the 2018 Munsell Centennial Award for Art.

State-of-the-Art Talk: Lightfastness was the topic of Sarah Sands's presentation "Not So Fast: The Often Seen but Rarely Told Issues with ASTM Lightfastness Ratings". The American Standards for Test-



ing and Materials (ASTM) have developed ASTM D4303 on lightfastness testing. This standard yields lightfast-

ness ratings that are very important to manufacturers, artists, and conservators when selecting materials for their work. This standard is based solely on the performance of the 40% reflectance tint of a material. (The tint is based on a white from Titanium Dioxide.) There is an indoor test that involves putting the samples in a xenon arc test chamber for 410 hours at 510 kJ/m². There is an outdoor test where the samples are put under glass in Arizona or south Florida for three months at 1260MJ/m². Lightfastness results are measured in terms of CIELAB color differences between the unexposed control and the exposed test sample. A lightfastness rating of I corresponds to a CIELAB delta E between 0 and 4, II corresponds to a delta E between 4 and 8 and III corresponds to a delta E between 8 and 16. Examples were shown for arylide Hansa Yellow Light (PY3) and Medium (PY73) illustrating that their lightfastness, when used in acrylics, have changed over time and are now unsuitable for use in works of art. These

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Remainder of Wed. General Art Session continued

concerns do not appear to impact their use in oils or watercolors. Evidence was shown to support why it is a good idea to include masstone, glazes, and pale tints in any evaluation of lightfastness. Different whites used for tints were shown to impact the lightfastness results one gets in two case studies involving Prussian Blue and Pyrole Orange oil paint. Data were shown to indicate that the best white to use for creating the tint is titanium plus zinc.

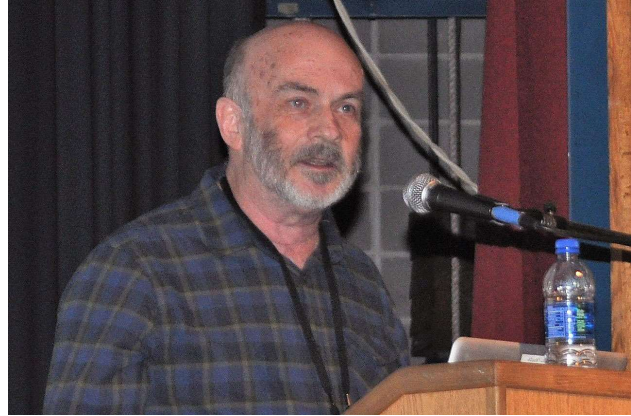
State-of-the-Art and Future Talk: Margaret Livingstone, Professor of Neurobiology at Harvard Medical School, enlightened us with her presentation, “What Art Can Tell Us About the Brain”. She



began by giving us examples of why vision is information processing and not image transmission. She gave a very effective illustration of how we can infer perceptual information from an afterimage. Artists were the first to realize that color and luminance often play independent roles in visual perception. She gave very effective artistic examples of how luminance, contrast, and orientation are local phenomena and not global ones. A Monet painting was shown where the water was always shimmering because all the brushstrokes in the water were equally luminant. She also showed some op art paintings that appeared to move and offered explanations based on neurobiology. She provided evidence for why our ability to see color is low resolution. Mona Lisa's smile was used to show how resolution differences across our visual field can change the way her smile is perceived. This presentation was a fascinating way to understand how neurobiology can provide explanations for the curious and beautiful effects that artists over the years have been creating for our visual perception.

State-of-the-Art Talk: Our last talk of the day was given by David Briggs from the National Art School

and Julian Ashton Art School in Sydney, Australia gave a fascinating talk on “Where is Color Education Now? Color and Technology”. In fact, ISCC members were so captivated with his talk that Mike



Brill asked him to write a summary of it for the Hue Angles column that appeared in *ISCC News* #483 (page 38), which is Part 1 of the Munsell Color Symposium. So, a summary will not be repeated here.

General Session on Industry Thursday, June 14, 2018

Thursday's General Session focused on Industry and was dedicated to the late Calvin S. McCamy, the recipient, posthumously, of the 2018 Munsell Centennial Award for Industry.

