Inter-Society Color Council *News*

Issue 454 Nov-Dec 2011

A Note from the Editor

Another two months have passed and as I assemble this issue I am reminded of the small handful of regular contributors that make this publication what it is. At the risk of omitting someone, I would like to acknowledge a few people whom I have learned to count on. To start with are Mike Brill and Mark Fairchild. These two write (or edit) dedicated columns for each and every issue of *ISCC News*. They also have something else in common: they would enjoy hearing any feedback – good or bad – on their efforts. It is difficult to assess if people are interested in the columns, or if they are even being read. Why not drop them a quick note with a reaction or possibly suggestion for a future column?

People will only work for so long in a vacuum. We have some great resources in the ISCC as a whole, and helping with this newsletter in particular.

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President's Report

The plans for the ISCC/IS&T/SID meeting are looking good. By the time you read this the meeting will be over and we will have had our annual meeting for 2011. This year we were due to present our Godlove award. This we did not do as we needed more time for our search committee to do its work. We are planning to present this next year at our annual meeting in 2012. Your directors met in teleconference on Friday November 4th. We discussed the upcoming special topics meeting and our annual meeting. Cynthia Sturke our office manager has been with us for fifteen years and will be presented a special appreciation award at this meeting. We are still in the planning stage for our annual meeting for next year. At present the dates look to be some time in June, most likely it will be sometime in the week beginning 18th June 2012. We are looking at several locations in the Boston area but the most likely venue will be in Manchester New Hampshire. While not formally announced, papers submission is open; please contact one of the Interest Groups chairs for more information:

Basic and Applied Color Research
Ann Laidlaw: ALaidlaw@XRite.com

Industrial Application of Color
Jim Roberts: jim.roberts@altanachemie.com

Art Design &Psychology
OPEN (use wyble@cis.rit.edu)

We have not forgotten the email survey we have talked about in earlier newsletters but have been working hard on the wording to make you're the survey easy to take and your answers easily and clearly understood. We think this will be ready to go in the early part of December.

We are also working on the By-Laws but this is a difficult task and will most likely on be able to make progress on this in 2012.

Finally I wish you all a happy holiday season.

Frank O'Donnell, *The Sherwin Williams Company*
President, ISCC

ISCC EXECUTIVE OFFICERS

ISCC BOARD OF DIRECTORS

ISCC Member Survey

Your Board of Directors is preparing a comprehensive survey to aid in strategic planning of the future of the organization. Look for this in email or hardcopy sometime in the coming months. PLEASE take the time to thoughtfully answer the questions. We truly value and require your open and honest opinions regarding the ISCC.

LinkedIn Group – Spread the Word!

Since our last ISCC News publication the harvest in new members for our online group has been very poor. We are stagnant at just 116. In the days leading to Thanksgiving I'd like to ask to every member a favor: Please POST on your Linked-In, UPDATE your Facebook status, TWEET or EMAIL a message with this link http://linkd.in/kxTd8G for your connections to enroll and help us raise the ISCC members in 2011! Time to get viral on the web and make good use of social marketing! Thank you for your time and consideration and Happy Holidays!

Henri Debar, *IsoColor Inc, ISCC Publicity Chair*

The Color of Controversy

By Laura Beil
Published in *Science News*, August 27, 2011


Image: Suzanne Tucker/ShutterStock

When it comes to the safety of dyeing food, the one true shade is gray.

Artificial colorings have been around for decades, and for just about as long, people have questioned whether tinted food is a good idea. In the 1800s, when merchants colored their products with outright poisons, critics had a pretty good case. Today's safety questions, though, aren't nearly so black and white — and neither are the answers.

Take the conclusions reached by a recent government inquiry: Depending on your point of view, an official food advisory panel either affirmed that food dyes were safe, questioned whether they were safe enough or offered a conclusion that somehow merged the two. It was a glass of cherry Kool-Aid: half full or half empty.

