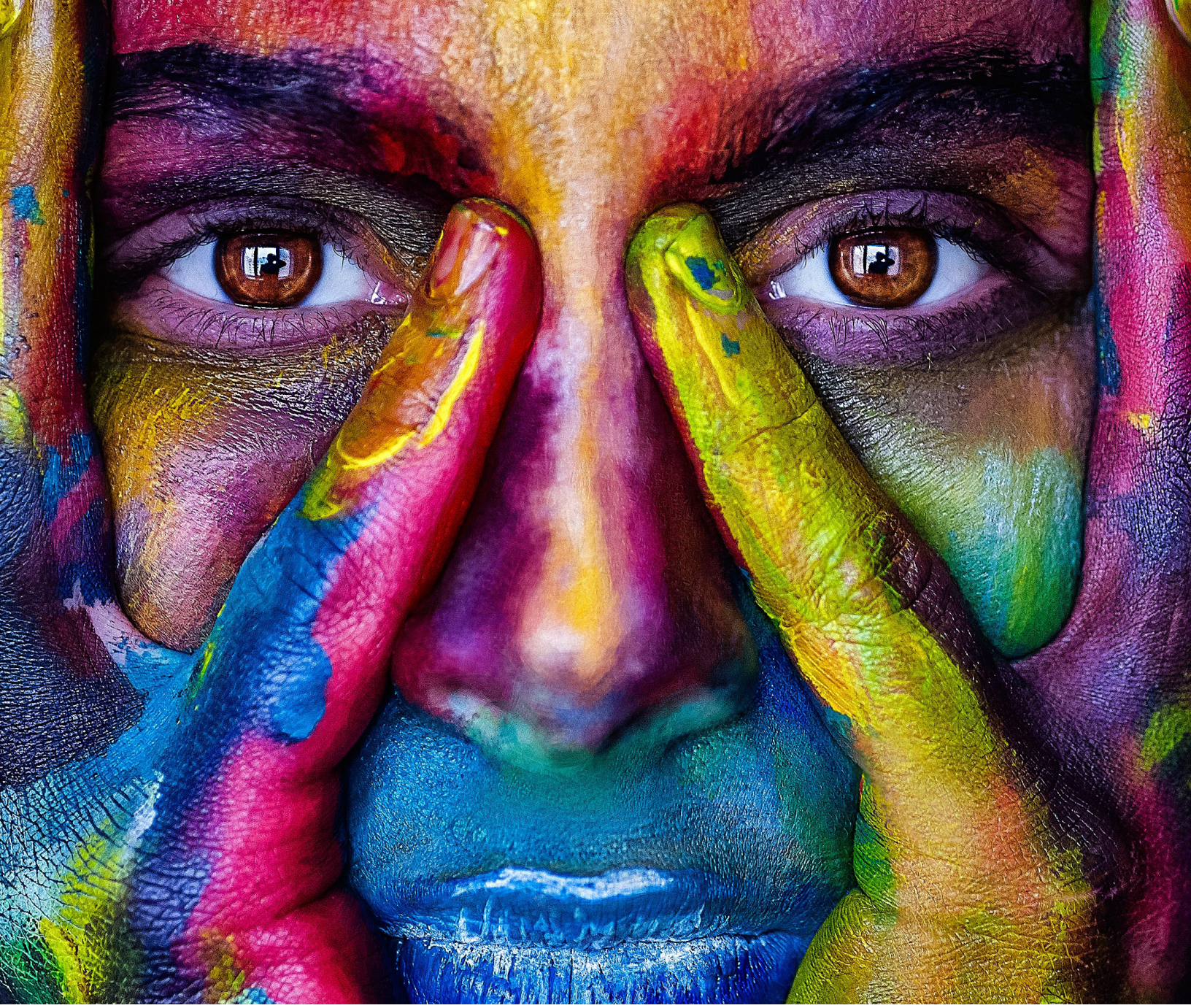

Inter - Society Color Council

Newsletter

Summer
2020 - Issue #491

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Photo by Alexandr Ivanov, Pixabay

Board of Directors Corner

Lina Cárdenas

Dear members,

Greetings from Santiago, Chile. My name is Lina Cárdenas, and I'm bringing you this issue's Board of Directors column. I am currently an assistant professor in the School of Design at the Pontifical Catholic University of Chile. I joined the ISCC back in 2017 and I have since had the privilege of joining the ISCC Board of Directors, starting in January 2019. As an ISCC board member, I have since collaborated with the layout of the newsletter.

Lina Cárdenas

I am originally from a small town in Colombia, in South America. My interest in color started when I was a teenager when I discovered the world of tie dye. From that moment, I knew that I wanted to pursue a career related to color. In 2002, I obtained a bachelor´s degree in textile design and worked for a couple of years for a hat company as its color specialist. In 2004, I went to the United States to pursue a Ph.D. in Fiber and Polymer Science at North Carolina State University. During my time at NC State, I had the privilege of working under the supervision of Drs. Renzo Shamey and David Hinks. They introduced me to the scientific side of color and their passion for it. My doctoral research focused on color perception of small color differences. Throughout my years at NC state, I got to meet many people involved in the world of color, many of them fellow ISCC members.

In 2010, I moved back to South America and I now live in Santiago, Chile. I remember that one of my first impressions of the country was that I felt it needed more color, as I found everything to be very gray here.

In my first years in Chile, I got involved with teaching and research at different universities. In 2017, I became an assistant professor in the School of Design at the Pontifical Catholic University of Chile, where I am also part of the Lighting and Color Design Laboratory. I teach two courses in the undergraduate program: Research for Designers, and a Textile Studio that focuses on color. In addition, since design is a 5-year program, I have also supervised undergraduate research.

As part of my effort to keep connected with my passion for color, I joined the ISCC in 2017. As a result, I went to the Munsell Symposium, where I had the opportunity to share knowledge and experiences with people from different backgrounds, but with a common denominator: color. I was able to meet many individuals that I deeply admire for their work.

The ISCC has given me the chance to stay connected with a color community. Also, it has made me realize that as a designer with a color science background, I have access to a unique combination of skills and knowledge that allows me to become a bridge between two worlds that work extensively with color. Through my own work, I try to promote the science behind color and the ways young and talented designers can use it in a more conscious manner. Finally, as a member of the ISCC, I look forward to continuing to meet color professionals and enthusiasts, and contributing to the growth of color knowledge in Latin America.

Colorfully,

Dr. Lina Cárdenas

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Hue Angles

Why Colors Show Up as Icons in Mathematics

In eerie resonance with Euclid's definition of a point as "that which has no part," J. Lettvin's *Colors of Colored Things* begins with the following: "Judgment of color (including brightness) seems not to depend on extension [... Redness] is like nothing else but itself, it cannot be decomposed or described, but only exhibited; it is a *simple*." [1] Lettvin goes on to discuss (in his unique way) the familiar complications of how vision transforms stimuli into color, but he retains the view that the judgment of color is a simple. I will now look at some implications of this idea.

Color as a simple is readily added to a geometrical object, and the color icons enrich the meaning. Examples range from traffic signals to the stylized footprints in an Arthur Murray dance studio. But mathematics offers some particularly interesting morsels. Three come to mind. One of these, the four-color map problem has been described in an earlier Hue Angles [2]. Another shows up in the title of Arthur Loeb's book *Color and Symmetry* [3], in which permutations of color coding in a pattern enrich the geometric symmetries incurred by such operations as glides and reflections. Now I want to introduce you to a third, perhaps less familiar example, the road-coloring problem.

The road-coloring problem involves a network with directed paths between pairs of vertices. Under some surprisingly general conditions, it is possible to color-code the paths so that, given a destination vertex, a single set of instructions in the form of a sequence of color choices will bring you from any source vertex to the same destination vertex.