Historical Talk: Danny Rich gave the opening presentation “Industrial Color Technology” in Cal's honor. Danny's talk reviewed Cal's lifetime of industrial color technology work, which involved use of the Munsell Color Order System to solve industrial color problems. In reviewing Cal's memoir, Danny found that Cal was frequently being asked to contribute to practical applications of the Munsell Color Order System.



Thursday General Session on Industry continued

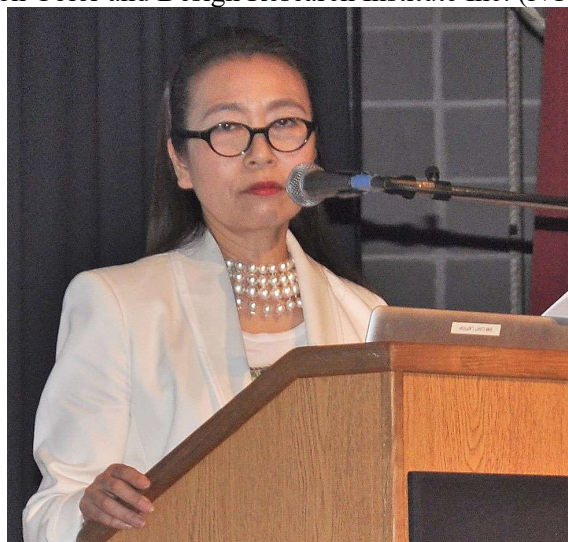
The coloration industry made the Munsell Color Company successful. Industry used chips from the Munsell Book to map large color differences or to estimate small color differences. When Dorothy Nickerson was working for the Department of Agriculture, she used the Munsell System to grade agricultural products like honey, molasses, cotton and hay. Even today Munsell chips are used by the United States Department of Agriculture for the color of frozen french fries and frozen cherries and to test soil colors and rock colors as part of their soil conservation work. The Munsell System is also used in Botany and Plant Pathology, which is very important for food production plants. Amazingly enough, the Munsell System has a bead color book that is used by archeologists for classifying the handwork of native cultures. Also, the Munsell System is very important to the electrical engineering industry because it was used to document and standardize the colors that are used in wiring applications. The Munsell System also developed personal coloring charts for home furnishings. Furthermore, there was a Munsell Color Grammar and Charts for training graphic designers. It is remarkable that the Munsell System, which was developed in the early 1900's, is still in use for important industrial applications in the 21st century. It truly is a miracle that the Munsell System, whose 100-year anniversary we are celebrating, has been able to successfully withstand the test of time for all types of applications.

Cal McCamy was active in a world where all these Munsell Charts and chips were being used. Cal worked at the National Bureau of Standards (now known as the National Institute of Standards and Technology, NIST). Cal's lab developed one of the most precise optical benches in the world for the assessment of transmittance. Cal discovered that circular and rectangular apertures were not optimum for excluding the stray light in a measurement. So, he used a triangular aperture initially made out of three Gillette safety blades.

Finally, we learned how Cal's love of photography and image science led him to develop the Macbeth ColorChecker, which is still being used for all types of industrial imaging applications today. The original chart colors were all given Munsell notations, though some of the patches had spectral signatures that produced minimal metameric differences under differing light qualities. Each patch in the chart was put there with a specific purpose in mind. Cal was meticulous in his application of color technology to photographic science. He had a pur-

pose for each and every chip and he tested and validated that the chip demonstrated the correct effect. The foliage green chip, if clipped partially through into a series of fine strips, could be planted into a lawn and neither human observer nor a film camera could detect the patch of color.

