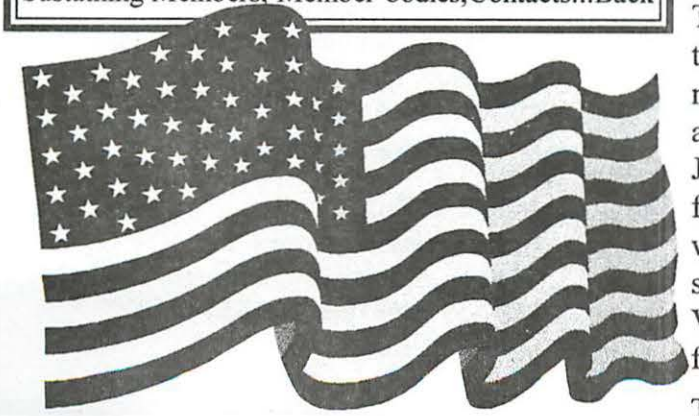
Inter-Society Color Council *News*

Issue 394

Contents



These colors won't run!

November/December 2001

ISCC/DCC Symposium on Appearance & Color

The **ISCC** will hold a joint meeting with the **Detroit Colour Council** at the Centerpoint Marriott Hotel in Pontiac, Michigan, USA, on April 20-23, 2002. All three ISCC Interest Groups will cover various aspects of **Appearance & Color.** Topics will range from the philosophical to the technical ramifications of appearance and color. **Peter Maier**, noted artist/designer, will be one of the invited speakers for Interest Group III (Art, Design and Psychology). He will detail the unique techniques he uses in producing fine art. Interest Group I (Fundamental and Applied Research), will cover the latest research in the areas of goniospectrophotometery, instrumentation and appearance measurement, while Interest Group II (Industrial Application of Color) will deal with the practical application of the various techniques involving appearance and color.

The DCC program, AutoDesign Tech II, will feature a number of prestigious speakers from automotive companies relating to the impact of Appearance and Color on Design. An update on SAE J1545 (Instrumental Color Difference Measurement for Exterior Finishes, Textiles and Colored Trim) will also be presented, followed by a panel discussion. The luncheon speaker will by Jack Lewis, Vice President and General Manager, Dupont Performance Coatings (Europe and Asia).

This highly educational symposium will go a long way in providing guidance around appearance and

ISCC Executive Officers

ISCC Board Of Directors

color tolerancing for the OEMs, insight on automotive needs/wants for styling, and updates on fundamental and applied research with regard to appearance.

For further details, please contact:

Jim Keiser, DCC/ISCC Program Coordinator
(248)-583-8345 james.r.keiser@usa.dupont.com

Jack Ladson, ISCC program co-chair
215-369-5005 jaladson@earthlink.net

Paul Tannenbaum, ISCC program co-chair
302-695-4054 paul.m.tannenbaum@usa.dupont.com

Joe Campbell, DCC program chair

CALL FOR PAPERS INTEREST GROUP I

ISCC Interest Group I, **Fundamental and Applied Color Research** is currently accepting submissions for inclusion in the joint meeting with the DCC to be held April 21-23 in Pontiac, MI.

Papers on new research that has been done in the last ten years in gloss, goniophotometmetry, goniospectrophotometmetry, retroreflection, gonioapparent materials, color measurement, color tolerancing or any other color area related to appearance are being solicited.

One-page abstracts may be submitted to either Frank O'Donnell (Chair) or Milt Hart (Vice Chair) no later than January 15, 2002. Authors of abstracts accepted for presentation will be notified by February 15, 2002. Please send your submission to:

Francis X. O'Donnell
Sherwin Williams Co.
Cleveland Technical Ctr. 601 Canal Rd
Cleveland, OH 44113
216-515-4810 fax 216-515-4694
fxodonnell@sherwin.com

Milton I. Hardt
Color Communications, Inc.
4000 W. Fillmore St., Chicago, IL 60624
773-638-1400 fax 773-638-5718
milhar@ccicolor.com

Interest Group II Call for Papers

Interest Group II, **Industrial Applications of Color** serves to present the technical challenges and solutions that industry encounters in commercial color applications. In keeping with the theme of the upcoming Annual Meeting in Detroit, Michigan being held from April 21-23, 2002.

Interest Group II is seeking papers that bridge the science of color and the coloring and measurement of various materials. The range of issues can include, but are not limited to, quality control and instrumental color measurement techniques, color tolerancing, visual and computer color matching, the relationship applications.

Please submit a one-page abstract to Britt Nordby or Craig Johnson until **January 15, 2002.** Authors of abstracts accepted for presentation will be notified by February 15, 2002.

Please send your submissions to:

Britt Nordby (Chair)
Degussa Corporation
12 Turner Place
Piscataway, NJ 08855-0365
tel: 732-981-5433
fax: 732-981-5033
britt.nordby@degussa.com

Mr. Craig Johnson (Vice-Chair)
Minolta Corporation
101 Williams Road
Ramsey, NJ 07446
tel: 301-212-9221
fax: 301-212-9611
cjohnson@minolta.com

This promises to be a meeting you will not want to miss!

Interest Group III Call For Papers

ISCC Interest Group III: **Art, Design & Psychology** is currently accepting submissions for inclusion in the joint meeting with the Detroit Colour Council to be held April 21-23 in Pontiac, MI.

The theme of this conference is APPEARANCE. Your proposal should not exceed 300 words and should be accompanied by your complete contact information as well as an indication of any specific technology needs you might require.

Deadline: January 15, 2002.

Please send your submissions to:

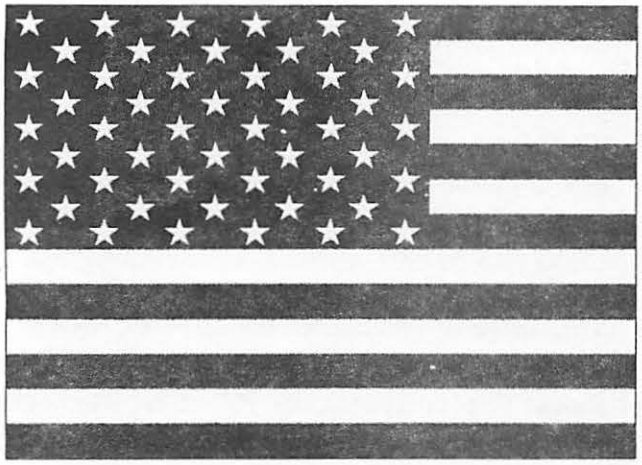
Prof. Margaret A. Miele
Department of Social Sciences
Fashion Institute of Technology
7th Avenue @ 27th Street
New York, N.Y. 10001-5992
tel: (212) 217-8449
mielemar@fitsuny.edu

STUDENT TRAVEL GRANTS

Student Travel Grants applications are now being accepted for student travel to attend the70th ISCC/DCC Joint Meeting. Two $500 Travel Grants are available. A preference will be given to those who are giving presentations or posters. For further information, please contact:

Dr. Geoffrey Rogers
Education Committee Chair
Fashion Institute of Technology
227 W 27th Street
Dept. of Science and Math
New York, NY 10001 USA
geof@matrixcolor.com

Application Deadline: March 15, 2002



Star Spangled Banner

Gultekin Celikiz, ISCC News Editor

The colonists on July 1, 1776 declared their independence from England, They stated that "**Life, Liberty and the Pursuit of Happiness**' were God given rights of all men and they named their new country the **United States of America.** A new Country would seem to need a new flag. Because of the war of independence it took almost a year for the country to decide on the flag. On June 14, 1777 members of the Continental Congress in Philadelphia, "*Resolved,* That the flag of the thirteen United States be 13 stripes alternate red and white; and that the union be thirteen stars, white in a blue field, representing a new Constellation."

A new Constellation. What did the Congress mean by a "new Constellation"?

No one seemed to know. Neither did the Congressional resolution. Why were the stars chosen? Unless we find a lost diary, a letter or some document we will never know. It is generally believed that the project for a national flag had been under consideration for some time previous to the abrupt decision.

A special committee had been appointed to prepare a design for the official seal of the new nation, and it is quite possible that the creation of a national flag had been initiated at the same time. Members of the committee included Benjamin Franklin, John Adams and Thomas Jefferson as well as Thomas Barton of Philadelphia and a noted French artist, Eugène Pierre du Simitière. Although copious reports were produced on the subject of the development of the design for the seal, there is no information on the flag. Charles Thomson, Secretary of Congress, could have shed some light on the flag design, but regrettably he saw fit to destroy the data shortly before his death.

