Inter-Society Color Council *News*

Issue 482 Spring 2018

Board of Directors Corner

Welcome to Spring. As a new board member, I am excited to bring you the Board of Directors Corner. My name is Jean Hoskin and I retired from Macy's Merchandising Group in New York City as Director of Color Services in 2016. Since then I have been consulting, writing, painting, and traveling. Color for textile and apparel production balances art, science, and industry, so the Inter-Society Color Council is the perfect place to learn more about all aspects of color and connect with people from all interest groups. My last assignment at MMG was to implement a global color process, to train the international color team on color science and technology, and to stay up to date on the latest in lighting, color software, and instrumentation that would impact our process. But my career did not prepare me for the painting class at the art center, where I discovered an entirely new world of application that could not have been more interesting or challenging. This highlighted for me that there is always more to learn about color.

I am taking a statement a bit out of context by author and entrepreneur James Altucher, who guided writers and readers "*to see something new inside something old*". I think his quotation is an excellent prediction of what will happen at the Munsell Centennial Color Symposium June 11-15 in Boston. Even 100 years after the death of Albert Munsell, we still learn from his thoughtful analysis and expand on his basic ideas. If you are interested in color, this is the place to be.

The conference is a big activity of the Board of Directors and the dedicated and agile planning committee, but not the only one. Monthly webinars produced by the ISCC are previews to the type and quality of presentations that will occur in Boston. In March, I listened to Dr. David Briggs speak on the *New Anatomy of Colour*, where he defined seven terms to characterize color. I thought I understood the nuances of these, but I was wrong. Not only did I learn a lot, but I also learned how to explain them clearly. By the time you read this, the April webinar will have been presented with a May one scheduled for May 23, demonstrating the knowledge and resources of the members of the ISCC.

For years I have benefited from the ISCC networking and communication. As a virtual organization, we depend on the information from the website, the LinkedIn blog, and the newsletter to bridge our distances. I also value the calendar, conference and

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Board of Director's Corner continued

journal summaries, and articles. Member Bodies provided this information in the past, but in 2014, the ISCC moved to an all-individual membership structure. We still need your information. If you are active in a color organization, we encourage your participation as a liaison to share activity and meeting dates with the ISCC members. We are eager to have active connections to organizations so that we may promote each other's activities.

The above initiatives seem like a lot of heavy lifting, but the Board of Directors does have the enjoyable work of reviewing nominations and selecting award winners. Two awards will be presented at the conference in June. The Macbeth Award is given for one or more recent outstanding contributions in the field of color and the Nickerson Award is to honor long-term service contributions towards the advancement of the ISCC.

Another fun activity is for the Board of Directors to welcome new members. If YOU want to reach out to membership, an easy way is for you to update your membership information and publish it to the ISCC site with our new membership service. This is such an exciting year to be joining the Board because so much is going on. Believe it or not, we have already started working on the 2019 conference with TAGA and are thinking ahead to 2020.

What can you do? Send information to the blog, go online and complete your directory information, or email the newsletter with information about your organization's activities. It is easy! The role of the ISCC is to be a source of information, so I invite you get involved and share your ideas. Let's talk in Boston.

Jean Hoskin, *ISCC Board of Directors*

Monthly Webinars Continue

As a prelude to the Munsell Centennial Color Symposium in June, we have been presenting monthly webinars instead of our usual quarterly schedule. The response has been outstanding, with hundreds of interested people registering, and fantastic attendance for each session. ISCC members can view the recordings anytime by logging into https://iscc.org/ and visiting the "Members-only content" page under the "Members" menu. (Note the Members menu will not appear until after you have logged in.)

On February 19, Mr. John Seymour (aka "John The Math Guy") presented "Albert Munsell –The

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Monthly Webinars Continue continued

Father of Color Science?" John explained the various strengths of the Munsell Color System. He also dug through the history books to see what evidence there was for making the claim implied in the title. The talk was delivered with John's usual sprinkling of humor, and even a short rendition of the color-relevant "Rainbow Song" complete with an impersonation of Kermit the Frog.

On March 21, as a part of the celebration of AIC International Colour Day, Dr. David Briggs presented "The New Anatomy of Colour." David's talk was (by his admission) not really a new description of color, but since it has not been widely accepted in some related color communities, he felt justified in retaining the new claim. The presentation was very visual, and therefore defies a useful summary using just words!

On April 25, Dr. Paul Centore presented "A Practical Introduction to the Munsell System for Artists." The ordered Munsell system using the properties of hue, value and chroma provides the perfect organization for a painter to create artwork where color choices are more effective, and the end result has increased clarity. While targeted to artists, Paul's talk helped the scientists and engineers appreciate the power and nuances of the Munsell system and how it can be used to create beautiful works of art.

The diversity of attendees for these webinars has been simply amazing. GotoWebinar collects no information about attendees beyond name and email address. But we can learn a little even from email addresses. We saw a broad range of industry and academics. We saw attendees from Russia, Canada, Netherlands, Japan, Hungary, Poland, Germany, Italy, Australia, Norway, Portugal, the UK, Brazil, Switzerland, Turkey, and probably several other countries from attendees without a location in their address.

The discussion portions of these webinars have been very lively as well. Thank you to all who have participated in these information-rich webinars!

Finally, if you have an idea or request for a webinar presenter or topic, please let us know at seminars@iscc.org We will do our best to make sure your ideas and requests are heard!

Dave Wyble and Ann Laidlaw, *Webinar Co-chairs*

May 2018 Webinar

The Munsell-themed webinars continue in May with a presentation given by Lori Sawaya on May 23 from 2-3 PM EDT. Lori Sawaya is a color strategist. She got her start in graphic design, and as color printing became more readily available, Lori started to become obsessed with the color management aspects of her career. This obsession turned into several years of dedicated training and study, which led Lori to a whole new understanding of color and how we measure it. From there, Lori developed a course that teaches others how color is measured but she takes it a step further and shows interior and architectural color designers how these concepts have practical application in their businesses.

Lori's business, Camp Chroma, is all about building the foundational tools needed to leverage the power of color data. Other industries rely heavily on the values and measurements surrounding color, so why not Interior and Architectural Color Design?

The title of Lori's webinar is *"Psychological Color Temperature and Color Harmony"*. Here is the abstract for Lori's webinar:

"The practical application of color data values isn't exactly a hot topic among architectural color and interior design professionals, but it should be.

"The order of a color space, like Munsell, provides context for comparing colors, especially with regard to hue, value and chroma. However, that contextual color space can also be used to establish a baseline of perceived warm and cool color temperature (i.e. the psychological qualities of color linked to temperature). Psychologically, red is warm, and blue is cool.

"Architectural color design strives to create aesthetically pleasing, visually ergonomic, and human supportive environments. The Munsell color space and color notations also provide an efficient framework for crafting color harmonies beyond pedestrian color theory. The resulting color combinations have a refined balance that would otherwise be time-consuming for a designer to conceptualize and pull together using only their color mojo super powers.

"In this webinar we will explore the usefulness of color notations and color data values to improve and streamline architectural color design processes."

Details on how you can participate in this May 23rd webinar will be sent out soon. Please stay tuned.

Welcome Four New Sustaining Members

ISCC is delighted to welcome four new sustaining members! A sustaining member is any person, society, association or organization interested in color and wanting to participate in the activities of the Council in order to support its aims and purposes.

FAIRCHILD BOOKS

Fairchild Books, a division of Bloomsbury Publishing PLC recently became a sustaining member. Fairchild publishes books on all aspects of the fashion and interior design worlds, including textiles, color theory, lighting, drawing, and sustainability. Books are available digitally or in print. For more information on Fairchild Books and Bloomsbury Publishing, please visit https://www.bloomsbury.com/us/academic/fairchildbooks/ .