Evolution Talk: Setsuko Horiguchi from the Nippon Color and Design Research Institute Inc. (NCD)



gave a presentation entitled "From Munsell Color System to A New Color Psychology System". This talk was co-authored with Katsura Iwamatsu. Shigenobu Kobayashi founded NCD in 1967. Kobayashi was looking for a color order system that would be simpler than the Munsell System. In order to do this, he decided to make a system that was two-dimensional. After doing some color naming studies and looking at systems like the ISCC/NBS system of color names, he felt he could combine Munsell Value and Chroma into one dimension called tone. This was called the NCD Hue and Tone System with 12 tones for the 40 Munsell Hues making 480 chromatic colors. Ten neutral colors were also added making a total of 490 colors. They decided to take this system one step further by asking people to assign colors to words that would lie along three axes: a warm – cool axis like hue, a soft-hard axis like value and a clear – grayish axis like chroma. This created a psychological system called Color Image Scales. There are adjectives associated with the words along each of the three axes. It is also possible to use the Color Image Scales to combine colors and patterns to determine their image scale positions. This system of Color Image Scales has been useful in product development, marketing and city planning. An example of where this system has been successfully used is in home appliances. Studies of taste and lifestyles have been used to create products.

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Thursday General Session on Industry continued

Evolution Talk: Berit Bergström compared the Munsell Color Order System to the Natural Colour System (NCS) as well as explaining more details about the NCS in “The Natural Colour System: A Visual Approach to Color”. Both color order systems are scientifically based on visual perception of



color. The perceptual attributes used to describe color are different and the arrangement of colors takes on a different shape in both systems. NCS was derived based on Hering’s theories. The NCS atlas is a Swedish standard, whose samples are coated and not printed. The NCS is built around six elementary “pure” colors. Four of them are the chromatic unique hues of yellow (Y), red (R), blue (B) and green (G) and the remaining two are the non-chromatic colors of white (W) and black (S). All other colors are described by their degree of resemblance to these 6 elementary hues in the natural sense. Every color has a location in the NCS three-dimensional model. The hue describes the relationship of the color to its two chromatic elementary attributes. Each quadrant between two elementary colors has been divided into 100 equal steps. An example: the hue Y90R describes the degree of resemblance to yellow and red: 10% yellow Y and 90% red R, so it is almost a pure red color. The NCS is spatially arranged in triangular slices that show the nuance of a color. The nuance of a color can be described in terms of its whiteness, blackness and chromaticness. Complementary colors are not a basic concept of NCS, but can be defined in NCS. Lightness, which can be derived from Munsell Value, is NOT the same as NCS whiteness. The lightness values of the NCS standard colors can be found in the NCS atlas. Berit then discussed some applications using the NCS model. When deciding on colors for exteriors, it is im-

portant to know the difference between perceived and inherent color. The perceived color will look more chromatic and less blackish than the inherent color. Berit emphasized that when working with colors, one must always understand what the effect on our color perception will be. For example, consider the change in how we perceive a small color sample compared to the same color applied to a ready-made wall (interior and exterior). She ended her talk with a profound quote from Albert Munsell: “Color is in us-not outside us”.

Evolution Talk: Tom Lianza shared a presentation on one of the most commonly used color systems in the world today; The Pantone Color System. In “The Pantone Color System: A Short History”, we learned



that Pantone began in the 1950s as commercial printing became popular. All Pantone color samples are commercially printed by combinations of subtractive printing inks. In 2007, Pantone was sold to X-Rite. Pantone is a formula guide and not a standard. It was originally designed to help sell ink. The system is built around 13 basic colors with a black and a translucent white. Pantone has gone environmentally green without the formulas for sample preparation having to change. Pantone colors are mixture oriented as they are made from combinations of printing inks. So, Pantone is not a visually-oriented system. Greens are not well represented in the Pantone System because there is no green ink. Many of the Pantone colors are printed with optical brighteners, which can be difficult to manage at times. There is a very extensive digital database for Pantone colors. Pantone colors contain physical elements that change with time, so new guides are periodically produced. New guides may contain new colors as dictated by market demand and every new color is measured objectively after being approved by an artist. Pantone colors are universally recognized around the world. If a color exists in the Pantone

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Thursday General Session on Industry continued

ecosystem, it is highly likely that it can be printed using standard printing methods. The gamut of Pantone colors exceeds the gamut of most displays and colors that are displayable are clearly indicated in the guide.