This much we know: George Washington and two representatives from Congress appeared on Betsy Ross' doorsteps and asked her to make an American Flag according to the sketch they carried with them. The sketch was made by Francis Hopkinson. Upon Betsy Ross' suggestion the shape of the stars were changed from six to five points. Also they were also arranged the stars in a circle so that no one colony would be viewed above another.

In 1831 Captain Wm. Driver left on one of his many voyages. As the new banner opened to the ocean breeze, he is believed to exclaim, "old glory," for the American flag in the wind. Eventually Old Glory became a nickname for all American flags.

In 1791 by the admission of Vermont and Kentucky to statehood, Congress acted the second time and the Act of January 13, 1794 provided 15 stripes and 15 stars. (Now we know why the stars and stripes that hang on Fort McHenry has 15 stripes and 15 stars.)

The Act of April 4, 1818 provided 13 stripes and one star for each state to be added to the flag on the 4th of July following the admission of each new

state signed by President Monroe.

According to the Executive Order of President Taft dated June 24, 1917- established proportions of the flag and provided for arrangement of the stars in six horizontal rows of eight each a single point of each star to be upward.

Also, the Executive Order of President Eisenhower dated January 3, 1959 provided for the arrangement of the seven rows of seven stars each staggered horizontally and vertically for our 49th state of Alaska.

In addition, when Hawaii became the Fiftieth State, the Executive Order of President Eisenhower dated August 21, 1959 provided for the arrangement of the stars in the nine rows of stars staggered horizontally and eleven rows of stars staggered vertically.

Why, red, white and blue colors? The Continental Congress left no record to show why it chose the colors. However same colors were chosen in 1782 for the Great Seal of the United States and their meaning was listed as: white to mean purity and innocence, red for valor and hardiness and blue for vigilance, perseverance and justice. Whatever the future may hold for the Old Glory, the flag began its life under extraordinary conditions.

We, the people of the United States, fly our flag almost everywhere. It waves over government buildings and country stores, above national shrines and suburban malls. From the huge 90-pound, 20-by-38-foot Army garrison banner to the tiny flag clutched in a child's fist. Old Glory celebrates holidays and ordinary days. We display the flag in schoolrooms, on used-car lots, and — making personal, individual statements of pride—on lawns and front porches across 50 states.

Clearly the flag had become enshrines the country's supreme symbol, guardian of everything from apple pie to the entire human race. Patriotic organizations developed standards for usage and display of the symbol, but only in 1942 did Congress enact a national flag code. It carried no penalties for ignoring the rules.

The information in the article "Star-Spangled Banner" is obtained from the following books:

"The Stars and The Stripes: the American Flag as Art and as History from the Birth of the Republic to the Present", Boleslaw and Marie-Louise D'Otrange Mastai, Alfred A. Knopf, New York 1973.

"Star-Spangled Banner, Our Nation and Its Flag," Margaret Sedeem, The National Geographic Society, Washington, DC, book division in association with Thomasson-Grant Publishers, Inc. 1993

"Shattering An American Myth: Unfurling The History of the Stars and Stripes," Henry W. Mueller, American House, 2nd Edition, revised 1995, The publishing division of American Ltd., P.O.Box 1200, Mattituck, NY 11952

New Gordon Research Conference

Sensory coding and the natural environment: Probabilistic models of perception

June 30 - July 5, 2002
Mount Holyoke College, MA.

This conference will bring together participants from many disciplines to discuss the statistical structure of natural sensory stimuli, and how biological systems may use these statistics to process natural signals. The meeting grew out of a smaller workshop and will cover similar topics:

From 1997: www.klab.caltech.edu/~pam/nssmeeting
From 2000:www.klab.caltech.edu/~pam/nss2000.html

As the date approaches, details and applications will be available on the GRC website: (http://www.grc.uri.edu). Until then, please mark the date on your calendars.

Pam Reinagel and Bruno Olshausen
Co-Chairs, 2002 GRC

Book Review

Color Studies, Edith Anderson Feisner, 2001 Fairchild Publications, Inc., New York $52.00

Color Studies by Edith Anderson Feisner is both an ambitious and beautiful book. Drawing from the likes of Chevreul, Albers and Birren, she has organized an extensive body of material on color, color theory and color application into a coherent format that lends itself quite readily to a one-semester introductory course. The fourteen chapters are subsumed under four main sections; *Color Foundations, Dimensions of Color, Color in Compositions* and *The Influence of Color.*

Part I, *Color Foundations,* attempts to cover a wide range of basic material from human physiology to color history and theory to color systems and coloring agents. Because such a diverse body of information is addressed, some topics are covered more horoughly than others. For a class such as mine, on the Psychology of Color, both the historical and the physiological components required supplementation. Alternatively, other material, like that on color systems was so well covered that it needed little addition or clarification.

Part II, *Dimensions of Color* would seem primarily to have been written for those in a Fine Arts program. *Dimensions of Color* covers the four components of color: hue, value, intensity and temperature. Each of these components is covered quite comprehensively. While many examples and illustrations are given, they almost exclusively relate to the principles of painting. My students, who are predominately from the advertising, packaging and graphics design fields, needed to be shown how the salient points translate into their respective concerns. The graphics in this section are excellent. Not only do they beautifully illustrate the text material, they are useful in demonstrating a number of principles of human perception, such as simultaneous contrast and just-noticeable difference.

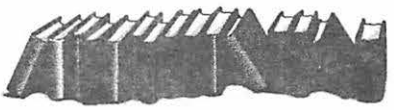
Part III, *Color In Compositions*, like the first section combines the principles of design with the science of human psychology and physiology. There is better integration of these two purposes here than there is in Part I. The examples are less dependent on fine art and incorporate the interests of the photographer and the graphic artist quite nicely. I especially found the chapter on lighting and lighting effects to be informative. Once again, the illustrations are right on-the-mark.

Part IV, *The Influence Of Color*, combines color symbolism and meaning with application. It combines a discussion of both the past and the present. Rather than offering an in-depth explanation of this subject matter, the author gives mention to a wide range of social arenas and professional pursuits. This allows the teacher to tailor class discussion and activity to best suit the needs of the member students. It affords the student an opportunity to glimpse aspects of color and its application perhaps otherwise unrecognized. The benefit is two-fold. They can develop an appreciation for color work outside their own and they might identify a newfound area of interest.

The text concludes with five appendices (three of these pertain to coloring agents), a glossary, a bibliography and an index all of which are useful to both teacher and student. An Instructor's Manual is also available. Like the text, the suggested exercises involve a great many fine arts activities. ***Color Studies*** is a good choice for those with only a very limited formal knowledge of color. It is easily understood and very well illustrated. It provides a sound introduction to color education.

Prof. Margaret A. Miele
Asst. Chairperson, Social Sciences Department
Fashion Institute of Technology, New York

Book Review



Jozef B. Cohen, *Visual Color and Color Mixture: The Fundamental Color Space*, University of Illinois Press, Urbana, (2001). Hardcover, 218 pp. $39.95

"This book was to be Jozef Cohen's magnum opus." So says the fascinating biography of the author in the front pages of the book. Unfortunately, Professor Cohen died in 1995 before he could see his work completed and published. With the urging and guidance of his wife, a special group of people came together with the effort that resulted in the ultimate publication of this interesting, informative, and important work. It is particularly appropriate to review Cohen's book in *ISCC News* since the end result is ripe with links to the ISCC. For example Jozef Cohen received the 1992 Macbeth Award for his work on matrix **R**, the overriding theme of this book. Several active ISCC members and officers were among the group that helped create the final book. For example, Hugh Fairman made several contributions to both the technical content and the manuscript prior to the author's death. Rolf Kuehni wrote the forward that nicely sets the historical context of this work. And Michael Brill wrote the introduction that frames the conceptual context of the book in terms of color science. I also have my own fond memories of Jozef Cohen and Matrix **R**. In 1986, the *Matrix **R** Conference* was held at RIT. At that time, my professional experience in color science and teaching was still measured in terms of weeks and it was a wonderful experience for me. I recall vividly Cohen's enthusiastic and meticulous presentation of his work and a discussion I had with him after the meeting in which we pondered what deeper meaning might lie within matrix **R**. I was delighted to be given the opportunity to rekindle those memories by reviewing this book and am happy to report that the book far exceeded my expectations. It is far more than documentation of the mathematics of matrix **R** and succeeded in inspiring me to once again ponder deeper meanings and look back upon what has been done with Cohen's techniques in the past 15 years. I sincerely thank Professor Cohen and the group that brought this book to life for their dedication to the project and hope that others can find the time to ponder some of the wonderful bits of information and intriguing questions presented in this book.

A nice summary of the content and importance of this book is provided in Mike Brill's introduction. Since I doubt I could come up with a better summary, I will simply quote it directly.

