

# **The Effect of Color in Web Page Design**

## **Introduction**

Web pages are communication tool between a web producer and a web user. As strangers get together for the first time and share their first impressions, the web producer and the reader share their impressions and communicate through a web. In the same way that we think it is important to choose an appropriate color and design for an important event, it is crucial to choose appropriate color schemes to convey images and messages on your web page.

Color is a central part of our lives. People look at and react to different colors, tints, and shades thousands time every day. People rely on colors to convey meanings for many things. Color has both emotional and psychological impacts. Colors can capture our attention and cause us to react based on our own experiences and beliefs. Web-designers must be very familiar with effects of colors.

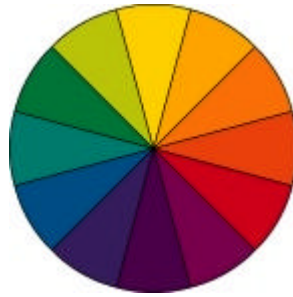
This paper includes the basic rules of color theory and the functions of color. Subtopics expand the discussion of the effects of colors on mood, color symbolism, readability, legibility, consistency and accessibility. Examples of effective and ineffective usage of color will be discussed.

## **Significance of the topic**

By examining the basic rules of color theory and effects of colors, a web designer can develop more appealing and effective web pages which are more likely to send images and messages of the site to users directly and effectively. Comparing effective

and ineffective examples of web sites will help us develop professional eyes and skills for producing the most effective web site.

## 2. Basic Rules of Color Theory



[Picture 1] Color Wheel

- (1) The *primary* colors are red, yellow, and blue. All other hues are derived from these colors.
- (2) The *secondary* colors are orange, violet, and green.
- (3) The *intermediate* or *tertiary* colors are between the primary and secondary colors: red-orange, yellow-orange, yellow-green, blue-green, blue-violet, and red-violet.
- (4) The *warm* colors are ranging from red-violet to yellow. Orange is considered the extreme of warm. Warm colors are vibrant and active.
- (5) The *cool* colors ranges from violet to green-yellow. Blue is considered the extreme of cool. Cool colors are relaxed and subdued. Creative color selection starts with a few basic color schemes.
- (6) *Analogous* colors are any three consecutive color segments on the color wheel. For example, Blue, blue-violet, and violet are analogous colors. Analogous colors produce a palette that blends well and conveys a feeling of harmony.

- (7) *Complementary* colors use two hues that are directly opposite. This color selection is very powerful and provides high contrast, but it sometimes can be quite jarring and hard to view over long periods of time.
- (8) *Split complementary* colors consist of one hue and the two segments adjacent to its complement. This color scheme is vivid and not too overpowering. For example, the green, red-violet, and red-orange segments are split complementary colors.
- (9) *Monochromatic* colors use all the hues of one color segment. A monochromatic color scheme conveys harmony through gradual tone changes in the single-hue segment.
- (10) *Triadic* colors use three colors that are an equal distance from each other. These can include the primary, secondary, and intermediate colors. This color scheme gives a sense of balance between the colors. For example, the blue-violet, red-orange, and yellow-green segments make triadic colors.

### **3. Functions of Colors**

#### **(1) Effects of Color on Mood**

Color can control or affect the look and feel of the web site. Adding a few colors can make a boring site exciting, a good site ugly, or can evoke emotional responses. Therefore, designers should have colors to enhance their sites by creating good visual and emotional effects. Colors should help the reader/user to enjoy the web-experience.

Here are some examples about how color influences mood:

- **Pink:** soothes, acquiesces; promotes affability and affection.





- **Yellow:** expands, cheers; increases energy.
- **White:** purifies, energizes, unifies; in combination, enlivens all other colors.
- **Black:** disciplines, authorizes, strengthens; encourages independence.
- **Orange:** cheers, commands; stimulates appetites, conversation, and charity.
- **Red:** empowers, stimulates, dramatizes, competes; symbolizes passion.
- **Green:** balances, normalizes, refreshes; encourages emotional growth.
- **Purple:** comforts, spiritualizes; creates mystery and draws out intuition.
- **Blue:** relaxes, refreshes, cools; produces tranquil feelings and peaceful moods.