Future Talk: Continuing on with the Pantone theme, Leatrice Eiseman, the executive director of



Pantone Color Institute, gave a presentation entitled “Future Trends: The Connecting Circle of Color”. The goal of her talk was to use the Pantone View Color Planner forecast to predict the international color trends that the future beyond 2018 will bring. She used examples from the Autumn/Winter 2019 and 2020 forecasts to illustrate how important the diversity of colors is. Her visuals were very enticing as we gazed upon spaces filled with colors from a warm and cool palette. There is a planet palette featuring earth colors centered around the theme of preserving our planet consisting of recyclable colors like those for wood and denim. Many of the colors had names in addition to their Pantone identification numbers. There is a cyclical palette with a nostalgic feel featuring what life used to be like when colors like lilac and yellow green were popular. Her visuals for the cyclical palette were attention grabbing and very riveting as they gave the audience a nostalgic spark as colors from the past filled our eyes. We saw examples of an orb palette, featuring colors where “muted meets muscular”. There was a fascinating legend palette showing colors taken to the next level. There was an eclipse palette featuring interesting dark colors with hue. The circle palette was made up of bright colors that you might put around a hue circle. We also saw examples of an intuition palette that implied wonder and complexity. Animation

from movies and television provide some of the inspiration to drive color forecasting.

Next Leatrice spent some time discussing specific colors for the future rather than palettes. She began with ultraviolet, the Pantone 2018 color of the year. She commented that it is now used in lighting more than usual. Browns, taupes and grays were identified as intuition colors along with white and black. Orange is hanging on as a popular color for a longer period of time than usual. Other colors, like hot pink, especially in clothing, are added to orange to keep it fresh. Believe it or not, pink has become a favorite color to use to inside to keep interiors fresh. Blue still is one of the consumer’s favorite colors. Green is “mother nature’s ubiquitous color”. Also, amazingly enough, avocado green is back and is very strong. Yellow-green hangs on as a popular color longer than history would have predicted. They also study what NASA is doing as they develop new color forecasts. As an example of this, we saw how chain metal undulates in space and causes color effects. The human eye likes luster as in pearlescence, as we were able to feast our eyes on some images that proved her point. She showed examples of power clashing colors that illustrated how discord can be attractive. Finally, examples of how neons colors are popular for safety applications were shown. The colorful imagery that Leatrice showed whet our appetites for the color world that will surround us in 2019 and 2020!

State-of-the-Art Talk: Wendy Luedtke, product technology specialist for color at ETC – Electronic Theater Controls, gave a presentation called “To Specify a Sunrise: Art, Science and Modern Lighting Design”. Wendy brought some theatrical lighting



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Thursday General Session on Industry continued

demonstrations that were truly fascinating! Wendy's talk focused on how the lighting designer's world is changing significantly with the adoption of LED technology that has become so pervasive everywhere. She began by showing us how it is possible to make white light from many different combinations of LEDs. She also illustrated how chromaticity diagrams are useful for predicting what colors can be achieved by combining different LEDs. However, lighting designers also need to consider spectral content because that has a huge impact on the appearance of colored objects. She showed that the same color can be mixed different ways, and that can lead to mismatches in object appearance.

Finally, Wendy moved on to a discussion of Color Rendering Index (CRI) with an emphatic plea for all to stop relying on it because it is based on old theory and has several known flaws, particularly when used with LEDs. She encouraged the use of IES TM-30-18 because it is based on new math and it has a very useful Color Vector Graphic. Wendy is chair of the Color Committee for the Illuminating Engineering Society (IES), so her recommendation was a valuable one!

Paula J. Alessi, *ISCC News Editor*

Editor's Note

All of the 2018 Munsell Color Symposium General Session summaries that appear in this newsletter were written from my notes and then sent to each presenter for revision. I wish to sincerely thank each presenter for ensuring the accuracy of each summary presented in this newsletter!

