

Introduction to Color & the Web

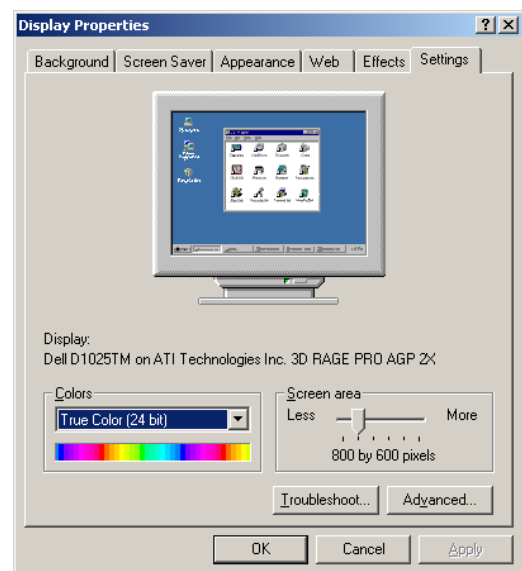
The Basics

The use of color on the World Wide Web has often been portrayed as a source of mystery and arcane science. In reality, Web color and how it can be used follows relatively simple principles that are easy to understand and apply

The first thing to understand is how color is produced on the screen of a computer monitor. Monitor screens are made up of small dots of phosphor called “pixels.” There are three pixel colors, red, green, and blue. A standard computer monitor has three electron guns, one each for red, green, and blue. Each electron gun “shoots” electrons that illuminate pixels with the matching color.

Varying the “amount” of red, green, and blue produces different colors. This is called the RGB system. The typical computer monitor today is capable of producing up to 32 million colors. The settings for a PC monitor are set using a Display Properties panel similar to the one on the right.

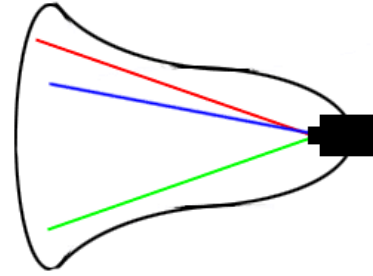
However, Web browsers use color pallets. These pallets consist of 256 specific colors. All colors displayed using a browser, such as Netscape, Internet Explorer, or Opera, are created using this pallet. Of the 256, only 216 are theoretically available on both Macintosh and PCs. These 216 colors are called “browser safe” because they are supposed to be presented identically by browsers on both PC and Macintosh computers.



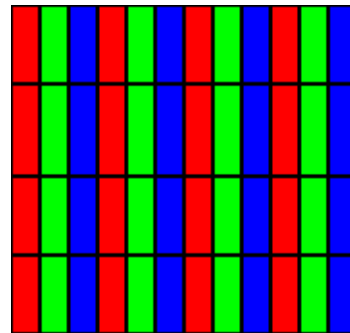
So while a computer monitor may be capable of presenting millions of different colors, browsers use only 216 when they display a Web page on that monitor. This can create some difficulties. To understand more it is necessary to see how colors are created on a monitor.

Colors and Hexadecimal Values

As mentioned before, computer monitors use the RGB (Red, Green, Blue) system to create all the colors that appear on a monitor's screen. Any color that appears on a monitor is made up of various amounts of red, green, and blue. Devices called "electron guns" inside the cathode ray tube (CRT) monitor "shoot" electrons at the back of the screen, which is coated with phosphor. This causes the phosphor to glow with varying degrees of red, green, and blue. The diagram on the right provides a basic illustration of what is happening inside the CRT.



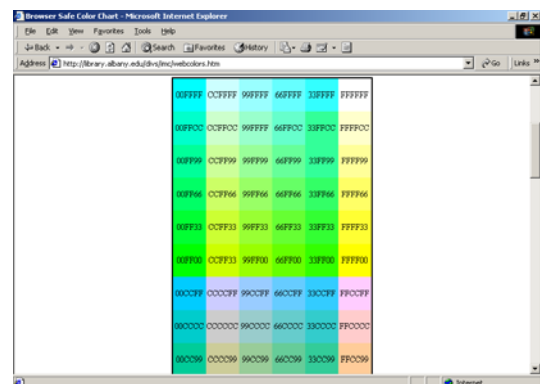
LCD (Liquid Crystal Display) monitors, on the other hand, do not have electron guns. Instead, they rely on certain properties of the crystals. These properties allow the crystals to either block light or let it pass through. RGB color combinations are controlled in this manner. Each pixel of a monitor's screen has three subpixels, one for red, one for green, and another for blue. The illustration on the right shows how the pixels and subpixels are arranged on the screen.



When working on the Web, colors are almost always specified using their hexadecimal values. The hexadecimal method of counting involves starting at 0 and continuing to f. The full counting range is 0 1 2 3 4 5 6 7 8 9 a b c d e f. Each color in the RGB system is assigned a value based on this method of counting.

Thus, true red is coded as ff0000. The first two digits in the code represent the "amount" of red that is to be displayed. That amount is ff. The next two digits represent the amount of green, 00. The last two digits are for the quantity of blue, again 00. Thus, in true red, ff0000, there is ff amount of red, no green, and no blue.