## (2) Color Symbolism by Culture

Color has a powerful effect on how we associate things. Colors can give a reader predefined feelings and prejudices about a web page even before he/she sees the content.

In the United States, certain colors are associated with certain things/images. Red is related to a stop sign and fire engines. Green is associated with go and nature. Blue is associated with the words blue and sky. However, the World Wide Web is reaching out to more and more people across the world. The web-designers' job with respect to color becomes more and more difficult. Colors take on totally different meanings in different cultures. For example, black is normally associated with death and evil in the United States. In China, however, black is associated with happiness and enjoyment. In the United States, white is symbolized purity and beginnings. But in India, white symbolizes death.

The following chart contains information on the cultural symbolism of various colors.

Color	Cultural Significance
 <b>Red</b>	<p><b>China</b> - symbol of celebration and luck, used in many cultural ceremonies that range from funerals to weddings.</p> <p><b>India</b> - color of purity (used in wedding outfits).</p> <p><b>United States</b> - Christmas color when combined with green, Valentines Day when combined with pink, indicates stop (danger) at traffic lights.</p> <p><b>Eastern cultures</b> - signifies joy when combined with white.</p>
 <b>Yellow</b>	<p><b>Asia</b> - sacred, imperial.</p> <p><b>Western cultures</b> - joy, happiness.</p>
 <b>Blue</b>	<p><b>China</b> - associated with immortality.</p> <p><b>Colombia</b> - associated with soap.</p> <p><b>Hindus</b> - the color of Krishna.</p> <p><b>Jews</b> - holiness.</p> <p><b>Middle East</b> - protective color.</p> <p><i>* Note: Blue is often considered to be the safest global color.</i></p>
 <b>Orange</b>	<p><b>Ireland</b> - religious significance (Protestant).</p> <p><b>United States</b> - inexpensive goods, Halloween (with black).</p>
 <b>Green</b>	<p><b>China</b> - studies indicate this is not a good color choice for packaging, green hats mean a man's wife is cheating on him.</p> <p><b>France</b> - studies indicate this is not a good color choice for packaging.</p> <p><b>India</b> - the color of Islam.</p> <p><b>Ireland</b> - religious significance (Catholic).</p> <p><b>Some tropical countries</b> - associated with danger</p> <p><b>United States</b> - indicates go (safe) at traffic lights, environmental awareness, St. Patrick's Day, Christmas color (red and green).</p>
 <b>Purple</b>	<p><b>Western cultures</b> - royalty.</p>
	
 <b>Brown</b>	<p><b>Colombia</b> - discourages sales.</p>
 <b>White</b>	<p><b>Eastern cultures</b> - mourning, death.</p> <p><b>Japan</b> - white carnations signify death.</p> <p><b>United States</b> - purity (used in weddings).</p>
 <b>Black</b>	<p><b>Western cultures</b> - mourning, death.</p>
 <b>Saffron</b>	<p><b>Hindu</b> - sacred color. (orangish peach color)</p>
 <b>Pastels</b>	<p><b>Korea</b> - trust.</p> <p><b>United States</b> - spring, Easter; pale blue (baby blue) stands for an infant boy; pale pink stands for an infant girl.</p>
 <b>Rainbow</b>	<p><b>United States</b> - symbol for homosexuality.</p>

Color symbolism can vary dramatically between cultures. If your audience includes people of cultures other than your own, make an effort to understand what meanings those cultures associate with color.

Research shows that most colors have more positive associations than negative. Many people associate black with mourning but only in the context of funerals. In other situations, some people perceive black to be an elegant color. So, although most colors do have some negative connotations, those associations may only be triggered under specific circumstances.

### **(3) Readability**

The color combination used is very crucial when dealing with backgrounds and foregrounds of a web page. An important design issue is to create the background and foreground with enough contrast to make the content legible. Not enough contrast, such as using analogous and monochromatic colors, makes it hard for readers to read the text whereas a too severe contrast can cause a physiological headache to result from your web page.