The balance of this article can be read here:
`tinyurl.com/6jvj8zq`

HUE ANGLES

(Send contributions to mbrill@datacolor.com)

We know Rembrandt's painting, Aristotle contemplating the bust of Homer. Now behold Hugh Fairman's essay…

Henry Hemmendinger Contemplating a Print of M. C. Escher

In the early 1990s, Henry Hemmendinger's son got married in San Francisco. Henry was walking the streets there one afternoon when he chanced upon an art gallery that was exhibiting M. C. Escher prints. There, in a well-lit (with daylight) stair-well, he found an Escher print that he interpreted to be a daylight scene of the sun reflecting from a puddle of water. That evening he took his wife to see the exhibit. This time the daylight was missing, and the puddle print was illuminated with incandescent light. Henry was convinced that the print now depicted the moon reflecting from the puddle.

For years thereafter, Henry wondered whether Escher knew enough about spectral interaction of light with matter to be able to create something resembling a metamer between the daylight illumination of the print and the incandescent illumination of it. In the early 2000s, he became aware that John Horton Conway, an esteemed mathematician and fellow resident of Princeton, N.J., had studied Escher's tilings of the plane from a purely mathematical standpoint and had published extensively on that subject. Henry contacted Conway with his thoughts on the puddle print. Conway lent Henry all his books on Escher, and in one of those Henry identified the print he thought he had seen in San Francisco.

The print Henry identified was Escher's *Puddle*, a 1951 lithograph which was in two colors on white paper (called three-color print in the art world). It may be viewed at `globalgallery.com`: first find M. C. Escher in left-hand column (perhaps under "All artists"), then click on the *Puddle* print. The original is 9½ by 12½ inches in size. It carries Escher's Catalogue Number 175.

One can be pretty sure that Escher intended the whitish disk to be interpreted ambiguously by the viewer either as the moon or as the sun. I offer as evidence of this the following items taken as a whole:

1) On the 29th of October in 1963, Escher gave a lecture in Amsterdam in which he said:

> "If you want to focus the attention on something non-existent, then you have to try to fool yourself first and then your audience, by presenting your story in such a way that the element of impossibility is veiled, so that the superficial listener doesn't even notice it. There has to be a certain enigma in it, which does not immediately catch the eye."

2) A series of elements in the print all appear in pairs.

a) There are two bicycle tracks in the mud. One rear-tire track crosses the front track in the mud; the other rear-tire track crosses the front under the puddle in the water. One bicycle track overlaps no other object in the print; the other bicycle track intercepts a footprint.

b) There are two truck, or tractor, tire tracks in the mud. The two tracks were made at a different time from each other ; they overlap. That is, one of the truck's right tire track is inside the other's left tire track. I presume that Escher would never, under these conditions, allow both trucks to be going in the same direction. One tire tread consists of two zig-zags and two straight beads; the other of two deep, parallel treads and a single bead, imparting a duality to even the tire treads.

c) There are two human foot-print tracks in the mud, going in opposite directions. One walker wore hob-nail boots; the other wore plain soled shoes. The right footprints of both tracks contain two prints, both dry. The left footprint in each case is singular and it is water-filled in both cases.

d) There are two large trees in the foreground of the reflection and two small trees in the background of the reflection. For these trees, Escher reused trees he had drawn in 1933 in a woodcut called *Calvi, Corsica* (Escher Catalog Number 56). If the reader believes it is a stretch to cite the use of two trees each here, be informed that the 1933 print had four large trees and eight small trees. Escher must, therefore, have carefully chosen a sub-section, and the appearance of duality here must have been conscious.

e) The season is Spring or Summer; but not Fall or Winter. There are leaves on the trees.

f) Of course, mud and puddle is the ultimate duality of the print. Sometimes duality is achieved by sameness, sometimes by differentness. That is how we know that Escher intended to communicate

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(Hue Angles, continued from previous page)

duality rather than differentness, or sameness.