The hexadecimal code for true green is 00ff00. True blue is 0000ff. Varying the amounts of red, green, and blue specifies other colors. 33CC99 is a particular shade of green, for instance. A complete browser safe color chart showing the colors and their codes may be viewed at <http://library.albany.edu/divs/imc/webcolors.htm>.



The colors that make up the browser safe pallet are not particularly artistic. Rather, they represent a mathematical progression. A study of the hexadecimal values will reveal that the each step of the progression is about 20% beyond the previous step. While this fact may not serve any useful artistic purpose, it is a handy bit of knowledge for trivia contests and unusually boring meetings of Web designers.

Interestingly, there are actual names for some of the browser safe colors. Rather than specifying the hexadecimal code in a Web page, it is possible to use these color names. Although 216 names exist, such as aquamarine, beige, and red, only 140 of them are reliable. Browsers do not recognize the entire list. In some instances, two or more names apply to the same color. The use of names is highly discouraged when building a Web page.

Web Color

What happens when a browser is asked to display a color that is not in its color pallet? There are two options. In some circumstances the browser may substitute a browser safe color for the new one. However, in other situations the browser attempts to compose the new color using two or more browser safe colors. In the case of a photograph, for instance, the results will be small dots all over a region that should actually look like a solid color. These dots will each be one of the several browser safe colors that make up the new color when viewed together.

This dotted effect is called “pixelation” because the dots are made up of pixels. It often resembles a pointillist painting. "A Sunday on La Grande Jatte" by Georges Seurat may be the most famous example of this style of painting.



The safest way to avoid pixelation is to use browser safe colors whenever possible. This is especially true for colors generated by HTML code and GIF images. GIF images are usually used for drawings and logos, both of which tend to feature masses of solid colors.

Color, Theme, Mood, and Message

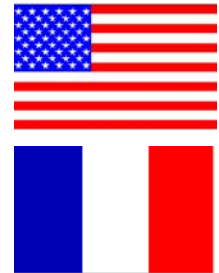
Color functions on many levels. It is endowed with cultural and literal meanings. Color resonates with emotion. Humans have both conscious and subconscious reactions to color. As a result, careful and judicious use of color on the World Wide Web is required.

Color can be separated into different categories. Among the most basic categories are warm and cool. Warm colors include red, yellow, and orange. Cool colors include blue, purple, and green. Use of either of these color categories can help determine the feel “feel” of a site.



Color also has representational elements to it. For instance, if we ask a group of people to name colors that they think of when they hear the word “forest,” they are likely to respond with green, brown, and gray. However, in the autumn they might also add orange and yellow to their list. It is no surprise to discover that grocery stores often decorate in shades of green, tan, and yellow. These colors are associated with food. Aside from eggplant and some grapes, there are few examples of purple food, so that color is rarely seen in grocery décor.

Other colors convey more direct messages. Many colors are associated with countries. The “Old Red, White, and Blue” usually refers to the flag of the United States. But mentioning a red, white, and blue flag in France will suggest a completely different banner.



On the other hand, while green has extremely strong associations with Ireland, the Irish flag has three colors. When used alone the "green" of Ireland will conjure images of shamrocks and leprechauns, but when associated with the white and orange of the flag the connotations are completely different.



Until the mid-1960s, automobiles on the Formula One racing circuit were painted in national colors. Italian cars were red, English cars were a particular shade called British Racing Green, French cars were blue, and German race cars were silver.



BRM Race Car from Great Britain

The cultural significance of color is particularly interesting. How we react to color and how we interpret it is often based on our cultural background. For instance, in Western culture, white is often used to represent purity and is thus the traditional color for wedding dresses. But in some countries wearing a white wedding dress would be considered a serious breach of etiquette.

An excellent example of how color use is, in part, culturally oriented can be observed by how red is used around the world. In many Asian countries red is considered a good luck color. It is used on important buildings, especially temples and shrines.



In Western culture red is a color used for warning purposes. Red is the color for stop signs and markings signifying a dangerous area. It is also used as an alert color. Workers performing a hazardous task wear it. Red is a common color for highway construction safety vests and life jackets.



In the United States and Canada red is the traditional color for barns and other farm out buildings. A barn that is painted in an unusual color might be blue, yellow, or tan. But those colors are perfectly normal for houses.



Red is so strongly associated with London double-decker busses that the origin of the photograph on the right would be instantly recognized all over the world. Even though red double-decker busses are used elsewhere, such as Hong Kong and some Canadian cities, without clues to identify the location most people assume that a photo of such a bus was taken in London.



At the same time, a car with red paint is recognized as being “sporty.”