BreakThroughColour COLOUR CARDS

ISCC is pleased to welcome BreakThroughColour as a new sustaining member. BreakThroughColour offers a "hold-in-your-hands way to explore, understand and celebrate colour". They sell colour cards, cubes and other interactive product tools that are of use for artists, designers and teachers. For more information on BreakThroughColour, please visit http://www.breakthroughcolour.com/

Visual Color Systems

We are happy that Visual Color Systems recently joined ISCC as a new sustaining member. Visual Color Systems "controls traffic in color space" by helping with selection, specification and communication of color. They apply the art and science of color to the creation of color control programs for food products, computer systems, office furniture, cosmetic packaging, automotive applications and medical instruments to name a few. For more information on Visual Color Systems, please visit http://www.visualcolorsystems.com.

WILEY COLOR RESEARCH AND APPLICATION

Another new ISCC sustaining member is *Color Research and Application*, a journal published by Wiley. *Color Research and Application (CR&A)* features articles on the science, technology, and application of color in business, art, design, education, and industry. It is endorsed by many color societies around the world, including ISCC. *Color Research and Application* will publish a special edition for the Munsell Centennial. This edition will include the papers presented at the Munsell Centennial Color Symposium as well as selected entries from the Call for Artwork. For more information on Wiley and *(CR&A)*, please visit https://onlinelibrary.wiley.com/journal/15206378.

Meet Your Fellow ISCC Members

Hi! My name is Jiangning Che. I am an Assistant professor in the Department of Apparel Merchandising and Management, California State Polytechnic University (Cal Poly), Pomona. I have developed and/or taught courses in textile science, textile quality, color science principles, and textile coloration. My research interests involve instrumental color measurement, computer color matching, and textile performance optimization.

I have more than 15 years' work experience in academic and industry segments. I have hands-on expertise in industrial color application with many fields such as textile, plastic, paint, ink, food, automobile, etc.

I hold professional membership in the American Association of Textile Chemists and Colorists (AATCC) and have played roles in its technical committee, RA36 of color measurement. I have also been an associate editor of publication. From 2015-2017, I served as one of the Student Engagement Pillar chairs for AATCC. Currently I am the student advisor to the Cal Poly Pomona AATCC section.

As a "color guy", I'd like to meet and share color experiences with peers. The ISCC offers an excellent platform in the field of color.

2018 Macbeth Award Announcement

The Inter-Society Color Council will present its 2018 Macbeth Award to Dr. Andrew Stockman, Professor University College, London in the United Kingdom. The Macbeth Award was established by Mr. Norman Macbeth, Jr. in honor of the memory of his father, Mr. Norman Macbeth. The award is usually, but not necessarily, presented biennially in even-numbered years.

The Macbeth Award is given for one or more recent outstanding contributions in the field of color. It is to be presented to a member, or former member, of the Council. The contributions shall have advanced the field of color, interpreted broadly as in the objectives of the Council as defined in Article II of the Constitution. The merit of a candidate shall be judged by his or her contributions to any of the fields of interest related to color whether or not it is represented by a Member-Body. The contribution to color may be direct, it may be in the active practical stimulation of the application of color, or it may be an outstanding dissemination of knowledge of color by writing or lecturing.

Due to the efforts of Dr. Stockman, it is now possible to predict color matches for individuals (according to their age) and for objects of any given size in the visual field—not just for one or two Standard Observers. The contribution to be recognized comprises the "Stockman and Sharpe" cone spectral sensitivities and the related luminous efficiency functions, all based on measurement in observers of known photopigment opsin genotype. These functions have now been adopted by the Commission Internationale de l'Éclairage (CIE) as a new international standard for color definition and color measurement. The route to the adoption of these functions has been a long one, which has now come to fruition. As early as 1992, Dr. Stockman was a member of the CIE Technical Committee 1-36 that was tasked with choosing a fundamental chromaticity diagram with physiologically significant axes. The work of the committee continued for 14 years, throughout which Dr. Stockman has contributed to the process. Part of the product of the committee was an algorithm (captured in a widely distributed spreadsheet) that predicted the sensitivities of L, M, and S photoreceptors as functions of age and field size. Later efforts within the committee gave rise to new xbar, ybar, and zbar color-matching functions based on these new L, M, S functions. The work of the committee, based solidly on the contributions of Dr. Stockman, has led to deeper understanding of the causes of variability of color-matching functions, and has had significant impact on color-science education in general. This is in keeping with the educational focus of the ISCC and the Macbeth Award in particular.

Dr. Stockman received his Ph.D. in 1984 in Vision Research from the University of Cambridge, England, under the direction of Dr. John Mollon. His career then took him to the University of California at San Diego (UCSD), where he stayed for 17 years. During this time, he became a member of the ISCC, and also during his career has joined many other professional societies. In 2001 he became the Steers Chair of Investigative Eye Research at the Institute of Ophthalmology, University College, London (UCL).

At UCSD, Dr. Stockman's research interests grew to include aspects of vision science other than color vision, including flicker and flicker interactions, rod vision, visual sensitivity, visual adaptation, electrophysiology, postreceptoral organization, and molecular genetics.

In 2001, after his return to England, he broadened his interests to include clinical research. He runs a small but successful laboratory called the Colour & Vision Research Laboratories within the UCL Institute of Ophthalmology. At UCL, he has been funded by a series of grants funded by the Wellcome Trust, Fight for Sight, the BBSRC and the EPSRC.

Dr. Stockman's devotion to promulgating color science is epitomized by a website for the use of the vision community that he first developed in 1995 and has continually updated. It is called the "Colour and Vision Research Laboratories Database" and contains data sets and other information relevant to vision research. The address is:.www.cvrl.org/ The site has become an important resource for color and vision scientists.

The ISCC is proud to honor Dr. Andrew Stockman with the 2018 Macbeth Award for his recent contributions to the field of color matching. The Macbeth Award Presentation Ceremony will take place during the Munsell 2018 Centennial Color Symposium.

2018 Nickerson Service Award Announcement

The Inter-Society Color Council will present its 2018 Nickerson Service Award to Dr. Mark D. Fairchild,

Professor and Founding Head of the Integrated Sciences Academy in Rochester Institute of Technology's College of Science and Director of the Program of Color Science and Munsell Color Science Laboratory. The Nickerson Service Award is presented for outstanding, long-term contributions towards the advancement of the Council and its aims and purposes. The contribution may be in the form of organizational, clerical, technical or other services that benefit the Council and its members. Mark was nominated to receive the 2018 Nickerson Service Award because he has rendered signal service to ISCC and its educational goals over an extended period of time. Among his contributions to the ISCC are the following:

During his early years of ISCC membership, he was Chair of Interest Groups 1 and 2 (on color science and color technology, respectively). Then he served as a member of the Board of Directors (1995-1998), culminating in his being the General Chair of the ISCC Annual Meeting in 1998. At about this time, he wrote the latest edition of the handbook for Annual Meeting chairs as guidance for future leaders of ISCC meetings.

Mark also served the ISCC goal of color education through an excellent academic career at RIT. However, he did not restrict his educational efforts to his students. He also contributed to several blogs and wrote a column "Metameric Blacks" for ISCC News (2011-2015) based on a set of his web-posted educational essays. Most recently he gave the ISCC webinar, "From Photon to Brain" in March 2017.

Finally, Mark is serving as the Papers Chair for the present ISCC/AIC 2018 Munsell Color Centennial Symposium.

Mark's contributions to the general educational goal of the ISCC have comprised his whole career, and there are recurrent highlights (such as those mentioned above) of his service to the ISCC in particular. These highlights considered by themselves merit his receiving the 2018 Nickerson Service Award. The Award presentation ceremony will take place during the 2018 Munsell Color Centennial Symposium.