The Wikipedia article on the road-coloring problem sets the context: "In the real world, this phenomenon would be as if you called a friend to ask for directions to his house, and he gave you a set of directions that worked no matter where you started from." You start with a graph with numbered vertices and colored arrows between the vertices. The arrows are like one-way streets: the instructions (a sequence of path colors) assume you are always going in the direction of the arrow you're on. To convince yourself that this behavior is possible, try the exercise based on the eight-vertex graph in Ref. [4].

The road-coloring problem started as a conjecture by Benjamin Weiss in 1970, but it took 38 years to prove. The proof came from Avraham Trahtman, a 63-year-old Israeli former security guard (who was a mathematician in his earlier life in the USSR) [5]. Trahtman [6] proved not only that the nominated graphs all had coloring sequences with the desired property, but also that one's mathematical life can peak long after one's teens and twenties.

Encouraged by checking the eight-vertex graph in Ref. 4, I wondered if I could make a simpler graph with only three nodes that had the same property. In the figures I show here, three nodes support two possible solutions, but I had to allow the possibility of paths from a node to itself.

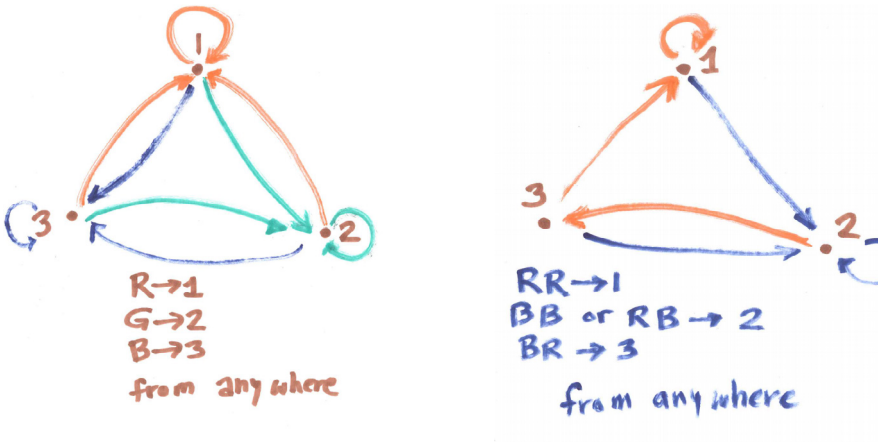
In the case of my first graph, if you live at vertex 1, all you have to tell your visitor is "take the red arrow from where you are to the next vertex (in the direction indicated by the arrow), and that will be node 1. That's what I mean by the instruction R → 1 from anywhere (i.e., from vertex 1, 2, or 3). Similarly, if you live at vertex 2, your instruction is "take the green path one step from wherever you are." If you live at vertex 3, your instruction is "take the blue path." Because the arrows are like one-way streets, you must always go in the direction of the arrow you choose.

In the second graph, there are still only three vertices, but the paths involve two steps and not just 1. Starting from vertex 1, 2, or 3, if you take two R steps, you end up at vertex 1. I denote that action as RR → 1, etc. But notice that I use only two colors of path instead of three (as in my first graph). There is a tradeoff between the number of colors and the length of the instruction string.

What use is the road-coloring problem (now a theorem)? It serves very well in the theory of automata. To quote Weifu Wang [7], "When the automaton is running and encounters an error, and if the road coloring conjecture is true, the automaton can always follow a certain sequence and go back to the previous correct state, regardless of what error it encountered." I think the "correct state" is the address of the person giving the instructions, and the "error state" is where the presumed visitor is when he gets instructions. It's a little confusing to call the direction "back" when you're proceeding forward along the arrows to get there. But synchronizing a move to an earlier known state seems the key to the application.

One place not to use the road-coloring theorem is in an Arthur Murray dance studio. Imagine giving a color-sequence instruction set to a bunch of dancers and have them all pile on top of each other when they (synchronously) reach the home vertex.

Michael H. Brill
Datacolor



Drawing of two three-vertex road-coloring solutions (Michael H. Brill, 2013). The medium is felt marker on flip-chart paper, photographed in a cool-white-fluorescent-lit office. Not surprisingly, the "red" looks very orange. My apologies, but I hope the idea is clear.

Send contributions to mbrill@datacolor.com

[1] J. Y. Lettvin, MIT RLE QPR 87, 1967, p. 193, http://dspace.mit.edu/bitstream/handle/1721.1/55670/RLE%20_QPR_087_XIV.pdf

[2] M. H. Brill, http://hueangles.blogspot.com/2013/03/

[3] A. Loeb, Color and Symmetry, Wiley, 1971.

[4] https://en.wikipedia.org/wiki/Road_coloring_theorem

[5] http://usatoday30.usatoday.com/tech/science/mathscience/2008-03-20-road-coloring-problem-solved_n.htm

[6] A. N. Trahtman, The Road Coloring Problem. Israel Journal of Mathematics, Vol. 172, 51–60, 2009, https://en.wikipedia.org/wiki/Israel_Journal_of_Mathematics

[7] W. Wang, The Road Coloring Problem. (2011). https://math.dartmouth.edu/~pw/M100W11/weifu.pdf

Color Research and Application

IN THIS ISSUE

Vol. 45 Issue #3, June 2020

By Ellen Carter

The first article, "***Categorical Observers for Metamerism***" by Yuta Asano and Mark Fairchild introduces a method to generate categorical color observer functions (individual color matching functions) for any field size based on the CIE 2006 system of physiological observer functions. A set of categorical observers can be used to quantify observer metamerism potential. Since categorical observers are finite and discrete, as opposed to observer functions generated from the individual colorimetric observer model, they offer a less accurate but more convenient and practical approach toward specifying observer metamerism or creating a personalized color imaging workflow. The number of required categorical observers varies depending on an application, but as few as ten are good for general use and convenience to represent color-normal populations and to be used for personalized color imaging. In other more demanding applications as many as 50 categorical observers would be required to predict individual observers' matches satisfactorily.

As children we learn color names while we are gaining our language and vocabulary. But do we perceive colors of objects the same as someone else sees them? Sometimes seeing the correct color is really important, such as when crossing a street. Studying vision, scientists know that some people have slightly different or missing cones from the majority of people. This results in degrees of color vision deficiencies. Ali Almustanyir and Jeffery K. Hovis designed an experiment investigating color naming aimed at the particular situation of determining use of color when using the pedestrian signal light. What is the color of the figure in the crossing sign that indicates whether it is safe to cross a traffic intersection? In "***Color Vision Defectives' Experience: When White is Green***," they found that individuals with a congenital color vision defect often, but less often the people with normal color vision, identify the color for the figure in the crossing sign correctly as white. But when they misidentify the color, it is most often identified as green or occasionally as yellow, and never as red. The data show one example of how context plays a role in how people with color vision differences identify color.

Around eighty years ago, people interested in color also began measuring gloss. To be more specific, they would measure specular gloss using a source at a specific angle to a material and classify the material's surface as high gloss, low gloss, matte or something in between. The assessment was made based on the clarity of the image (or reflectance) of the source on the surface. Since then the study of visual gloss has evolved to a global appraisal of the whole scene, as opposed to just measuring a single object or surface. Following this line of thought, Guillaume Ged, Ana-Maria Rabal-Almazor, Marc Emile Himbert, and Gael Obein developed a study to quantify the effect of both the nature of illumination and surrounding conditions on gloss sensation. Through their experiments described in the article, "***Assessing Gloss under Diffuse and Specular Lighting***," they observe that the visual system tries to maintain gloss constancy in a similar way to what it does for color constancy. That is, an object's glossy appearance is perceived identically despite changes in the lighting divergence. However, this constancy may not be possible without external cues. They show that the realistic environment increases the gloss perception dynamic and consequently allows a better evaluation of gloss.