> *Although the algebra of color matching has been well understood for more than a century, Cohen's picture of it has been particularly thought provoking and attractive to a fairly wide audience. Before matrix **R**, the matching of metameric lights was represented by mapping their spectral power distributions to one point in a three-dimensional space of tristimulus values (the precursors of perceived colors). But spectral curves and points in 3-space evoke very different pictures. Cohen's method merged these two pictures into one: matching spectral power distributions of lights are mapped to a single spectrum, called a fundamental metamer, which is a sum of the color-matching functions weighted by three coefficients (with appropriate units). Matrix **R**, computed from the color-matching functions, performs this mapping from one spectrum to another.*

In terms of colorimetry, what Cohen's technique accomplishes is to transform the traditional equivalence statement in which a color is said "to be matched by" specified amounts of various primaries to a true mathematical equation in which the fundamental spectra of the three primary lights can actually be added to quantitatively produce the fundamental spectrum of the matched color. (See Eq. 6.4 on

p. 30.) This is no small accomplishment and brings a much higher level of mathematical rigor to the algebra of color matching that is the fundamental basis of colorimetry.

Given the topic, one might expect a book that reads like a calculus textbook and I must admit that was what I was expecting. Considering the author, I should have known better and I was indeed pleasantly surprised to find this book very enjoyable and easy to read. The style is unique and ripe with meaningful content in seemingly simple statements. A few quotes from the book serve to illustrate this style. On the bottom of page 2 in chapter 1 on notation, Cohen succinctly puts chromaticity coordinates in the place that many of us in the field of color science feel they belong. I found great joy in reading "chromaticity coordinates are completely foreign and meaningless in this work." There really is no better way to state it and no need for more words. On pages 51 and 52, Cohen brilliantly describes metamerism as follows.

> *Momentarily, give an anthropomorphic interpretation to the color processing mechanism, burdened with serious maledictions. The color processing mechanism has only three "channels" and can only transmit three dimensions of an incoming k-dimensional color stimulus. The long-suffering color processing mechanism, knowing that full transmission is far beyond its capabilities suffers massive anxiety attacks. Given it's deficiencies, the mechanism transmits only a selected portion of the stimulus, representing the maximum possible information. As reported in Cohen (1988), the color processing mechanism does its level best.*
>
> *The best, however is not good enough and penalties are exacted. The penalty is the occurrence of metamers, where the identical fundamental is extracted from two very different radiometric functions. The color sensation evoked by one metamer is precisely identical to the color sensation evoked by another, although their radiometric functions are very different; one metamer may be substituted for the other in the additive compounding of any color stimulus. Metamers occur because some information, the residual, is ignored and lost. Metamers represent failures of the color processing mechanism, where it gives identical interpretations to vastly dissimilar stimuli, and so fails to differentiate among stimuli belonging to the same metameric suite.*
>
> *These deficiencies have been exploited. Indeed, if the visual system completely processed every radiometric function to evoke a different color sensation, then contemporary color printing, color photography, and color television would be virtually nonexistent. Modern color reproduction is essentially the generation of new color stimuli metameric to the original color stimulus.*

Amen.

Cohen's book consists of 16 chapters, 3 appendices with BASIC code, and an extensive reference section. A sampling of the chapter titles helps describe the book and illustrate the point that this book is much more than mathematics. Chapters include:

Contemporary Psychophysical Constructs in Colorimetry
The Newtonian Doctrine and Trichromacy
The Electromagnetic Spectrum
The Wyszecki Hypothesis
Mathematical Properties of Matrix **R**
Linear Transformation of Color Stimuli, and
A Synthesis of Color Theories by Matrix-**R** Operations

among many others. As can be seen from these chapter titles, Cohen has included significant background material and very interesting treatments on various aspects of the history of color science. Pleasant discoveries within the book included nice reviews of the history of Grassmann's laws and the various concepts of complementary colors. I also particularly enjoyed Cohen's mini-biographies of many of color science's historical figures. Again, a direct quote from page 112 serves to illustrate the style and content of these historical sections. "After conveniently forgetting that he had read about colored shadows in Joseph Priestley's *History of Optics* (1772), Rumford (1870-1875) rediscovered the phenomenon." Cohen's book is also full of fascinating tidbits of historical trivia. For example some points that I became aware of from this book include that Wilhelm Ostwald was the Nobel laureate for chemistry who also coined the word metamerism in 1919, the scalar product (important in matrix algebra) was defined by Hermann Grassmann (of Grassmann's laws of additive color mixture), and that another Nobel laureate ,Erwin Schrödinger (who wrote a few equations of his own), was responsible for defining a line specifying theoretical color stimuli lacking all brightness and coining the term *alychne* for this line (important in the construction of CIE XYZ tristimulus values).

Cohen's book is very sound technically and provides good fundamental insight into the mathematics of color matching. It is only slightly marred by occasional minor technical mistakes that should not be allowed to detract from book's main thesis since they are off the main point. For example, on page 92, it is stated that the NTSC system results in color shimmering on television displays due to correlation of the primaries. It is the encoding scheme, rather than the color of the primaries that causes such artifacts. On page 148 the terms brightness and lightness are deemed to be interchangeable; something that \often causes difficulty when attempts are made to describe color appearance with color matching data. There are occasional other minor comments on technology that are insightful even if their technical details are a bit inaccurate. These are minor problems with the book, but of the sort that might cause some readers to discount the more important points made. That would be a mistake in this case.

In essence, Cohen's book defines "spectral colorimetry" in a sense where the math is more rigorous than just the equivalency of tristimulus colorimetry. This construct of spectral colorimetry has proven useful in a variety of applications and is likely to continue to be of use in future applications (*e.g.*, spectral image reproduction). Even if you were not to find a personal application of matrix **R**, reading this book will certainly solidify your understanding of visual color matching, tristimulus values, metamerism and other concepts of basic colorimetry. It will also provide you with some fascinating historical insights. In the field of colorimetry, you might look to a text like the recent 3rd Edition of *Billmeyer and Saltzman's Principles of Color Technology* by Berns as a guide for studies of applied colorimetry. Similarly, Cohen's *Visual Color and Color Mixture* would be a guide for studies of theoretical colorimetry.

The final chapter of the book aims to synthesize a variety of color theories by matrix-**R** operations. Cohen's success in achieving this lofty goal is arguable, but there is no question he presents some interesting ideas for consideration in this chapter. Unfortunately, the chapter seems somewhat incomplete and is a very abrupt ending to the book. (Indeed, Mike Brill's introduction mentions that Cohen intended there to be two more chapters that were never completed). The spirit of the final chapter is captured nicely in the following quote.

> *After the CIE's adoption of the 1931 standard observer, it became fashionable to write a 3 x 3 matrix that would transform the color-matching data labeled X,Y,Z to the color-matching data of this or that color theory. Researchers proposed, arguably, that this personally designated triplet of color-matching functions was "best" because the triplet also helped to predict other aspects of color vision – as after-images, color contrast, color blindness of various categories, and so forth. Because an infinite number of*

transformations were possible, in principle, a distinct color theory was available to every person on earth.

One doesn't have to look far in the current color science literature to see the rapid rate at which color theories (and their accompanying 3 x 3 matrices) are being developed in order to keep pace with the earth's growing population. Cohen clearly envisioned more fundamental descriptions of color matching, the seeds of which are planted throughout this book.

A clear and succinct presentation of the derivation, form, and application of matrix **R** would make this book worthwhile for many to own and study. All of the added historical insights make it into a wonderful little book on the theory and development of basic colorimetry that should be considered a must read for anyone doing serious research or development in color science or anyone who simply has an intellectual curiosity about the difficulties of measuring a perception. I picked up this book expecting an interesting mathematical treatment, but in addition found a very enjoyable read with many pleasant surprises.

Mark D. Fairchild
RIT Munsell Color Science Laboratory

Congratulations to Mark and Lisa. Elizabeth Reniff Fairchild was born on September 18, 2001, weighing 7lbs. 14oz, 21.5 inches long.

The proud parents, Mark and Lisa and big sister, Acadia, are all doing well.

COLOR RESEARCH AND APPLICATION

In This Issue, October 2001

October 26, 2001 is the hundredth anniversary of the death of Arthur Peter König. Thus Rolf Kuehni leads off this issue with a Talking about Color column entitled "The Remarkable Arthur König." König was the protégé of Hermann von Helmholtz. This created the happy circumstance of having the right person present at the right place at the right time to be able to produce a series of measurements of the human color vision system that were seminal for the development of color science in the twentieth century.