AATCC Color Management Workshop

AATCC's Color Management Workshop is being held August 15-16, 2018 at the Association's Technical Center in Research Triangle Park, NC, USA. This workshop will feature world-renowned color experts discussing the following topics and speakers:

- *Color Communication: Color Theory Basics* - Roland L. Connelly, Sr., RoLyn Group Color Consultants
- *Dye Selection for Desired Fastness Requirements* - Nelson E. Houser, M. Dohmen USA.
- *Color Communication: Best Practices* - Sandy L. Johnson, Color Solutions International
- *Understanding Whites and other Fluorescent Materials* - Roland L. Connelly, Sr., RoLyn Group Color Consultants
- *Color Tolerances in "Black and White"* - Ann C. Laidlaw, ACL Color Consulting LLC
- *Color and Lighting: Control, Efficiency, and Compliance* - Ann C. Laidlaw, ACL Color Consulting LLC
- *Supply Chain Conformance - Why Don't my Numbers Match Yours?* - Ken R. Butts, Datacolor
- *Matching Heather Fabrics - What Could Be Easier?* - Keith D. Hoover, Black Swan Textiles LLC
- *The Evolution and Revolution of Global Color Management* - Carol T. Revels, Lands' End Inc.

This workshop is designed for merchandisers, retailers, manufacturers, product developers, color approval managers, specifiers, and designers.

Breakout sessions will focus on illumination and observer issues; sample analysis and measurement technique; implementing virtual development in a digital workflow; what is color formulation; production evaluation and control; and color control in the supply chain.

Individual and Corporate AATCC members registering on or before July 31 pay US$750 (nonmembers pay US$1119). Registration includes luncheons,

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AATCC Color Management Workshop continued

the AATCC Color Guidebook, the Textile Coloration for the Retail Supply Chain book, and a copy of all available presentations.

After July 31, the registration fee increases to US$800 for AATCC members and US$1169 for nonmembers. Refunds will be honored if cancellations are received on or before July 31, 2018. No refunds will be given after July 31. A US$75 cancellation fee will be charged. Attendance is limited so early registration is encouraged.

Visit https://www.aatcc.org/evnt/workshops/color/ for additional details or to register.

AIC LISBOA 2018
colour & human comfort

The Portuguese Colour Association is hosting the 2018 AIC Interim Meeting in Lisbon, Portugal from September 25-29. The venue is The Calouste Gulbenkian Foundation, which is a green park located in the center of the city with direct connections to the airport and all other forms of transportation within the city. There are several hotels in the area, where you can find reasonably priced accommodations. For more information, please visit http://www.aic2018.org/useful-information.html .

The theme of the meeting is Colour and Human Comfort. Authors who submitted abstracts have already been notified of whether their paper will be an oral or poster presentation. **May 31** is the author registration deadline. **May 31** is also the deadline for submission of Final Papers. **July 31** is the early registration deadline. **September 7** is the normal registration deadline. **September 15** is the late registration deadline. Prices are listed on the website www.aic2018.org .

Early registration has begun! We encourage all ISCC members to go to the website and **register now** for this exciting AIC Interim Meeting in Lisbon, the City of Light!

Joint ISCC - AIC Special Event

AIC

INTER-SOCIETY COLOR COUNCIL, INC. FOUNDED 1931 SCIENCE · ART · INDUSTRY

The Munsell Centennial Color Symposium

ISCC/AIC BOSTON
MUNSELL2018
Bridging Science, Art, and Industry

Celebrating the Past | Envisioning the Future
June 11-15, 2018
Massachusetts College of Art and Design (MassArt) | Boston, MA USA

The countdown to the 2018 Joint ISCC/AIC one-time special event is in full swing. We are just about one month away from The Munsell Centennial Color Symposium. If you have not already done so, **please register on or before May 10th**. All registrations received after May 10th will increase by $50. So, please visit https://munsell2018.org/registration/ and register now!

Munsell 2018 Program Extras

This article will feature the extra programming events that will take place throughout the week of June 10th to enhance your experience at The Munsell Centennial Color Symposium. So, in addition to the three days of general sessions and two days of breakout sessions, here are some other events you can enjoy!

Welcome and Exhibit Opening Reception
Sunday, June 10th

The Welcome Reception will take place in the Atrium at Massachusetts College of Art and Design. Attendees will be able to check in for the Symposium starting at 4:00 PM and the reception will be open from 6:00 PM until 8:00 PM. The Welcome Reception will coincide with the opening of the special exhibit, **Color Connections: Tracing the Influence of Albert H. Munsell,** in Doran Gallery adjacent to the Atrium. The reception is sponsored by the Munsell Color Company and by X-rite/Pantone. For more details, please visit https://munsell2018.org/sunday-welcome/ .

Panel on Color Education
Tuesday, June 12th

One of the Aims and Purposes of the Inter-Society Color Council is: "To promote educational activities and the interchange of ideas on the subject of color and appearance among its members and the public generally."

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Joint ISCC-AIC Munsell 2018 Symposium continued

With so many educators in attendance at the Symposium, we are taking the opportunity to host a panel discussion on the Future of Color Education. The panel will be introduced by Maggie Maggio, Co-Chair of the Munsell Symposium and moderated by Robert Hirschler, Chair of the AIC Study Group on Color Education.

Panelists

- Harald Arnkil, Aalto University School of Arts, Design and Architecture, Espoo, Finland
- Emily Barnett, Parson's School of Design, The New School, NY, NY
- Roy Berns, Rochester Institute of Technology, Rochester, NY
- Paul Green-Armytage, Curtin University, Perth, Australia
- Sarah Sands, senior technical specialist at Golden Paint company, New Berlin, NY
- Lori Sawaya, architectural color consultant, Land of Color, Camp Chroma
- Luanne Stovall, University of Texas, Austin, TX

Potential Discussion Points

- What **is** color education? (This is a basic question. What do we actually mean by this term? Should a simple course on some basic principles be considered color education, or is something more complex?)
- What is **color theory**? (Another fundamental question. Can teaching additive and subtractive mixing + the color wheel be considered 'color theory'?)
- What is at the cutting edge of color education?
- How can we work together to promote color literacy in the 21st century?

For more information on the Color Education Panel, please visit https://munsell2018.org/panel-on-color-education/ .

Gala Awards Banquet
Tuesday, June 12th

The gala awards dinner and program will take place at the Pozen Center, located on the ground floor of the North Building at Massachusetts College of Art and Design. The keynote speaker will be John Seymour discussing "The Color Name Conundrum". Webster's Third New International dictionary contains a few thousand definitions of color names that are at once whimsical and tedious. John Seymour (AKA John the Math Guy) will recount his vain attempts to win an argument with his wife about color names. He starts by turning to the biggest dictionary in his house to map out the two disputed color names. Along the way, he finds some interesting history about official naming of colors and the tie to the Munsell company. He may not have won the argument, but his presentation is guaranteed to be great edutainment!

Presentation of the Munsell Centennial Awards will also take place at the Gala Awards Banquet. Paula Alessi will present the Munsell Centennial Awards to Rolf Kuehni, Joy Turner Luke, and posthumously, to Calvin McCamy. For more details on the Gala, please visit https://munsell2018.org/day-2-awards-banquet/ .

Munsell 2018 Duck Boat Tour
Wednesday, June 13th

One of Boston's most unique tour experiences is a trip on the famous Duck boats. These beautiful, multi-colored, World War II amphibious vehicles navigate the streets of Boston as well as the currents of the Charles River. We've arranged a special group tour with pickup and drop off at MassArt. The tour will depart the Atrium of the New Media Arts Center at the Massachusetts College of Art & Design at 6:45 pm. You will return to the Atrium after the tour at approximately 8:40 pm. The cost is $60 per person.

