iSCC
INTER-SOCIETY COLOR COUNCIL

Inter - Society Color Council

Quarterly Newsletter

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President's Message

Jen Kruschwitz

Happy New Year ISCC Members and Friends,

I am the new incoming president, and I have big shoes to fill as Dave Wyble rotates off the Board of Directors as previous past-president, and Maggie Maggio moves into the past-president role. Dave and Maggie's leadership over the past four years have yielded so many success stories for the ISCC. We branded our conferences as Color Impact, we have a new logo and visual identity on our website, and we have initiated many other efforts to keep the ISCC a vital community. I personally want to thank Jerry Dimas for staying on as treasurer and look forward to Amy Woolf assuming a new role as corresponding secretary.

We say a heartfelt goodbye to members retiring from the Board: *Anthony Calabria, Axalta; Robin Myers, RM Imaging; and Karen Triedman, Rhode Island School of Design.* The ISCC has truly benefitted from your efforts on the Board. **We welcome three new members to the Board:** *Max Derhak, Onyx Graphics; Nancy Lockhart, Viavi Solutions; and Mary Mello, PPG.* Max, Nancy, and Mary, we are excited to have you as a part of our leadership! Lastly, we welcome Rachel Schwen back to the Board as president-elect. I have known Rachel for more than a decade, and I hope she will continue to be a great sounding board for me.

I would also like to thank all of our volunteers who are the heart of our events: *Luanne Stovall, Jean Hoskins, Ann Laidlaw, Ellen Divers, Lina Cardenas, Jodi Baker, and Amy Woolf*; you are our champions. We are so very grateful for all of your energy and dedication to the ISCC.

Color Impact 2025 *(CI2025)* is taking shape. As of this writing, we have the most submissions that we have ever had for a Color Impact conference, and we believe it is due to our social media reach. A shout out to Nader Sadoughi, a graduate Design student from the University of Texas at Austin, for single-handedly creating extremely effective social media blasts for CI25 on Facebook, Instagram and LinkedIn.

I personally shared his blasts in my Instagram and Facebook stories, receiving hundreds of views, and my twenty-something daughter now believes that I slayed *(and apparently that is a good thing!)*. The program committee is busy reviewing all of the proposals for presentations, posters and short courses. We will have tours, workshops and other activities to offer a solid conference focused on Color as Communication. CI2025 will take place in Rochester, NY at the Rochester Institute of Technology, June 16 – 18, 2025. Registration opens March 21. For more information on CI25, see https://iscc.org/Color-Impact-2025.

I would like to invite you to contact me at president@iscc.org and let me know what you value from your membership as we are a 100% volunteer-run society. I welcome ideas on how we could improve our events, outreach, etc. The ISCC wants to keep enhancing its offerings to our members, to keep the organization relevant, and to continue as an essential part of the color community for many decades to come.

Jen Kruschwitz's two-year presidential term runs from January 1, 2025 to December 31, 2026.

Photo of Jen Kruschwitz

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Election Results

The election is officially completed, and I am pleased to announce the following results:

- *Rachel Schwen* has been elected to the 2-year term of **President-elect** (46 votes).

- *Jerry Dimas* has been elected to the 2-year term of **Treasurer** (48 votes).

Three Directors have been elected for a 3-year term:

- *Max Derhak* (47 votes)
- *Nancy Lockhart* (46 votes)
- *Mary Mello* (48 votes).

Respectfully submitted,

ISCC Secretary

A Blast from the Past: ISCC Newsletters 50 Years Ago

The Final Column

Dave Wyble

Starting with this column, A Blast From the Past has a new author. The ISCC wants to again thank Paula Alessi for initiating this column and acknowledge her years of effort creating this contribution. We will do our best to continue reminding our membership of our rich history.

This article will cover a few interesting details from *ISCC Newsletter No. 234*, January-February 1975. Like all older, previous issues, this was mostly a simple two-column layout with black and white text. The cover, however, since Issue 224, was a full-color lettering on a blue background.

This newsletter started with an announcement of the agenda for the 44th Annual Meeting, held at the Statler-Hilton Hotel in New York City on April 14-15, 1975. In those days an important component of the activities of the organization were Problem Committees.

These committees were formed to address issues of concern to the members of the ISCC. In 1975, the Problems Subcommittees *(and their coordinators)* were:

- Color Problems in Photography and Printing (Calvin S. McCamy)
- Color Matching Problems in Dentistry (Dr. Robert C. Sproull)
- Color Difference Formulas and Industrial Small Color Difference Problems (Rolf Kuehni)
- Problems in Dye Strength Evaluation (Dr. Charles E. Garland)
- Plans for Verifying the Color Aptitude Test (Bonnie Swenholt)
- Color in the Building Industry – Needs and Trends (Milo Folley)

What strikes me from this list is the breadth of the problems addressed. Anyone in these respective fields could probably name several, if not dozens, of problems that would fit under these broad descriptors. In part, this is due to the relative youth of color science. Yes, there were many important advances made prior to the 1970s, even back to the 1940s and earlier. But obviously from the above list we can see that there was still much to do, and that the ISCC was focused on the effort.

Starting on page 3 of Issue 234, there is a long and detailed article entitled *The History of the Munsell Color Foundation 1942-1974*. In 1942, the assets of the Munsell Color Company, entirely owned by members of the Munsell family, were turned over to the newly chartered Munsell Color Foundation. The Foundation was created to fund research in color in a non-commercial way that the Munsell Color Company could not do without at least the appearance of impropriety. One key aspect of the founding board of trustees of the Foundation was that the National Bureau of Standards *(now the National Institute of Standards and Technology)* and the ISCC were each granted the appointment of one Special Trustee. Reading through the balance of this article, it can be seen that many of the officers and trustees of the Foundation were also, at one time or another, officers and directors of the ISCC. This set the stage for a long relationship between the ISCC and the Foundation, and indeed, the Munsell Color Science Laboratory which followed.

Much of what follows in Issue 234 describes in detail several meetings, both of the ISCC in particular, and other organizations.

Among these: Color Science Association of Japan, American Ceramic Society, Canadian Society for Colour, Oil & Colour Chemists' Association, Manufacturers Council on Color and Appearance, and Graphic Arts Technical Foundation. Most of these were ISCC Member Bodies.

The final thing I want to highlight from Issue 234 is the announcement of a new journal, Color Research and Application. With its founding, this journal was "devoted to the dissemination of knowledge concerning all branches of the science, technology, and practical application of color in business, art, design, education, and industry." We can see why it quickly became the premiere journal for publication of all aspects of color research, and why it was and always has been endorsed by ISCC.

We can also note how times have changed: the initial annual subscription was $15 for ISCC members!

To review Issue 234 in its entirety, see:
http://www.iscc-archive.org/Newsletters/ISCCNews234.pdf

ISCC Webinar Report

Ann Laidlaw

April Webinar

On April 15, John J. Wiens will provide a "Cutting Edge Color Lecture" titled *How life became colorful: the evolution of conspicuous colors (and their functions) in plants and animals*.

In this talk, he will discuss recent work on the evolution of colors in animals and plants. Plants and animals are often adorned with potentially conspicuous colors (e.g. red, yellow, orange, blue, purple). These include the dazzling colors of fruits and flowers; the brilliant warning colors of frogs, snakes and invertebrates; and the spectacular sexually selected colors of insects, fish, birds and lizards. Such signals are often thought to evolve by utilizing pre-existing sensitivities in the receiver's visual systems (e.g. sexually selected coloration evolved to utilize sensitivities to brightly colored fruit).

This raises the question: What was the initial function of conspicuous coloration and color vision? Here, we review the origins of color vision, fruit, flowers and aposematic and sexually selected coloration, as well as when each one evolved. We find that aposematic coloration is widely distributed across animals but relatively young, evolving only in the last approximately 150 million years *(Myr)*. Sexually selected coloration in animals appears to be confined to arthropods and chordates, and is also relatively young *(generally less than 100 Myr)*. Colorful flowers likely evolved about 200 million years ago *(Mya)*, whereas colorful fruits/seeds likely evolved about 300 Mya. Color vision *(sensu lato)* appears to be substantially older and likely originated about 400 to 500 Mya in both arthropods and chordates. Thus, color vision may have evolved long before extant lineages with fruit, flowers, aposematism and sexual colour signals. We also find that there appears to have been an explosion of color within the last approximately 100 Myr, including more than 200 origins of aposematic coloration across nine animal phyla and more than 200 origins of sexually selected coloration among arthropods and chordates.