This issue has the theme of Color Difference. One of the new developments of the twenty-first century is "The Development of the CIE 2000 Colour-Difference Formula: CIEDE2000." In this lead article M. R. Luo, G. Cui, and and B. Rigg describe the optimization of the lightness, chroma and hue weighting functions. They also discuss the interaction between the hue and chroma parameters that combine to make the newest color-difference formula, which was approved by the CIE this May.

In the next article, Claudio Oleari examines three main aspects of color-space metrics. He looks at the distinction between small and large color differences, the relation between space metrics and color-difference formulae, and the color scale comparison between the two and ten degree CIE observers. One key to his analysis in "Comparisons between Color-Space Scales and Uniform-Color-Scale Atlases and Color-Difference Formulae" is the transformation of the L, g, and j of the OSA-UCS to Y, x, and y of the CIE 10 degree observer.

Generally color-difference metrics are developed for use with small color differences, less than about 5 CIELAB units. Historically they have taken one of two courses using either color-matching perceptibility data or tolerance acceptability data. Fernando Carreño and Jesús Manuel Zoido have been studying the nature of color-matching data. They have previously shown that the probability density functions of color matches are not normally distributed in chromaticity space and that the functions are asymmetric. In the next article these two authors examine "The Influence of Luminance on Color-Difference Thresholds." They find that the lower the luminance the more asymmetric the probability density distribution function, i.e., the less well an ellipse fits the

matching data. Thus they conclude that it is particularly important to have a lightness-dependence correction in color-difference metrics.

Color-difference metrics are used often for situations where the differences are larger than 5 CIELAB units. Our next two articles deal with somewhat larger color differences than the traditional small color difference. Dong-Ho Kim, Eun Kyoung Cho, and Jae Pil Kim have developed a new medium-to-large color-difference data set, with the mean color difference 8.5 CIELAB units. With this new set of data the authors test six of the recent color difference metrics (but not CIEDE2000). In "Evaluation of CIELAB-Based Colour Difference Formulae Using a New Data Set" they report that the LCD (Leeds Colour Difference) gave the best performance.

In the second article, John H. Xin, Chuen Chuen Lam, and M. Ronnier Luo use a textile dataset with an average color difference of about 5.0 CIELAB units to investigate parametric effects. In "Investigation of Parametric Effects Using Medium Colour Difference Pairs" the viewing parameters studied include sample separation, sample size and background color. The authors report results that clearly indicate the crispening effect.

In the next article Rolf G. Kuehni examines classical color matching error data in L, M, S cone space. His purpose is to reveal the parts of color space where small and large color difference data agree and those areas where they diverge. The results reported in "From Color Matching Error to Large Color Differences" can be explained as an overlay of a crispening effect on the basic global increment function revealed in the Munsell and OSA-UCS data according to Kuehni.

Our last two articles of this issue are studies that involved "Colour Difference Evaluation Using CRT Colours." Originally the color perceptibility data was developed using a visual colorimeter, later many of the color acceptability studies involved sets of real color samples. However, it is difficult to produce specimens exhibiting the desired size of difference in all directions of color space from a specific color center. Thus, more recently researchers have turned to colors produces on CRT monitors. In "Part I – Data Gathering and Testing Colour Difference Formulae" by Guihua Cui, M. Ronnier Luo, Bryan Rigg, and Wei Li describe how the colors were produced, the sets of data collected. Then they look at the various color-difference metrics. In "Part I I–Parametric Effects" the same authors examine the effects of different viewing parameters. The viewing parameters include: sample size, background color (8 different colors or lightness levels), frame, gap width between the sample pair, and color in the gap. The purpose of the experiments was to find which situation agreed best with observations of surface colors.

Sadly we close with a farewell to Heinz Terstiege, who died in April.

Ellen Carter
CR&A, Editor

COLOR RESEARCH AND APPLICATION
In This Issue, December 2001

In 1997, the Commission Internationale de L'Éclairage (CIE) Division 1 on vision and color recommended an interim color appearance model – simple version (called CIECAM97s). This model was a combination of parts of many of the current models under study at the time. Since then technical committees of CIE Division 8 on color imaging have been studying the application of this model to device-independent color imaging applications. By focusing many researchers on to the application of one model, much has been learned about color appearance modeling. In the first article of this issue, Mark D. Fairchild incorporates several previously proposed enhancements of CIECAM97s and a few new suggestions into a "Revision of CIECAM97s for Practical Applications."

Before Division 8 was formed, CIE Division 1 began a project TC 1-27 Specification of Color Appearance for Reflective Media and Self-Luminous Display Comparisons. The work of this committee turned out to be strongly related to projects in Division 8 while using the work of CIE TC 1-34 on color appearance models. This relationship between the work of the two Division 1 technical committees and the work of Division 8 can be seen in our next article, which reports on research conducted for TC 1-27. In "Investigation of Colour Appearance Models for Illumination Changes across Media," Suchitra Suseprasan, M. Ronnier Luo, and Peter A. Rhodes report on an experiment to assess color models' performances in terms of color fidelity between displayed (i.e., soft copy) and printed (i.e., hard copy) images.

In another article that compared hard copy and soft copy images, Ákos Borbély and János Schanda examined

"The Usability of the CIE Colour-Matching Functions in the Case of CRT Monitors." While they found observer variability in making matches, they did not find a major difference between the tristimulus data of the hard copy and soft copy presentations that would indicate errors in the CIE color matching functions. They also examined the measurement accuracy, quantization errors of the monitor and the accuracy achieved in color matching.

Our final article in the area of imaging is "Colour-Imager Characterization by Parametric Fitting of Sensor Responses." This article describes a novel method for characterizing the colorimetric and photometric properties of a 3-channel color-imaging device, such as color cameras or scanners. Mitch Thomson and Stephen Westland detail an application of this technique in which a CCD camera is characterized using only the Macbeth Color Checker and a number of artificial illuminants. While the characterization is important in itself, it has additional uses. Characterization provides the information necessary to define the set of colors that are perfectly reproducible by the imager, and also allows the application of algorithms for recovering illuminant information.

People seem drawn to use one-dimensional, scales to describe phenomena wherever possible. An example of this is describing the color of a source color by using the term "correlated color temperature". Even though the concept of describing a source's or illuminant's color in terms of the temperature of a black body having the same color seems do have been developed nearly a century ago, and the *International Lighting Vocabulary* has a very specific definition for correlated color temperature, questions remain. Should the calculations for correlated color temperature be done on the traditional u,v-diagram or using a more equidistant color space such as CIELUV or CIELAB color spaces? Two of our earlier authors, Ákos Borbély and János Schanda, join with a third author, Árpád Sámson, to discuss "The Concept of Correlated Colour Temperature Revisited." After describing their visual experiments, they recommend changing to definition of correlated color temperature to be strictly a mathematical definition and dropping any reference to visual investigations.

When examining a pair of adjacent samples it is easy to judge whether they are equal or not because the human visual system is very good at detecting small color differences. When the samples are not viewed at the same time, memory plays a role. Results can vary by a number of factors. M. D. de Fez, P. Capilla, M. J. Loque, J. Pérez-Carpinell & J. C. del Pozo have observed a tendency by observers to select more colorful colors than the original ones both when they use simultaneous matching and when they use memory matching of target colors under different illuminants. In their article, "Asymmetric Colour Matching: Memory Matching Versus Simultaneous Matching," these researchers compared corresponding pairs obtained by simultaneous matching and by memory matching using samples from the Munsell Atlas. They found best matches occurs along the red-green axis and the worst matches lie along the blue-yellow axis.

When we look around us, we view objects, and some say, we determine their shape and extent by their color. We also make a number of other determinations such as the material's composition. Most of these determinations are made unconsciously from the characteristics of the light reflected from the object. In the next article,

"Visual Perception of Texture of Textiles, Wonjung Lee and Masako Sato report on the investigation of the mechanism of texture perception by use of textile fabrics in order to model surfaces of objects. This is important not only for understanding human perception, but also for realistic image simulation on elctronic displays for design and graphics.

For our Color Forum this month, we have an article by C. J. Hawkyard and C. de M Bezerra on the "Spectral Power Distributions for the CIE Stimuli." The authors remind us about the development of the CIE system of colorimetry and the reference stimuli X, Y, and Z that lie outside the area bounded by the spectrum locus and the purple line. These stimuli are not realizable as light sources and the CIE have not specified their spectral power distributions. In this article, two possible sets of spectral power distributions have been calculated by different methods. They are compared and contrasted, and some of their uses discussed.

We end the issue with a review of John Cage's book, *Colour and Culture: Practice and Meaning from Antiquity to Abstraction.* The review is written by Christopher Willard. Three publications are briefly mentioned: *The Fred W. Billmeyer Color Science Collection, Color Vision from Genes to Perception* and *Color and Light in Nature, 2nd Ed.* Finally since this is the last issue of the year 2001, we have the annual index.