For many color applications such as color measurement, computer vision, computer graphics, and color image reproduction, one needs to obtain the surface spectral reflectance of objects in a scene. Recently, Cao et al. proposed an improved adaptive weighting method for the training samples for reflectance reconstruction. Building on that work, Yang Xu, Chongchong Zhang, Cheng Gao, Zhifeng Wang, and Changjun Li developed "***A Hybrid Adaptation Strategy for Reconstruction Reflectance Based on the Given Tristimulus Values***," where a hybrid weight is in-

troduced, which cuts in half the number of the training samples needed, thus using less CPU time, but still performs equally well as or slightly better than the Cao et al. method.

By the end of the 20th century, color science had moved from the relatively simple measurement of individual colors to developing models to describe many aspects of color appearance in a wider view. This appeared to culminate in the publication of the CIECAM02 color appearance model for color management systems. As its acceptance and usage grew, researchers have attempted to model more complex viewing situations and looked for additional capabilities working from CIECAM02 as a starting point. In this vein, Yuecheng Zhu, Minchen Wei, and M. Ronnier Luo conducted an "***Investigation on the Effects of Adapting Chromaticities and Luminance on Color Appearance on Computer Displays Using Memory Colors***." From two of their physical experiments, they explain how the chromaticities and luminance of an adapting field affect the degree of chromatic adaptation on a display. In addition, the results also suggest that the Hunt Effect may be over-predicted in CAM02-UCS (uniform color spaces).

When using a head-mounted display, the user is suddenly immersed in a new world that completely encompasses the immediate environment and provides its own lighting. This sudden change can cause visual discomfort primarily due to an increased illumination level, which decreases to some extent as adaptation to the lightness level takes place. The article "***Discomfort-luminance Level of Head-mounted Displays Depending on the Adapting Luminance***" explores the luminance change necessary to induce discomfort when using a head-mounted display and develops a prediction model. The authors, Hyeyoung Ha, Youngshin Kwak, Hyosun Kim, and Young-jun Seo explain that the discomfort-luminance level prediction model for head-mounted displays can serve as a guideline for setting and controlling the peak-white when the content is being created for the display to avoid unintended discomfort.

Edges are important for image perception. Strong edges are often enough to allow an observer to recognize the image. As a consequence, when trying to develop algorithms to identify or categorize images or their content, the first step is usually edge detection. The advantage of edge detection is significant reduction of image data, and it provides appropriate generalization of the image data. Traditionally this was done by identifying gray scale steps. However, with color images, many edges are formed with changes in hues that may have similar lightness levels, where gray scale steps would miss important distinctions. Saeedeh Abasi, Mohammad Amani Tehran, and Mark Fairchild examine and discuss different "***Color Metrics for Image Edge Detection***." They provide a new algorithm for edge detection based on the "HyAB" large-color-difference formula. This algorithm uses Sobel operators for gradient-magnitude calculations and Canny methods for localizing edge points.

Pictures taken in extreme lighting conditions, at either very high or very low light levels, often are disappointing to the viewer because of lack of low contrast. Bharath Subramani and Magudeeswaran Veluchamy developed an efficient contrast enhancement algorithm to address over-enhancement and preserve the fine detail of the whole scene in the image without false contouring. In their article, "***Quadrant Dynamic Clipped Histogram Equalization with Gamma Correction for Color Image Enhancement***," they report on procedural steps involved in the algorithm and evaluate the performance of their technique as compared to other current procedures. The performance is evaluated in terms of entropy, contrast, colorfulness and saturation of the final image.

Just as traditional photographic images were processed through wet chemical and light controlling techniques in a darkroom, electronic images may undergo many processing procedures such as image noise removal, contrast enhancement, image segmentation, object detection, skin color capture, and color transfer. The authors Zhijian Li, Yingping Zheng, Ligin Cao, Lei Jiao, Yanfei Zhong, and Guorui Ma first review and explain traditional image clustering algorithms in their article, "***A Student's t-based density peaks clustering with superpixel segmentation (tDPCSS) method***." They propose an image color clustering method that can automatically obtain clustering results, without requiring a large amount of memory, and is not dependent on the parameters of the algorithm or the number of clusters.

Electronic displays are widely used by designers when preparing image designs to be printed in journals, on labels and for other items. However, using an electronic display in the process of developing a product, such as a picture in a printed mag-

azine, is problematic in that 1) the computer screen and printed offset may not match, 2) adjusting the color on the printing machine automatically changes the tone throughout the entire image, not just on the target area and 3) simultaneous contrast effects on the two media may differ. With the goal of allowing designers to continue to use computer displays to design their products, and printing machine operators to obtain identical reproductions of the original design, Krunoslav Hajdek, Ivan Budimir, and Mile Matijevic studied the simultaneous contrast of a particular design solution and its impact on the final reproduction. They report on "***A Shift of the Perceptual Attributes of Color Due to the Manifestation of the Simultaneous Contrast Effect on Display***."

The color and quality of package printing is extremely important because it draws attention to the product and increases its marketability. The color must be bright and durable on the package throughout the lifetime of the package. Flexography and Gravure printing processes are considered the leading processes for flexible packaging substrates such as film and foils, which must remain durable the lifetime of the package. Towards this end, Mahasweta Mandal and Swati Brandyopadhyay introduce an "***Artificial Neural Network Approach to Predict the Lightfastness of Gravure Prints on the Plastic Film***." Being able to predict the fading rate of various inks in the printed film, enables the package designer to optimize the color ink selection for the package design.

In a reverse example of color design for the packaging to enhance product sale, Hui Li, Uandan Hou, Shuhong Zhang, Zuying Liu and Jinzhou Chen discuss the "***Color Design of Cigarette Packaging for Reducing Smoking Rate in Youth***." They developed a study to discover color schemes that focused on teenage consumers' disgust and applied the color schemes to cigarette packaging. Their ultimate goal was to reduce the desire of purchasing cigarettes, and thus reduce the smoking rate of young people. The study used two methods to obtain the color schemes of cigarette packs that were hated by teenagers. Their eye movement experiment proved that the eight color schemes selected by the questionnaire were unpopular. More than half of the subjects indicated that they were affected by the appearance of packaging when purchasing tobacco products, showing the feasibility of influencing the sales of tobacco products by the choice of color on cigarette packets.

Color is an important consideration when designing interior spaces. Colors usually are applied in different proportions in interiors on furniture, walls, floors and ceilings. Seden Odabaşıoğlu and Nilgün Olguntürk hypothesized that harmonization of colors depends on how much area each color covers. Not only is the colorimetric content (hue, chroma or saturation, and value or lightness) important, but also the proportions of the area that each of the selected colors fills—the combination has a strong effect on the overall satisfaction. In their study of the "***Effect of Area on Color Harmony in Simulated Interiors***," they used three-color combinations in four different room designs (in which the area of each of the three colors was varied) to evaluate the effect of the color schemes for their harmony content and the effect of area of each color on the harmony. Their results confirmed that there are objective laws for obtaining color combinations that are found universally harmonious.

The last three articles in this issue deal with color as it affects a person through perception, taste, and preference. There have been reports that the optical chromatic stimuli can lead to direct psychological experiences. For example red may result in the feeling of warmth, in contrast to color emotional experience where the emotion belongs to indirect psychological cognitive effects that evoke other more complex psychological feelings, e.g., "happy/sad". While most research on perception deals with the perception of a single color at a time, Shuang Wang, Jiang Wei, Yanan Su, and Jingyu Liu designed an experiment to study perception of images involving multiple color combinations. Their article, "***Human Perceptual Responses to Multiple Colors: A Study of Multicolor Perceptual Features Modeling***," reports on a subjective evaluation experiment in which they developed a mathematical model that from multicolor objective features could predict multicolor perceptual features well. The model uses three multicolor perception factors: 1) a color vitality perception factor, 2) a color energy perception factor, and 3) a color space perception factor. These three factors elucidate the difference between single-color perception and multicolor perception.