Authors' Book Signing

The bookstore at the Massachusetts College of Art and Design hosted a book signing event in the Atrium on Thursday, June 14, 2018 following the General Session on Industry. Books from invited presenters were featured. Participants enjoyed meeting favorite authors of books about color. Bookplates were available for those who already owned the book. Books that were included in the author signing event were:

Colors In the Visual World by Harald Arnkil
Color Science and the Visual Arts by Roy Berns
The Color Revolution by Regina Blaszczyk
The Fashion Forecasters by Regina Blaszczyk
The Complete Color Harmony: Pantone Edition
 by Leatrice Eiseman (signed copies available)

Color Appearance Models by Mark Fairchild
Vision and Art: The Biology of Seeing by Margaret Livingstone
Dimensional Color (2nd Edition) by Lois Swirloff

Editor's Letter to Membership

Dear ISCC Members,

It has been my honor and privilege to be Editor of your *ISCC News* since the Summer 2013 issue. I am sorry to say that this Winter 2019 issue is my last issue as Editor. I have enjoyed capturing ISCC news and milestones for your reading pleasure over these last 5+ years. I hope you have enjoyed some of the new columns that I have brought to *ISCC News* such as "Meet Your Fellow ISCC Members", "ISCC Archives from Hagley Museum— Correspondence between Dorothy Nickerson and Fred Billmeyer", AIC events, and "A Blast from the Past". I still plan on writing for *ISCC News*, but not in the capacity as Editor.

I wish to thank all those who have supported me in this role over the years. First, I must thank all ISCC Presidents under whom I have served; Scot Fernandez, John Conant, Jerry Dimas and now Renzo Shamey. It is their help and support along with all the Officers and Directors who served under them that made it possible for me to do my job as Editor. My thankful heart also goes out to Mike Brill for *Hue Angles*, Mark Fairchild for *Metameric Blacks*, Ellen Carter for *CR&A In this Issue* and Carl Jennings for *Refractions*. Without your enlightening standing columns, the newsletter would be devoid of significant color content that all ISCC members needed to enrich their lives! Dave Wyble, thank you for being my teacher on how to be an effective Editor. Ann Laidlaw, thank you for important Board content that I might not have gotten if it were not for your diligence. Ellen Carter, thank you for calendar items that I never seemed to have time to gather. I am indebted to Jodi Baker and Dave Wyble for helping me transition to the use of Wild Apricot for softcopy newsletter distribution. Finally, I would like to thank my Editors, Mike Brill and Ellen Carter, for their blood, sweat and tears shed over the years as we dealt with tight publication deadlines and for their patience with me when some of the newsletters ran long.

Being your newsletter Editor has brought me joy over the last 5+ years, but now it is time to pass the torch. Thank you for your readership!