You'll cruise by all the places that make Boston the birthplace of freedom and a city of firsts, from the golden-domed State House to Beacon

Hill and the TD Garden, Boston Common and Copley Square to the Big Dig, Government Center to fashionable Newbury Street, Quincy Market to the Prudential Tower, and more. As the best of Boston unfolds before your eyes, your ConDUCKtor® will be giving you lots of little known facts and interesting insights about our unique and wonderful city. And just when you think you

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A Blast from the Past: ISCC Newsletter 50 Years Ago

Number 194 – May - June 1968 on ISCC website -https://iscc22.wildapricot.org/Newsletter

The May-June 1968 issue #194 (13 pages long) begins with a delightful article written by Harry Helson called "Harry Helson on Godlove, Judd and Color". Harry recalled that I. H. Godlove was in the last year of his doctoral studies in chemistry at the University of Illinois. It was the plight of a chicken in the dark that turned Godlove on to an interest in color. Here is the story as Helson told it:

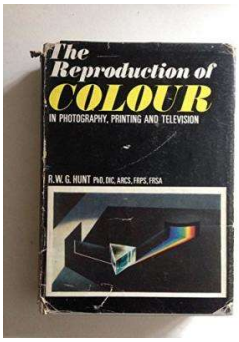
"By chance, I. H. and his first wife, Esther Godlove, and I had our dinners in Champaign at a boarding house which catered to University of Illinois students and young faculty. Occasionally we sat at the same table, and one evening late in October, I. H. related how he was trying to fatten a chicken for Thanksgiving dinner without any luck. He kept it in the basement of the apartment house where he lived. In spite of the fact that it stood 'ankle' deep in corn, it did not eat. Instead of getting bigger, the fowl was losing weight and would probably not survive until Thanksgiving. I asked him what the lighting conditions were in the cellar, and he confessed they were very poor -- in fact there was hardly any light at all. I explained to I. H. that birds and fowl possessed only cone vision for the most part and that fowl would not peck unless they had enough light to see to aim. My advice was to install an electric light, and all would be well.

"The bird reacted as it was supposed to do according to my diagnosis and I. H. was delighted. Thereafter we began talking about the eye, light, color, and form perception, and I gave him one of my prized copies of the first colorimetry report, written largely by Troland, who was chairman of the committee."

The article goes on to say that Judd was the person who educated Helson and Godlove on "basic approaches to color problems".

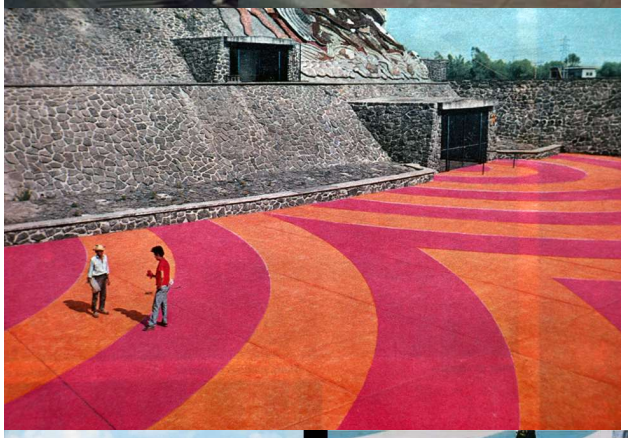
Helson ended this article with a striking paragraph on the importance of scientists studying the psychological aspects of color in 1968: "Although psychologists are now less numerous in the offices and power structure of ISCC, its future lies largely in the hands of individuals having what for want of a better term we may call 'psychological' interests, for ultimately we are dealing with perception, judgment, and evaluation of color when we analyze, measure, or otherwise deal with it. Regardless of formal training, there will always be individuals, who, like I. H. Godlove, though trained as physicists, chemists, architects, or what not, nevertheless see the importance of the psychological aspects of color. Indeed, I believe I am not exaggerating the importance of the psychological aspects in asserting that such problems may be what attract and challenge scientists like Godlove and others to bring their specialties to bear on their solution."

Ralph M. Evans wrote an excellent book review of Robert W. G. Hunt's second edition of *The Reproduction of Colour* published in 1967. (The first edition came out 10 years earlier.) Ralph felt that this was like a new book compared to the first. It was rich with the latest on color photography, color as it relates to the graphic arts industry and "color in the world". This book was so complete, especially with regard to its treatment of color photography that Ralph felt it superseded his out of print book written with Drs. Hansen and Brewer, *Principles of Color Photography*.



https://www.abebooks.co.uk/book-search/title/reproduction-of-colour/author/r-w-g-hunt/

Finally, according to John Canaday (New York Times, Dec. 31, 1967) knowledge of Spanish was not important in order to get around at the 1968 Olympic Games in Mexico City as long as you were "not color blind". Maps, competition sites, and even the venue pavement were all well marked with the vibrant colors of Mexico, magenta, orange, lemon, emerald, violet, azure, and pink. Please enjoy the pictures I found to display the broad use of bright saturated colors for this Olympic experience http://graphicambient.com/2012/07/26/1968-mexico-olympics-mexico/ .



Paula J. Alessi, *ISCC News Editor*

Munsell 2018 Program Extras continued from pg 8

have seen it all, there's more. It's time for "Splashdown" as your captain splashes your DUCK right into the Charles River for a breath taking view of the Boston and Cambridge bridges and skylines, the kind of view you just won't get anywhere else. Boston Duck Boat Group Tour will depart as scheduled, rain or shine. For more information, visit https://munsell2018.org/new-page-1/ . To register for the Duck Boat Tours, please click here: http://www.prestoregister.com/cgi-bin/order.pl?ref=destinationpartnersinc1&fm=34 .

Authors' Book Signing
Thursday, June 14th

Come meet some of your favorite authors of books on color! Since we have a number of authors attending the conference, we are hosting a book signing event on Thursday immediately following the General Sessions. Books will be for sale at a 10 - 20% discount for attendees. Bookplates will be available for the authors to sign if you already own the book. The book signing will take place in the Atrium and last one hour. It will be a festive way to end the General Sessions! For more information on the book signing, visit https://munsell2018.org/book-signing/ .

Guest Speaker at the Study Group on Language of Color
Friday, June 15th

Dr. Edward Gibson, Professor of Cognitive Science, Department of Brain & Cognitive Sciences, MIT will present a short summary of his recent paper, "*Color naming across languages reflects color use."* at the meeting of the AIC Study Group on the Language of Color.

To All Munsell 2018 Participants

You will be receiving an email containing the program schedule and your registration details soon.

There is no parking on the MassArt campus. The closest and least expensive parking is available at the Boston Museum of Art garage two blocks away at 20 Museum Road. ($29/day non-members, $15/day members) Please visit http://www.mfa.org/visit/getting-here/parking .

If you are staying in the Treehouse Dormitory, we are arranging for you to order items, such as a desk lamp and hangers, from the bookstore. More information coming soon!

