

# REFLECTIONS



THE OFFICIAL PUBLICATION OF THE STONY BROOK CAMERA CLUB

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*An unusual photography exhibit is now on display in N.Y.C.: "Ashes and Snow" by Gregory Colbert.*

*Gregory Colbert started his career as a documentary filmmaker and has now become a fine arts photographer. His extraordinary collection of photographs depicts the interactions between humans and animals. Some of his subjects have been elephants, sperm whales, manatees, leopards and cheetahs, to name a few.*

*His singular work, "Ashes and Snow", was first shown in Italy in 2002, and was the largest solo exhibit ever presented in that country. The show contains 130 images up to 10 feet in length on sheets of hand-made Japanese paper. There is a one hour film as part of the exhibit. With his N.Y.C. showing, Colbert's exhibit will begin it's migration around the world in the Nomadi Museum, the first of it's kind.*

*Location: Hudson River Parks Pier 54@ West 13<sup>th</sup> Street, N.Y.C. March 5, 2005 - June 6, 2005.*

*To view some of his truly exceptional photographs, go to his web site at:*

<http://www.ashesandsnow.org>

## Color Management Systems

*By Andre Bourque*

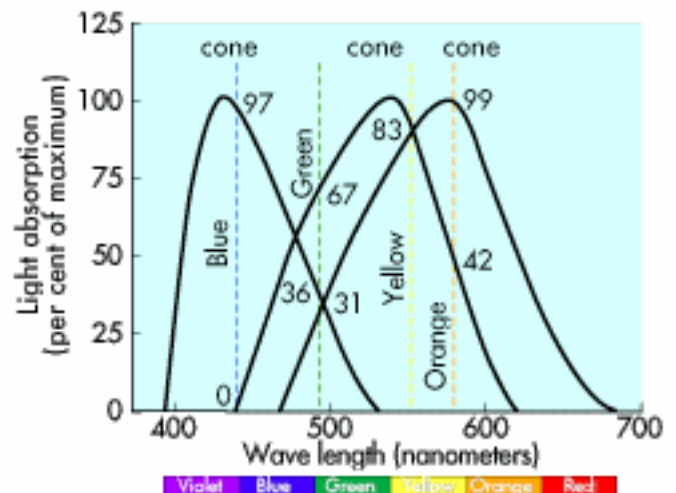
### Speaker's Notes for SBCC Workshop, Feb 17, 2005

*This article is provided as follow-up to a workshop presented at SBCC, Feb 17, 2005 to demonstrate the importance of the Color Management System for Photoshop post-processing and printing of images using a desktop printer.*

## Perception of Color

Prior to answering the question of "What is Color Management?" it may be useful to offer a fundamental overview of how the human eye perceives color. First, understand that the human eye perceives limited wavelengths of light in the electromagnetic spectrum. The eye cannot see X-rays, Ultraviolet and Infrared wavelengths. What humans see, 'trichromacy' of colors, as it is referred to in the field of color science, are the physical properties in light wavelengths picked up by way of rods and cones receptors in the eye, cones being most color responsive. Light wavelengths entering the eye are channeled to the brain with the assistance of numerous chemical reactions in the eye, the optic nerve, and in the cortical layers in the brain itself.

Figure 1.



**President:** Paul Burke  
31 Bellview Drive  
Mansfield, MA 02048  
(508) 339-6295

**Vice President:** Mike Di Stefano  
22 Orchard Street  
N. Providence, RI 02911  
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NECCC Representative	Ray Guillette

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Color Slides	Martha Kerns
B&W Prints	Ken Wiedemann
Color Prints	Ray Guillette
PSA/NECCC	Dan Charbonnet
Multi-screen	Martha Kerns

#### **STONY BROOK CAMERA CLUB**

**PURPOSE:** To promote enjoyment and proficiency in all aspects of photography through education by mutual exchange of knowledge and experience; and, to promote a broad appreciation of our environment.