John J. Wiens is a Professor in the Department of Ecology and Evolutionary Biology at the University of Arizona. Prior to coming to Arizona

in 2013, he was an Associate Professor and Assistant Professor at Stony Brook University in New York *(2003–2012)*. Before that he was a curator of herpetology at the Carnegie Museum of Natural History in Pittsburgh *(1995–2002)*. He obtained his Ph.D. at the University of Texas at Austin *(1995)*, and his B.S. degree at the University of Kansas *(1991)*. He has served as an Associate Editor for several journals in ecology and evolution (including American Naturalist, Ecography, Ecology Letters, Evolution, and Systematic Biology) and as Editor-in-Chief of the Quarterly Review of Biology. He is an ISI Highly Cited Researcher and a winner of the President's Award of the American Society of Naturalists. He has published more than 250 scientific papers. He studies many questions in ecology and evolutionary biology, especially the origins of biodiversity patterns and the impacts of climate change. He is also interested in phylogeny, speciation, sexual selection, niche evolution, and the biology of reptiles and amphibians. He has been interested in the evolution of conspicuous colors in animals for many years.

May Webinar

On May 13, John Seed and Gabrielle Selz will provide a joint presentation on Sam Francis and Color. Sam Francis *(1923-1994)* was an internationally acclaimed Abstract Expressionist who spoke of color as "a kind of holy substance" and a "receptacle of a feeling." In this webinar, art historian John Seed and Francis's biographer Gabrielle Selz will explore the artist's fascination with color and the varied effects and meanings he generated with it over the span of his career. They will also describe his collaborations with Daniel Cytron, a studio assistant who for three decades manufactured custom acrylic color dispersions and printing inks to Francis's specifications.

Past Webinar – January

On January 28, 2025, Andrew Reach presented a "Cutting Edge Color Lecture" titled *Color is Life*. Andrew's art is one of a perspective that is built of layers upon layers of inspiration, meaning, and life experiences. Color is a strong part of his life experience. Growing up in Miami, the tropical colors, from the hedge in the backyard of deep pink Hibiscus flowers to the azure blues of the Atlantic Ocean, to the coral reefs in the Florida Keys, the saturated colors seeped into him and never left. Andrew's love of geometry and the art deco buildings in Miami were a strong pull and led him to architecture studies. Color was merely cursory, having been exposed to Joseph Albers from the Bauhaus and his book Interaction of Color. He would go on to use color in architecture practice, somewhat limited on building exteriors and more on interiors projects he designed for offices for advertising agencies and film

production companies. But the pursuit of color in these endeavors was limited in scope as opposed to a visual artist with freedom to explore more dynamic and expansive palettes. This would change when a spine disease and disability made the rigors of the profession untenable.

John Wiens

AIC 16th Congress in Taipei, Taiwan

Paula J. Alessi

The Color Association of Taiwan is proud to announce that they are hosting the 16th Congress of the International Color Association *(AIC)* in Taipei, Taiwan from October 19-24, 2025. The Inter-Society Color Council, as well as all other AIC regular members, are cordially invited to attend!

The main theme of this Congress is Color for the Future. The Call for Papers has been officially issued (www.aic2025.org). Authors are encouraged to submit abstracts that are aligned with the following Congress topics:

- Color Vision
- Color Psychology
- Color Communication
- Color in Art and Design
- Color Education
- Color Culture
- Color Therapy
- Color Technology and Application
- Color Lighting
- Color Rendering and Visualization
- Color for the Future

Abstracts should be 300-900 words in length and can be submitted as PDF files through Microsoft CMT according to submission guidelines found at https://www.aic2025.org/author-guildelines.

The abstract submission deadline is April 1, 2025.
Taipei is a city where tradition meets the modern world. The Congress venue, Songshan Cultural and Creative Park, is located in the heart of the city. Once an industrial complex, this beautifully restored space is now a colorful center for innovation, art, and design, making it the perfect venue for an AIC Congress.

ISCC members are encouraged to attend and/or submit papers to this Congress, which promises to be an unforgettable cultural and colorful experience.

Please visit the website at www.aic2025.org for more details.

Color Impact 2025 Keynote Speakers

Maggie Maggio

Exploring Three Languages of Color

The theme of this year's Color Impact conference is Color as Communication. This wide-ranging topic encompasses everything from how we talk about color, to the use of color as visual information in the natural world and in art and design, to the specification of color in industry. These are three distinctly different languages of color – one uses words, one uses images, and one uses numbers. Our invited keynote speakers will address each of these three languages used in color as communication.

Words – The Verbal Language of Color

Dr. Dimitris Mylonas

I have a vivid memory from the Progress in Colour Studies conference in 2016 at University College London. I was playing the Color Naming card game designed by Dimitris Mylonas with Anya Hurlbert during a break. When we disagreed on which card was *"turquoise,"* I realized that her frame of reference for what is turquoise was not the same as my frame of reference. We agreed to disagree.

Dimitris's research in color naming includes an online experiment designed to collect color names in multiple languages with their corresponding color ranges. If you haven't participated in Dimitris's online color naming experiment, give it a go. You will be asked to name a series of color samples and provide information about your cultural background and viewing conditions. Here is the link: https://colornaming.net/

Dr. Mylonas's talk is titled ***Augmenting Color Communication Within and Across Languages***.

Words do more than simply describe color; they shape how we categorize and communicate. For the past 15 years, he and his team have led an international project that explores color naming in dozens of languages and

across a range of viewing conditions (available at colornaming.net. They have combined crowdsourcing, laboratory experiments, and field studies to build an extensive multilingual dataset that highlights both the consistency and dynamic nature of color languages.

In this talk, he examines how color naming is driven more by language than perception. Through the development of robust computational tools, they have mapped colors to names in American and British English, Spanish, German, Russian, Greek, Turkish, Estonian, Thai and Himba[1] with greater precision on the surface but also within the interior of the color solid[2]. Their findings suggest that the development of color lexicons is influenced more by communication needs rather than by visual perception alone. They also explore how color naming varies across demographics, showing that younger and female participants exhibit a richer color vocabulary than older and male participants, respectively. Color naming not only links vision and speech but also strengthens connections between people by revealing how we collectively augment colour communication within and across cultures and diverse viewing conditions. This work offers a new framework for understanding the complex interplay of language, perception and culture in our shared experience of color.

Dr. Dimitris Mylonas is an Associate Professor and Head of Data Science and Artificial Intelligence at Northeastern University London, U.K. He holds a Ph.D. in Computer Science from University College London. His research explores the intersection of perceptual, cognitive, and linguistic aspects of color communication. With over 15 years of interdisciplinary experience, his work spans visual communication design, color management, experimental psychology, cognitive neuroscience, cross-cultural studies, crowdsourcing, and computing. Mylonas is a Senior Editor of Color Research and Application, Co-editor of the Progress in Color Studies book series, and Chair of the International Colour Association's Study Group on the Language of Color.

[1]The Himba are an ethnic group of semi-nomadic pastoralists who live in northern Namibia and southern Angola.

[2]A color solid is the three-dimensional representation of a color space or model, such as CIELAB or the Munsell color pace.

Images – The Visual Language of Color

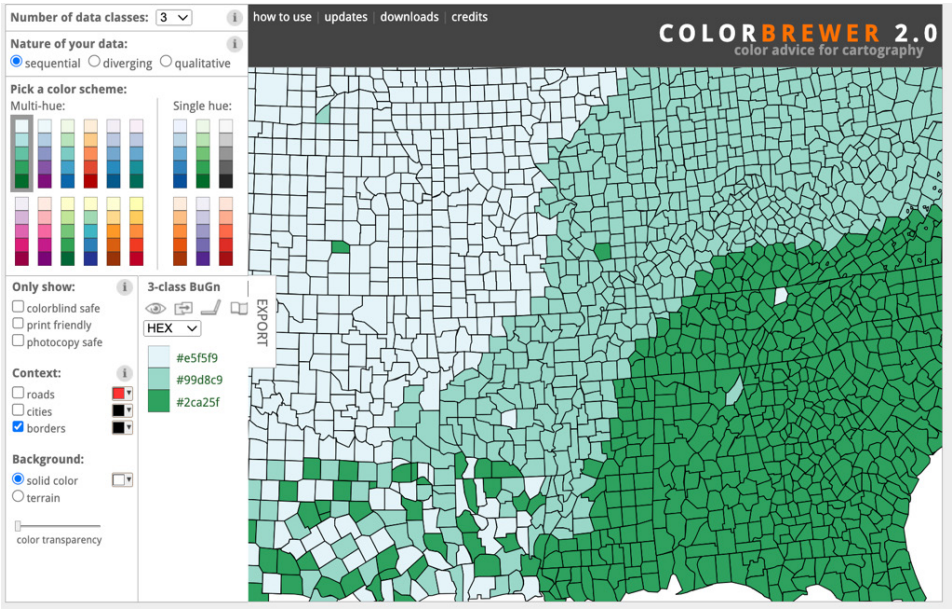
Dr. Cynthia Brewer

I am a longtime fan of ColorBrewers, Cynthia Brewer's influential website for the mapping community. ColorBrewer is an online tool for selecting map color schemes based on palettes created by Cynthia Brewer. It was launched in 2002 by Brewer, Mark Harrower, and The Pennsylvania State University. Suggested color schemes are based on data type (sequential, diverging or qualitative). It also provides options for varied display environments, such as laptop, photocopy, and LCD projector, and colorblind safe options.