Munsell Centennial Color Symposium — Preliminary Program

SUNDAY, June 10 - WELCOME DAY — Atrium

2:00	Treehouse Dorm Check-In open until 9:00 pm
4:00	Registrants Check In
6:00	**WELCOME RECEPTION and EXHIBIT OPENING in Doran Gallery** open until 7:30

MONDAY, June 11 - GENERAL SESSIONS ON SCIENCE — Tower Auditorium

7:30	Continental Breakfast open until 8:15 - Atrium Registrants Check In - Atrium
8:30	Welcome
8:45	Announcements
9:00	**Roy Berns**: Development of the Munsell Color System
9:45	**Renzo Shamey**: Evolution of Color Order Systems
10:30	**Break**
11:00	**Michael Webster**: Color in Language and Culture
11:45	Posters Preview
12:00	**Lunch (on your own)**
1:00	**POSTER SESSION 1 - Atrium**
2:00	**Osvaldo Da Pos**: Subjective Links in Color Names and Stimulus Color
2:45	**Susan Farnand and Don Williams**: Modern Tools for Optimal Color Selection
3:30	**Break**
4:00	**Mark Fairchild**: Munsell's Legacy - The Foundation and the Lab
5:00	Closing Remarks

TUESDAY. June 12 - BREAKOUT SESSIONS — Design and Media Center

7:30	Continental Breakfast open until 8:45 - Atrium	
9:00 - 10:30	Tutorials	**Mark Fairchild**: Color Appearance, Color Order, Color Space **Roy Osborne**: An Artist's Approach to Teaching Color
10:45 - 12:15	Tutorials	**Greg Wallace**: MassArt's Munsell Treasures **Kathryn Millard**: Color Clips
9:00 - 12:00	Workshops	**Paul Centore**: Intro to the Munsell System for Artists & Designers **Lois Swirnoff**: Color is Magic - Albers' Exercises **Setsuko Horiguchi and Katsura Iwamatsu**: Color Image Scale
9:00 - 12:00	Field Trips	Harvard - Pigment Collection + Collection of Scientific Instruments MIT - Exhibits at the Media Lab Gallery Boston Museum of Fine Art
12:00	**Lunch (on your own)**	
1:00	**PANEL ON COLOR EDUCATION** Moderated by **Robert Hirschler**	
2:00 - 3:30	Tutorials	**Roy Berns:** Archiving Your Own Artwork Photographically **Dimitris Mylonas**: Color Naming Across Cultures
3:45 - 5:15	Tutorials	**Greg Wallace**: MassArt's Munsell Treasures **Leslie Harrington and Anat Lechner**: Creating a Color Forecast
2:00 - 5:00	Workshops	**David Briggs**: Dimensions of Color for Artists **Paul Green-Armytage**: Seeing Color **Berit Bergström**: Intro to the Natural Color System
2:00 - 5:00	Field Trips	Harvard - Pigment Collection + Collection of Scientific Instruments MIT - The Beautiful Brain Exhibit Isabella Stewart Gardner Museum
7:00	**GALA AWARDS BANQUET** Keynote by **John Seymour**: The Color Name Conundrum Award Presentations by **Paula Alessi**	**Pozen Center at MassArt**

Munsell Centennial Color Symposium — Preliminary Program

WEDNESDAY, June 13 - GENERAL SESSION on ART and DESIGN — Tower Auditorium

7:30	Continental Breakfast open until 8:15 - Artrium
8:00	One-Day Registrants Check In - Atrium
8:30	Announcements
8:45	**Roy Osborne:** Historical Survey of Teaching Color in Art and Design
9:30	**Regina Lee Blaszczyk/Reflections by Joy Turner Luke:** Munsell's Vision for Teaching Artists
10:30	**Break**
11:00	**Paul Green-Armytage:** Relating Color Systems in an Elastic Color Space
11:45	Posters Preview
12:00	**Lunch (on your own)**
1:00	**POSTER SESSION 2 - Atrium**
2:00	**Graydon Parrish:** Contemporary Realism
2:45	**Margaret Livingstone:** What Art Can Tell Us About the Brain
3:30	**Break**
4:00	**David Briggs:** Where is Color Education Now? Color and Technology
5:00	Closing Remarks
7:00	**Optional Evening Excursion:** Duck Boat Tour of Boston

THURSDAY, June 14 - GENERAL SESSION on INDUSTRY — Tower Auditorium

7:30	Continental Breakfast open until 8:15 - Atrium
8:00	One-Day Registrants Check In - Atrium
8:30	**Announcements**
8:45	**Danny Rich:** Calvin McCamy's Recollections: The Color Checker
9:30	**Setsuko Horiguchi and Katsura Iwamatsu:** From Munsell to a New Psychological System
10:30	**Break**
11:00	**Berit Bergström:** Natural Color System - A Visual Approach to Color
11:45	Posters Preview
12:00	**Lunch (on your own)**
	International Association of Color Consultants Annual Meeting
1:00	**POSTER SESSION 3 - Atrium**
2:00	**Tom Lianza:** A Short History of Pantone
2:45	**Leatrice Eiseman:** Future Trends - The Connecting Circle of Color
3:45	**Break**
4:15	**Wendy Luedtke:** To Specify a Sunrise: Art, Science and Modern Lighting Design
5:00	Sessions Summary by **Dave Wyble**
5:30	**Book Signing - Atrium**

FRIDAY. June 15 - BREAKOUT SESSIONS — Design and Media Center

7:30		Continental Breakfast open until 8:45 - Atrium
9:00 - 10:30	Tutorials	**Dimitris Mylonis:** Color Names Bring People Together
		John Seymour: Panoply of Color Measurement Devices
10:45 - 12:15	Tutorials	**Leslie Harrington and Anat Lechner:** Creating a Color Forecast
		Kathyrn Millard: Color Clips
9:00 - 12:00	Workshops	**Berit Bergström:** Intro to the Natural Color System
		Lois Swirnoff: Extending Color Interactions to Form and Space
		Setsuko Horiguchi and Katsura Iwamatsu: Color Image Scale
	Demo	**Graydon Parrish and Steve Linberg:** Munsell Color Mixing
12:15		**ISCC ANNUAL MEETING - Box Lunch**
1:30		AIC Study Group on Environmental Color Design: Co-Chairs, **Verena M. Schindler / Yulia Griber**
3:15		AIC Study Group on Color and Language: Chair, **Dimitris Mylonis - Guest Speaker: Ted Gibson**
4:30		AIC Study Group on Color Education: Chair, **Robert Hirschler**

refractions
seemingly random musings on color

All the Colors We Cannot See
Tetrachromacy in Humans

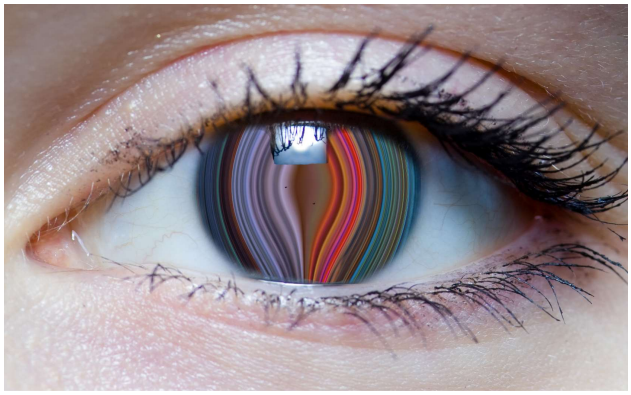


Image source: Carl Jennings

One million colors, that is the approximate number the typical human can see[1]. This is due primarily to the fact that our eyes contain three different types of photoreceptors, known as cones, that are responsible for detecting wavelengths in the visible spectrum, with different yet overlapping ranges. They are known as short (S), middle (M) and long-wave (L) cones, because each has its peak sensitivity in the respective range. Because humans possess these three types of cones, they are described as *trichromats* (*tri* = 3, *chroma* = color). The perception of color is not simply a matter of wavelength detection, as it involves various stages of neuronal processing. But the ability to detect and discriminate colors is affected by the variety of cones in the eye. Dogs, and the majority of mammals for example, have only two types of cones, so they are known as *dichromats*. As a result, they can detect and discriminate fewer colors than humans. On the other hand, some animals such as certain species of birds, fish, butterflies and bees, are known as *tetrachromats*, because they have four types of cones and can see and discriminate many more colors than humans. By some estimates they can see about 100 million different colors, or about 99 million more than we can! This is due largely to the fact that many tetrachromats have a fourth cone sensitive to the ultraviolet part of the spectrum, which is invisible to the human eye. We don't exactly know what colors such animals can see in this range, but we do know that they can make distinctions that humans can't, in other words what we see as one color, they see as several. This can be demonstrated with the use of ultraviolet photography as in the following example (Fig. 1).