**MEETINGS:** Meetings will be held on the first and third Thursdays of each month, except for no meetings in July and August. Other Workshops and Print/Slide Study Nights may be scheduled on the second and fourth Thursdays. Consult the SBCC Calendar of Events. All meetings start at 7:30 P.M. The regular meeting place is Stony Brook Audubon Preserve, Norfolk, MA off Route 115. At other times activities are scheduled in other nearby locations.

**DUES:** Individuals: \$30.00, Families: \$40.00, and \$15.00 for students and members over 65 years of age. To be eligible for competitions, dues must be paid by the first competition in November.

**NEWSLETTER:** Published six times during the year for Aug/Sept, Oct/Nov, Dec/Jan, Feb/Mar, Apr/May, and Jun/Jul and solely for the information, guidance and enjoyment of the Stony Brook Camera Club, Norfolk, MA

**OFFICERS:** Elected annually and serve as the executive committee with two past presidents. The Stony Brook Camera Club is affiliated with the New England Camera Club Council and is a member of the Photographic Society of America

The trichromacy of colors the eye absorbs are red, green and blue. When these colors combine, the cones, along with the rods' ability to differentiate gradations of darkness and lightness, enable the human eye to sense just about all the known gradation of colors in the visual spectrum.

Color models the eye perceives fall into two categories: Additive and Subtractive colors. Additive colors are those commonly perceived in our monitors and television sets. In these devices light is "shot towards" us from a source such as the CRT (Cathode-Ray-Tube), sending a beam of *emitted* light which strikes the phosphorus coating inside the rear of the monitor's glass screen to display a visual field we call RGB colors – Red, Green, and Blue – the same colors the eye's rods and cones perceive. LCD monitor colors are produced in a different way, but nevertheless, the colors perceived are the same additive colors.

Subtractive colors give off *reflected* light from objects that absorb some wavelengths while allowing others to continue on. That is, the light wavelengths reflected off a print will go up to the eye as light wavelengths with color properties that are not absorbed into the 'object'. More specifically, if red is absorbed, you are left with a blue and green combined and produce a cyan hue – the color that actually registers in the brain. According to Harald Johnson, editor of *Mastering Digital Printing*, Second Edition, "the color of an image on a piece of paper is what's left over *after* the ink and the paper have absorbed or subtracted certain wavelengths".

#### **Color Management System**

Understanding that these fundamental physical differences exist between additive and subtractive colors, we can also understand why colors viewed on a monitor compared to the ones normally seen in a print *always* differ from one another. Bringing us to Problem Number One: Setting up a proper Color Management System (CMS); when instituted, it will ease the pain of dealing with Problem Number Two: Working with digital devices (digidcams, scanners, monitors, and printers) designed to with specific default color spaces/profiles--and no two are alike. These devices' color spaces are known to be device-dependent. This de facto explanation is the source of many a printer's nightmare. The photographer and printer's quest is ongoing: How to get all these devices to display 'reliable and consistent' colors throughout the workflow system?

A red flag needs to be raised at this point to alert the reader to the fact that "*what-you-see-is-NOT-what-you-print*" is usually the case. Why not? Aside from the problems mentioned in the last paragraph, one could simply restate this to read the image displayed on a monitor when compared to the printed image *cannot* and *will not* look 'exactly' alike.

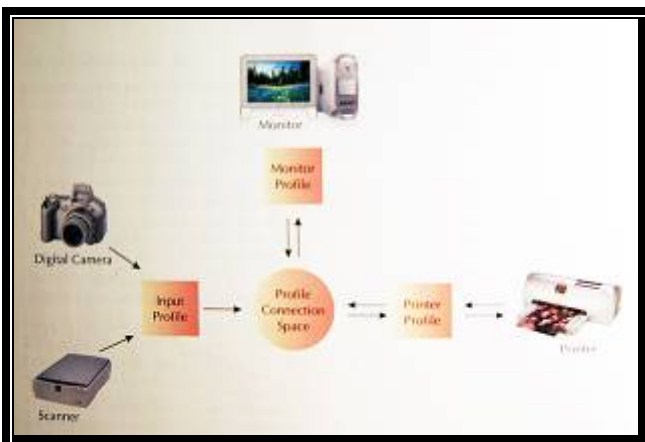
The differences between additive colors (Monitor's RGB) from those in the print which are subtractive (colors now reflected from an object, in this case, a print) are different. There are also numerous other variables to consider which will impact the way your image looks – the inks you use (dyes vs. pigments), the printer and driver you have installed and which provide you with specific profiles, and lastly, the paper you print on – coated vs. non-coated papers, the absorbency, and the whiteness of the paper. Of course, there are numerous other variables affecting how a printed image is seen. Composition, design, application of colors, types of colors, psychological interpretations, physical attributes, as well