Ellen Carter
CR&A, Editor

DCC Holds Fall Meeting

The Detroit Colour Council held its fall meeting on November 7 at the Marriott Centerpoint Hotel in Pontiac, Michigan, the site of next year's joint ISCC/DCC joint meeting. Following an excellent dinner, President Kathy Loftus introduced the slate of officers and directors for 2002:

Officers:
Terese Schroeder, President
Daimler Chrysler Design
James King, Vice-President
DuPont Performance Coatings
Brian Rausch, Treasurer
Honda of America Mfg
Christine Vincent, Bd Secretary
GE Plastics
Kathy Loftus , Past President
Collins & Aikman

Directors:
James Hall
General Motors
James Keiser
DuPont Performance Coatings
Lisa Nicol
Ford Motor Company
Wendy Lorenzen
BASF Colorants
Larry DePaoli
Uniform Color Company
Gabriel Gabriel
United Paint
Michael Henry
PPG Industries

Our speaker for the evening was Gary Jepsen of DuPont Performance Coatings, who addressed the topic ,"New Developments in Predicting Coatings Performance". Gary described the DuPont Herberts Fingerprint System, a unique combination of precision paint application/measurement/interpretation which allows the coatings formulator to conduct a rapid laboratory assessment of the application properties and process suitability of coatings. It is a useful tool for the development of coatings , analysis and optimization of the application process, and troubleshooting plant problems. It provides high quality reproducible data which can serve as a basis for meaningful and objective dialogue between the coatings supplier and the customer/applicator. Originally developed by a consortium of paint suppliers and auto companies in Europe, the Fingerprint System is already in commercial use there and it is now coming into use in North America as well. Gary included several practical examples of how the system worked to predict the performance of actual paint colors. His presentation was well-received and he answered many questions about his experiences with this system.

DCC programs for 2002 are currently under development. In February our speaker will be George Moon of George Moon Design, retired Design Executive at General Motors, who will discuss Trends in Automotive Interior Design". Our April program is the ISCC/DCC joint meeting on the themes "'Appearance and Color" and "Auto Design Tech II". In September we will offer a panel discussion meeting "Will It Last? - Speed to Market versus Risk-Free Product Introduction", and in November we hope to hear from Dr. Allen Rodrigues on the status of the new SAE J1545 standard for color tolerancing.

The DCC has launched a new website at <www.detroitcc.org>. Visit us to find out what's new and for updates on our upcoming programs.

James G. King ISCC Board Liaison

Colorful Tidbits and Teasers from the Office

Simplify this statement, and you will find a wise and "colorful" saying: A totality of numerous objects that coruscate or are refulgent are not necessarily composed entirely of auriferous substances.

All that glitters is not gold.

Only one color, but not one size, Stuck at the bottom, yet easily flies. Present in sun, but not in rain, Doing no harm, and feeling no pain. What is it?

A Shadow

What is red and bad for your teeth?

A brick. (Feel free to groan!)

The Society for Imaging Science and Technology

IS&T's Conference Response

NIP17-Digital Printing Conference Happens!!

All over the US companies, associations, and other groups canceled meetings in the weeks following September 11. With NIP17, IS&T's annual conference on Digital Printing Technologies, scheduled to begin on September 30, IS&T had to make the decision quickly: go ahead with the meeting.

Lives, businesses, the livelihoods of so many people were affected by the events of September 11. . . it was difficult for anyone to feel they were in control. What the leadership, the staff, and many volunteers did to make the meeting happen is worth of reporting.

Would the hotel work with us and waive attrition penalties?
Would we be able to hold the program together?
Would the exhibitors come?
Would the tutorial instructors come to teach their courses?
Would the plan to record presentations work?
Would we have a meeting?
Would anyone come?

YES! YES! YES! YES! YES! Though there were some canceled papers, 77% (136 oral papers and 20 posters) were presented, and 121 papers were recorded for presentations over the web. The teamwork, and cooperation of the NIP17 committee, volunteers to read papers, to help with recording, the tutorial instructors, the exhibitors, the session chairs (those who worked on the meeting all year, and those who stepped in at the last minute), all the authors — those who came to Ft. Lauderdale to present their papers, and those who sent their presentations in to be read — made NIP17 a truly memorable meeting. Registration report showed 509 pre-registered for NIP17; only two exhibitors canceled their booths.

VIRTUAL NIP17...So, now the newest IS&T meeting is on the web: Virtual NIP17. 125 oral apers presented in Ft. Lauderdale are available with audio and slides. Seven of the tutorials presented at NIP17 are available. IS&T is offering the content of the NIP17 meeting to those who canceled their attendance in Ft. Lauderdale, as well as to those who, for one reason or another were not able to register for the meeting this year.

What Color is Kindness?

September 12th, a day after the tragic events in New York and Washington, D.C. as I was driving home to Virginia from New England (my flight was cancelled), I was surprised to find the major highway drivers remarkably different. "No, you go first...." seemed to prevail, which doesn't usually happen. The toll booth personnel seemed to be filled with a smile and a thank you. Color them courteous, warm and personable.

The bridges and overpasses were filled with red, white and blue flags and banners, and waving and smiling pedestrians. Color them all supportive.

This past week my car died in the parking lot. Before I could even call the garage, a gentleman came over and offered to help if only I would pop the hood. While he cleaned a corroded battery terminal, a woman came over and offered the use of her jumper cables. By the time she returned with the cables, another man drove over and asked if I needed to use his car to jump mine. Unbelievable! Within a minute of my unexpected trouble, three good samaritans were helping me on my way. I would color them with many gentle colors, and I would color them with kindness.

So what color is kindness? A combination of red, white and blue might be appropriate. As ambiguous as these times are, it seems that people have "stopped to smell the roses" and are taking care of their fellow man. Perhaps the good that has come out of all this is a general step back from our busy lives to look at what is really important in life.

It isn't what we don't have, but what we do have - family, friends, faith and freedom.

God Bless America - and each other.

Cynthia J. Sturke, ISCC Office Manager

9th Color Imaging Conference

Color Science and Engineering: Systems, Technologies, Applications

November 6-9, 2001 Scottsdale, AZ USA

As usual, this was a comprehensive overview of the state of the art in color technology. There were 12 tutorial sessions, each lasting 2 hours on the first day, 11 technical sessions spread over the next three days and three keynote presentations, one each day during the technical sessions. There were 60 total papers, 28 oral presentations and 32 interactive and poster presentations. The quality of the presentations remains higher than average for technical and trade conferences. As a result of current economic and political conditions, attendance was down about 40% over last year.

The 12 tutorials included: Fundamental Treasures of Color (Marguerite Doyle, Lexmark International), Color Appearance Modeling and CIECAM97s (Mark D. Fairchild, Rochester Institute of Technology), Visible Spectrum Imaging, (Roy S. Berns, Rochester Institute of Technology), Image Processing Tools (Chris Cox, Adobe Systems Incorporated), Color Imaging Standards, (Rob Buckley, Xerox Architecture Center), Colorsync Framework And Workflows, (Steve Swen, Apple Computer), Color in Electronic Displays (Gabriel Marcu, Apple Computer), Spatial Color - Vision, Devices and Imaging (Lindsay MacDonald, Univ. of Derby), Digital Still Camera Systems (Michael A. Kriss, Sharp Laboratories of America), Color Management: The Basics (James C. King, Adobe Systems), Web Color Management (Michael Kieran, E-Color), and Mechanisms and Microstructures of Color Imaging Systems (John J. McCann and Mary A. McCann, McCann Imaging).

If there was one over riding theme that could be extracted from the submissions it would be that this was the year of "Multi-spectral Imaging". Many of the papers and tutorials focused on issues related to capturing, processing and reproducing images with more than three degrees of freedom. This meant cameras that could record images at six or more wavelengths and print the image with six or more inks to obtain a "least metameric" or "greatest gamut" reproduction. Two oral sessions were dedicated to Spectral Image Analysis and contained papers that were both theoretical and experimental. The major players here were the RIT Munsell Color Science Laboratory from the USA, The Colour Imaging Institute of Derby University from the United Kingdom and Chiba University from Japan. The theory papers dealt primarily with mapping the 31 or more true spectral to a smaller number of channels and basis vectors. The experimental papers dealt with selecting and applying various filter combinations for measurement of art works, skin tones, and other critical scenes. One of the most interesting papers was a challenge to one of the keynote papers from last year's conference. In that keynote Dr. R. W. G. Hunt suggested that the color fidelity in web-based commerce that to be confident, a consumer needed to order a physical swatch from the manufacturer rather than rely on computer images. Mitch Rosen accepted the challenge and demonstrated that he could take a 6 primary, 720 dpi spectral image and CYMKOG ink jet printer and compared the prints to an actual textile swatch. The images were metameric but looked pretty good for a first attempt. The proposal was to develop an ICC like spectral profile that would be an optimized 6 primary home user printer.

