Color Processes
A Basic Overview

Ok, here is a basic overview of what you may want to consider before designing your CD packaging. It is important that you understand the distinction between different color processes so that you will be able to successfully pick the right colors and set up your images in a proper manner. There are many different graphics programs out there offering a multitude of color space options. While some of you may already be very familiar with these different color options, there are many who have never considered their differences or never heard the term "color space" before. It is for the benefit of those people that this article is written.

For the purposes of album packaging through Cravedog, you will mostly be concerned with these basic color schemes:

1. CMYK (Four Color Process)
2. Greyscale (Halftone, 1 Color)
3. Bitmap (1 Color)
4. Pantone® Solid Coated (Spot Color)
5. RGB (Screen Colors)

I will explain each of these processes in detail in the sections below. I will also comment on some other color schemes that you will undoubtedly encounter over the course of your project. Each of these processes encompass different color spaces. The term color space refers to the maximum range of color that can be achieved through a given color scheme.

CMYK (Four Color Process)

CMYK is an acronym that stands for "Cyan, Magenta, Yellow, Black" (See **Figure 1a**). These are the four names of the inks that comprise many of the printed colors and images that you see everyday. These four inks mix together on a printing press to produce a wide range of colors. For example, cyan and yellow mix together to make green. Magenta and and yellow mix to make red. In a more complex scenario, all four of these colors come together as tiny elliptical dots to form a color image (See **Figure 1b**).

Figure 1a:

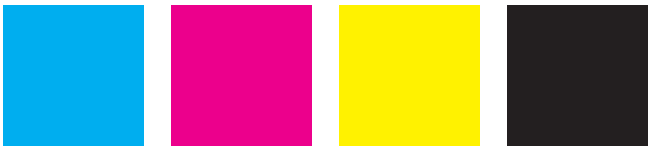
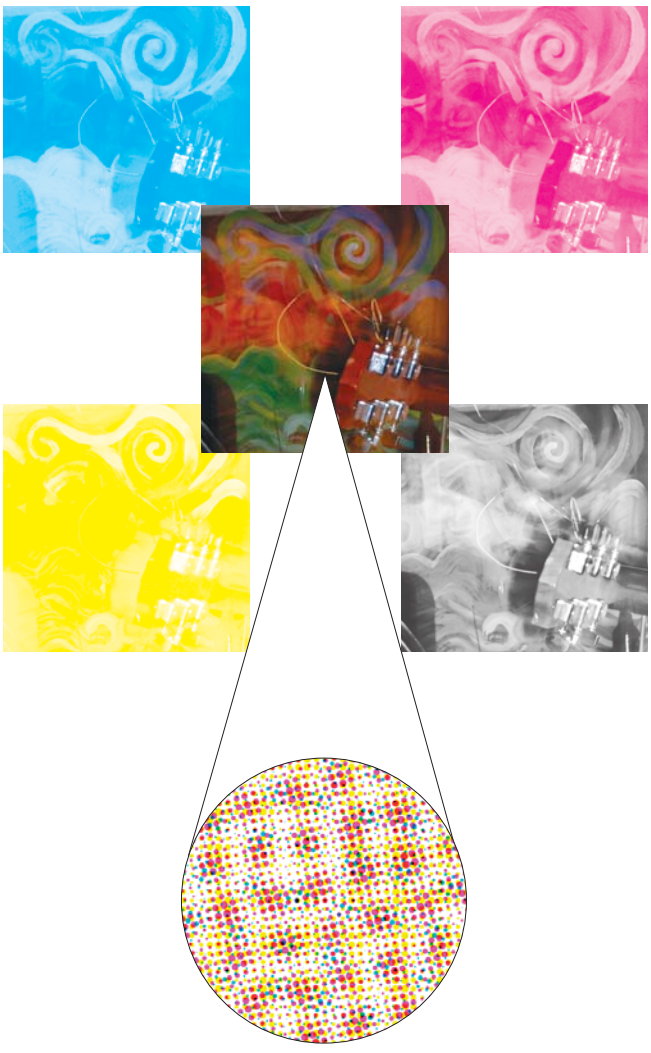


Figure 1b:



The advantages of the four color CMYK process are the wide range of color selection and the ability to generate "full-color" images. The disadvantages are that while you have a wide selection of color, the colors you generate are not as vibrant as those achieved through other processes (Pantone® or RGB) and can be more expensive if you elect to have your whole package in CMYK.