There are, therefore, enough occurrences of duality in the print that it is almost certain that Escher, in accordance with his lecture precept. was leading the observer to the duality, or ambiguity, of whether the orbital object was the sun or the moon. It is highly unlikely, then, that the interaction of lighting quality is causing the ambiguity. Escher has put duality in our head, and we can interpret the orb as we wish as sun or as moon.

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Hugh S. Fairman

[*I think the light helps with the duality. The sky around the orb is greenish, and will be darker (relative to the white orb) under tungsten light than under daylight. A dark sky implies night rather than day, and Moon rather than Sun. Perhaps readers can also think of other mechanisms*. MHB]

Keeping acrylic paintings clean poses big challenges

Article by Celia Henry Arnaud
Published in *Chemical & Engineering News*

With the first acrylic paintings — the medium made famous by artists like Mark Rothko, Andy Warhol, Robert Motherwell, and David Hockney — pushing 60 years of age, scientists specializing in art conservation are seeking ways to rejuvenate these paintings and keep them looking their best. That's the topic of an article in the current edition of Chemical & Engineering News, the American Chemical Society's weekly newsmagazine.

Acrylic paints were invented in the 1940s, with the first wave of acrylic paintings in museum and private collections now between 50 and 60 years of age. They quickly became an artistic mainstay, along with the familiar oil paints that have been used for centuries. One main difference: Oil paints can take weeks or month to dry. Acrylics, which are water-based, dry fast, often in hours.

Full article here (subscription required)
`tinyurl.com/3e8cofj`

COLOR research and application

Color Research and Application IN THIS ISSUE, December 2011

This issue opens with Ralph W. Pridmore discussing "Complementary Colors Theory of Color Vision: Physiology, Color Mixture, Color Constancy and Color Perception." Dr. Pridmore has been reporting on complementary colors and color constancy in numerous articles in this journal in the past few years. However, in this article he describes complementary colors' physiology and functional roles (at least 37 specific roles) in color vision in a three stage theory (receptor, opponent color, and complementary color stages). The many roles of complementary colors can be grouped into three major roles: color mixture, color constancy, and color perception. In this article, he also discusses four recent concepts in color science: relative wavelength, constant hue mechanism, interharmonics, and the direct relationships between the cones, opponent color chromatic responses, and complementary peaks/ troughs.

Our second article picks up on the theme of color constancy. In "Color Constancy, Color-mixing Ability and Color Inference" Ta-Wei Lin and Chun-Wang Sun examine whether variability in individual color-matching ability (or color-mixing ability) correlates with or predicts ability on tasks of color constancy. The authors considered three hypotheses: 1) a matching hypothesis: People achieve color constancy by remembering and applying the color surrounds' spatial locations to the target color; 2) a comparing hypothesis: People achieve color constancy by discriminating the relative differences between color surrounds; and 3) a reasoning hypothesis: People achieve color constancy by comparing the color surrounds and referring to color knowledge accumulated in the past. Through this study the authors discovered that the subject's color-mixing ability may be an important interference factor as well. Therefore, only naïve subjects of consistent color-mixing ability should be used in order to acquire more objective and reliable experimental results. The study also looked at the different types of color surrounds provided as well as the proposed hypotheses. The authors recommend the use of consistent color surrounds, in which the color surrounds' relative spatial locations remain fixed

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and the relationship between colors may be easily memorized by the subject and used to infer the original color of the target color.

Moving to other appearance attributes and how they affect color perception, in our next article Marcel Petrus Lucassen, Theo Gevers, and Arjan Gijsenij describe an experiment they conducted to measure and model how emotions change when texture is added to the color samples. In their experiments samples of increasing complexity were evaluated by observers along fours scales: Warm-Cool, Masculine-Feminine, Hard-Soft and Heavy-Light. The found that texture fully determined the response on the Hard-Soft scale and had a decreasing effect on Masculine-Feminine, Heavy-Light and Warm-Cool scales. Thus they conclude in "Texture affects color emotion" that when textured samples are used in color emotion studies, the psychological responses may be strongly affected by the texture.