Mehran Fateminia, Talayeh Dehghani Ghotbabadi and Kamran Mohammadi Azad postulate that tastes of colors are related to people's perceptions and assumptions, as well as their personal experiences. In their article they combine data from their

new study on young children (ages 2-6 years old) with data from an earlier study of the taste perceptions of adult Iranians to answer questions of the impact of colors on people's perception of taste: correlations between color and taste, and how people describe the taste of different colors. In their article, "***Perceptions of the Taste of Colors in Children and Adults***," their analysis reveals that children's taste perceptions of colors are roughly the same as those of adults, indicating that there is a specific relationship between taste and color that is concordant with the rules of Itten's color wheel. This study showed that primary colors have their own specific tastes, and that the tastes associated with secondary colors are the common taste of their constituent primary colors.

In the final article, the topic moves from perception and taste to preference. It is widely believed that children will choose furniture that has the same color as their preferred color, but in reality, the adults purchasing the furniture actually make the color decision. "***The Impact of Color Preference on Adolescent Children's Choice of Furniture***" discusses the implications of adolescent color preference and color choice for children's furniture color design. The authors, Liling Jiang, Vien Cheung, Stephan Westland, Peter A. Rhodes, Liming Shen and Lei Xu, explain their findings that the adolescent's selection of color not only depends on their preferred color, but also is influenced by other factors such as the category of furniture, the room where it will be used and personal factors such as gender and age of the adolescent.

The Publications Briefly Mentioned Column introduces an interesting book, The Rarest Blue: ***The Remarkable Story of an Ancient Color Lost to History and Rediscovered***, by Baruch Sterman. The column also announces two new publications from the International Commission on Illumination:

- *CIE 239:2020 Goniospectroradiometry of Optical Radiation Sources*
- *CIE 238:2020 Characterization of AC-Driven LEDs for SSL Applications*

A Blast from the Past:
ISCC Newsletter from 50 Years Ago

By Paula J. Alessi *Senior Color Scientist*

ISCC News No. 207 July-August 1970 and No. 208 September – October 1970

Inspirational Poetry from the 1970s

For the 43 years that I have been involved in color science, I have found that people with an interest in color are very creative people in more ways than how they work with color. Here are two examples. The first one (from No. 207) is a poem written by Dr. I. H. Godlove that describes what belonging to ISCC meant to him:

"It's not the brains or genius
Nor money that we pay;
It's the close cooperation
That's bound to win the day.
It's not the individual
Nor Council as a whole,
But the everlastin' teamwork
Of every bloomin' soul."

Amen!!! Dr. Godlove, the namesake for our most coveted award, captured the identity and strength of our beloved Inter-Society Color Council that still holds true for its members today. Our Council is not about "I," it is about "We." Our work is done in teams who volunteer to ensure a successful outcome working toward a collective goal!

The second one (from No. 208) was written by W. J. McConeghey as an homage to color measurement.

THE THEOLOGY OF COLOR MEASUREMENT

Book I

Geniuses

In the beginning there was darkness and void.
And God said Let there be light; and there was light.
And God saw the light that it was good: and God divided the light from the darkness.
And God called the light and the darkness Value.
And on the sixth day God created Adams.
And these are the generations of Adams.
Adams begat Munsell, and Munsell begat MacAdams,
And MacAdams begat Simon and Goodwin:
Now Munsell also begat three sons called Hue, Value and Chroma
And each of these sons begat ten sons and each of these ten more sons:
And the sons were so like each to the next that no man could but scarce distinguish between them.

Book II

Numbers

Now there came about in the land of Kohlor a great contest of seers and savants and those skilled in the mystery of numbers.
And this was the manner of their trial: to place about a point the smallest ring that could be seen.
And the ring required to be true and even with no part one whit closer nor one whit further from the middle than its fellows.
And there came to the fray Munsell from the land of Ba'astun,
And DIN from across the sea, and Judd, and MacAdam, and Hunter, and Moon, and Spencer, and Billmeyer, and Glasser, and other mighty men of old.
And each came with great arrays of numbers
And they called upon strange powers and with cabalistic signs concocted great stews of root of square and root of cube.
But lo! Though they strove with might and main, not one could form a true ring.
But each that they made was awry and bent askew, some in one way and some in yet another.
Thus all their struggle came to naught.

Book III

Ezekiel or Perhaps Not Ekiel

Now also in the land of Kohlor in the provinces of Delta there came about a controversy among the prophets as to how the Trinity might be One.
Some there were who said that Ehcks and Waiee and the Shade of Value could by the squinting of the eye be seen as One.
And yet others spake saying Nay! The One can be found only in the fusion of Ahee and Bhee and Ehil.
There were also radicals among them who spake of the Power and the Sum and the Holy Spectral Figure.
Each proclaimed that his was the one true Instrument through which the Oneness of the Three might be seen.
And they disputed for days without end and could not agree one with another.
Oh Man! If you will have harmony between thy house and another's, both must pledge their faith to but one Instrument and forget not the uses of Judgement.

If someone knows who W. J. McConeghey is, please send me an email at geinhaus@frontiernet.net. This is a very clever poem brilliantly using the Bible as a backdrop. It is an innovative way of discussing the evolution of color metrics like the Munsell System, MacAdam ellipses, xyY or Value, and various color difference systems. The description of how, in 1970, the spectral curve reigned supreme over other methods of describing color is very witty. The harmony dispute between different "Instrument houses" is priceless and something that many of us can relate to even now in 2020. The wisdom of using "Judgement" in the end is also a great reminder for us all. I hope you enjoyed reading this as much as I did!

1970 Annual Report Issue No. 207

This is not your usual Annual Report Issue. The first 6-1/3 pages feature "The Story of the Inter-Society Color Council." This is definitely a good read for those who would like to reminisce a bit of the ISCC history from inception! Also, on pages 8 and 9, there is a detailed discussion of the "Recommended Practice for the Macbeth Award", which should be read by the current Macbeth Award Committee and members of the ISCC Board of Directors. To read at least the first nine pages of the newsletter, see: http://www.iscc-archive.org/Newsletters/ISCCNews207.pdf Enjoy the large black and white pictures of the officers!

1970s: The Psychedelic Era

Anyone interested in color loved the psychedelic '70s because they represented an age of new color explosions! From Issue No. 208, the article titled "The Products of a Psychedelic Age: New Instruments, Tied in with Computers, Revolutionize the Old Art of Color Matching" talks about a brighter world featuring the apricot-colored business shirt as never seen before explosive colors.

The apricot business shirt
https://in.pinterest.com/pin/127578601919245685/

Psychedelic Art
https://www.udiscovermusic.com/stories/best-psychedelic-albums/

More Psychedelic Art
https://www.medicaldaily.com/psychedelic-drug-use-united-states-common-now-1960s-generation-245218

Consumers were demanding exact color matches to these psychedelic colors in all types of media from paints to textiles. Color matching in the 1970s was done primarily with a visual technique which did not produce the precision that would live up to the demand. The color measuring industry was small compared to the demand with only three companies making instruments that could measure color: Kollmorgen Corporation, Gardner Laboratory, Inc., and Hunter Associates Laboratory, Inc. The most that the color-measuring instruments could do in those days was to check a color match. There was little or no technology to control a color match or even formulate a color match instrumentally. So, the need started in the 1970s and the technology eventually developed to meet the need! Once again, thank goodness for ISCC and its role in this evolution!

Coming this fall
Conversations in Colour!

We are pleased to introduce a new online series of color-focused conversations with guests from diverse interests and backgrounds. Our first guest is David Scott Kastan, author of *On Color*, a cultural history of the seven "rainbow" colors as well as of black, white, and gray, published in 2018 by Yale University Press. The Los Angeles Review of Books called it a "gorgeously illustrated in-depth exploration of color on all of its symbolic, visual, literary, political, historic, and scientific registers…an optimistic and essential reminder of the ever-shifting meanings and functions of color." Kastan's day job is as the George M. Bodman Professor of English at Yale, where, through his teaching and writings, he has become one the most influential Shakespeare scholars in the world. Presently he is working on a book called *In Search of Rembrandt*, on twelve of the self-portraits.