Greyscale (Halftone, 1 Color)

The term greyscale generally refers to black and white images. This process utilizes one color, black (with exception to greyscale Tiffs, more about this later). Many of you will be designing the back panels of your booklet in greyscale mode. Like CMYK, the images you create are made up of many tiny dots. These dots produce many gradations of what we perceive to be "grey". Greyscale gets its name from print operators use of a scale with degrees of black from 0% (White) to 100% (Black) to calibrate their devices (See **Figure 2a**). You will most likely want to set up your black & white photos in this color mode.

The advantages of greyscale images are that they are a cost effective way to print high quality images, tend to have smaller file sizes, and can add a touch of class if utilized well. The disadvantage is that they are obviously limited in color selection.

Bitmap (1 Color)

A bitmap is the less sophisticated cousin of greyscale. In the world of bitmaps, there are no gradations of black. The dots are either 100% black or 100% white. When you convert an image to a bitmap, pixels that with values over 50% will be determined black and pixels under 50% will be white. While greyscale images are generally reserved for photographic images and gradients, bitmaps seem to be more suited to accommodate things such as text, signatures, hand drawings, and other solid color shapes. You can, however, change photographs into bitmap images to give them a rough computerized look (see **Figure 2b**).

The advantages of bitmaps are that they render text and other simple line art very well at high resolutions without generated large file sizes. The disadvantages of bitmaps are that they lack color versatility and have a rough and unnatural look.

Figure 2a:

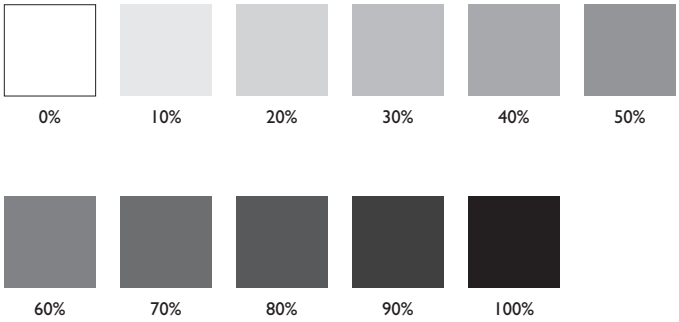


Figure 2b:

greyscale bitmap

Pantone® Solid Coated (Spot Color)

The final main color process you will be dealing with are Pantone® or what are often referred to as spot colors. It is very likely that you will be using this color process when you design your CD face. Many of you will be creating a 2 or three Pantone® color CD face. Pantone® is just a brand name of a printer ink (like Kleenex™ is for facial tissue). "Spot Color" is a phrase used to indicate colors used that are not 4 color process or CMYK. As I explained in the section about CMYK colors, numerous dots of cyan, magenta, yellow, and black ink mix together to create various colors. For instance, Cyan and Yellow are mixed together to make "Green". In the world of spot colors, the ink is premixed (in a factory somewhere opposed to on the printing press) to be a specific shade of green. Because spot colors are premixed chemically, you can achieve a wider range of colors that are more vibrant or rich than those achieved through 4-color process. Also, when the spot color is used at 100%, you won't see a screen pattern within the color as you do in many CMYK colors. (See **Figure 3a**).

The advantages of spot colors are that the colors are more vibrant, there are no screen patterns when used at 100%, and they can be cost effective if you keep the number of designated colors to a minimum. The main disadvantage of spot colors are that they can be costly if you have many (more than three) in a given document or used in conjunction with CMYK colors.

RGB (Screen Color)

So far, we have been discussing the processes that directly have to do with printing. Since this is typically the default color mode that your files will be in and also the mode your documents will be in as you view them on the screen, it is important to understand how it works. It is also important to realize that **RGB is only a temporary stage** in the color process. You will need to convert your images to one of the processes that we previously discussed.

RGB colors are generated by light. Red, Green, and Blue light blends together to give you the millions of colors that you see on your computer screen. Hence this is called the RGB color process. This is a completely different process than the CMYK processes. CMYK works on a subtractive process, RGB works on an additive process. To achieve white using the CMYK mode, you take away all colors. To get white using the RGB method, you add all the colors together (See **Figure 3b**).