We can not have all these colors that we enjoy looking at, without considering some manufacturing issues. "Paramerism and Reliable Parameric Correction" is the subject presented next. According to ASTM Standard terminology for appearance, metamerism is property of two specimens that match under a specified illuminator and to a specified observer and whose spectral reflectances or transmittances differ in the visible wavelengths. In reality most of the time, the two specimens do not match perfectly, but are very close; thus technically they are called paramers. Shahram Peyvandi and Seyed Hossein Amirshahi discuss the various methods for parameter correction in developing and correcting color formulations. They show that among the variety of techniques suggested for parameric correction, parameric decomposition using optimal process primaries is the most reliable method for correction leading to minimal errors in estimated index of metamerism. They also demonstrate that that under certain conditions the reflectance difference between match and batch can be completely recovered from its tristimulus values and then parameric decomposition method using optimal process primaries will lead to accurate estimation of metamersim index. Finally, the process primaries derived from eigenvector analysis of covariance matrix of batch spectral dataset produced by real primaries employed for matching would be the optimal statistical colorants for parameric correction of an individual color reproduction system.

Tsuei-Ju Hsieh and I-Ping Chen have studied the categorical formation of a set of Mandarin color terms on the CIE1931 chromaticity diagram across six luminance levels. They performed a study that employed 44 native Mandarin speakers to perform a force-choice sorting task and found that the hues of green, blue, purple and grey stably exist at most luminance levels, but that red, orange, yellow and pink are highly luminance-dependent. These and other details are reported in "Categorical Formation of Mandarin Color Terms at Different Luminance Levels." They also comment that the location of boundaries between blue and green are remarkably different than those in a similar study that employed Japanese speakers.

Our final article touches on a different industry. It relates to the application of color science to woods for architectural uses. Halil Turgut Sahin, Suleyman Korkut, and Candan Sahin report on the "Colour Changes of Heat Treated Woods of Red-bud Maple, European Hophornbeam and Oak." The ability to correlate color change with treatment conditions for these three wood species improves their value for outdoor uses such as landscape applications. Such ability provides a quality control indicator to predict the in-service performance of these woods based on knowledge of their heat-induced color variations.

We close this issue briefly mentioning four recent publications from the International Commission on Illumination (CIE): CIE Standard S 014-3/E:2011 Colorimetry - Part 3: CIE Tristimulus Values, CIE Standard S 017 the International Lighting Vocabulary, CIE 199 Methods for Evaluating Colour Differences in Images, and CIE Publ. 198 on Measurement Uncertainty with its supplement CIE 198-SP1 Determination of Measurement Uncertainties in Photometry Supplement 1: Modules and Examples for the Determination of Measurement Uncertainties in four parts:

CIE 198-SP1.1:2011 Part 1: Modules for the Construction of Measurement Equations. CIE 198-SP1.2:2011 Part 2: Examples for Models with Individual Inputs.

CIE 198-SP1.3:2011 Part 3: Examples for the Solving of Systems of Equations.

CIE 198-SP1.4:2011 Part 4: Examples for Models with Distributions.