Dr. Brewer's talk is titled ***Communicating Map Patterns Using Perceptual Dimensions of Color***

The keynote presents color use for cartographic communication and an evolution to map design using geographic information *(GIS)* system tools. ColorBrewer.org offers specifications for sequential, diverging, and qualitative schemes that match the perceptual dimensions of color with conceptual structures in geographic data. These designs help map-readers understand the patterns in mapped distributions.

Dr. Cynthia A. Brewer is a professor of geography and information sciences and technology *(IST)* at The Pennsylvania State University. She teaches introductory cartography and map design courses and advises graduate students working in cartography. She has worked as a map and atlas design consultant for the U.S. Census Bureau, U.S. Geological Survey, National Cancer Institute, National Center for Health Statistics, and National Park Service. In 2023, she was awarded the International Cartographic Society's highest honor, the Carl Mannerfelt Gold Medal, for her distinguished contribution to the field. She is currently the Associate Dean for Faculty Affairs in the College of IST.



ColorBrewer

Numbers – The Scientific Language of Color
Dr. Mark Fairchild

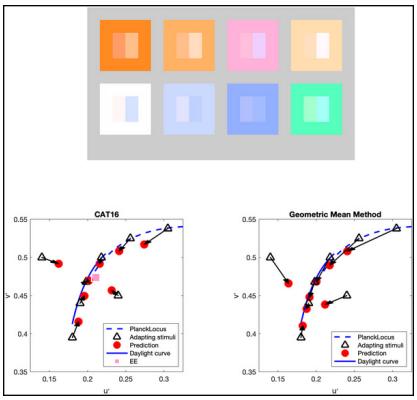
When I joined ISCC as a designer, I'd never heard of color appearance models, so I did a little research. I found Mark Fairchild's seminal book which begins "Color appearance models aim to extend basic colorimetry to the level of specifying the perceived color of stimuli a wide variety of viewing conditions." Here is a recent AI definition - "A color appearance model (CAM) is a mathematical model that predicts how a color will appear to the human eye under specific viewing conditions, taking into account factors like background, illumination, and surrounding colors, essentially describing the perceived attributes of a color like lightness, hue, and chroma rather than just its physical measurements." If you want to hear about the latest concepts in CAM, don't miss this keynote!

Dr. Fairchild's talk is titled: ***Seeking Improvements in Color Specification***

This presentation describes the potential for advancements in colorimetry, and thus color communication, based on a different overall approach. While there are a variety of advancements to be considered, the following are some that will be discussed. Improved color matching functions based on cone fundamentals and visual physiology are available. In addition, methods exist to characterize and implement individual differences in color matching functions. Once metameric matches are specified with improved color matching functions, more physiologically plausible methods of accounting for chromatic adaptation, and degree of chromatic adaptation, such as the weighted geometric mean method can be applied.

These chromatic responses can then be used to create improved correlates of appearance such as G0-weighted lightness and brightness metrics that automatically incorporate the Helmholtz-Kohlrausch effect. Further, descriptors of other dimensions of color appearance (e.g. hue, saturation, chroma, colorfulness) can be derived independently rather than relying on the concept of an overarching single three-dimensional color space. Lastly, specifying color differences can be accomplished unidimensionally, as they are perceived, rather than striving for a single overall delta-E metric (i.e., curing mononumerosis!) While these concepts, as outlined, might never be combined into a single new standard system of color specification, considering different and varied approaches can certainly lead to some significant improvements worth seeking.

Dr. Mark D. Fairchild is Distinguished Professor in the Program of Color Science and Munsell Color Science Laboratory at the Rochester Institute of Technology *(RIT)*. He was the Founding Head of RIT's Integrated Sciences Academy. Mark received his B.S. and M.S. degrees in Imaging Science from RIT and Ph.D. in Vision Science (Brain & Cognitive Science) from the University of Rochester. He is the author of over 400 technical publications and books, including *Color Appearance Models, 3rd Ed.*, which serves as a reference to the fundamentals of color appearance and the formulation of specific models, and *Munsell Trees: A Season of Leaves and Colors*. Fairchild was co-Editor of the Handbook of Color Psychology and has self-published books and websites on color education and high-dynamic-range imaging. His most cited research is in the areas of color appearance models, image appearance models, high-dynamic-range (HDR) imaging, human color vision, and color reproduction. He has been the research supervisor to nearly 70 graduate students who now work in the field across the world. Dr. Fairchild has received numerous awards in the fields of color science, imaging science, and photography research and education including the ISCC Macbeth Award in 1995 and the ISCC Godlove Award in 2021.



Weighted Geographic Mean (WGM)

Colour Literacy Forum

Luanne Stovall

The **Colour Literacy Forum** is a virtual platform featuring presentations and interactive conversations focused on updating and expanding 21st century color education at the university level. The Forum is an international, collaborative effort of the joint ISCC/AIC Colour Literacy Project and Cumulus (see https://cumulusassociation.org/), the leading global association of art and design research.

The goal of this global collaboration is to align higher level color education with current design needs in the culture and develop an interdisciplinary STEAM (Science, Technology, Engineering, Arts, Math) model that aligns color education with current needs in the culture, provides cutting-edge resources, and offers dynamic networking opportunities for all stakeholders. For more information, see https://colourliteracy.org/colour-literacy-forum.

Upcoming Forums (Save the Date)

Colour Literacy Forum #11

Facts and Myths About Color Series - Part 1
Colour Misconceptions and Their Impact in the Classroom
Saturday, March 1, 11 a.m. - 12:30 p.m. EST (via Zoom)

Speakers:

Robert Hirschler, Co-Chair of the Study Group on Colour Education, Co-Chair of the Colour Literacy Project, member of ProCor (Brazil) and the Hungarian National Colour Committee.

Andreas Schwartz, author of several colour articles and books, team member of the Color Literacy Project with a research focus on the didactics and methodologies of colour education.

Summary of Past Events

Forum #10 is availavble on YouTube at:
Colour Literacy Forum #10 - "Colour in Context Series, Part 4", Winter 2024.

Forum #10: The Cultural Palette: Colour's Role in Identity, Gender and Society

Talk 1. Lives in Colour: Pioneering Women in Colour History by Dr Alexandra Loske

A British-German art historian, writer and museum curator with a particular interest in late 18th and early 19th century European art and architecture. Loske's talk focused on three pioneering women in color history, demonstrating that women were actively engaged in color theory and practice, despite the challenges they faced as women in their respective eras, and even if their contributions have been overlooked in traditional histories.

The Forum audience learned that Mary Gartside (c.1755-1819) was an 18th century English painter and teacher who published one of the earliest books on color theory by a woman. Essay on Light and Shade, on Colours, and on Composition in General (1805) was structured as a practical guide for her students, providing instructions on techniques like foreshortening and shadows. It also included vibrant, freely painted "color blots" that represented Gartside's color theory, which she divided into eight chromatic colors. The second edition of the book (1808) further developed these studies, assigning specific flowers to each composition. Loske explained that Gartside's innovative use of abstract color images predated similar experiments by over a century.

Next, Loske introduced the work of Beatrice Irwin (1877-1956), an early 20th century actress and performer who performed "color poems" on stage and published The New Science of Color (1912) and The Gates of Light (1927) that explored the use of colored light in interior and exterior spaces. Irwin went on to patent the "Irwin Color Filter," a simple light source surrounded by colored transparencies that could be used to make lighting changes in various settings. Her pioneering work bridged the realms of performance, spirituality, and the emerging science of color and light, demonstrating women's multifaceted contributions to this field.

The third woman Loske discussed was Carrie van Biema (1881-1942), a German artist and teacher who moved from a representational approach toward a more expressive, color-focused approach influenced by the German Expressionist movement. In the 1930s, she published Farbengestalt (Colors and Forms as Living Forces), a book exploring Goethe's color theory and the work of her Expressionist teacher Adolf Hölzel. Tragically, van Biema's story has a devastating ending. As a Jewish woman, her books were likely confiscated and burned by the Nazis in the 1930s. She was murdered in the gas chambers of Auschwitz in 1942.