Figure 3a:

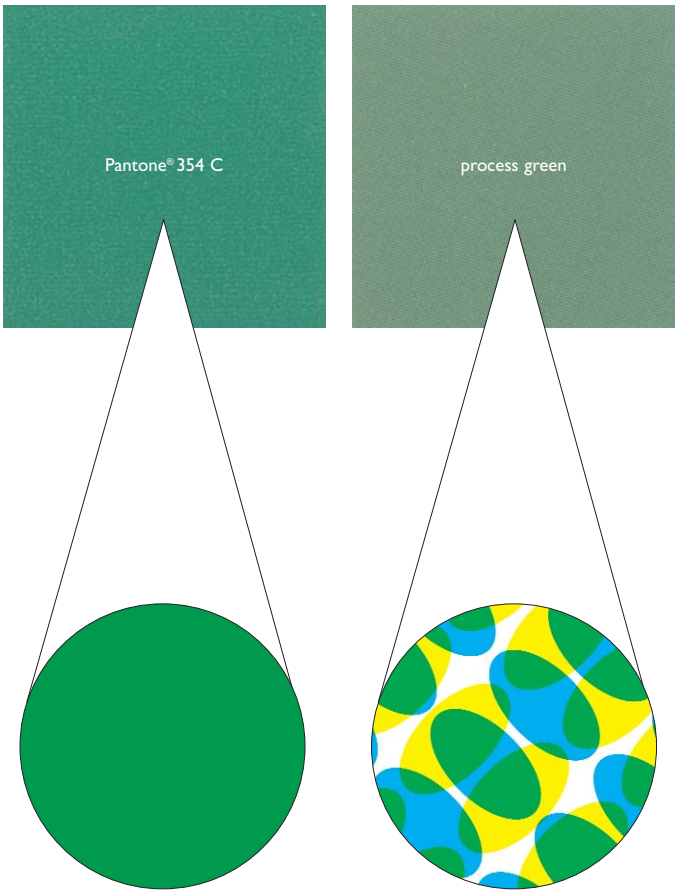
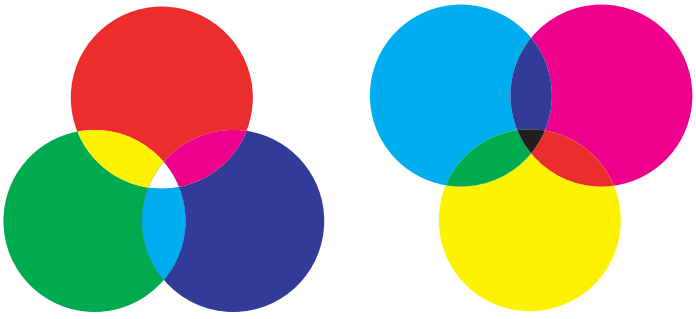


Figure 3b:



RGB (additive)

CMYK (subtractive)

So, where am you going with this? How does this apply to my project? Well, it is important to understand that the colors you see on your computer screen may not necessarily look the same when you see your colors come off a printing press. The reason is that, RGB's color range is much wider than CMYK's or even spot color processes. This color range is what is referred to as the *color gamut* **(See Figure 4a)**. The colors you see on your screen will always look more vibrant than the colors you see on paper. When choosing your colors in any given graphics application, you should be mindful of the limitations of the CMYK process.

How do I know how my colors will exactly look before they come off the press? This is a tough one to answer. I will have to be honest and say that you will never be totally 100% certain. But all is not lost, there are some things you can do to get a pretty good idea what your colors will actually look like. The best way (of course the most expensive too) is to get a professional print proof which are sometimes called by brand-names such as MatchPrint or PressMatch. These are generated directly from the color separations using a CMYK color method. It is also may helpful (but also expensive) to get a Pantone® Solid to Process conversion booklet. These are very helpful when choosing your CMYK colors as well as Pantones®. These books show Pantone® colors and their respective CMYK color equivalents. Some graphics programs, such as Adobe Photoshop, will indicate that your colors may not print properly when you go to select them in the color palette **(See Figure 4b)**. As a rule of thumb, you should be especially leery of bright colors. These are the colors that will be most effected by the RGB to CMYK conversion. If you are planning on using bright colors, you want to carefully pick the color build. The color build is the individual values from 0% to 100% of each of the four color channels. For bright colors, you should refrain from having any black within your builds. For instance, to get a good blue, you would use values like 100% cyan and 20% magenta.