Color Schemes

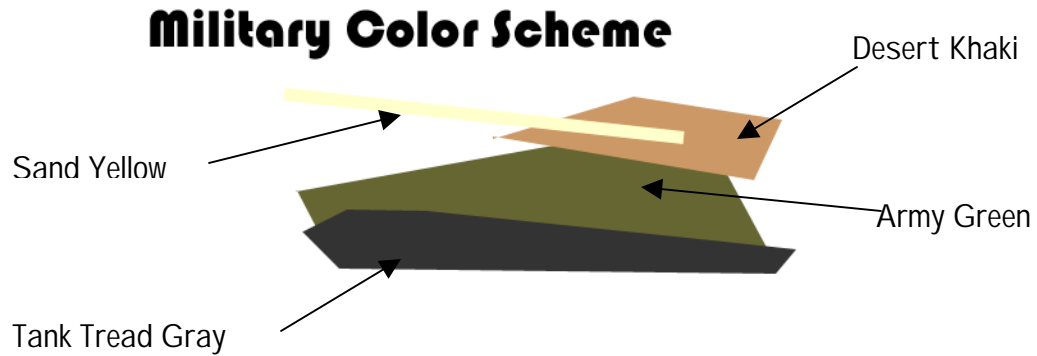
Color schemes are groups of colors, which are designed to server particular purposes. Some colors may be used to divide different areas of a Web page into particular areas such as information zones and navigation regions. But color schemes are almost always used to create an identity. They also help to establish mood.

Below is a color scheme similar to that used by several grocery store chains.

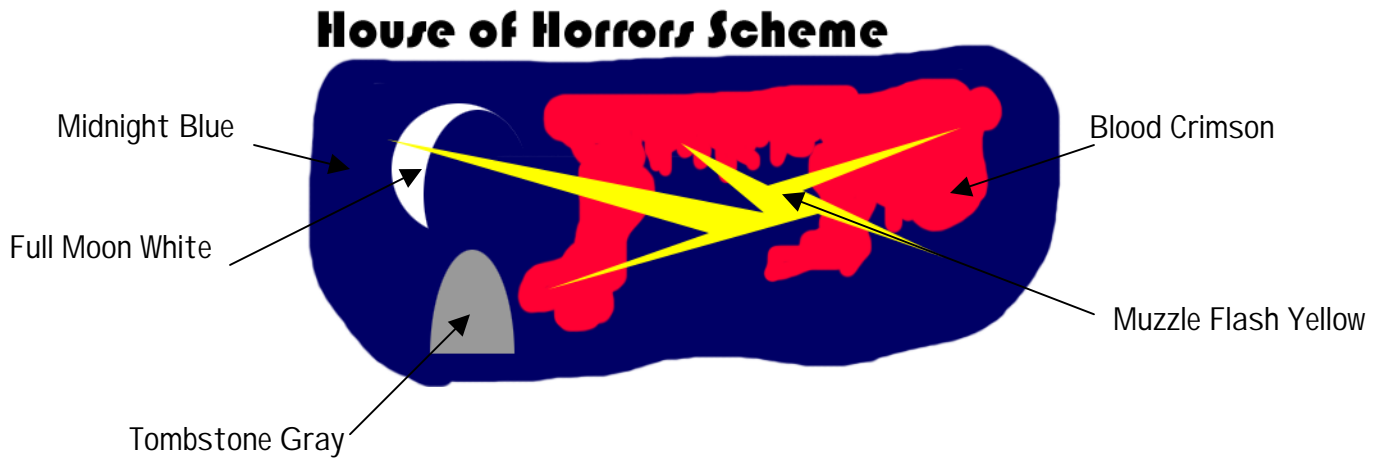
Grocery Store Color Scheme



Other colors are clearly recognized as being military in theme.



Color schemes may be less representational and more emotional. When combined together, the colors below can be used to convey a fearful feeling.



Choosing Colors

There is no right way or wrong way to choose colors for a Web site. The colors should be used to convey the theme, mood, feeling, and message of the site. And we know that there shouldn't be "too many" colors. However, deciding what quantity is too many is hard to decide. And it varies from site to site. In one instance three colors might be just right. On another five colors are appropriate. But on a third site four colors could be too much.

There are several questions that can be asked when trying to decide what colors are appropriate.

- **Is there already an identifying color scheme for the organization desiring the site?** For instance, both Ford and IBM have particular shades of blue that are associated with those companies. Schools and colleges have colors, too. School colors have often been incorporated into the schools' nicknames, hence the "Crimson Tide," "Red Birds," and "Orangemen."
- **That is the primary theme of the Web site?** A Web site for a nonprofit organization that is dedicated to saving the old growth timber forests would be almost certain to feature various shades of green and brown. It wouldn't make sense to have a site that is primarily bright yellow or red because these colors do not "say forest."
- **Is there a favorite color?** The person who desires the site may have a strong preference for a particular color. Such a person may identify with a color to such a degree as to actually collect objects that feature it. That type of individual may have, as an example, a pink car, pink socks, and collect pink glassware.
- **Will the connotations of the color match the intent of the Web site?** Vibrant and exciting colors, such as blood red, are inappropriate for a dentist's site. In most instances such a site should feature calming and soothing colors that also hint at trust and reliability.
- **Do the colors get the message across?** All Web sites have a message. The message is associated with the purpose of the site. Visitors to the site will be encourage to take a class, buy a product, watch a TV show, play a game, send a greeting card, or enroll in a school. The colors used in a site should always work to enhance the message and not detract from it.

Color is one of the most important components of a Web site. It can add interest, promote a message, and convey feelings. Careful selection and use of color will enhance any site.