In conclusion, Alexandra noted the irony and cruelty of history, emphasizing the need to uncover and chronicle the overlooked histories of women, a project that she plans to continue developing.

Talk 2. Blue Jeans: An Exercise in Contrast by Carolyn Purnell, historian, writer, and author of Blue Jeans (2023) and The Sensational Past: How the Enlightenment Changed the Way We Use Our Senses (2017).

In her talk focused on blue jeans, Carolyn Purnell discussed the global nature and cultural associations of blue jeans, one of the most ubiquitous garments in the world, and one of the few articles of clothing consistently linked to a specific color. She highlighted how this ubiquitous garment became a complex signifier that carries a wide array of meanings, from casual to high-fashion, masculine to feminine, global to regional.

Purnell began by outlining the global supply chain behind blue jeans, with materials and production spanning multiple continents. She traced the historical origins of the denim fabric, noting its links to

India, Europe and the American West, and explained how the availability of indigo dye was a key factor to blue jeans popularity as a garment for the masses. The fortunes of indigo, she explained, went hand in hand with cotton, another notorious cash crop. So blue jeans, a juggernaut of colonialism and slavery fueled by the twin luxuries of cotton and indigo, completely reconfigured the global economic system. Next, the Forum audience learned how iconic blue jeans with metal rivets –– patented in 1873 by Levi Strass for the California mining population –– became associated with the romanticized image of the American West.

But Levi Strauss never imagined that those trousers would go mainstream. They were intended as work garments, and they were extremely successful in that market. It took the Great Depression to push blue jeans firmly into the mainstream in America; denim companies knew that if they wanted to stay in business, they had to find new customers, so they pivoted by focusing on middle class buyers. In the 1930s, many Americans had a very romantic view of the American West, in large part, thanks to Hollywood westerns. And in this period, fascination with the Old West reached a fever pitch. As the decades progressed, this iconic garment evolved to become a symbol of youth rebellion and protest, before eventually becoming a mainstream wardrobe staple.

Carolyn concluded with the argument that the very malleability of blue jeans – their ability to embody opposing meanings – is precisely what has allowed them to become a universal signifier. She suggested that by recognizing the depth of meaning in this seemingly ordinary item, we can better appreciate the cultural power of blue jeans.

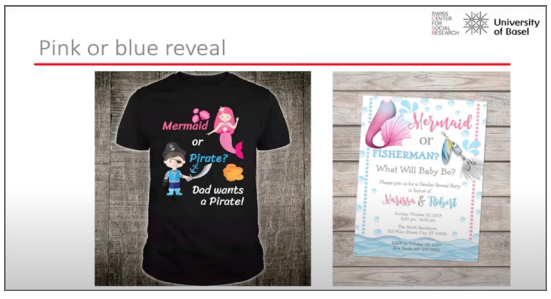
Talk 3. It's a Girl! What Pink Reveals about Colour, Gender and Childhood in the 20th and 21st Century by Dr. Dominique Grisard, professor of gender studies at the University of Basel and head of the Swiss Center for Social Research.

Has pink always been a girl's color? In the final Forum presentation, Dominique Grisard discussed the significance of the color pink to affirm a culturally constructed gender binary with the color blue, and addressed the cultural stereotypes reinforced through the use of these colors –– including gender reveal parties, pink or blue baby showers, "gender-appropriate" nursery designs, color coded toys, and pink or blue birth-announcements, all exhaustively documented on Instagram in a rapidly changing landscape of gender identity.

Grisard began by introducing gender reveal parties as a way to affirm the gender binary through the use of pink and blue colors. She delved into the power dynamics reinforced through these events, analyzing how they promote an understanding of gender as a linear progress from a pink fetus to a pink girl and a pink feminine woman, and vice versa for babies who are assigned the color blue. Next, she explored the historical evolution in western cultures of the color pink, tracing its origins to the 14th century and its gradual association with femininity, pink-hued flowers, and the ideal of womanhood.

The role of Disney was highlighted as a significant factor in shaping gender roles through the pinkification of girlhood, as well as the products of gendered consumerism and the pink tax, where women pay more for certain gendered products and services. Grisard also acknowledged the LGBTQ+ community's reappropriation of the color pink and toys like Barbie, who since her birth in 1959, has played a central role in coming-out narratives, culminating with the 2023 Barbie film and its excessively pink aesthetic.

Dominique concluded her talk by emphasizing the importance of delving into the historical evolution of pink and the role of diverse geographic contexts in order to gain insight into the evolving meanings of color and gender –– how color meanings are culturally constructed and how they cannot be contained within a rigid binary.



Color Research and Application

Michael J. Murdoch

This article covers CR&A 49(6) 2024 & 50(1) Jan/Feb 2025

Through this column, I have had the pleasure of highlighting articles in Color Research & Application that are authored by ISCC members. The number of ISCC-authored articles has varied widely, and in some quarters, there have been no articles. Starting with this Newsletter, I am adopting a new approach of highlighting a few articles that I think will be interesting to ISCC members. I won't claim to always pick the best or most interesting to everyone, but hopefully I can pique the interest of some of you to go read something in the journal!

Luminance and chromaticity discrimination sensitivities right after an abrupt decrease in background luminance

Takehiro Nagai | Minwoo Son

https://doi.org/10.1002/col.22950

Everyone has experienced the temporary near-blindness of walking into a darkened room or driving into a tunnel. This paper presents a well-designed study of exactly how much visual discrimination is degraded after sudden darkening and how quickly it recovers. The authors arranged a sequential experiment, adapting observers to 100 cd/m2 *(typical display luminance)* and then switching to 1 cd/m2 (very dim display) for a discrimination task in either the luminance or one of four opponent-color directions *(roughly, yellow, blue, red, and green)*. They employed a four-alternative forced choice task, meaning observers were presented with four options and had to choose which of the four was the misfit – either a chromatic sample among achromatic ones, or a darker or lighter sample among those that were equiluminant *(of equal luminance)*. A staircase algorithm that made the differences smaller when the observer correctly identified the target and larger when the observer was incorrect led to the discrimination threshold for each direction.

An important variable was the duration of a pause between the instantaneous darkening and the presentation of the discrimination task, from 80 to 400 milliseconds.

This allowed the authors to relate the size of the discrimination threshold to time, and as expected, additional dark-adaptation time resulted in smaller thresholds, meaning that they became more sensitive to differences. For luminance, thresholds were four times higher at the shortest pause (80 ms) relative to the threshold when fully adapted to the dim condition. Thresholds had improved to two times higher after 400 ms, showing how fast visual sensitivity recovers in this situation. The authors found that luminance discrimination was worse after darkening than any of the chromatic directions, and that people retained their sensitivity in red and green directions slightly better than in the yellow and blue directions. Interestingly, the authors discuss previous research on "transient tritanopia," an appealing appellation to a related time-based loss of yellow-blue sensitivity that appears to align with the present work.

Urban Color Plan: The case study of the Ledro Valley (Italy)

Katia Gasparini

https://doi.org/10.1002/col.22947

How do we describe the characteristic color palette of a historic town, and how do we plan for future development that is consistent with and respectful of the description? This paper, with photos and maps, provides a kind of travelogue into the rural Ledro Valley of northern Italy. Katia Gasparini provides a broad introduction to the concept of a color plan, essentially a guide to choosing colors for buildings being built or repainted. Color plans have been used both to preserve the historical identity of municipalities and to transform their appearance to a modern ideal or for political ends. Historical color palettes are often closely tied to a city's geography, as materials and pigments from the locality have been used in its construction. Historically oriented color plans often are created through observations at multiple scales, from architectural elements, to facades, buildings, and entire vistas. Context, contrast, shading and perspective all affect the appearance of materials in architectural objects just as in painting.

The color plan for the Ledro Valley was created considering five component localities, chosen more for cultural similarity than for surveyed boundaries. Historical and environmental information was gathered, then a photographic survey was taken, and architectural colors were determined according to the Natural Colour System *(NCS).* Figure 9, a palette of colors with NCS nuance labels, beautifully shows the range of hues as well as the distinct difference in NCS blackness and chromaticness between samples of facades and shutters. Special attention was paid to a prevalence of sundials in this region. Interpreted as an indication of the importance of sun direction, this variable was considered as it impacts the appearance of facades and other elements over the course of the day or the year.

Turning from the survey to the plan, Gasparini lays out several grids of colors and describes the local regulation system that has incorporated her work. To some it may sound odd for a town to regulate building colors, but to many this is not only useful guidance, but an essential constraint to preserve historical identity. Some deviations are described and encouraged, for example to choose a lighter shade of the suggested sample for use in a narrow street with less illumination. The final figure shows the five distinct palettes for the five localities of the Ledro Valley, showing their subtle variations from a set of common colors. The palettes are noticeably but slightly different, which seems to say that the commonalities across the valley are more valued than their differences. However, like neighbors and dialects, the subtleties are surely perceived most strongly by those living in their midst.