Join us to learn how Kastan and painter Stephen Farthing began a conversation that lasted over ten years, examining the various ways colors have shaped and continue to shape our social and moral imaginations. Host for the October event is Luanne Stovall, artist, color theorist, and ISCC Board Director. The series is being created in response to a growing interest in the multidisciplinary nature of color. Stay tuned for the early evening happy hour time slot and exact date!

David Kastan

COLOR IMPACT 2020 Virtual Symposium

Color Impact 2020:
ISCC Virtual Symposium on Color Education

June 6, 2020

Summary

The ISCC hosted its first virtual conference on Saturday, June 6, 2020. With only two months to transform the originally planned symposium at Yale to a full-day online program, this special event turned out to be a win-win for both the attendees and the ISCC.

Without the expense of travel and lodging, 269 color colleagues from 29 countries were able to join us for a day focused on color education. The feedback from the attendees was overwhelmingly positive with 100% of survey respondents saying they would be interested in attending future ISCC virtual events.

One of the attendees, Christine Dickey, wrote a good summary of the day:

The conference [yesterday] was excellent. Very good content overall.

This certainly opened up a dialogue among a wider audience about how to teach color, especially in the early years.

It was very well organized. Speakers kept strictly to their time allotments which helped the moderator move it all along. I liked having the moderator be a familiar face and voice throughout the proceedings.

I did miss the interaction with real people that comes from a face-to-face conference, but it was easy to see the camaraderie that exists between all the organizers and the panelists, and the friendliness and familiarity and even some partnerships were highly evident and welcoming. I felt like I was listening to a group of people who work together in friendship every day. Nice.

Another attendee, David Briggs, posted a summary of the conference on his blog at: http://www.huevaluechroma.com/1110.php?fbclid=IwAR2DTaSP-KXe2cCHGzTOXyluRdjMPsTkPp9H91adPASVVTAKfhHBiDqxWQR4

by Maggie Maggio

During the process of planning and hosting the event, the organizers (Jean Hoskin, Maggie Maggio, Amy Woolfe, Ellen Divers, Luanne Stovall and Dave Wyble) spent countless hours in online meetings and rehearsals, learned a great deal about available technologies, considered ways of engaging participants, and built a strong foundation for future virtual events.

Due to the financial uncertainties of the pandemic, we offered three levels of registration for the six-hour event. The pricing options were $150, $100, and $50, and most attendees paid the middle or upper fee. The proceeds from the event will be split three ways:

- to jumpstart the new ISCC Student Outreach Program,
- to help fund the Color Literacy Project, and
- to supply seed money for next year's Color Impact 2021 conference at Yale in June.

Schedule

The symposium was scheduled from 11:00 AM to 5:00 PM EDT on Saturday, June 6. The hours were determined by the best time for most international attendees.

Part One was dedicated to the keynote and four short presentations by color educators. Following the end of the presentations, the speakers "moved" to individual breakout rooms for a moderated question and answer session. Attendees were then invited to join whichever speaker they were most interested in asking questions.

Part Two included two color activity sessions, a Point-Counterpoint debate, a panel discussion and a report on the ISCC/AIC Colour Literacy Project. The schedule worked well, although the consensus was that the breaks were too short and the day a bit too long. We will fix that the next time!

Program - Part One

Pre-Symposium Games: All registrants were mailed an activity packet with three printed sheets and then invited to play an online "Colour Clues" game developed by Paul Green-Armytage. Participants joined us for one of the two sessions that were scheduled on the Thursday and Friday before Saturday's symposium. The two sessions, one in the evening and one in the morning EDT, allowed us to accommodate both US and international schedules. The sheet used for the game was a chart with 36 different colored squares. Participants could use either the mailed version, or, since delivery to many countries was delayed due to COVID-19, they could use the online version available on the event website.

After a quick introduction by Paul, the participants were randomly divided into teams of two and sent to online breakout rooms. Each team of partners competed against the other teams to guess the identity of the colors on the chart by giving each other one, two, or three-word clues. The fewer the words used for the clue, the higher the score!

The games provided attendees with a wonderful opportunity for face-to-face interactions, and they provided the organizers with the opportunity to troubleshoot the symposium's Zoom and GoTo Webinar platforms before the start of the full day event. In the end, the "Colour Clues" game showed how difficult it is to use only words to successfully describe colors. Everyone agreed the game was lots of fun to play.

Symposium Keynote

The highlight of the event was the opening presentation, "Why Color?" by Philip Ball, author of the seminal book *Bright Earth: Art and the Invention of Color*. From his home in London, Dr Ball shared his enthusiasm for color as a subject that spans countless disciplines and talked about his many experiences connecting with the color world since the book's publication 20 years ago. His talk was timely and engaging, addressing not only his primary interests in the history of dyes and pigments but also diving into present day issues surrounding color and race.

Invited Presentations by Color Educators

Jennifer Cohlman-Bracchi, Acting Head Librarian at the Cooper Hewitt Smithsonian Design Museum in NYC, presented on the topic of "Museum as Color Educator." Ms. Cohlman-Bracchi curated Color in a New Light at the National Museum of Natural History in Washington, DC in 2017 and co-curated Saturated: The Allure and Science of Color at the Cooper Hewitt in 2018-19. Her talk focused on the exhibit materials from the "Capturing Color" segment of last year's show. There were artifacts illustrating the development of color measurement tools and standards along with display cases featuring the museum's collection of original books covering the history of color order systems.

The slides also included images from the 1960 exhibit in honor of the museum's centennial celebration. Titled Logic and Magic of Color, this historic exhibit included works by Faber Birren, Josef Albers, Hans Beckman, Ben Cunningham, Hilaire Hiller, and many others. The success of the 1960 show led to a proposal for a Color Center in a 1967 issue of the ISCC newsletter. This resulted in the donation of many personal collections to the museum. When the collections were resurrected in the 1980s, the books remained with the Smithsonian while artifacts were sent to the Hagley Museum. At the end of her talk, Jen asked the audience to imagine what a Color Center might look like today.

Dr. Andreas Schwarz, co-author with Rolf Kuehni of the book, *Ordering Color*, presented "The Long Way to a Color Theory Free Art Teaching Curriculum." Schwarz showed examples of repetitive classroom exercises using standardized lessons and discussed the problems resulting from teaching color theory in art classes. He summarized the problems by stating that "Color theory does neither explain color as a visual phenomenon, nor does it match its own claims concerning the mixing of paints." He advocates practice before theory, allowing students to use more than just primary colors, and encourages free explorations of mixing and using color expressively.

He then described the path taken ten years ago by art teachers in his state of North Rhineland-Westphalia in Germany to replace color theory with new approaches. The basic elements of the new guidelines focus on experience and perception rather than color contrast sets and color wheels with primaries and secondaries. He showed examples of publications for teaching grades 5-12 using the new approaches and described how the exercises are closer to the student's personal experience of color. His conclusion was that if art teachers from the same educational system present a convincing alternative to standardized color theory

exercises and get support from key personnel in the local teachers' association then radical changes to color curricula are possible.

Dr. Robin Kingsburgh presented "Understanding Colour: A General Education Course on the Science of Colour." Dr. Kingsburgh has a PhD in astronomy and is also an accomplished painter. For the past 20 years, she has taught both the science and art of color in a full-year interdisciplinary elective course at York University in Toronto as well as teaching at the Ontario College of Art and Design. The first part of the course is focused on color science foundations and includes studying light, materials, vision, and perception. Once the students get the fundamentals, they move on to practical applications with a wide variety of exploratory assignments accompanied by critical thinking questions and essays. With hundreds of students enrolled at any one time, most of the explorations are done off-campus in the student's home environment. The emphasis of all the experiments is on getting students to "really see" and to record what they see accurately. The interaction between the experiential and the conceptual is at the heart of the course. She wants students who take the course to be able to take a moment to see color and then "look twice" with enough knowledge to figure out what is going on.