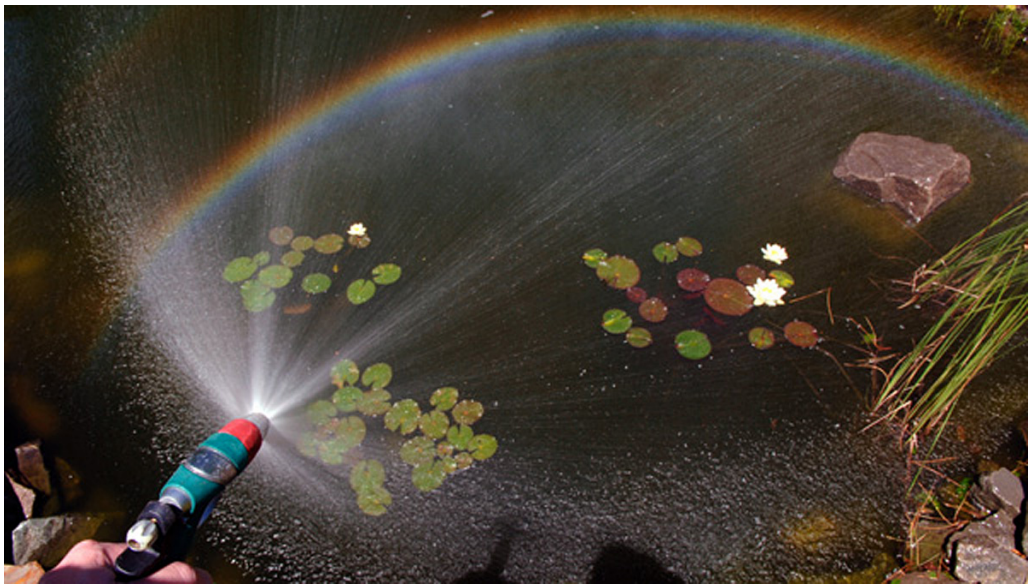
Ellen Carter
Editor Color Research and Application

Metameric Blacks: A Color Curious Column

Ever wonder ... "why is a rainbow?"

I'm feeling sunny on this crisp autumn day in upstate NY (we've had an unusually warm autumn this year .... hmm) so I thought I'd choose my module on rainbows aimed at primary schoolers for this issue of *ISCC News*.

The beautiful colors of a rainbow are perceptions, like all colors. However, the process that creates the light we see as a rainbow is actually based on some fairly simple math.



That math is what we call geometry. The light from the sun is reflected by the surface of raindrops in the sky (just like it reflects off a window or surface of a lake) and its direction also changes when it enters and leaves the raindrop. The combination of all those changes in direction means that most of the light coming out of the raindrops is at an angle of about 41-42 degrees away from the shadow of our head (or in the direction half way between your nose and your ear when you look directly away from the sun). That alone would make a bright white circle in the sky. The reason the rainbow has its colors, is that the different wavelengths of light, producing different color perceptions, are reflected back to our eyes at slightly different angles. This makes the white light of the sun smear across the sky with different colors produced as the light is smeared and then we have a beautiful rainbow to see.

You might also see that the sky inside the curve of a rainbow is always brighter than the sky outside. This is also because of the way light reflects through the raindrops. You can even see that in the rainbow I made with my garden hose in the accompanying image. Check out all the angles and the location of the shadows of my head and the spout.

You can find a more detailed explanation of rainbows at this website from Dartmouth, <tinyurl.com/65h7a3f>. And remember that rainbows are rarely seen since you need to have rain drops in the sky off in the distance in front of you and the sun low in the sky behind you; all at the same time!

Content of this column is derived from *The Color Curiosity Shop*, an interactive website allowing curious students from pre-school to grad-school to explore color and perhaps become interested in pursuing a science education along the way. Please send any comments or suggestions on either the column or the webpage to me at <*mdf@cis.rit.edu*> or use the feedback form at <*whyiscolor.org*>.

-Mark D. Fairchild

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Fossil moth reveals colorful hue

By Devin Powell
Published in *Science* News, November 5, 2011

Ancient moths have for the first time shown their true colors to modern humans.

By piecing together clues from a fossil unearthed in a former German quarry, a team of scientists has figured out how light bounced off a moth that lived 47 million years ago. Today, the insect's remains are bluish. But before time alchemized its wings, the creature was mostly yellow-green, with only a fringe of blue.

"The original colors aren't preserved, but they can be reconstructed," said Yale paleontologist Maria McNamara, who presented the new findings October 9 at the Geological Society of America annual meeting.

Like beetles and dragonflies, modern moths and butterflies owe their brilliant hues not only to chemical pigments but also to the shape of tiny structures on their wing scales. Parallel ridges redirect incoming waves of light, which bounce around and interfere with each other like ocean waves crashing together. Depending on how the peaks and troughs of the light line up, this interaction boosts some colors at the expense of others. Ridges with different shapes, sizes and spacings can give rise to a variety of colors, including iridescent colors that seem to shift and shimmer.