ISCC Treasurer Jerry Dimas Receives the Inaugural Robert E. Kester Award

It is my honor to present Jerry Dimas with the Robert E. Kester award. Jerry received the award, given annually by the CEO, along with two CCI colleagues. The receiver of this award is an associate that exemplifies the qualities of leadership, pride, innovation and dedication to our work that Bob Kester personified. By the example of their work ethic, these award winners have made tremendous contributions to the legacy of Color Communications. I'm very proud to recognize Jerry Dimas, Jim Fester, and Jesus Cardenas for their amazing work.

Jerry Dimas is widely recognized in the color marketing industry as a *"go to"* person for issues with color. Our clients have such respect for him that it raises the credibility of our company to the point that one of them insists Jerry attend every strategic meeting with them. Jerry is also a key member of the Color Communications Quality Team that not only assures products are produced to client specifications, but more importantly documents our processes so that all associates have the best opportunity to perform to our client's needs.

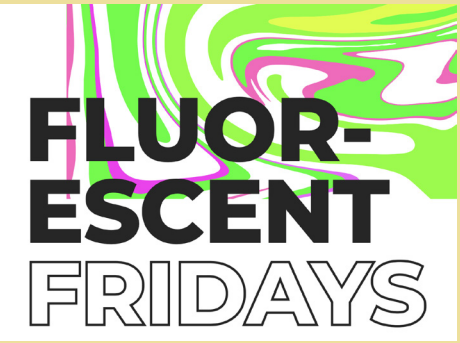
In the last 2 years, the innovation team that Jerry leads has developed 3 patents, most recently the paper powder coated chips that are a big focus of our business revenue plans for this year. Each of these patents leverage Jerry's incredible knowledge base while innovating a new way to present color. Jerry is always willing to listen to associates' concerns and tries to resolve operational issues including helping people develop career paths to improve their engagement with the company. Most recently, Jerry was a key member of the team that led to the purchase of our new colorant dispersal equipment, which was not only a significant capital expenditure, but led to faster and more reliable color being delivered to our coating lines.

Tom Ragen, President, Color Communications Inc.

Photo of Tom Ragen with Jerry (Jerald) Dimas receiving the Kester Award

Fluorescent Fridays

Luanne Stovall



Upcoming Event

What: In Celebration of International Color Day: Color with Purpose in Product Design

Who: Gisela Costa Pinheiro Monteiro, Associate Professor, Industrial Design, Department of Design and Technology, Fluminense Federal University *(UFF)*, Rio de Janeiro, Brazil
Josue Custodio Neves Dos Santos, Industrial Design student, UFF
Pedro Viana, Industrial Design student, UFF

When: Friday, March 21, 1 p.m. EST via Zoom

Zoom link: *Stay tuned!*

Recent Event

On Friday, November 1, 2024, Fluorescent Friday spotlighted Optics students and faculty from The Institute of Optics, University of Rochester.

Students in Color, Saving the Planet Through Optics Education

Check out the video on the ISCC YouTube channel: *Stay Tuned!*

Speakers:

- Dr. Jennifer Kruschwitz, Associate Professor of Optics, The Institute of Optics, University of Rochester
- *(Agent D)* Demetrious Dowdell, Ph.D. Optics student
- *(Agent M)* Megan Fallon, M.S. Optics student
- *(Agent J)* Jayvyn Dennis, Junior Optics student

In honor of Dia de los Muertos, Agents D (Demetrious), M (Megan), and J (Jayvyn) were advised by Dr. K (Professor Kruschwitz) to prepare a briefing for the Fluorescent Friday participants. The objective was to guide the audience through the abundance of

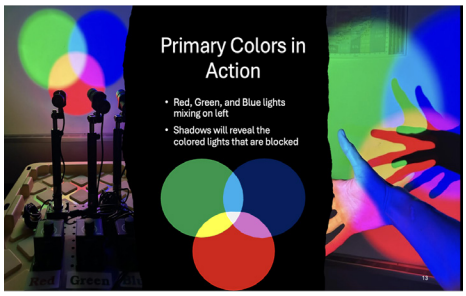
optical phenomena that utilize color. Referencing the science fiction comedy, *Men in Black*, Dr. K introduced the three students, who served as tour guides for visual experiments designed to illuminate the mind and dazzle the senses—so curious members of the audience could replicate them at home. Topics included polarization, color mixing, refraction and diffraction.

What is Polarization?

The three "Optics Agents" began the tour by introducing the concept of polarization explaining that 3D movies take advantage of our depth perception abilities, where each eye sees a slightly different view of the object, and our brain leverages that difference to interpret depth. He showed examples where 3D glasses were used in movie theatres to create the illusion of depth by putting polarizers over each eye to process slightly different views.

What are Additive and Subtractive Colors?

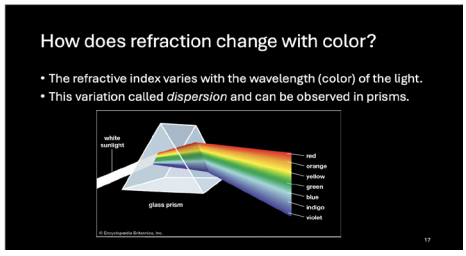
Next, they provided an overview of additive and subtractive colors. They showed that the additive colors Red, Green and Blue are ranges of wavelengths responsible for creating the colors that we see on the screens of computers and smartphones. When these three colored lights are projected, the shadows will reveal the colored lights that are blocked.



The audience learned that Cyan, Yellow and Magenta are the subtractive colors used in printer ink, paints and dyes. Combinations of these three primaries create the colors we see by absorbing (or subtracting) the light.

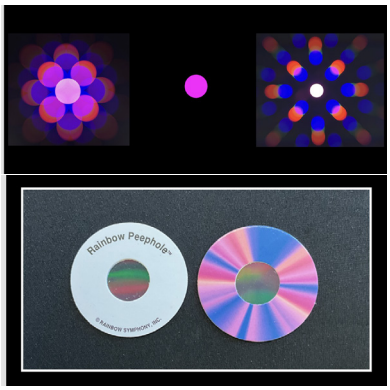
What is Refraction?

As the visual tour continued, the agents explained that refraction occurs when light changes direction upon striking a surface at an oblique angle –– that the angle changes as a function of the material's index of refraction. The refraction index varies with the wavelength of light. They showed that lenses work using refraction by focusing the different colors of light to different locations. The shorter wavelength will experience a higher index, bending more severely than the other wavelengths.



Diffraction and Rainbow Peepholes

On the final leg of the tour, Agents D, M and J explained that diffraction is a phenomenon that happens when light hits a very small obstruction and bends around the object, causing the light to spread out. The audience was invited to play a color guessing game to guess which colors we might see with different colored light bulbs. Finally, they introduced the audience to Rainbow Peepholes to show how the concept of diffraction can be used to create vibrant geometric patterns when light is projected through a small opening in a CD disk. At the close of the presentation, the three optic agents shared a list of equipment so that inquiring minds can replicate each experiment on their own.



Example of the patterns created by diffraction using a Rainbow Peephole

Diffraction Demo Inventory For Your Home Experiments

- Rainbow Symphony 500 lines/mm Diffraction Grating Slides [10 for $13]
- Amazon.com: Rainbow Symphony Rejillas de difracción Difracción, lineales 1000 líneas/milímetros, paquete de 10
- Rainbow Symphony, Rainbow Peepholes [25 for $13]
- Rainbow Symphony Diffraction Grating Rainbow Peepholes, 13500 Line/Inch, Made in USA, Package of 100
- White Light Bulbs (incandescent, compact fluorescent, LED, white holiday lights)
- Colored Light Bulbs (Multicolor Holiday lights work well too!)
- LED Colored Light Bulbs 9 Watts (60W Equivalent), E26 Base for Wedding Halloween Christmas Party Bar Decor, 6-Pack on Amazon
- Light Bulb Sockets
- Outlet to Socket Adapter, Plug-in Light Socket, Convert Outlet to Light Bulb Socket, Polarized 2-Prong Outlet to E26 E27 Screw Base Bulb Socket, 660 Watt, 125 Volt, UL Listed (4-Pack) on Amazon
- Plug strip surge protector

The **Inter-Society Color Council** created **FLUORESCENT FRIDAYS** as an online platform for international university students from diverse color-related disciplines to share their research and network with color professionals. The goal is to build a global student chapter that positions color as a multidisciplinary STEAM model *(Science, Technology, Engineering, Arts, Math)* and provides state-of-the-art color research by scientists, artists, designers, industry professionals and university students.