A Word about Laser Prints

After laboring through your layouts, most of you will want to see your work on paper. Many of you out there will be using your trusty ink jet printers. Once again, the colors produced from your ink jet are not accurate as to how your colors will come off the press. Ink jet printers use a CMYK process to produce the range of colors you see printed on your laser. The

Figure 4a:

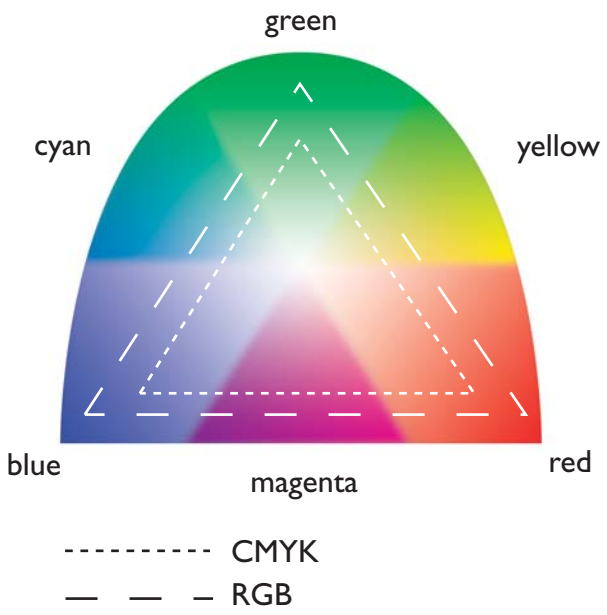
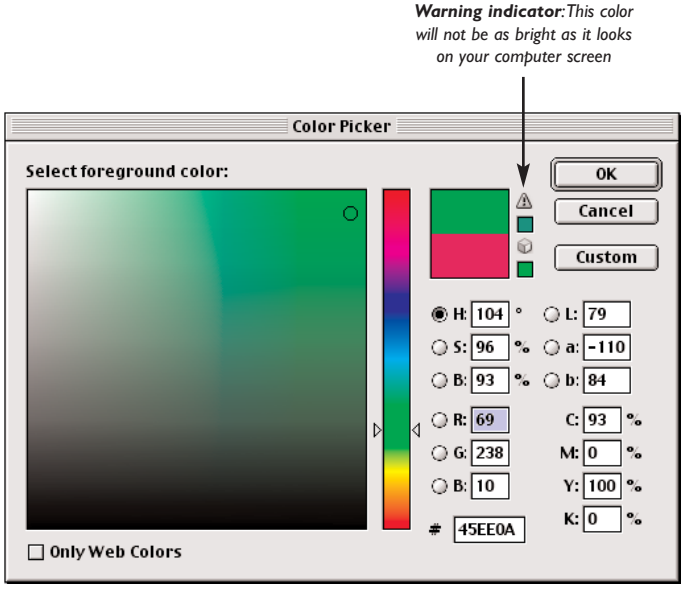


Figure 4b:



problem with this is that the inks used in this process are different than ink used in offset printing. In addition to that, color can vary depending on the levels of ink in your cartridges. Typically, colors may seem more vibrant from inkjets. It is important to realize that inkjet printouts can be deceiving.

So, if you can't trust inkjet printers, what can you trust? Well, as I mentioned before, you really can't trust any device except perhaps a professional color proof such as a Matchprint, Pressmatch, or other high-end color proofing devices. But I realize that most of you simply can't afford to go this route. So, I will suggest what I do when I prepare a CD package for press. After I properly get my layout files and supporting files together onto a storage medium (usually a CD or Zip Disk), I go to Kinkos and have my files printed on a Fiery laser printer. These devices are some of the best quality laser printers in the business. They work on a CMYK process and, according to Kinkos, they are are regularly calibrated to press proofs. The best part about Fiery lasers is that they are relatively inexpensive. It is roughly a dollar for an 8.5" x 11" print and two dollars for an 11" x 17". I believe that these prints are more accurate than most devices out there. But always keep in mind that color laser prints are only approximations of how your colors will actually look when they come of a printing press.

Summary

Hopefully you now have a basic understanding of color processes. The processes I have discussed will definitely come into play as you put your CD package together. As you can see, color can be a precarious issue as it can vary greatly from device to device and process to process. Having a basic understanding will help you get your colors closer to your desired expectations. I have tried to briefly explain this rather complex subject of color management the best I could. If you have further interest or seek more detailed knowledge about color management and related subjects, I suggest that you check out these useful web sites:

- http://dx.sheridan.com/advisor/cmyk_color.html
- http://www.adobe.com/support/techguides/color/main.html
- http://www.microsoft.com/hwdev/tech/color/icmwp.asp
- http://www.color.org/
- http://www.pantone.com/
- http://www.apple.com/colorsync/