All the Best,
 Paula

Calendar

2019

- Jan 9-14 Human Vision and Electronic Imaging (HVEI)**, Burlingame, California, Info: http://www.imaging.org/site/IST/IST/Conferences/EI/EI_2019/Conference/C_HVEI.aspx
- Jan 30-31 ASTM E12 Meetings**, Hyatt Regency Houston, Houston, Texas, Info: www.astm.org
- Feb 4 CMG 2019 ChromaZone®**, The Materials Library, Stockholm, Sweden
Info: <https://colormarketing.org/event/chromazone-stockholm/>
- Feb 26-28 Techtexil North America 2019**, Raleigh, North Carolina, Info: <https://techtexil-north-america.us.messefrankfurt.com/us/en.html?us/en.html>
- Feb 27 Advancements in Manufacturing Technologies**, Raleigh Convention Center, Raleigh, North Carolina, Info: <https://www.eventbrite.com/e/advancements-in-manufacturing-technologies-tickets-50503097123>
- Mar 13 CMG 2019 ChromaZone® Chattanooga**, The Chattanooga, Chattanooga, Tennessee
Info: <https://colormarketing.org/event/chromazone-chattanooga/>
- Mar 17-20 TAGA/ISCC 2019 Joint Conference**, Millennium, Minneapolis Hotel, Minneapolis, Minnesota,
Info: <https://www.taga.org/register/>
- Mar 18-21 2019 SPE ANTEC® Color and Appearance Division**, Detroit Marriott at The Renaissance Center, Detroit, Michigan, Info: <http://www.specad.org/2019-spe-antec-color-and-appearance-division/>
- Mar 27-29 7th IAPR Computational Color Imaging Workshop**, Chiba, Japan, Info: <http://dippix.tp.chiba-u.jp/CCIW2019/>
- Apr 5-8 NAPIM Spring Convention 2019**, Biltmore, Miami – Coral Gables, Florida,
Info: <https://www.napim.org/napim-event-list>
- Apr 9-11 AATCC 2019 International Conference on Innovating Today for a Challenging Tomorrow**, Fort Worth, Texas, Info: <https://www.aatcc.org/ic/>
- May 3 CMG 2019 ChromaZone® Vancouver**, Centura Tile, Vancouver, British Columbia
Info: <https://colormarketing.org/event/chromazone-vancouver/>
- May 14-17 IS&T 2019 Archiving Conference**, Lisbon, Portugal, Info: [Archiving 2019 Website](http://Archiving2019Website)
- May 23-25 ICA-Belgium Colour Symposium**, KU Leuven Ghent Technology Campus, Ghent, Belgium,
Info: <https://coloursymposium.org/>
- May 24 ICC Color Expert Day**, Bressanone, Italy, Info: <http://www.color.org/events/bressanone/index.xalter>
- Jun 10-13 International Conference on Predictive Vision**, Centre for Vision Research, York University, Toronto, Canada, Info: <http://www.cvr.yorku.ca/conference2019>
- Jun 13-14 ASTM E12 Meetings**, NIST, Gaithersburg, Maryland, Info: www.astm.org
- Jun 17-22 CIE Quadrennial Meeting**, Washington, D. C., Info: www.cie.co.at
- Aug 6 CMG 2019 ChromaZone® Minneapolis**, Sherwin Williams, Minneapolis, Minnesota
Info: <https://colormarketing.org/event/chromazone-minneapolis/>
- Aug 8-10 Illumination Engineering Society Annual Conference**, Omni Louisville Hotel, Louisville, Kentucky, Info: <https://www.ies.org/events/annual-conference/>
- Aug 22-24 Visual Science of Arts Conference**, Leuven, Belgium, Info: website coming soon; Johan Wagemans johan.wagemans@kuleuven.be
- Aug 27-29 European Conference of Visual Perception**, Leuven, Belgium, Info: website coming soon; Johan Wagemans johan.wagemans@kuleuven.be
- Sep 2-9 18th International Conference on Computer Analysis of Images and Patterns**, Salerno, Italy,
Info: <http://caip2019.unisa.it/>
- Oct 14-17 AIC Interim Meeting on Color and Landscape**, Buenos Aires, Argentina, Info: <http://aic2019.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.avianttechnologies.com	603-526-2420
Bloomsbury Publishing/Fairchild Books	https://www.bloomsbury.com/us/academic/fairchildbooks/	800-932-4724
BreakThroughColour	http://www.breakthroughcolour.com	No phone #
Datacolor	www.datacolor.com	609-895-7432
GTI Graphic Technology, Inc.	www.gtilight.com	845-562-7066
Golden Artist Colors	www.goldenpaints.com	607-847-6154
Hunter Associates Laboratory, Inc.	www.hunterlab.com	703-471-6870
Konica Minolta Sensing Americas, Inc.	https://sensing.konicaminolta.us	888-473-2656
Visual Color Systems	http://www.visualcolorsystems.com	845-434-2646
Wiley/Color Research & Application	https://onlinelibrary.wiley.com/journal/15206378	877-762-2974
X-Rite Pantone®	https://www.xrite.com/	888-800-9580

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 Jerry Dimas, jerdim@ccicolor.com

ISCC News Issue #485, Winter 2019

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)
 The Color Association of the United States, Inc. (CAUS)
 Color Marketing Group (CMG)
 Council on Optical Radiation Measurements (CORM)
 Detroit Colour Council (DCC)
 Gemological Institute of America (GIA)
 International Association of Color Consultants – North America (IACC)
 International Colour Association Environmental Colour Design Study Group (AIC – ECD)
 International Color Consortium (ICC)
 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)
 Technical Association of the Graphic Arts (TAGA)