Pebbles on the Beach
The MacAdam Ellipses

John Seymour

Today's color science pebble is about a very useful large set of data that was meticulously collected, which practically all color scientists know about, but which practically no one uses anymore.
Nine out of ten books on colorimetry include a picture of the MacAdam's ellipses, based on David MacAdam's 1942 paper. I had a little chat with Google Scholar and it told me this paper has been cited 1,703 times! Rumor has it that "MacAdam's ellipses" is the passcode that will get you into the swank clubs that cater to color scientists. Oddly enough, I don't know of any swank clubs where admittance requires a lucid explanation of how they were created. The main purpose of this column is to prepare the readers for some time in the future when a bouncer at a club asks them to explain how David MacAdam determined the ellipses.

What are the ellipses?

Figure 1 *(left)* is copied from MacAdam's paper. It shows the MacAdam ellipses on what is known as the chromaticity diagram. Figure 1 *(right)* is the magic decoder ring for the chromaticity diagram which shows how colors map to positions in the diagram.

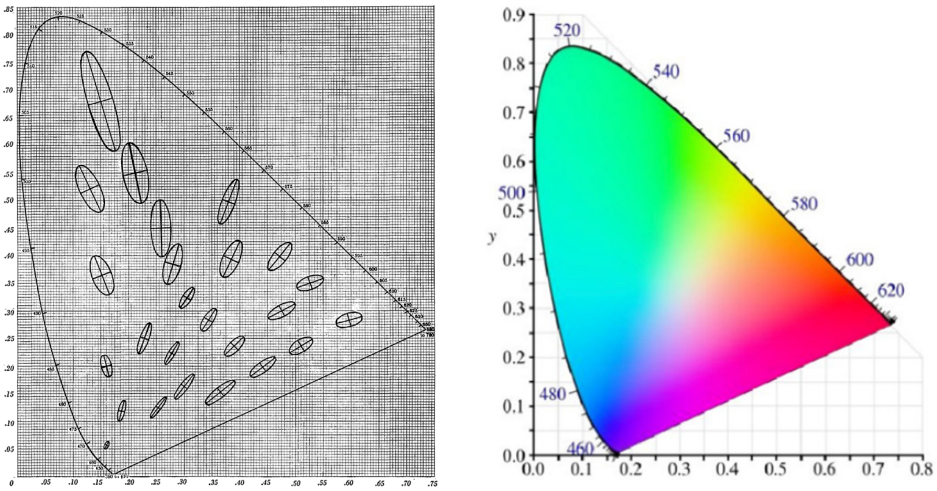


Figure 1 – The MacAdam ellipses (left) and a color decoder chart (right)

As an aside, the rainbow around the top of this shape and the straight line connecting red to violet form the outer edge of the chromaticity diagram. You cannot make reflective colors outside the boundary formed by the rainbow and the straight line without using fluorescence (but that's another paper by MacAdam). A truly pedantic reader might recognize that the color coding is a bit of a lie. If you are looking at the diagram with a computer monitor, colors are limited to a small triangular region that is well inside of this shape. Almost all colors near the edges cannot be reproduced on your computer monitor or tablet or cell phone.

Getting back to the topic, the ellipses include all colors which are just noticeably different from the point in the center. I italicized those words to indicate that this is a concept that I will explain in a bit. One more comment – to make the small ellipses visible, all of them are scaled up by a factor of ten.

How was the data collected?

MacAdam, an employee of Kodak Research Laboratories, elicited the help of a grad student by the name of Perley G. Nutting, Jr [1].
In the words of MacAdam, "[Nutting], whose interest and patience is acknowledged here with gratitude and admiration, has made nearly 25,000 settings for color match".

Let's say it took Nutting a minute for each observation. Working 40 hours a week, this represents about ten and a half weeks of work. I can hardly imagine making even 25 observations!

Figure 2 illustrates how each of these 25 thousand observations were made. The black box with the two half-circles is what Nutting looked at all day for nearly four months. The half-circle on the right was the target color of the day. The half-circle on the left was the color that he had control over by moving a slider back and forth. Moving the slider all the way to one side would in this case give him a color that I would call salmon, labelled A (The ISCC editor will probably correct this to rose pink). Moving the slider all the way to the other side would give him that lovely shade of lavender, labelled B. (Again, the editor will likely call this ezoviyon.) For further information, see [Seymour, 2019].

[1] Very little is known about Perley G. Nutting, Jr. *(1914 – 2001)*. I found a commencement program that shows he received his Master of Science degree from RIT in 1938. This degree was the first masters in Optics awarded by RIT. Perley Jr.'s short obit from the Tampa Bay Times says he was a physicist for the U.S. Defense Department. I have found some papers from the late 1930s and 1940s that suggest he had a career in geology. I have not been able to find out what he was doing between graduation in 1938 and the publishing of MacAdam's paper in 1942.His father, Perley G. Nutting, Sr., was born in a little town 40 miles from where I was born!
Fun fact: Nutting *(senior)* started the Optical Society of America, now known as Optica.

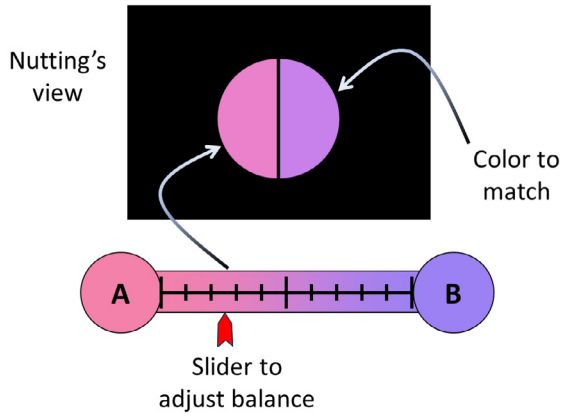


Figure 2 – The setup for one set of 50 color matches.

Nutting's job was to adjust the slider until he decided it was a perfect match and then record the setting. Then, in Sisyphean fashion, he would move the slider all the way to one side and repeat this process. And then again. And then again. And then again. He made this assessment 50 times. And you thought you had a fun job?!?!?

The 50 samples were all considered by Nutting to be a perfect match to the target color, so the range of that data is an estimate of the precision with which Nutting could assess differences in color. MacAdam used the standard deviation of these measurements as a metric that he called the just noticeable difference.

When one set of 50 color matches was complete, Nutting would proceed to the next set of 50 color matches, using the same target color, but with different colors to mix, as shown.

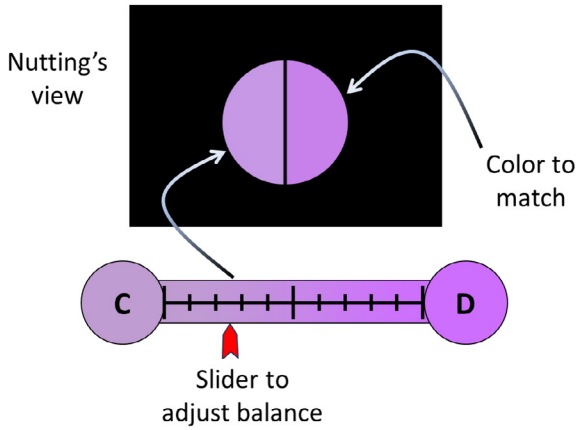


Figure 3 – The setup for another set of 50 color matches.

Figure 4 is taken from MacAdam's paper with my own embellishments. This figure is of the tiniest ellipse, the one in the lower left in the diagram shown in Figure 1, closest to rainbow violet. I first draw your attention to the line at the narrowest portion of the ellipse, which goes from MacAdam's color #40 *(labeled "A")* to MacAdam's color #47 *(labeled "B")*. It represents the experiment shown in Figure 2.

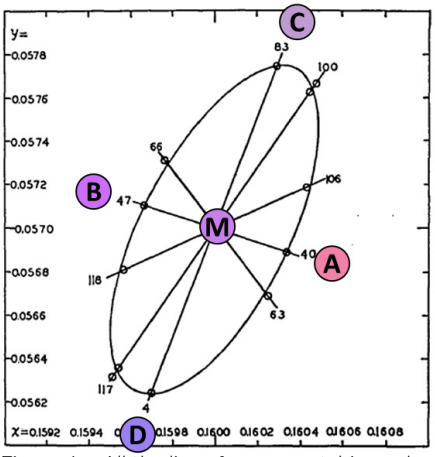


Figure 4 – All the lines for one matching color.

You will notice two small circles on this line. One circle is a certain number of standard deviation units to the left of the middle *(labeled M)*, and the other is that same distance to the right of the middle. All the colors between these circles could be confused with the color M in the eyes of Perley Nutting, Jr.