Other highlights included a demonstration of the IBM ultra high resolution and ultra bright flat panel display. This display has more than 3800 x 2400 pixels and a brightness of 230 cd/m2 . There was also two review papers on the application of the Texas Instrument DLP projectors to digital video projection. Thus setting the stage for eventual replacement of traditional wide format film distribution to local theaters with digital downloading with buffering of the films directly to the theater from the distributor. Even though there is work going on to mosaic multiple projectors to form one large image - reports at this conference show that there is still some way to go. Companies like Microsoft, Xerox and Kodak are clearly intending to be a part of this cultural paradigm shift.

Clearly absent from the conference were the usual

handful of papers on new achievements in color printing technologies or in color profiling of input and output devices. There was one interactive presentation comparing and contrasting the RIMM/ ROMM and wide gamut Adobe RGB to the newer e-sRGB method. In contrast, Chengwu Gui of Lexmark International, gave a thorough if somewhat overly detailed description of why one has difficulty getting good color to project from an overhead transparency. Interestingly, he had to correct an introductory remark in his written paper indicating that the use of overhead transparencies was growing, after noting that during the three days of the conference only two overhead transparencies has been shown to the audience. The rest of the presentations were either Powerpoint™ computer slide shows or 35mm slide projections.

Color appearance models and especially chromatic adaptation transforms filled a number of papers again this year. Two papers particularly stood out here. One, a poster given by Anthony Calabria of the RIT Munsell Color Science Lab, compared the results of the CIECAM97s color appearance model while changing to various of the proposed color adaptation transforms. Using the best available visual data sets, his results showed that it did not seem to matter what CAT was used, as long as something was used. The next day Sabine Süsstrunk of the Laboratory for Audiovisual Communication of the Swiss Federal Institute of Technology gave a numerical simulation paper, where she sampled color space as widely as possible under a large number of illuminants and then used the results to search for the optimum CAT from that data set. The somewhat surprising results were that of the .7 million possible configurations of a CAT matrix, there are at least 500 indistinguishable from the best available today. Until we are able to develop an experimental procedure to produce more reliable visual data, it looks as though we will continue to have a flow of papers proposing new CATs that are only marginally better or not statistically better than what we have today in CIECAM97s.

In spite of the lower attendance and the obvious financial ramifications, everyone is convinced that this conference will remain one of the premier conferences on research into color engineering and technology.

Dr. Danny Rich
Sun Chemical Corporation

Joseph B. Keller at NJIT:

A more precise color-matching theory

Anyone who studies color-matching theory "knows" that matches are reflexive, symmetric, and transitive: Light A matches itself; A matches B if B matches A; and A matches C if A matches B and B matches C.

But wait—in the real world, this can't possibly work, because matches have an intrinsic uncertainty known as a "just-noticeable difference" (JND)—such as described by the famous MacAdam ellipses. Hence "A matches B" must mean "A is within a JND of B." Now transitivity of matches is in trouble. Just because A is within a JND of B and B is within a JND of C, it doesn't follow that A is within a JND of C.

We've just had to live with this problem over the years. But now a professor emeritus from Stanford, Joseph B. Keller, has found a way to give transitivity to color matches, and hence to satisfy our intuitions about them. In an invited lecture on 14 November at New Jersey Institute of Technology (Newark, NJ), Keller described a new kind of relation between colors, which he calls "really matching". The definition is simple: Two matching lights A and B "really match" if any light C that matches A also matches B.

Keller modestly claims that his definition is not original, but it certainly needs to be aired for discussion.

It is clearly much harder experimentally to find out if A and B "really match" than if they simply "match". You have to try out on B all lights C that could come close to matching A. The prospect is daunting, but at least it is defined. It could be a valuable tool in pure research, and perhaps in new standardization activities such in CIE TC1-56 (Improved Colour Matching Functions).

Michael H. Brill, 15 November 2001

CORM

Fourth Oxford Conference on Spectrometry June 9-13, 2002

The Fourth Oxford Conference on Spectrometry will be held from June 9th to June 13th, 2002 at Davidson College, Davidson, North Carolina. The previous three Oxford Conferences have all been highly successful, both in their scientific content, with the Third Oxford Conference in Egham, UK drawing a large group of scientists from throughout the world. This conference, as with the previous three, will have published proceedings. Davidson College is conveniently located less than one half hour from Charlotte International Airport.

Papers are invited in the field of spectrometry, color science, appearance measurements, and related fields. Proposals should be submitted to either Dr. Art Springsteen or Miss Teresa Goodman.

Program and Session Chairs:

Day 1
SpectrophotometryAdvances in Instrumentation
Dr. Jim Nobbs (Leeds University)

Colorimetry of Fluorescent Materials
David M. Burns (3M Company)

Standards and Intercomparisons
Dr. Joanne Zwinkle (NRC)

Day 2
Materials and MethodologyAppearance Measurement, Dr. Michael Pointer (NPL)

Standards and Techniques
Richard Harold (Avian Group USA/BYK-Gardner)

Day 3
Radiometry and Colorimetry of Displays Standards and Methodology
Dr. Steve Brown (NIST)

Measurement Techniques
Dr. Julie Taylor (NPL)

For further information on the conference, including presentations and poster papers, please contact the following organizers:

Dr. Art Springsteen (Chairman)
Avian Technologies
P.O. Box 882, 91 Worthington Road
Wilmington, OH 45177
937-655-8767 (tel) 937-655-8765 (fax)
www.aviantechnologies.com

Ms. Teresa Goodman (European Chair)
National Physical Laboratory, Queen's Road,
Teddington, Middlesex TW11 OLW UK
011-44-020-8943 6863 011-44-020-8943 6458
teresagoodman@npl.co.uk

SPIE
Call for Papers

Submit your abstract to:
The International Symposium on
Optical Science and Technology
SPIE's 47th Annual Meeting
July 7-12 2002
Seattle, Washington USA

Featuring 80 conferences in 5 technology tracks:
* Optical System Engineering
* Radiation Technologies
* Signal and Image Processing and Sensors
* Materials and Nanotechnology
* Remote Sensing and Space Technology

Locate entire Calls for Papers, including abstract submission information: *http://spie.org/info/am*
Abstracts are due 10 December 2001 and abstracts for conferences with onsite proceedings are due November 26, 2001.

Sponsored by: SPIE
The International Society for Optical Engineering
http://www.spie.org
spie@spie.org