as personal preferences are all factors that will affect how an image is perceived. Nevertheless, Color Management—beginning with the input (source) to a final output (destination)—is enormously necessary to render vibrant and accurate colors, lightness, and saturation to a final print.

Color Management System (CMS) is not simply the ‘application of color adjustments’ normally done in an image processing software like Photoshop. Novices to digital imaging are individuals most prone to make prints by way of ‘eyeballing it’. This is a hit and miss, trial-by-error method, and a very expensive way of going about it, I would add. No doubt a few individuals have the knack for doing this. Nevertheless without a proper color management system and assuring proper monitor calibrations to begin with, applying tweaking to hue, saturation, and lightness in an image will most likely produce an images with inaccurate color renditions, darkness-lightness problems (think zone/gradation problems), and an overall poorly printed image with shifts in hue and color casts. But when Color Management is done properly, it is highly probable and very possible to get that winning print ready for the next competition at SBCC – consistently and reliably.

**Color Management System** simply stated is, “. . . rendering color across devices – digital cameras, scanners, monitors, print devices – *in a predictable and repeatable way*”. **Figure 2**, below, is an illustration providing a standard ‘workflow’ most photographers utilize to craft and compose prints on a desktop inkjet printer.

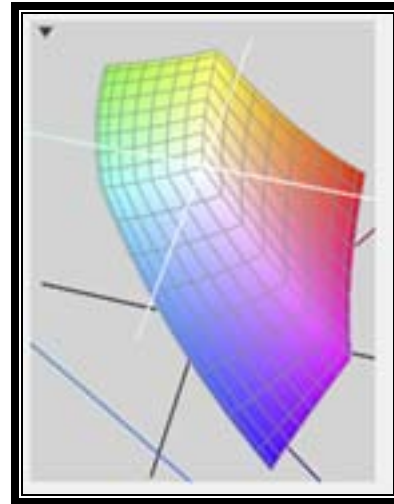
**Figure 2.**



Note that the first device is either a scanner or a digital camera. Each device is the primary source of your image input. Images start as Analog data and are converted to digital data: on-off. All scanners color space is RGB and most digital cameras are assigned a default color space of sRGB. More upscale DSLR cameras will allow you the option to choose either the color space of sRGB or Adobe RGB. A color space is best described as “an abstract, three dimensional range

of colors” **Figure 3** as shown. Here it is illustrated in a 2-D figure.

**Figure 3.**



- Note how the 2-dimensional representation of the color model sRGB gives the various values of hues from the center to the extremities of the visible spectrum of color.

### Calibrating Your Monitor

Next, let’s talk a bit about the need to calibrate your monitor in a desktop workflow. A monitor, whether CRT or LCD, is a RGB devices and will need to be calibrated and profiled to obtain a high-quality monitor-to-print match. There are two ways to calibrate a monitor. One method is to use the ‘eyeball method’ – something I warned against doing previously. There is, however, a technically accepted variation on this concept to visually calibrate a monitor. This done with the use of the Adobe Gamma accessory provided in the Adobe Photoshop software. Readers may refer to the PS manual or HELP in Photoshop’s menu, and look in the content section, ‘*Producing Consistent Colors in PS*’ for helpful instructions on how to calibrate a monitor.