Luanne Stovall teaches "The New Color" course at the University of Texas, Austin. The course is open to all students. Two years ago, Stovall proposed that the school host a free evening lecture once a month in conjunction with her spring color course. Open to the public, the Color Salons bring in experts from a number of different color fields to supplement the color course. Overcoming a number of hurdles along the way, the popular Wednesday Color Salons are now in their second year.

Question and Answer Zoom Rooms

Due to the tight time schedule, each speaker had only a few minutes to answer questions immediately following their presentations. To allow for more time with the speakers, the decision was made to host concurrent 30-minute Q and As at the end of Part One. Conversations in each room were lively and even though there was not enough time to answer all the questions, the Q and A rooms turned out to be one of the most popular and engaging parts of the online format.

Part Two will appear in the next newsletter along with the information for CI 2021.

COLOR IMPACT 2021
For the Built Environment

Due to the future uncertainty of the COVID-19 pandemic on universities, Yale University has asked ISCC to consider alternate dates for Color Impact 2021. The ISCC Board agreed to work closely with Yale, focusing on a conference later in June. Yale University was chosen as the site for the conference due to its strong architecture, design and art departments and also its connection to the Bauhaus through Josef and Anni Albers. It is the home to the Faber Birren Color Library and numerous buildings of architectural significance. This event is a collaboration between the Inter-Society Color Council (ISCC) and the International Association of Color Consultants - North America (IACC-NA).

The ISCC Board also decided to add online events to the 2021 program, based on the success of the Virtual Symposium on Color Education described by Maggie Maggio in this newsletter. We are encouraged by the positive response and the possibility of international speakers, audience, and students. Continuing to focus on the built environment, most of our speakers are able to join us in 2021. We have some great additions.

Whether you are an architect, interior or industrial designer, artist, student or color scientist, we invite you to explore the influence of lighting and color science on design and to meet researchers who have developed innovative studies and applications into many facets of color.
I am thrilled to announce that we have internationally known art and design professionals, who will speak on the impact that color has had on their lives and careers. Whether or not you are familiar with their work, you will leave the conference inspired.

- Shashi Caan — Design Futurist with dedication and commitment to furthering human betterment through and by design
- Jill Pilaroscia — Accredited IACC Designer believing in the power of color, which shaped her quest to educate the public and design professionals about the value of color
- Eve Ashcraft — Designer consulting on color for everything from interiors, exteriors, and corporate branding to paint lines and knitting yarn
- Additional speakers to be announced on the website

In addition, we will hear from four expert researchers on education and application of color.

- Robert Hirscher — Bauhaus Influence on Color Education: A Critical Homage
- Renzo Shamey — Color Pioneer Faber Birren
- Leslie Harrington — Augmented Color Intelligence
- Kory Stamper — "Rose" by any other Name, The Color Name Problem from the Language Specialist's Point of View

Additional learning opportunities for attendees include:

- A webinar series starting in Fall 2020
- 24 Breakout Sessions
- Research and Design Posters
- Lighting Panel and Science - Materials Panel
- Networking Events
- Expanded Student Poster Competition with prizes
- Short Courses on Color Literacy, Josef Albers Color Experiments, Measuring Color, and Humane Color Design
- Tours of the campus architecture, the Birren Library, and the Albers Foundation
- ISCC and IACC-NA Annual Meetings

In the last newsletter I recommended reading articles for those of us confined to our homes. Now I suggest two books based on our recent symposium and our future webinar:

- *Bright Earth*: *Art and the Invention of Color*, by Philip Ball
- *On Color*, by David Scott Kastan and Stephen Farthing

See you in June 2021.
Jean Hoskin,
Conference Co-Chair

October 2, 2020

ISCC Virtual Annual Business Meeting

The Annual Business Meeting originally scheduled during the Color Impact 2020 Conference at Yale was postponed due to Covid-19. Selected by a member survey, a new date for the Virtual Annual Business Meeting is Friday, October 2, 2020 from 2:00pm to 4:00pm eastern.

- I hope you will be able to join us for our traditional President's, Treasurer's and Secretary's Reports as well as news on webinars, membership, fundraising, and elections.
- Highlights will include updates on the Newsletter, the Color Literacy Project, and the 2020 Virtual Symposium on Color Education.
- The Nickerson and Macbeth Award winners will be announced with a presentation by the Macbeth Award recipient.
- We will also announce the call for a new ISCC Logo design, discuss the Color and the Built Environment 2021 Conference at Yale with expanded research/design and student poster competition tracks, plus ideas to expand students' engagement in all color disciplines.

Prepare a snack and join us to learn how you can get involved.

Renzo Shamey,
ISCC President

ISCC Officer /

Board of Director Nominations

This fall the ISCC will be holding elections for the following positions:

- two Officer positions – President-Elect and Treasurer
- two Board of Director positions

If you have any good nominees in mind, please email any of the following Nominations Committee members.

Jerry Dimas	*jerdim@ccicolor.com*
Dr. David R Wyble	*dave@avianrochester.com*
Ms. Rachel Schwen	*rschwen@valspar.com*
Dr. Danny C. Rich	*Danny.Rich@sunchemical.com*
Ms. Amy Woolf	*Info@awcolor.com*

Thank you to our outgoing Treasurer, Dr. Francis O'Donnell and Directors, Mr. John Seymour and Ms. Rachel Schwen. The ISCC is thankful for your years of service.

Warm regards,

Jerald Dimas
ISCC Past-President

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Refractions
The Color of Things

Fig.1 Patrick Caulfield, Pottery, 1969, © The Estate of Patrick Caulfield / © Tate, London 2013. CC-BY-NC-ND 3.0. www.tate.org.uk Wikimedia Fair Use

Sinoper, *falu*, *gamboge and watchet* – A strange and alien language perhaps, but one that speaks to the myriad ways in which colors can reveal themselves. Most of us can see these colors quite easily, but we would be hard pressed to identify or even remember them. The language of color both reveals and conceals. In the *sinoper* common to Renaissance art, we perceive a deep rust-red, but one that is distinct from the rust-red of *falu*, a color commonly found on Swedish barns. Our language, however, is but a coarse and blunt instrument when it comes to carving up the million or so colors that our eyes can actually perceive.

Language has always had a rich and intertwined history with color and even today still has much to say about the *how*, *what* and *where* of the color of things.

One of the longstanding issues in color science and philosophy concerns the *where* of color, or in the parlance of philosophy, the ontological status of color. In other words, do colors exist independently? Are they "out there" in the world, or are they subjective experiences that exist inside our minds? Or, are they something else altogether?

The common sense view of *color* maintains that objects look colored because, quite simply, they are colored. This is our default experience of the world. In this view, color exists as a property of objects: your blue shirt is blue, red wine is red, lemons are yellow, and grass is green. This position, known as color *realism*, posits color as a mind-independent property of things in the world. Such a view is buttressed by the grammatical structure of just about every language on earth, where color is used *adjectively*, as a qualifying property of things.

A more nuanced version of this maintains that color is simply the reflectance property of surfaces to differentially reflect and absorb various wavelengths of light, or radiant energy. In this view, blue shirts reflect wavelengths of light predominantly in the blue part of the spectrum, whereas red tomatoes reflect light from the opposite (red) end of the spectrum. For color realists, colors *are* reflectance.[1]

One of the difficulties with this position is the capacity for colors to appear different from the wavelengths reflected from surfaces. This has been examined most famously by Edwin Land, in his *Retinex Theory of color*[2]. Though Land's theory is too technical to be summarized here, a clear example of how this works can be seen in figure 2. In this image, the blue squares on the top of the cube on the left are the same "color" (spectral reflectance) as the yellow squares on the top of the cube on the right!