ISCC New Members

Dr. Dean T. Behm	CIBA Specialty Chemicals, 205 S. James Street, Newport, DE 19804 *dean.behm@cibasc.com*
Dr. Wilhelm H. Kettler	DuPont Performance Coatings, Christbursch 25, Wuppertal, D42285 Germany *kettler@wuppertal@heserta.de*
Mr. Gordon Leggett	Hunter Associates Laboratory Inc., 11491 Sunset Hills Road, Reston, VA 20190 *gordonl@hunterlab.com*
Mr. Gary Regulski	DuPont Automotive Systems, 945 Stephenson Hwy, Troy, MI 48083 *gary.j.regulski@usa.dupont.com*
Dr. Virginia Covert Colla	3717 Apple Hill Road, Modesto, CA 95355 *gcolla@msn.com*
Ms. Mary D. Shipp	7426 HgSystems, Inc., 7426 Fish Hatchery Road, Bath, NY 14810 *hgsystems@infoblvd.net*
Mr. Nathan Moroney	Hewlett-Packard Laboratories, 1501 Page Mill Road, Mail Stop 24-7 Palo Alto, CA 94303 *nathan_moroney@hp.com*
Sun Ju Park	Rochester Institute of Technology, 1901 Wittenden Road, Apt. #5, Rochester, NY 14623 *sun_ju_park@hotmail.com*
Mr. Joseph Carroll	Medical College of Wisconsin – Dept. Cell Biology, 8701 Watertown Plank Road, Milwaukee, WI 53226 *jcarroll@mcw.edu*
Mrs. Patty Monteleone	PPG Industries, 3800 West 143rd St., Cleveland, OH 44111 *monteleone@ppg.com*
Mr. Michael J. Henry	PPG Industries, 3800 West 143rd St., Cleveland, OH 44111 *mhenry@ppg.com*
Mr. Anthony Calabria	Munsell Color Science Lab, RIT, 54 Lomb Memorial Drive, Rochester, NY 14623 *ajc1961@cis.rit.edu*
Ms. Marina Panova	Design and Comfort, 440 Park Ave South, New York, NY 10016 *june77@phoenixdsl.net*
Ms. Veronica Piselli	F.I.T., 297 Cedar St., So. Hempstead NY 11550 *vpiselli@optonline.net*
Ms. Yuki Ota	26-41 29th St. 1st Floor, Astoria, NY 11102 *pinkpandany@earthlink.net*
Ms. Margarita Odesska	F.I.T., 101 Pelican Circle, Staten Island, NY 10306 *enigma407@aol.com*
Mr. Trevor Marcus	F.I.T., 210 W. 27th St. Apt. 6H, New York, NY 10001 *tmcreations_99@yahoo.com*
Mr. Jed Grossman	F.I.T., 210 West 27th St., Apt. 6H2, New York, NY 10001 *digitalboy00@yahoo.com*
Ms. Jennifer Drimmer	F.I.T. , 2838 Brigham St., Brooklan, NY 11235 *jenfit@aol.com*
Mr. Jamie Calvo	F.I.T., 210 West 27th St., New York, NY 10001 *jamiec44@hotmail.com*
Ms. Naima Barnes	F.I.T., 210 E. 85th St., New York, NY 10028 *ninice27@aol.com*
Ms. Kay Austin	F.I.T., 220 w. 27th St., New York, NY 10001 646-414-3584
Mr. Kelson dos Santos Araujo	Av. Suburbana, 7168 – Apto. 302 – Pilares Rio de Janeiro, RJ, 20751-002 Brazil *tradtec@cpnsultant.com*
Mr. Elie Ahad	Xerox Corporation/TAC Engineering, 700 North Dianthus St. Manhattan Beach, CA 90266-5940 *eahad@yahoo.com*
Mr. Edward Braunig	Prinne Co., 42 Columbia Road, Somerville, NJ 08876 908-231-9490 fax 908-526-5058
Mr. Roger Breton	270 Rue des Hiboux, Laval Quebec Canada H7A325 *graxx@videotron.ca*

Ms. Rebecca Bushner	Unlimited Color, 390 Caudill Road, Corralitos, CA 95076 *info@unlimitedcolor.com*
Dr. Nilgun Camgoz	Middle East Technical University, Necatibey Cad. 96/17 Maltede, 06570 Ankara – Turkey *ncamgoz@hotmail.com*
Mr. Yves Charnay	ENSAD, 31 Rue d/Ulm, Paris, 75005 France *ycharnay@dub-internet.fr*
Dr. Roseler Gerhard	Gretag Macbeth, Bleichanger 5, Fuerstenfeldbruck Germany *roesler_gerhard@t-online.de*
Mr. Hal Glicksman	Percept, 1303 9th Street, Santa Monica CA 90401 *percept@csulb.edu*
Ms. Susan Habib	Architect, 6. Sakak 47/4 Bahgelievler 0650, Ankara, Turkey *lapismaple@hotmail.com*
Dr. Anya Hurlbert	University of Newcastle Upon Tyne Medical South, Dept. of Physiological Sciences, Newcastle Upon Tyne, NE2 4HH, UK *anya.hurlbert@newcastle.ac.uk*
Mr. H. John Johnsen	625 Oak Park Circle, Merritt Island, FL 32953-4159 *johnthewriter@yahoo.com*
Ms. Jacqueline T. Karel	1407 Northgate Square, #21, Reston, VA 20190-3723 *jkarel@purespeed.com*
Dr. Chang Soon Kim	KRISS, 1 Doryung Dong Yusung Gu, Daejeon, Korea *kcss@kriss.re.kr*
Dr. Jin-Sook Lee	Department of Architecture, Chungnam National University220 Kung-dong, Yusung-ku, Taejon, 305-764 Korea *js_lee00@hotmail.com*
Mr. Kyung Jae Lee	Purdue University, 220-15 Nimitz Drive, West Lafayette, IN 47906 *klee9@purdue.edu*
Mr. Jerome Lukas	Shalom Graphics, P.O. Box 372, Bluemont, VA 20135 *shalomsky@earthlink.net*
Dr. Ken Pidgeon	The Colour Society of Australia, 4 Morning Glory Avenue O'Halloran Hill, South Australia *kpidgeon@bigpond.com*
Ms. Joely L. Pomprowitz	Pompflyart, 2121 Fairfax Ave., #2, Nashville, TN 37212 *pompflyart@aol.com*
Dr. Klaus Richter	Federal Institute for Materials Research (BAM), Unter den Eichen P7, D-12200 Berlin, Germany *klaus.richter@bam.de*
Mr. Mitchell Rosen	P.O. Box 10093, Rochester, NY 14610 716-482-8062
Mr. Steve Smiley	Vertis/LTC Group, 2010 Westridge Dr., Irving, TX 75038 *ssmiley@vertisinc.com*
Ms. Cynthia J. Sturke	Inter-Society Color Council, 11491 Sunset Hills Road, Reston, VA 20190 *iscc@compuserve.com*
Dr. Rengin Ünver	Metehan Sok. Dogakent Sitesi, B3 Blok.D.10, 2. Ulus/Bes Istanbul, Turkey *runver@superonline.com*
Mr. Jerry Wagner	Hewlett-Packard, 13046 W. Elmspring St., Boise, ID 83713 *jerry_wagner@hp.com*

Color Marketing Group Best Selling Colors For 2002

Color is morphing, blending and overlapping in consumer markets for 2002 according to (CMG). According to **Jay de Sibour**, President of CMG, "Colors are becoming more complex and sophisticated and are incorporating a variety of special effects including pearlescence and metallics along with the dimension of transparency and translucency."

The result is **CMG's 2002 Consumer Colors Current Palette®** — a look at new and established colors that will be found in consumer products over the next year. CMG says many of the colors in 2002 will go redder, exception being in a blue family. Blue is trending towards green, and with a strong movement to bring the blues and greens closer together (i.e., greener blues and bluer greens). Many blues and greens are chameleon colors that fit into either family and can be used in combination with each other or with yellows and browns. Red is moving bluer with reds trending towards red/pink and red/orange combinations. Purples and browns are still the biggest story with "bi-polar" purples moving both bluer and redder.

Yellows are used most often as an accent or background color; generally soft in value. Browns are drinkable (e.g. coffee), and copper is a big story morphing brown into orange giving way to a brown/orange/yellow evolution. Oranges are becoming more sophisticated, a little more red and tropical, mostly on accents but coming on strong. Neutrals require special effects; they are still very strong in all industries, but seem to be fading. Metal or metal looking finishes are prevalent, inspired by the earth's minerals or metals, while Neutrals are moving into color families.

Color is on fast-forward and all over the board, according to CMG. "More industries, more technology, and more products will mean more color in 2002," commented fellow committee co-chairman, **Dee Andrews, CMG**, Norcom, Inc., Norcross, GA, USA. "As more lower-end manufacturers and marketers introduce colors that have moved rapidly from high-end to establish Palettes, the colors are being accepted by mass markets faster than ever before."

Special Effects are the next interpretation of color being used to attract consumers and make products more visually interesting. ***Metallics,*** namely copper, are the newest trend in metal. Automotive is the cutting edge of big metallic chips in paint for more muted/matte look. ***Nature*** is still a strong influence from the exotic (tropical, flora and animal prints) to military and camouflage styles brought about by remote location reality shows and extreme sports. Color blending or morphing is creating lots of blending and crossover into another color families (e.g. green/blue, brown/orange).

Texture - considered to be a special effect - is a necessity. ***Wood Finishes and Faux Woods*** are another hot topic for 2002: Wood itself, real wood and faux finishes, colors, grains and wood trends in general.

Economic influences don't appear to have a major effect so far. As the Consumer Colors Current forecast looks 12 to 18 months into the future, it may be too early to tell if a downtrend in the economy will make any major impact on the Palette, and since technology has made color pigments and special effects affordable to even lower end markets.

For more information:

Judy Peck
Color Marketing Group
703-329-8500

"Color and Light"

by Fred W. Billmeyer Jr. & Harry K.H ammond,III.

ASTM Paint Manual, Chapter 40, 23 pages
$5 each or 20 copies $50.00
Authorized reprint from:

ASTM Manual 17, Copyright 1996
American Society for Testing and Materials
100 Bar Harbor Dr., W. Conshahocken, PA 19428

"Demystifying Color"

by Bob Chung
11 pages (color)
$5 each or 20 copies/$50.00

Discusses and explains ten myths about color.