Fig.1 What a human sees (top) what a butterfly 'sees' (bottom). Image taken with an ultraviolet camera. Image source: http://www.webexhibits.org/causesofcolor/17C.html

Recent research has opened up the possibility that some humans might in fact be tetrachromats, and therefore seeing a greater range of colors than the rest of us. The idea of tetrachromacy in humans was first broached by the Dutch scientist H. L. de Vries in 1948[2] when he speculated that men who had a particular form of color-blindness, known as *anomalous trichromacy*, would have inherited their conditions from mothers who might be carrying an extra cone. This was later developed in the work of John Mollon and Gabriel Jordan, at the University of Cambridge in the 1990's as they set out to find women who might be tetrachromats. The idea works something like this. The genes responsible for our M and L-cones are carried on the X-chromosome. Women have two X-chromosomes, whereas men have only one X and a Y chromosome. The vast majority of color-blindness is caused by a subtle change in the DNA sequence (mutation) of the L or M-cone and is why color-blindness occurs mostly in men – who have only the one X-chromosome. Since women carry two X- chromosomes, any defect or mutation on one is typically compensated for by the other. However, in some cases, that mutation can create a cone whose spectral sensitivity is different enough

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Refractions: All the Colors We Cannot See continued

from the other three (anomalous trichromacy) to qualify as a *fourth cone*. It becomes possible therefore for a woman to carry both the standard set of S, M and L-cone sensitivities and a fourth with an altered spectral sensitivity. And that is exactly what Mollon et al. set out to find. They began by identifying the mothers of color-blind men and subjected them to genetic and color matching tests. What they found was that the fourth cone sat somewhere between the M and L cones, in terms of peak sensitivity (between 530nm and 560nm respectively). Unfortunately, the fourth cone is not in the ultraviolet range and so does not bestow super human bee-vision, but it should confer the ability to discriminate more colors in the red, yellow, green part of the spectrum – they should see discriminations in color that most of us don't recognize. But to their surprise, this did not seem to be the case. They concluded that the altered spectral sensitivity of the fourth cone in the women they looked at, was not different enough from the others to bestow what has been termed *functional* or *strong tetrachromacy*. The women studied had the fourth cone, but it made no difference.

After nearly twenty-five years of searching, Jordan and Mollon finally discovered what they were looking for in 2007[3]. Having administered a set of color matching tests to a group of women identified as having sons with anomalous trichromacy, they discovered one person who passed the color matching tests successfully. The successful candidate, hereafter known as cDa29, is the first *functional* tetrachromat to have been identified. She had an extra cone that sat midway between the tradition M and L-cones (Fig.2).

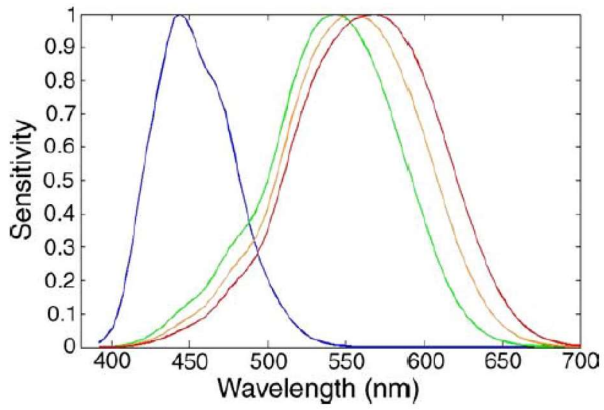

Fig 2. Simulated cone fundamentals for cDa29. Source: Jordan et al (2010)

Jordan estimates that 12% of women are candidates for tetrachromacy but that functional tetrachromats are rarer - 2-3% by some estimates[4]. One reason for the rarity is that besides having a spectral sensitivity that is distinct from the typical M and L-cone sensitivities, things like the optical density of the photopigments and the proportion of such cones also play a part. So even though tetrachromacy is not necessarily rare, most carriers do not exhibit four-dimensional color vision. In addition, being able to identify such people has become a real challenge, as many of them probably assume we all see the same world as they do.

Today there are only a small handful of identified functional tetrachromats – but seeing what they see is still largely a mystery, especially since our language, our world and our science is designed for trichromats. All we have are anecdotal descriptions of a world of colors the rest of us cannot see.

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1. J.D. Mollon, "Color vision: Opsins and options," Proceedings of the National Academy of Sciences. USA 96, 4743-5 (1999).
2. De Vries, H. (1948). The fundamental response curves of normal and abnormal dichromatic and trichromatic eyes. *Physica*, 14, 367–380.
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Please visit Carl's blog at
http://cjenning.wix.com/refractions for comments and feedback on his articles!

Important Maps for the Munsell 2018 Centennial Color Symposium

For the best information on how to navigate the venue site in the midst of bustling Boston, please go to https://munsell2018.org/maps/ .There you will find a MassArt Campus map showing where symposium events will take place as well as dormitory housing. There also is an Area Map showing MassArt and its Boston surroundings. A general Boston map can be found. Finally, there is a Massachusetts Bay Transportation Authority (MTA) map to help you navigate around the Boston area from MassArt using public transportation.

HUE ANGLES

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

Psychology and the Big Adventure of the Elastic Yardstick

A psychologist looks to color science to resolve old measurement quandaries.

A news flash: psychology is hard if you don't have the right tools. Psychology has a significant problem with measurement. Call its problem what you will: a crossing of ideas, a confluence of concepts, a tired old mistake, or even a methodological thought disorder (the last phrase is from Michell 1997, p. 374). Psychology has had a perennial problem with measurement since the mid-1800s (if not before) when Gustav Fechner announced his law to relate psychological qualities to physical magnitudes. The heart of the problem is that measurement in psychology is taken to be the same activity as quantitative measurement in physics. Measurement in physics involves knowing how to measure distances and knowing how to measure time, among other notions; it is clear that we cannot extend the same activities of measurement to psychology without some conceptual upheaval in our understanding of measurement. It is as if I were to say, "You surely know what 'It's 5 o'clock here' means; so, you also know what 'It's 5 o'clock on the sun' means." (Wittgenstein, 1953/2009, § 350, p.118e) We do not, at least not without a lot more work and a few conventions about astrophysics. The one activity (in psychology) is just not the same as the other (in physics). More than that: it is *meaningless* to begin to describe how the two activities are the same or different, before we think harder about measurement and psychology.

One can begin in psychology by honoring Fechner and repealing his law, repeating a phrase from Stevens (1957). We are not rid of the problem of measurement in psychology merely by repealing Fechner's law, though. Stevens himself caused as much trouble by introducing another procedure he called 'magnitude estimation': a procedure of attaching number words to stimulus magnitudes. The very act of attaching numbers to perceptible magnitudes was supposed to constitute measurement, somehow. One can't just attach numbers to situations and expect the procedure to stand as measurement: such an attitude trivializes psychology in a parody of physics. "The proposition that *one conversation is ten times as boring as another* is neither true nor false but is simply a string of words to which no sense may be attached." (von Kries in Niall, 1995). Stevens only created trouble by introducing one more procedure unworthy of being called measurement. So, let us honor Stevens and repeal *his* law of magnitude estimation in turn.

Is there hope left for measurement in psychology? Measurement continues to be a problem all over psychology today, but hope remains. We do know what constitutes effective measurement. The formal or mathematical conditions for quantitative measurement are well-known (as in Krantz, Luce, Suppes, and Tversky, 1971). Problems of measurement do matter, if a coherent description of color space matters in colorimetry – as one example. What can be done to resolve issues of the application of measurement in psychology? We can begin by recognizing that measurement is something that may be possible in psychology, or *else it may fail to obtain*. There may be *no* measurement in most domains of psychology: we just do not know when measurement makes sense.