The balance of this article can be read here:
tinyurl.com/43bgpaz

ISCC News Issue #454 Nov/Dec 2011

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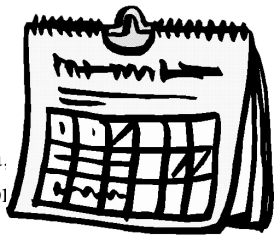
Newsletter Team
Cynthia Sturke, Mary McKnight, Mike Brill, and YOU!

All submissions must be in English. Please submit materials by the 15th of each even numbered month.

November/December 2011 Calendar

Nov 7-11	**CIC19, Society for Imaging and Technology**, San Jose, CA, www.imaging.org/IST/conferences/cic
Nov 12	**ISCC topical meeting on color spaces**, San Jose, California, (Co-located with CIC19)
Nov 14-17	**ASPRS 2011: Fall Pecora Conference,** Herndon, Virginia, www.asprs.org/pecora18/
Dec 8	**ASTM E12 Color and Appearance** Tampa Marriott Waterside; Tampa.
Dec 7-9	**AATCC Denim and Outdoor Performance Wear Symposium,** Lo www.aatcc.org/events/symposia



2012

Jan 22-26	**IS&T/SPIE Electronic Imaging Conference,** San Francisco, CA www.imaging.org/ist/conferences/ei
Feb 1 - 2	**ASTM E12 Color and Appearance** Hyatt Regency Atlanta; Atlanta, GA US. astm.org
Apr 2 – 5	**SPECAD ANTEC 2012** Orlando, FL www.specad.org
May 6 – 9	**IS&T Color in Graphics, Imaging, and Vision,** Amsterdam, the Netherlands www.imaging.org/ist/conferences/cgiv/
Jun 3 – 8	**SID Display Week**, Boston MA. www.sid.org/ConferencesExhibits.aspx
Jun 5 – 7	**Munsell Color Science Lab Industrial Short Courses**, Rochester, NY. www.cis.rit.edu/mcsl/SSC
Sep 22 – 25	**AIC Interim Meeting**, Taipei, Taiwan. "In Color We Live: Color and Environment" www.aic2012.org
Sep 28 – 29	**SCAD Meeting 2012**, W Chicago City Center Hotel, Chicago IL www.scadent.org/events/chicago-2012

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
BYK-Gardner USA	www.byk.com/instruments	301-483-6500
Datacolor	www.datacolor.com	609-895-7432
Hallmark	www.hallmark.com	816-274-5111
Hewlett-Packard Company	www.hp.com	650-857-6713
Hunter Associates Laboratory, Inc.	www.hunterlab.com	703-471-6870
IsoColor Inc.	www.isocolor.com	201-935-4494
Chester F. Carlson Center for Imaging Science	www.cis.rit.edu	585-475-5944
X-Rite Incorporated	www.xrite.com	616-803-2113

Thank You!

ISCC Member Bodies

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

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

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

American Association of Textile Chemists and Colorists (AATCC)
American Society for Testing and Materials International (ASTM)
American Society for Photogrammetry & Remote Sensing (ASPRS)
The Color Association of the United States, Inc. (CAUS)
Color Marketing Group (CMG)
Color Pigments Manufacturing Association (CPMA)
Council on Optical Radiation Measurements (CORM)
Detroit Colour Council (DCC)
Gemological Institute of America (GIA)
Illumination Engineering Society of North America (IESNA)
International Color Consortium (ICC)
National Association of Printing Ink Manufacturers (NAPIM)
Optical Society of America (OSA)
The Society for Color and Appearance in Dentistry (SCAD)
Society for Information Display (SID)
Society for Imaging Science and Technology (IS&T)
Society of Plastics Engineers Color and Appearance Division (SPE/CAD)