The line from MacAdam's colors #4 and #83 *(my colors D and C)* represents the second experiment.

There are additional experiments with this same match color: from #66 to #63, from #106 to #118, and from #100 to #117. The experiment on this last pair was repeated, since there are two sets of circles on this line. The set of data for this matching point thus required 6 experiments, each with 50 measurements. Some colors included more experiments, up to maybe ten. In all, Nutting collected data like this for 25 different colors.

Normal or not?

MacAdam had put a lot of thought into the appropriate metric to use to characterize this data. Researchers performed less comprehensive experiments prior to 1942. It seemed that the most common metric was along the lines of "of all the colors that are deemed the same as the target color, XX% of them will be within this range."
MacAdam didn't like that, since it had an inherent assumption that the data was normally distributed. That is why he based the size of the tolerances on the standard deviation.

How were the ellipses generated?

I would next like to describe, in horrendous mathematical detail, how those ellipses were generated from the little circles that stake out the border of the just noticeable difference ellipse.

Anyone who still remembers those joyous days spent in Analytical Geometry class will recognize that given *1)* the center of an ellipse, *2)* three appropriate points on the ellipse, *3)* a large box of legal pads and pencils, and *4)* a couple of weeks to scribble and pull out your hair, it is a simple matter to find the equation of the ellipse that goes through those points.

If the history of statistics or astronomy is more your bag, you may recall Gauss invented the method of least squares and applied it in 1809 to determine the elliptical orbit of the dwarf planet Ceres. Maybe this is how the ellipses were created? After all, this is the same darn problem – fitting an ellipse to a set of points.

As I said, I would like to describe the method, but this is how MacAdam described the process: "The complete ellipse is drawn through the points at the ends of these diameters."

Enter Silberstein

MacAdam's 1942 paper used a combination of one-dimensional statistics (the standard deviation) and an ad hoc method to create the tolerance ellipses. MacAdam later elicited the help of a former colleague at Eastman Kodak, Ludwik Silberstein, to improve the analysis of this data [Silberstein and MacAdam]. Silberstein was a physicist who wrote a textbook on the theory of relativity in 1914. He worked at Eastman Kodak from 1920 to 1929 [Debus].

Silberstein was able to put the analysis of MacAdam's data on a firm footing. He provided a way to extend standard one-dimensional statistics to two-dimensions. He did not put it quite like this, but the ellipses that he created were effectively two-dimensional standard deviations. As a thorough statistician, he also demonstrated that the matching data was normally distributed. (Remember MacAdams's reservation about that?)

But isn't color 3D?

MacAdam's paper is all about two-dimensional data. All the colors within one of the individual ellipses all had the same L^* value. One

could argue that this is rather incomplete. Nutting really should have been tasked with adjusting colors not just in 6 to 10 directions within a plane, but in maybe 20 or 30, including darker and lighter colors. It's pretty easy for me to type that on my computer!

I expect that Perley would've had some kind words for me, had I been around to make this suggestion.

In a follow-up paper [Silberstein, 1946] Silberstein extended his ideas of data analysis to three-dimensional data, that is, from ellipses to ellipsoids. In 1949, MacAdam found another willing RIT grad student, W. R. J. Brown, to take this experiment to the third dimension [Brown and MacAdam,1949]. Brown must have done all right on this, since he published a follow up paper two years later under the flag of Kodak Research Laboratories [Brown, 1951].

The image below shows a three-dimensional model of the standard deviation ellipsoids in Brown's 1949 paper. The original image appears in the paper which can be downloaded from the Optica website. Unfortunately, the digitized version of this image is almost unrecognizable. But fortunately, I remembered having seen the image before. I found it on page 101 of Billmeyer and Saltzman, with the misleading title of "The MacAdam Ellipsoids". The moniker should be "The Brown-MacAdam Ellipsoids".

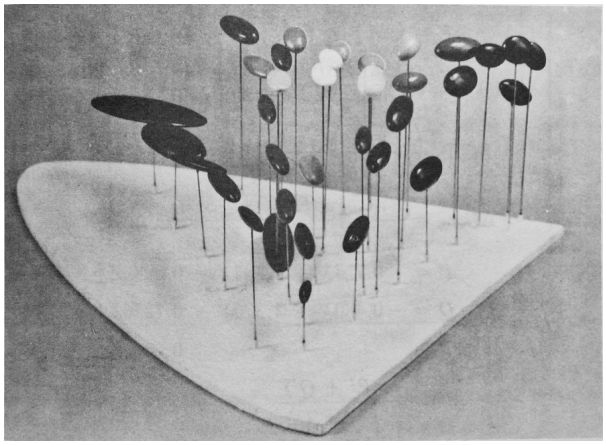


Figure 5 – The Brown-MacAdam Ellipsoids.

How are these results used today?

We have a huge set of data which was carefully derived. The data is interesting from a scientific standpoint – it helps a person understand the mechanisms in the eye that cause the nonlinearity of our sensation. There were seven papers between 1942 and 1975 that provided additional data based on this approach.

Using this data to create an equation for color difference would be very helpful for industry. This need was fulfilled by at least three sets of researchers [Davidson and Halnon *(1955)*, Simon and Goodwin *(1958)*, and Robert Foster *(1966)*].

They developed charts that would allow someone to determine the parameters of the ellipses for any color. From these parameters, it was possible to compute a color difference.
Figure 6 shows one of three such diagrams. It is a topographic plot for one of the three ellipse parameters. The color is first located in the chromaticity diagram. The nearest contour line is found, and then this contour line is traced back to an edge to get the value of the parameter, anywhere from 1 to 350.

Figure 6 was copied from a book by MacAdam that was published in 1981.

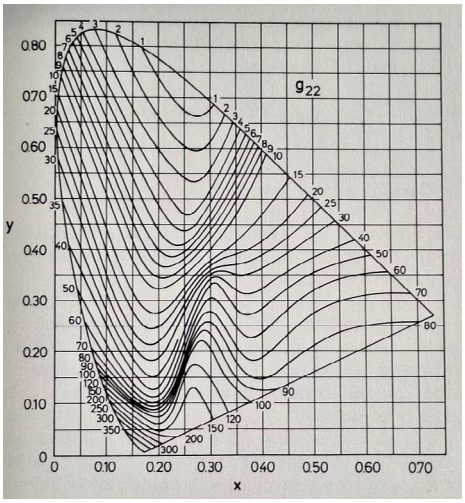


Figure 6 – One of Three Nomographs to compute a Color Difference.

Noting that the book was published five years after the development of CIELAB, one would expect that the whole chapter is about CIELAB and the associated ΔE color difference equation. I hate to disappoint the dear reader, but CIELAB gets two paragraphs in this chapter and ΔE is not mentioned in this chapter. The color difference equation does appear in the notes near the end of the book, but it is called "E (L*, a*, b*)" and is not referred to as a color difference. Oh, and those two paragraphs on CIELAB? One of them is devoted to badmouthing CIELAB. I don't want to read anything into this, but I get the feeling that MacAdam was not a big supporter of the whole CIELAB craze.

Billmeyer and Saltzman (p. 101) provide an answer to the question implied by the heading for this section. They explain that the MacAdam,

Friele and Chickering color difference equations (FMC-1 and FMC-2) were developed based on this collection of data, but:

> Despite the wide use of these equations, neither they or any others based on McAdam-type threshold data are represented in the 1976 CIE recommendations.

Why is this?

Sounds like I need to have a look at that pebble in a later issue!