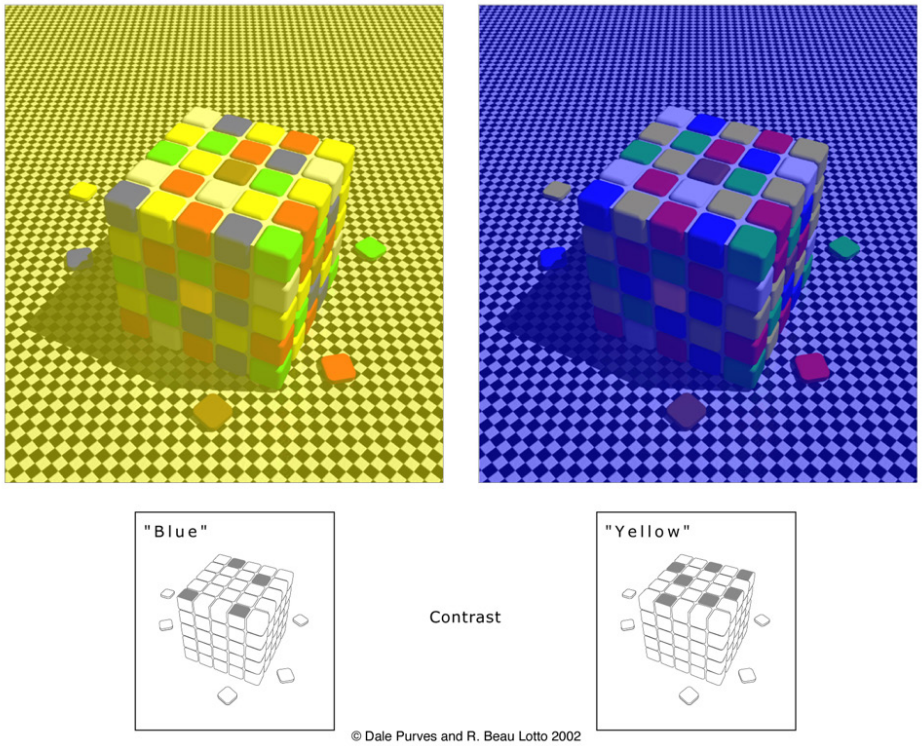


Fig. 2. Color contrast illusion. From Dale Purves and R. Beau Lotto's book Why We See What We Do: An Empirical Theory of Vision (2003, revised 2011)

If the perception of color was simply a matter of extracting information about the surface reflectance of wavelengths, then the illusion would not work. But color is much more than reflected light, and our empirical knowledge of the world (the effects of surfaces, illuminants, and context) leads us to conclude that the colors on the cubes *must* be different, and as a result, we perceive them that way[3].

This approach, known as a type of *relationism* in philosophy, has come to define the modern conception of color as a perceptual experience, based on the interaction between the world and the mind. A key aspect of perception and experience is that it is always mediated; in other words, we never have direct access to the world "as it is". In this case, our perception of color is subject not only to the physics of light and surfaces, but also the hardware of biological variation (animals have different eyes and brains) and to the vicissitudes of our 'software' – namely, our culture, our experiences and even our language. As I discussed in a previous article (ISCC News #478) we now know that the colors we can discriminate and identify are influenced, in part, by the words that we use[4]. For example, some languages, like English, make a distinction between blue and green, whereas others, like Berinmo, from Papua New Guinea, have a single term, nol, for both. As a result, English speakers are better able to discriminate and identify colors in that part of the spectrum where these two categories meet. Other languages, such as Russian and Greek, have two different words for the basic color category of blue, which means, that unlike English they subdivide this region of the visible spectrum, and as a result, are better at discriminating and identifying differences in this part of the spectrum. The more precise the language, the more categories we create and the more colors we can discriminate[5].

Research on color categories and color language demonstrates that the colors we perceive, depend to varying degrees, on how we think and the words we use to categorize our experience. An extreme version of this view, known as *irrealism* in philosophy, maintains that colors are fictitious, that they exist entirely in our minds.[6]

An interesting twist on all of this was recently put forward by the philosopher Mazviita Chirimuuta.[7] Known as *color adverbialism*, it treats color not as a property of things (adjectives), or as a property of internal construction, but as a property of processes (adverbs), specifically the perceptual process. According to Chirimuuta, "instead of treating color words as adjectives (which describe things), we should treat them as adverbs (which describe activities). I eat hurriedly, walk gracelessly, and on a fine day I see the sky bluely!"

Such considerations raise interesting philosophical puzzles and questions not only on color, but also about reality, language and our relation to the world. So, the next time you put your blue shirt in the closet and close the door, ask yourself the following question: If there is no light, and no perceiver (and no language), is the shirt still blue?

Carl Jennings

[1] Byrne, A. Hilbert, D. (2003) Color Realism and Color Science. Behavioral and Brain Sciences 26:3–21

[2] Land, E.H. (1977) The Retinex Theory of Color Vision. Sci. Am. 237, 108–128

[3] Purves, D., & Lotto, R. B. (2003). Why We See What We Do: An Empirical Theory of Vision. Sunderland, MA, US: Sinauer Associates.

[4] Jennings, C. (2019) There's a Word for That: What Nail Polish Can Teach Us About Color Perception. Retrieved from: https://www.refractionsblog.com/single-post/2017/05/05/There%E2%80%99s-a-Word-for-That-What-nail-polish-can-teach-us-about-color-perception

[5]Roberson, D., Davidoff, J., Davies, I. & Shapiro, L. (2005). Colour Categories in Himba: Evidence for the Cultural Relativity Hypothesis. Cognitive Psychology, 50, 378–411

[6]Hardin, C. L. (1988). Color for Philosophers: Unweaving the Rainbow. Hackett

[7]Chirimuuta, M. (2015) The Reality of Colour is Perception. Nautilus Issue 026, July 23, 2015. Retrieved from: http://nautil.us/issue/26/color/the-reality-of-color-is-perception

The AIC 2020 Interim Meeting

Date Changes

The AIC 2020 Interim Meeting, hosted by the Centre Français de la Couleur (CFC), is an online and on-site conference scheduled for late November 2020. The online portion begins Friday, November 20, 2020 and continues the following week.

The on-site conference and a theatrical exhibition, at Théâtre des Halles in Avignon, France, is on Thursday, November 26 and Friday, November 27. Continuing on Saturday, November 28, there will be an homage to Dean Centre Français de la Couleur, Mrs. Jacqueline Carron, a painter who was born in 1920.

Mrs. Jacqueline Carron

Meeting Theme and Sessions

The theme of the meeting is "Natural Colors – Digital Colors." The meeting pertains to colors in their natural environments, such as colors that light the sky, colors from environmental materials, and vegetable, mineral and animal colors that meet digital colors in all their forms. These digital forms include virtual and augmented reality, image analysis and synthesis, and reconstructed heritage and restoration, to name a few. There will be two parallel sessions with speakers from the natural world and digital world in both sessions.

There are four featured themes with two sessions per theme:

- ***Sessions 1 and 2:*** Color, Environment and Sustainable Development
- ***Sessions 3 and 4:*** Color and Heritage
- ***Sessions 5 and 6:*** Perception, Captation, and Creation
- ***Sessions 7 and 8:*** Digital Color and Virtual World

COLOR, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

Session 1
Materials and applications: Sciences and industries: structural colors, natural dyes, bio-inspired pigments (food, cosmetics, paints, textiles, etc.)

Session 2
Sustainable development: Health, biodiversity, living spaces, landscape, town planning, building materials, etc.

COLOR AND HERITAGE

Session 3
Material approach: Past and future architecture, natural light, material and digital restoration, art materials, 3D scanning technologies

Session 4
Cultural approach: Intangible heritage and know-how, language, anthropology, teaching of color

COLOR PERCEPTION, CAPTATION AND CREATION

Session 5
Scientific dimension and economic impact: Human, animal and artificial vision and economic benefits; design, marketing, packaging, etc.