Quantitative structure is a contingent matter for colorimetry as it is for psychology generally – not a law at all, not by Fechner and not by Stevens and not by anyone. I venture to say the quantitative nature of color space has not been demonstrated in full: we *still* do not know if measurement works within colorimetry in the same way it does for other, physical magnitudes. In a profoundly ironic twist though, measurement in color space has a far *better* chance of working than the application of quantitative measurement in a geometry of 'visual space'. Color theory has a better legacy: the pioneers of modern color theory were acutely aware of problems of measurement as they advanced the notion of color space, and a 'line element' for color space. In contrast my bet is that ordinary measurement is meaningless for visual shape, that is, under what has been called 'the geometry of visual space'. But that conclusion follows from a long and abstract argument which I leave for another day (though see Suppes, 1991, p.48).

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Hue Angles continued

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COLOR research and application

IN THIS ISSUE, June 2018

We open this issue with a review article by Javier Romero, Luis Gómez-Robledo, and Juan Luis Nieves. These researchers wondered whether it is possible to establish the evolution from Renaissance to Baroque artwork by studying color parameters of paintings by six artists from those periods: Titan, El Greco, Rubens, Velázquez, Rembrandt and Vermeer. In their article, "Computational color analysis of paintings for different artists of the XVI and XVII centuries," they report on their analysis of color gamuts, number of discernible colors, and other statistical data of 199 paintings to determine whether the paintings can be grouped with the same style or transitions of the painter from one style to another, or whether the use of color is more personal to each artist. Read about the characteristics that they found common to different painters, and other characteristics that establish differences between painters. They measured the gamut, number of discernable colors, and distribution of the colors.

Our next article, "Supporting history of art with colorimetry: The paintings of Amadeo de Souza-Cardoso," describes a method to analyze and compare the colorimetric properties of painting, either to help art historians investigate changes in the artist during his lifetime or to compare the works of different artists belonging to the same school or group. In this research Cristina Montagner, João Linhares, Márcia Vilarigues, Maria João Melo, and Sergio M.C. Nascimento used hyperspectral imaging to compare the earlier and later paintings of Amadeo. While the mean color of the paintings moved from the earlier green-yellow to orange-reddish tones in the later paintings, the gamut size and number of discernable colors remained quite constant, thus supporting art historians' contention that these paintings form a homogeneous nucleus for Amadeo works. This article also shows that the non-destructive hyperspectral imaging technique is an important tool that provides a fast comparative and global analysis for researchers.

The April issue of the journal included the first two parts of the article, "Digitally reconstructing Van Gogh's Field with Irises near Arles." Those parts discussed the cleaning (Part 1) and the method of determining concentration maps for each of the 13 pigments used in this Van Gogh painting (Part 2). Now in this Issue we have "Part 3: Determining the original colors." In this part, the team of Eric Kirchner, Ivo van der Lans, Frank Ligterink, Muriel Geldof, Proano Ness, Art Gaibor, Luc Megens, Teio Meedendorp, Kathrin Pilz, Eric Hendriks, and John Delaney discuss how they used the information from the first two parts to aid them in making a digital reconstruction of the painting as it likely appeared in Van Gogh's time. They found that the digital reconstruction they propose agrees more closely with Van Gogh's letters describing the painting, but also that in some parts of the physical painting there are areas where significant changes have occurred including variations in iris color and what is now dark brown spots were originally bright yellows.

Over the ages, color is truly a wonder; it has so many uses and effects. Articles have talked about its language, its presence in art work, its use in products, advertising, and language. It can give us pleasure, but also it can help us in other ways. Our next article discusses the use of color as a data-coding technique, where it might help users in data discrim-

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CR&A In This Issue, June 2018 continued

ination, possibly to identify significant data or compare like data or find the important data. In the field of information, visualization and computing a treemap may be used to organize the data. In our next article "Towards Improved Aesthetics and Data Discrimination for Treemaps via Color Schemes" Yingtao Xie, Rui Chen, Zhi Chen, and Tao Lin examine the effect of aesthetics and data discrimination in treemaps. They then propose a quantitative color-visually perceived area model and a new treemap coloring algorithm. Their model results in improved data discrimination and aesthetics.

The recent developments in digital cameras have had to move the camera from a device for recording memories of either a scene or persons image, to an analytical instrument measuring data. However, noise is a fact of life when using analytical instruments. True measurement/estimation of colorimetric coordinates and spectral reflectance/radiance data using digital cameras have been under attention since emergence of these devices. Weiner filter estimation technique is one of the most cited techniques for estimation of spectral reflectance from imaging device data. Alireza Mahmoudi Nahavandi presents a method for "Noise segmentation for improving performance of Wiener filter method in spectral reflectance estimation" in our next article. The method enhances the performance of the assumed multi-channel camera and can be implemented in industrial multi-channel multispectral cameras software to enhance their results.

Our next article is "Color appearance of afterimages compared to the chromatic adaptation to illumination." Probably all of you have experienced afterimages. If one looks at a colored patch presented on a white field for a few seconds and then looks at a white field, an afterimage is observed. The color of the afterimage is roughly opposite to the adapting color. Therefore, the afterimage gives us information about the observer's state of adaptation. One technique to examine the observer's state of adaptation is called the two-room technique, in which the subject room is illuminated by a colored light, and a person observes a psychophysically achromatic board placed in a test room illuminated by a white light through a window opened at the separating wall of the two rooms. The board, or rather the window, appears very vividly colored, roughly opposite to the color of the subject room. In their article Chanprapha Phuangsuwan, Mitsuo Ikeda, and Janjira Mepean compare the relationships obtained by the two-room technique and the afterimage technique.

How people identify the colors they see, and how these names are related to those of other cultures is a continuing interest. Galina V. Paramei, Yulia A. Griber, and Dimitris Mylonas used a web experiment to study basic and other frequent color terms in Russian comparing them to the basic color terms in English and also looking at gender differences in color naming. Their article, "An online colour naming experiment in Russian using Munsell colour samples" reports that Russian speakers use elaborate naming strategies and revealed a rich inventory of non-basic color terms. The frequencies of the 12 basic Russian color terms were comparable for both genders; however, linguistic examination of the color space disclosed gender differences in naming colors, with more refined naming of the "warm" colors from females.

Our next author, Ming Feng Wang, explains that Taiwan is home to Austronesian Languages. He describes how the mutual exchanges began between the Tao and aborigines in Batanes, the Philippines and later between Maoris in New Zealand and Amis tribe in Taiwan show that these peoples share similar languages, cultures and customs. He noticed that color was the first thing the subjects noticed among all the elements (i.e., symbol, shape, color, and material) of cultural and creative products. Thus in "A Study on Fuzzy C-means Application in Austronesian Language Cultural and Creative Product Colors," he used an examination of products that were deemed significant cultural or creative designs accentuating the different representations between cultures to investigate Austronesian languages, discussing the facts of similar cultures, colors and customs between Taos in Taiwan and Maoris in New Zealand. In this way, he extracted precisely the colors, which came from color evaluations of the cultural products and the products successfully entered the markets, to compare and contrast the use of color in the different languages and cultures.

Since the last article featured the colors that designers chose to exemplify their nation's cultural products, we will move to a study that investigates the status of color information use in the design process and generates ideas for a color tool for designers. Seahwa Won and Stephen Westland conducted face-to-face interviews with senior designers and brand managers from the packaging and branding fields as the primary data collection method. They organized the data they received into six topics: types of color information considered to be important in the design process, reasons for considering color information important in the design process,

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current use of color information, design professionals′ preferences for existing color tool types and data types and suggestions for a color tool. In "Requirements capture for colour information for design professionals," they conclude the research highlights the potential for developing new sources and tools of color information based on design professionals′ preferences and suggestions.