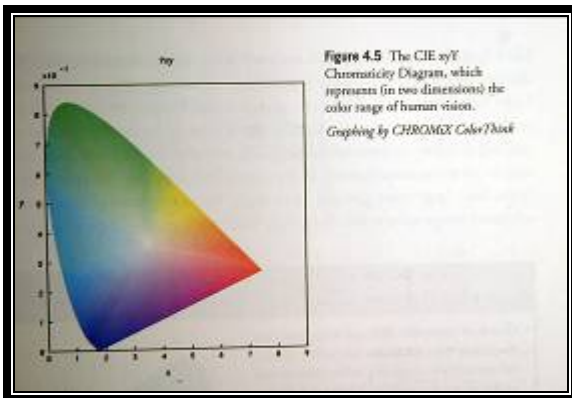
The second way to calibrate your monitor is using a ‘measuring device’, identified as ‘hardware-based profile-generating device’ with software program. SBCC has one such device: SpyderPro by Color Vision, which is a much more accurate method for calibrating your monitor in that it actually measures each pixel’s RGB value and calibrates, rather adjusts “combinations of the RGB gun and your video board (card), Finally the measuring device “creates a monitor ICC/ICM profile that your editing software (Photoshop) refers to when

displaying images”.

Next, note that in **Figure 2**, the Profile Connection Space is the hub or the connector where communication between devices moves—both directionally and bi-directionally. This is where the Color Management Module (CMM) is apt to be located. Also known as a Color Engine, its function is to ‘interpret’ a device profile, “to map its color space or its gamut from one device to another”. Primarily, it is the CMM that will interpret color spaces in terms of being either ‘in gamut’ or ‘out-of-gamut’. This is done using a numerical ‘mapping’ process so that these colors are reliably ‘reproducible colors’ when sent out to the next device. Numerically speaking, a pixel’s three channels - red, green, and blue – each having a numerical value attribute running from 0 to 256 (making for a 24 bit depth image rendering a total of 16.8 million colors per pixel). Each must be interpreted and matched to the next device’s color space. The constant interpretation and transformation of these numerical values is a ‘bi-directional’ process and occurs ‘transparently’ to and from the Monitor to the CMM and from the Printer to the CMM.

It is at this point that it is important to introduce you to the International Color Consortium (ICC) which was formed when a group of eight industry leaders met in 1993 – Adobe Systems, Kodak, Apple Computer, and Microsoft just to name a few. Their primary objective at the time was to formulate a ‘standardized color representation gamut’ that would be an open source, cross-platform color-management, and represent a gamut of colors that closely resembled the colors the human eye perceives to be true colors.

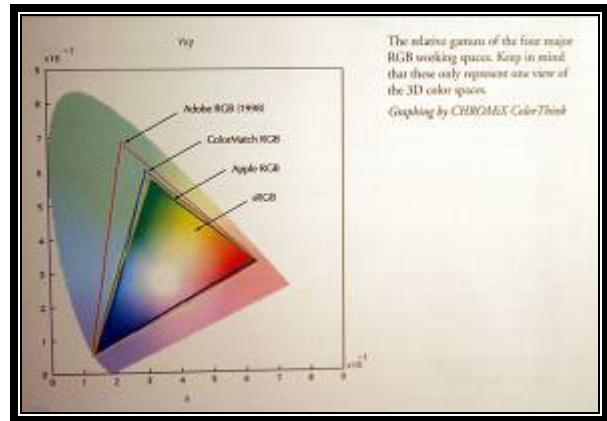
**Figure 4**



**Figure 4** is a two-dimensional representation of the ICC’s “Reference Color Space”, the CIE’s xyY color model utilized to calibrate monitors and LAB (L is lightness, a and b both color channels, for printers.

To fully comprehend the efficacy of the ICC Reference Color, **Figure 5** illustrates a two-dimensional Chromaticity Diagram of a color management system representing how color spaces *overlap* to interpret and transform device-dependent color spaces. Schematically, this illustration shows how input of color spaces assigned to various devices in a workflow are compared and matched to the ICC reference color profile and subsequently mapped numerically and sent to the *rendering intent* device. This ‘represents the ‘to and from’ relationship that exists when devices are in constant communication with each other. As previously stated, this occurs “transparently” through a device or through software color engines, also known as a Color Management Module.