Bibliography

- Billmeyer, Fred W. Jr. and Max Saltzman, Principles of Color Technology, 2nd edition, Wiley, 1981
- Brown, W.R.J., The Influence of Luminance Level on Visual Sensitivity to Color Differences, JOSA, Volume 41, Number 10, October 1951
- Brown, W.R.J. and David L. MacAdam, Visual Sensitivities to Combined Chromaticity and Luminance Differences, JOSA, Vol 39, No. 10, Oct. 1949
- Davidson, Hugh and J.J. Hanlon, Use of Charts of Rapid Calculation of Color Difference, JOSA, Vol 45, No. 8, 1955
- Debus, Allen G., Who's Who in Science, Marquis Biographical Library, 1968
- Foster, Robert, A New System of Charts for Rapid Color Difference Calculations, Color Engr., 4, No. 1, 26, 1966
- MacAdam, D. L., Visual sensitivities to color differences in daylight. Journal of the Optical Society of America, 32, 247–274, 1942
- MacAdam, D.L., Color Measurement, Theme and Variations, Springer Verlag, 1981
- Ludwik Silberstein and David L. Macadam, The Distribution of Color Matchings Around a Color Center, JOSA, Vol 35, Number 1, Jan. 1945
- Ludwik Silberstein, On Two Accessories of Three-Dimensional Colorimetry, JOSA vol. 36, No. 8, August 1946
- Seymour, John, The Color Name Conundrum, John the Math Guy blog, Jan. 30, 2019 https://johnthemathguy.blogspot.com/2019/01/the-color-name-conundrum.html
- Simon, Fred and W.J. Goodwin, Rapid Graphical Computation of Small Color Differences, Am. Dyest. Rep. 47, No. 4, 1958
- Wright, W.D., The sensitivity of the eye to small colour differences, Proceedings of the Physical Society, Vol. 53, Part 2, No. 296, March, 1941

Appendix, list of colorimetry books surveyed

- Billmeyer, Fred W. Jr. and Max Saltzman, Principles of Color Technology, 2nd edition, Wiley, 1981, p. 100
- Committee on Colorimetry, Optical Society of America, The Science of Color, Thomas Y. Crowell Company, 1953, p. 251
- Hunt, R.W.G. and M.R. Pointer, Measuring Colour, 4th edition, Wiley, 2011
- Hunter, Richard S., Richard W. Harold, The Measurement of Appearance, 2nd Edition, Wiley, 1987, p. 154
- Judd, Deane B. and Günther Wyszecki , Color in Business, Science, and Industry, 3rd edition, Wiley 1975, p. 302
- Kaiser, Peter K and Roberty M. Boynton, Human Colour Vision, 2nd edition, Optical Society of America, 1996, p. 350
- MacAdam, D.L., Color Measurement – Theme and Variations, Springer-Verlag, 1981, p. 131
- Ohta, Noboru and Alan R. Robertson, Colorimetry – Fundamentals and Applications, Wiley 2005, p. 118
- Wright, W.D., Measurement of Colour, 4th edition, Van Nostrand, 1969, p. 161
- Wyszecki, Günther and W.S. Styles, Color Science, Concepts and Methods, Quantitative Data and Formulae, 2nd edition, p. 308

Calendar 2025

March 5-6	Color Marketing Group (CMG) Virtual ChromaZone https://colormarketing.org/event/2025-chromazone-workshops-2/
March 11	Call for Papers: Optica Advanced Photonics Congress Deadline https://www.optica.org/events/congress/advanced_photonics_congress/
March 12-14	ASPRS Gulf South Region 2025 Annual Meeting Austin, TX https://my.asprs.org/ASPRSMember/Events/Event_Display.aspx?EventKey=GSAM2025
March 14	American Society for Photogrammetry and Remote Sensing ASPRS Gulf South Region 2025 Annual Meeting Austin, TX 5:00 p.m. https://my.asprs.org/ASPRSMember/Events/Event_Display.aspx?EventKey=GSAM2025
March 18	IS&T Digitizing to International Imaging Performance Standards - Virtual Meeting https://www.imaging.org/IST/Conferences/DigiTIPS/DigiTIPS2025/DigiTIPS_Home.aspx?WebsiteKey=6d978a6f-475d-46cc-bcf2-7a9e3d5f8f82&hkey=85ba7a51-c0be-491a-809d-cdec79ab2ef2&45b5d4abd064=1#45b5d4abd064
March 18-19	CMG Hybrid ChromaZone Minneapolis, MN https://colormarketing.org/event/2025-chromazone-workshops-2/
March 25	AATCC Chemical Applications Interest Group Meeting: Antimicrobial Applications with Empa 11:00 -1:30 Virtua https://www.aatcc.org/aatcc-events/chemapps032525/
March 27-28	CMG Hybrid ChromaZone Toronto, Canada https://colormarketing.org/event/2025-chromazone-workshops/
March 30 - April 3	Optical Fiber Communications OFO Conference and Exhibition San Francisco, CA https://www.ofcconference.org/en-us/home/
April	
April 24	AATCC Building a New Method Forward for PFAS in Textiles Conference, Raleigh, NC https://www.aatcc.org/aatcc-events/pfas2025/
April 24	IS&T Digitizing to International Imaging Performance Standards - Virtual Meeting https://www.imaging.org/IST/Conferences/DigiTIPS/DigiTIPS2025/DigiTIPS_Home.aspx?WebsiteKey=6d978a6f-475d-46cc-bcf2-7a9e3d5f8f82&hkey=85ba7a51-c0be-491a-809d-cdec79ab2ef2&45b5d4abd064=1#45b5d4abd064
April 24-25	ASPRS Mid-South Region Conference 2025 Hybrid/Virtual Oak Ridge, TN https://my.asprs.org/ASPRSMember/Events/Event_Display.aspx?EventKey=MIDSOUTH25
May	
May 1-2	CMG ChromaZone North America Regions 2 day Virtual Meeting https://app.glueup.com/event/virtual-chromazone-workshop-may-01-02-2025-na-marathon-127157/

May 4-8	Lightfair Las Vegas Convention Center, Las Vegas, NV https://www.ies.org/events/ies-lightfair/
May 8	UF/FL-ASPRS Spring Geospatial Workshop 2025 Apopka, FL https://my.asprs.org/ASPRSMember/Events/Event_Display.aspx?EventKey=SPRING2025
May 11-16	Society for Information Display - Display Week Exhibition San Jose, CA https://www.displayweek.org/
May 12	AATCC Committee Meetings Raleigh, NC https://www.aatcc.org/aatcc-events/research/
May 13-15	Society for Information Display - Display Week, San Jose, CA https://www.displayweek.org/
May 15	IS&T Digitizing to International Imaging Performance Standards - Virtual Meeting https://www.imaging.org/IST/Conferences/DigiTIPS/DigiTIPS2025/DigiTIPS_Home.aspx?WebsiteKey=6d978a6f-475d-46cc-bcf2-7a9e3d5f8f82&hkey=85ba7a51-c0be-491a-809d-cdec79ab2ef2&45b5d4abd064=1#45b5d4abd064
May 29	CPMA Spring Sustainability & Innovation Forum Hatfield, PA
June	
June 1-5	Optical Society of America Optica Quantum 2.0 Conference and Exhibition San Francisco, CA https://www.optica.org/events/topical_meetings/quantum/
June 16-18	ISCC Color Impact 2025 Rochester, NY https://iscc.org/Color-Impact-2025
June 24-27	IS&T Archiving 2025 Granada, Spain https://www.imaging.org/IST/IST/Conferences/Archiving/Archiving2025/Archiving2025_Home.aspx?hkey=92f0ee33-a36c-4594-be74-d70b6302df03
June 25	ASTM E12.10 Retroreflection Sheraton Centre Toronto Hotel ASTM International
July	
July 13-17	Optica Advanced Photonics Congress Marseille, France https://www.optica.org/events/congress/advanced_photonics_congress/
July 14-18	2025 NAPIM Summer Course Appalachian University Boone, NC https://www.napim.org/aws/NAPIM/pt/sd/calendar/364496/_PARENT/layout_details/false
July 20-24	ITMA 2025 Singapore Expo https://www.aatcc.org/aatcc-events/itma2025/

July 20-24	Optica Sensing Congress Hilton Long Beach Long Beach, CA https://www.optica.org/events/congress/optical_sensors_and_sensing_congress/
August	
August 21-23	Illuminating Engineering Society(IES) IES 25 The Lighting Conference Anaheim, CA https://www.ies.org/events/ies25/
September	
Sept. 4	2025 International Summit | Chromatic Connections Part One: Virtual Summit Reveal 2025 International Summit | Color Marketing Group® on Glue Up
Sept. 7-10	GIA Converge AGS Conclave X GIA Symposium Carlsbad, CA https://www.gia.edu/event/converge
Sept. 15-17	CAD RETEC Long Live Color presented by SPE Color and Appearance Division Cleveland, OH https://specad.org/2025_cadretec_homepage/
Sept. 21-24	Illuminating Engineering Society (IES) SALC Street & Area Lighting Conference New Orleans, LA https://www.ies.org/events/salc2025/
Sept. 30 - Oct. 2	CMG Chromatic Connections Dallas, TX In Person https://app.glueup.com/event/2025-international-summit-124762/
October	
Oct. 5	AATCC Fabricating the Future – AATCC & SEAMS Annual Conference, Savannah, GA https://www.aatcc.org/aatcc-events/summit/
Oct. 10-11	SCAD 2025 Annual Conference Novotel Miami Brickell Hotel, Miami, FL https://www.scadent.org/events
Oct. 20-24	AIC 2025 Taipei 16th AIC Congress https://www.aic2025.org/
Oct. 28-31	ITMA 2025 Singapore Expo https://www.aatcc.org/aatcc-events/itma2025/

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.

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