Our next two articles examine "The Influence of color on impulsiveness and arousal." In Part 1 Yiting Duan, Peter A. Rhodes, and Vien Cheung used psychophysical methods to examine subjects′ response time and error rate in problem solving to determine the effect of changed hues of the surrounds on the subjects′ performances on various tasks. Based on the subjects′ error rate and response time results, each participant was identified as one of the four impulsiveness/arousal states (High Impulsiveness: HI; High Arousal: HA; Low Impulsiveness: LI and Low Arousal: LA). They found that different hues definitely had an effect on subjects′ impulsiveness and arousal. They also examined gender differences.

In Part 2, the same authors follow up on their work in the first part by examining how chroma can influence emotion (impulsiveness and arousal) and performance. Four psychometric tests were used in the chroma experiment: Logical Ability (Logical Rule and Mathematics Sequence) and Spatial Imagination Ability (Spatial Structure and Rotation). The effect of chroma on impulsiveness and arousal is complex, and chroma influences on response time, error rate and impulsiveness are significantly different across the four types of psychometric tests. Gender difference was not significant, however there was a trend for females to respond slower than males and with more errors.

Color control in the textile industry has many different facets. The procedures for textiles which are woven then dyed or printed are very different than the techniques for matching and color control of textiles in which the threads are dyed first then woven into fabric. Our next article deals with the latter. In "Color matching of fiber blends: Stearns-Noechel model of digital rotor spun yarn" Rui Hua Yang, Yu Zheng Lu, and Weidong Gao used the Stearns-Noechel model to study the color matching principles of red, yellow and blue cotton fibers to spin into blended yarn. In particular, they studied four methods to calculate the Stearns-Noechel parameter M value in order to improve the prediction accuracy of the model. In the article they report on the optimization of the model parameters, which greatly improve the predictive capability of the model.

China is a very large country with definite differences from one region to another. So, the question is should the Chinese fashion industry (or any other country) regionalize their product offerings for the consumers in the Pearl River Delta region, or the Yangtze River Delta region or people in the Beijing–Tianjin–Hebei and Chengdu–Chongqing regions? Our next article discusses "Apparel color preferences for different regions in China: the connection to personal values." Xue Xing, Wen Gu and Gang Xiao Liu examine the associations between personal values and apparel color preferences and deduces the apparel color preferences of consumers based on the mainstream values in different regions in China.

Remaining in China for our last article, Yuning Cheng and Ming Tan discuss "The quantitative research of landscape color—A study of Ming Dynasty City wall in Nanjing." Landscape planning and design is complex because it involves not only diverse landscape elements such as plants, rocks, structures, facilities, water, sky to be built together, but also it changes with the time of day and with the season. Color is an important aspect of the design. The quantitative measurement of the color of various elements using digital color technology is the specific challenge addressed in this article.

We close this issue with two book reviews. First, Robert Carter reviews *Seeing: How light tells us about the world* written by Tom Cornsweet. Then Jan Koenderink reviews Paul Centore′s book, *The Geometry of Colour.*

Ellen Carter
Editor, Color Research and Application

CORM 2018 Annual Technical Conference – Call for Papers

The CORM 2018 Annual Technical Conference and Business Meeting will be held in Gaithersburg, MD in cooperation with the National Institute of Standards and Technology (NIST). Please consider submitting a paper on any of the following topics: Solid State Lighting, Optical Properties of Materials, UV Radiation Metrology, Current Research Activities at NIST, NRC and CENAM. There will also be a special session for emerging professionals. The deadline for abstracts is **May 11, 2018**. Presentation materials are due by **June 26, 2018**.

For more information, please email davy.gross@gmail.com or massy.anaya@boeing.com .

Calendar

2018

May 7-10 **SPE ANTEC 2018 Plastics Conference,** Orange County Conference Center, Orlando, FL, Info: Doreen.Becker@ampacet.com or AnnSmeltzer@clariant.com

May 9-11 **15th Conference on Conference on Computer and Robot Vision,** Toronto, Canada, Info: http://www.computerrobotvision.org/

May 15-16 **ASTM E12 Meetings,** NIST, Gaithersburg, MD, Info: www.astm.org

Jun 11-15 **Joint ISCC/AIC Munsell Centennial Celebration,** MassArt, Boston, MA

Jun 13-15 **CIE Division 2 Meeting,** Eindhoven, The Netherlands, Info: www.cie.co.at

Jun 27-29 **15th International Conference on Image Analysis and Recognition** Porto, Portugal, info: http://www.aimiconf.org/iciar18/

Jul 13-16 **14th Annual Asia-Pacific Conference on Vision (APCV) and 3rd China Vision Science Conference (CVSC)** Hangzhou, China, Info: http://apcv2018.org/

Jul 29-Aug1 **CORM 2018 Annual Technical Conference,** NIST, Gaithersburg, MD, Info: davy.gross@gmail.com or massy.anaya@boeing.com

Aug 9-11 **IES Annual Meeting,** Boston, MA, Info: ies@ies.org

Aug 10-11 **Symposium on Applied Perception,** Vancouver, Canada, Info: http://sap.acm.org/2018/

Aug 13-17 **CIE Tutorial & Expert Workshop on Research Methods (2 days) + LumeNet Doctoral Workshop,** Copenhagen, Denmark, Info: www.cie.co.at

Aug 15-16 **AATCC Color Management Workshop,** Technical Center in Research Triangle Park, NC, Info: www.aatcc.org/evnt/workshops/color/

Aug 24-26 **The Visual Science of Art 2018,** Trieste, Italy Info: http://www.vsac2018.eu/

Sep 11-12 **XIV Color Conference,** Florence, Italy, Info: www.gruppodelcolore.it

Sep 19-20 **9th Colour and Visual Computing Symposium,** Gjovik, Norway, Info: https://www.ntnu.edu/web/colourlab/cvcs

Sep 21-23 **OSA Fall Vision Meeting** Reno, Nevada, Info: http://www.osavisionmeeting.org/2018/conf/

Sep 25-29 **AIC Interim Meeting, Colour and Human Comfort,** Portuguese Colour Association, Lisbon, Portugal, Info :https://www.facebook.com/apcor.org

Oct 3-5 **2018 Pigment and Color Science Forum and 2018 TiO2 World Summit, Technical Advancements in Color,** Boston, Massachusetts, Info: https://www.pigmentmarkets.com/tio2

Oct 7-9 **The Eye, The Brain, and The Auto 2018, the 8th World Research Congress on Vision and Driving,** Detroit, Michigan, Info: www.henryford.com/theeyeandtheauto

Nov 12-16 **26th IS&T Color Imaging Conference,** Vancouver, BC, Canada, Info: https://www.imaging.org/site/IST/Conferences/Color_and_Imaging/IST/Conferences/CIC/CIC_Home.aspx

Dec 5-8 **4th Conference of Asia Color Association,** Chiang Mai, Thailand, Info: www.aca2018.rmutt.ac.th

2019

Jan 30-31 **ASTM E12 Meetings,** Hyatt Regency Houston, Houston, Texas, Info: www.astm.org

Jun 17-22 **CIE Quadrennial Meeting,** Washington, D. C., Info: www.cie.co.at

ISCC Sustaining Members

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

Avian Technologies	www.aviantechnologies.com	603-526-2420
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.gtilite.com	845-562-7066
Golden Artist Colors	www.goldenpaints.com	607-847-6154
Hallmark	www.hallmark.com	816-274-5111
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

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 John Conant, jconant@aerodyne.com

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ISCC Member Bodies

At its foundation, the ISCC is composed of many related societies. These societies, our Member Bodies, help the ISCC 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)