Either publication can be ordered by contacting the ISCC office (if pre-paid, s&h will be included):
Inter-Society Color Council
Cynthia J. Sturke, Admin. Asst.
11491 Sunset Hills Rd. Reston, VA 20165

Advertising Policy

The ISCC advertising policy for the Inter-Society Color Council News is as follows Pre-paid color-related advertising will be accepted thirty days in advance of the publishing date. The rates are:

$ 100	business card-size ad
$ 250	1/4 page ad
$ 500	1/2 page ad
$1,000	full page ad

Artwork must be publisher ready and will be returned within 30 days after publication. The publishers reserve the right to determine the acceptability of the advertising. A 20% discount is offered for a yearly contract.

Contact: Tek Celikiz, Editor
703-215-836-5729 or
Cynthia Sturke, Assoc. Editor
703-318-0263

Happy Holidays from the ISCC News Staff!

Speedy Recovery Wishes to Roland Connelly and to Ralph Stanziola from the ISCC News Staff.

Also, "fast mending" orders are sent to Joan Celikiz (our behind-the-scenes proof-reader). A broken hip is no way to spend the holidays.

CALENDAR

Please send any information on Member-Body and other organization meetings involving color and appearance functions to:

Ms. Cynthia Sturke
ISCC Office
11491 Sunset Hills Road, Reston, VA 20190
703-318-0263 tel **email:** *iscc@compuserve.com*
703-318-0514 fax **website:** *http://www.iscc.org*

2001

Dec 5- 7 **The Art of Seeing and the Seeing of Art,** Canberra Australia A conference exploring how normal and abnormal visual processes influence the interpretation of art. For more information: http://cvs.anu.edu.au/artsci/ or Dr. T. Maddess, Visual Sciences Group, RSBS, ANU, Canberra ACT 0200 *ted.maddess@anu.edu.au http://cvs.anu.edu.au/maddess/*

2002

Jan 20-23 **ASTM D-1 on Paints,** Embassy Suites, Ft. Lauderdale, FL

Jan 21-23 **ASTM E12 on Color and Appearance,** Embassy Suites, Ft. Lauderdale, FL

Rescheduled **ISCC Williamsburg Conference,** Solutions for Industrial Color Problems, Chair: Ralph Stanziola, *rascolor@juno.com* **Changed to March 2003**

Apr 2-5 **CGIV'2002 First European Conference on Color in graphics Imaging and Vision,** University of Poitiers, France Contact: Society for Imaging Science and Technology, 703-642-9090, 703-642-9094 fax, *info@imaging.org* or *www.imaging.org*

Apr 7-10 **IS&T's PICS 2002 International Technical Conference on Digital Imaging**, *Portland, OR http://www/imaging.org/conferences/pics2002/authors.cfm*

Apr 14-17 **TAGA 2002,** Asheville Renaissance Hotel, Asheville, NC

Apr 20-23 **ISCC/Detroit Colour Council Joint Meeting, Troy, MI** Chair: Jim Keiser, *james.r.keiser@usa.dupont.com*

April 22-26 **2002 ASPRS-American Congress on Surveying and Mapping Annual Conference and FIG (International Federation of Surveyors)Congress** , Washington, DC *www.fig2002.com/*

May 6-8 **CORM Annual Meeting,** Sheraton Westport, St. Louis, MO

June 3-7 **SID Annual Meeting,** Boston, MA Contact: Bill Klein, 212-460-8090x204 Fax: 212-460-5460 *wklein@palisades.org*

June 9-13 **Fourth Oxford Conference on Spectrometry**, Davidson College, Davidson, N.C. Info: Art Springsteen *arts@aviantechnologies.com* Teresa Goodman *tmg@npl.co.uk*

June 16-20 **ASTM D-1 on Paints** - Meeting and Centennial Symposium, Philadelphia, PA

June 26-28 **ASTM E-12 on Color and Appearance,** Little America Hotel & Towers, Salt Lake City, UT

Aug 29-31	**Interim Meeting: AIC Color 2002,** "Color & Textiles" Maribor, Slovenia Contact: *vanja.kokol@uni-mb.si*
Oct 1-4	**AATCC International Conference and Exhibition, Charlotte Convention Ctr, Charlotte, NC** Contact: Shirley Clifton 919-549-8141 919-549-8933 fax
Nov 8-15	**Integrating Remote Sensing at the Global, Regional and Local Scale. The 15th William T. Pecora Memorial Remote Sensing Symposium/Land Satellite Information IV Conference and the ISPRS Commission I** (Platforms and Sensors) Symposium, Denver, Colorado, conference website *www.asprs.org/Pecora-ISPRS-2002.* For more information about ISPRS please see *www.isprs.org*
	2003
March	**ISCC Williamsburg Conference,** Solutions for Industrial Color Problems, Chair: Ralph Stanziola, *rascolor@juno.com* Philadelphia (exact date TBD)
May 3-9	**ASPRS Annual Conference,** Anchorage, AK,
Aug 4-6	**Midterm Meeting: AIC Color 2003, "Color Communication & Management"** Bangkok, Thailand Contact: *aran@sc.chula.ac.th*

"We could learn a lot from crayons: some are sharp, some are pretty, some are dull, some have weird names, and all are different colors....but they all have to learn to live in the same box".

SPC Software is looking for sales people throughout the United States to become involved in their product. The mission of SPC Software is color management and communication. SPC Software develops and sells standard and/or specific colorimetric software. Our product is called IsoMatch-IsoControl-IsoColor that runs on Windows. (See ISCC Newsletter, Issue 392-3, for complete article on SPC Software.)

SPC Software is located near Paris with a new subsidiary in Carlstadt, New Jersey under the name of IsoColor Inc.

If you are interested in applying for a US sales position, please send your resume by email for review to:

Jacques Gombert
CEO and Sales Manager
jgombert@spc-software.com

The ISCC Office has the following items for sale:

ISCC White Polo Shirts	**($30)**
ISCC Mousepads	**($5)**
Large colorful Umbrellas	**($20)**
ISCC T-shirts	**($10)**
Color Cube Puzzles	**($30)**
Color Cube Screen Savers	**($10)**

Issues #394 November/December 2001

Editor: Prof. Gultekin (Tek) Celikiz
Associate Editor: Cynthia J. Sturke

1309 Paper Mill Rd
Erdenheim, PA 19038-7025
215-836-5729 fax: 215-836-0448
celikizg@aol.com

All submissions must be in English.

January/Februrary 2002 articles must be submitted by December 1st, 2001.

ISCC Sustaining Members

Barr Associates, Inc.	*www.barrassociates.com*	978-692-7513
BYK-Gardner USA	*www.bykgardner.com*	301-483-6500
Chromatics Color Sciences Intl, Inc.		212-717-6544
Ciba Specialty Chemicals	*www.cibasc.com*	302-633-2042
Color Communications, Inc.	*www.ccicolor.com*	773-638-1400
DuPont Performance Coatings	*www.dupont.com*	248-583-8345
Flex Products, Inc.	*www.colorshift.com*	707-525-7337
GretagMacbeth, LLC	*www.gretagmacbeth.com*	800-622-2384
Hewlett-Packard Company	*www.hp.com*	650-857-1501
Hunter Associates Laboratory, Inc.	*www.hunterlab.com*	703-471-6870
Labsphere, Inc.	*www.labsphere.com*	603-927-4266
Minolta Corporation	*www.color.minoltausa.com*	201-934-5291
Pantone, Inc.	*www.pantone.com*	201-935-5500
PPG Industries, Inc.	*www.ppg.com*	724-274-3532
SPC Software	*spc@spc-software.com*	+33-1-4784-0066

ISCC Member-Bodies

American Association of Textile Chemists and Colorists (AATCC)
American Society for Testing and Materials (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)
Federation of Societies for Coatings Technology (FSCT)
Gemological Institute of America (GIA)
Graphic Arts Technical Foundation (GATF)
Graphic Communications Association (GCA)
Illumination Engineering Society of N. America (IESNA)
National Association of Printing Ink Manufacturers (NAPIM)
Optical Society of America (OSA)
Society for Information Display (SID)
Society of Plastics Engineers, Color & Appearance Div.(SPE)
Society for Imaging Science and Technology (IS&T)
Technical Association of the Graphic Arts (TAGA)
Technical Association of the Pulp and Paper Industry (TAPPI)

ISCC News Editor

Prof. Gultekin (Tek) Celikiz 1309 Paper Mill Rd, Erdenheim, PA 19038-7025
celikizg@aol.com 215-836-5729 215-836-0448

ISCC Office

Cynthia J. Sturke, Office Mgr. 11491 Sunset Hills Road., Reston, VA 20190
iscc@compuserve.com 703-318-0263 703-318-0514