**Figure 5.**



Note the difference in gamut – defined as “the entire range of possible colors in that system”. sRGB has a very restricted gamut when compared to other color spaces such as Adobe RGB 1998. This is why you will often read that Adobe RGB is the color space preferred by artists and photographers. sRGB is predominantly the color space of choice for the internet, digital projection, and other specific hardware.

CMYK is the other predominant color space most likely to be recognized by the reader. It is a color space, whose acronym stands for Cyan, Magenta, Yellow, and Black. As mentioned earlier, these are colors found in “real-world inks” and are subtractive colors, the de-facto standard inks used for most commercial printing.

Should you decide to have an outside service bureau print your images, you may encounter their policy of accepting only sRGB files for printing. However, depending on the desired final print, the service bureau may request that you convert an RGB image to CMYK color space. When this is

# 2004-2005 PROGRAM SCHEDULE

<u>DATE</u>	<u>PRESENTER</u>	<u>MEETING THEME</u>
4/7/2005	All SBCC members	Competition #6
4/14/2005	All SBCC members	SBCC Multi-Screen Selections (moderator Martha Kerns)
4/21/2005	Guillette & Marshall	Program: David Hughes Show
4/28/2005	All SBCC members	Image Study - Prints, Slides, & Digital (moderator Ray Guillette)
4/29/2005	7 Hills Camera Club	Inter Club Multi-Screen Competition
5/5/2005	All SBCC members	Annual Business Meeting & Print/Slide/Digital Image of the Year
5/12/2005	Digital Committee	Program: T.B.A. (To be Announced)
5/19/2005	Jake Mosser	Program: Salmagundi
5/26/2005	All SBCC members	Image Study - Prints, Slides, & Digital (moderator Ray Guillette)
6/2/2005	Ray Guillette	Workshop/Program: Celebrating the Landscape
6/9/2005	All SBCC members	Annual Awards Banquet & Member's Digital Show

*Andre's column continued...*

done, a change of the color's gamut is definitively noted. When making the decision to outsource to a service bureau, it is highly suggested there be ample communications with service bureau personnel – otherwise, errors can be both time consuming and costly to repair. More information about this color space can be found in the Photoshop manual as well as the HELP in the menu bar.

*To be continued in the June / July issue with  
Calibrating Your Printer / Color Settings on Your  
Computer*

*Don't forget...April 14th, Multi-screen selection night!*

<b>Multi-Screen 2004-2005</b>	
1. After Dark	13. Machinery
2. Bicycle(s)	14. On the Beach
3. Blue	15. Part of a Flower
4. Boat(s)	16. Photojournalism
5. Broken	17. Seashore
6. Church	18. Shadow(s)
7. Clock(s)	19. Softness
8. Door(s)	20. Speckled
9. Graveyard	21. Sports
10. Green	22. Tree(s)
11. Lighthouse	23. Window(s)
12. Lock(s)	24. Winter Activity

PHOTOGRAPHIC SOCIETY OF AMERICA  
67<sup>TH</sup> Annual International Conference of Photography



August 28 – September 3, 2005  
Salt Lake City  
UTAH

## 2004-2005 Stony Brook Camera Club Field Trip Schedule

APRIL 16th, 2005  
LEXINGTON/CONCORD WALDEN POND, MA

MAY 21st and 22nd, 2005  
MARTHA'S VINEYARD, MA

JUNE 11th, 2005  
LUPINE FESTIVAL, NH

Paint Lic # 14590	Contractor Lic # 117164
<b>HMD</b>	
Home Repairs painting	
Harry Davis	508 543-4588



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**STONY BROOK CAMERA CLUB "REFLECTIONS"**  
***A PSA Award-Winning Newsletter***

HENNY SMITH, EDITOR  
3 MEDWAY BRANCH ROAD  
NORFOLK, MA 02056  
E-MAIL: [hennyapril@verizon.net](mailto:hennyapril@verizon.net)

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