Session 6
Socio-cultural dimension: New forms of knowledge and cultural dissemination to audiences (sound and light show, digital media and interactions with the public), reproducing art, new fields of creation and digital fidelity to natural colors, ethics of the restoration of works, real makeup / virtual makeup, etc.

DIGITAL COLOR AND VIRTUAL WORLD

Session 7
Technology: Colorimetry and instrumentation, spectral image synthesis, screens (TV, video, telephone, projectors, HMD, etc.), 2D and 3D digital printing, lighting, color physics

Session 8
Interaction of natural colors and digital colors and applications: Virtual reality, augmented reality, diminished reality (image analysis, image synthesis, graphic creation) and uses (cinema, video games, medicine, dentistry, manufacture of prostheses, construction, etc.)

Meeting Program

Friday November 20
– videoconference only

9:00 Plenary Session
Opening Talk
Invited Talk: "Natural Colors" by Dominique Cardon, Honorary President of AIC 2020

Dominique Cardon

Invited Talk: "Digital Colors" by Livio de Luca, Honorary President of AIC 2020

Livio de Luca

11:00AM – 6:30PM Parallel Sessions 1 and 2

Thursday November 26
– Théâtre des Halles, on-site and videoconference participation

9:00AM Plenary Session
Invited Talk: "Colour and animals in the wall paintings of the Popes' Palace" by Dominique Vingtain, chief-curator of the Popes' Palace, Avignon

Dominique Vingtain

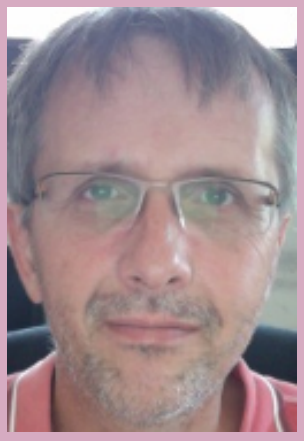
Invited Talk: "Colour and natural environment" by Laure Bonnaud-Ponticelli, professor at Muséum National d'Histoire Naturelle, Paris

Laure Bonnaud-Ponticelli

11:00AM – 12:30PM Parallel Sessions 3 and 4
2:00PM – 6:30PM Parallel Sessions 5 and 6

Friday November 27
– Théâtre des Halles, on-site and videoconference participation

9:00AM Plenary Session
Invited Talk: "The amazing potential of flashes of UV-C light and of pulsed light for driving biological changes in plants", by Laurent Urban, professor at the University of Avignon



Laurent Urban

11:00AM – 4:30PM Parallel Sessions 7 and 8
4:30PM Closing Plenary Session
Final Review of AIC 2020 by Françoise Viénot, Emerita professor at Muséum National d'Histoire Naturelle, Paris

Françoise Viénot

6:00PM – 7:00PM AIC Awards Ceremony and Announcements

More on Avignon

Avignon is known as the "city of popes." It offers "an exceptional testimony of the arts, knowledge and know-how of the Middle Ages (painting, architecture, sculpture)." It houses a monumental complex and the Saint Benezet Bridge, which is listed as a UNESCO World Heritage Site.

Saint Benezet Bridge

This world-famous bridge is used as the logo for this AIC 2020 conference in the hope that the conference fosters communication that will bridge the gap between natural colors and digital colors.

Accommodations

CFC has recommended about six hotels that are about a 10-minute walk to the venue. You can learn more about them at ***https://aic2020.org/?page_id=312&lang=en***

Registration is now open

The following registration fees are for online or conference site participation for the full conference on November 20th, 26th, 27th plus the cultural day on Saturday 28 th .

Full registration fee: **200 euros**
Online-only conference, 3 full days: **150 euros**
Online-only conference, one day only (November 20 or 26 or 27): **50 euros**
Accompanying person, full conference (only one for each participant) fee: **100 euros**
Accompanying person, one day on-site (November 26 or 27): **50 euros**
Students or unemployed people, full conference CFC and CDC Members: **120 euros**
Students or unemployed people, one day online only: **40 euros**

Important Note: The registration fees will increase by 50% after September 30th

ISCC Participation

ISCC members are encouraged to attend this very exciting AIC conference on a topic that we have never had before! We are very familiar with the success of on-site and online meetings. The choice is yours!

The official language of the conference is English. For more details on the conference, please see ***www.aic2020.org***

Paula J. Alessi,
ISCC Liaison to AIC

Calendar 2020- 2021

Aug 19	CMG Color Speak Webinar – Bridging Color Communication Info: https://colormarketing.org/event/colorspeak-color-communication/
Aug 25-28	Online Conference: International Meeting on Information Display Info: http://www.imid.or.kr/2020/index.asp
Sept 3-4	XVI Color Conference of the Italian Color Association at the University of Bergamo Info: https://gruppodelcolore.org/the-conference/?lang=en
Sept 14-17	Virtual Meeting: OSA Quantum 2.0 Conference Info: https://www.osa.org/en-us/meetings/topical_meetings/quantum/
Sept 16-17	CVCS 2020 10th Colour and Visual Computing Symposium, Gjovik, Norway Info: https://www.cvcs.no/
Sept 17	Detroit Color Council Webinar: Color Trends for 2021 Info: https://detroitcc.org/upcoming-events/
Sept 21-23	Virtual Conference: CAD RETEC 2020 Info: https://specad.org/2020_retec_home/
Oct 2	ISCC Virtual Annual Business Meeting 2-4 Eastern Info: https://iscc.org/
Oct 5-7	15th International Symposium on Visual Computing, San Diego, California. Info:https://www.isvc.net/
Oct 6-9	AIC Interim Meeting on Natural Colors-Digital Colors, Avignon, France Info: http://aic2020.org
Oct 15-17	2020 AATCC Sustainability Innovation & Fashion Technology International Conference (AATCC-SIFTIC), Shanghai, China Info: https://www.aatcc.org/aatcc-events/2020-aatcc-sustainability-innovation-fashion-technology-international-conference-aatcc-siftic/

Oct 19-21	Virtual Conference: IES Street and Area Lighting conference(SALC) Info: https://www.ies.org/events/street-area-lighting-conference/
Oct 28	CMG Virtual Workshop Experience : Future Thinking 2030 Info: https://colormarketing.org/event/future-thinking-2030/
Nov 2-13	CIC28 Virtual Color and Imaging Conference Info: https://www.imaging.org/Site/IST/Conferences/CIC/CIC_Home.aspx?Website-Key=6d978a6f-475d-46cc-bcf2-7a9e3d5f8f82&hkey=d2cf3f19-87b4-4164-8274-c40180e9dfa7
Nov 16	ICC DevCon 2020: The Future of Colour Management Info: http://www.color.org/DevCon/devcon2020/index.xalter
Nov 18-19	CMG Virtual International Summit Info: https://colormarketing.org/event/international-summit-update/
Nov 23	ICC DevCon 2020: Colour Appearance Info: http://www.color.org/DevCon/devcon2020/registration.xalter
Nov 30	ICC DevCon 2020: Display and Print Info: http://www.color.org/DevCon/devcon2020/registration.xalter
Dec 1-5	The International Conference of the Color Society of Russia Info: http://www.ad-chroma.com/index.php?article_id=89&clang=2
2021	
Mar 19-21	CSA National Conference Color Connections, Sydney 2021 Info: https://coloursociety.org.au/event-3844772
Apr 13-15	AATCC International Conference, Charlotte, North Carolina Info: https://www.aatcc.org/events/callforpresentations/
June 6-9	ISCC Color Impact 2021, New Haven, Connecticut Info: www.iscc.org

Sustaining Members

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

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ISCC would like to thank the following people for volunteering their time and talents to make this issue.

ISCC Newsletter Issue #491, Summer 2020

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