Bright colors are good attention grabbers, because they are loud and obvious. But if every color on the page is bright, the page just becomes an eyesore. Creative color schemes are exciting, but make sure that they add to the readability of your content.

Colors that are close together on the color wheel are good to use for subtle changes. However, using them as a foreground/background color scheme is not wise. Complement colors have a vibrant feel when used together. However, for a foreground/background, they might be too powerful. A high contrast might be exciting

and attention grabbing, but its overuse can reduce a readability of a text severely.

Achieving balance in color is vital in order to properly convey the contents of your web page without injuring the reader's eyes.

#### **(4) Legibility**

The colors for a text and links are an important consideration when ensuring that your site is legible. Foreground/background color combinations are crucial in making your site legible and choosing a text color that does not make readers difficult to read. Also don't make your reader go treasure hunting for your text.

Links should be distinguishable from the body text, even after it has been clicked. Try not to select colors that match the body text around the link. Make also sure that after the link has been visited, the link color does not turn into the surrounding text color or blend into the background.

#### **(5) Consistency**

Consistent color schemes give your site a sense of familiarity and professionalism that a reader can recognize right away. For example, in order to get people to associate certain colors with their company, they must be consistent in the way they splash their colors all over their promotional materials, correspondence, commercials packaging, sign, and so on. As a designer, we have to take some of that mentality and add it to our web design.

## **(6) Accessibility**

Increasing accessibility for colorblind readers is an important thing to develop professional web pages. There are some considerations that we should have to increase accessibility for colorblind readers.

It is strongly recommended that you should use a strong and bright contrast between foreground and background colors not only for your page text but also in your images. Even totally colorblind readers can differentiate similar colors which contrast bright with dark. It is good to use blue, yellow, white and black if you really must use colors to distinguish items. These combinations are less likely to be confused than others.

However, don't use [red / green / brown / gray / purple] [next to | on top of | changing to] [red / green / brown / gray / purple]. Try not to use colors in images to denote special areas, such as bar charts, maps and navigation bars. Consider using textures or line shading instead (try the "paper" or "pattern" function in your graph or painting program). Alternatively, provide additional written labels.

Whenever you should provide ALT="..." text for all your images. If a user cannot understand your image they can reload with images off. You should also consider using JavaScript MouseOver events to provide status-line descriptions of images, especially maps and navigation bars.

## **(7) Web-safe Colors**

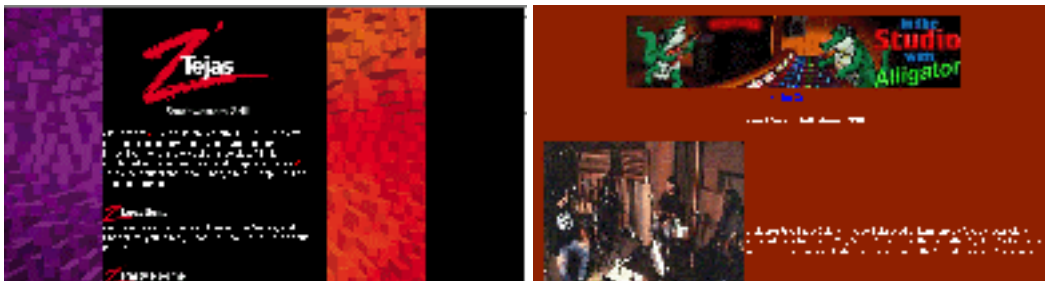
Color on the web is a very complex and often frustrating issue to deal with. If you use the 216 browser-safe colors, your image will look good and won't dither, but you

still might be surprised to find out what others are seeing. Colors outside of the browser-safe palette can cause dithering problems. Even browser-safe colors can display differently on different operation systems and monitors.

When the programmers at Netscape developed their browser, they created a browser palette from a mathematical color cube. This palette contains 216 colors that will display without dithering on any platform, at any resolution. The same palette is used by other browsers and has become the standard for web color. If you use colors outside of this palette, the colors will dither on monitors set to a low resolution. Dithering is the process of attempting to create a color not in the palette with the available colors from the palette. Unless you like spotty, the effect created is not usually very appealing.

#### 4. Examples of Effective and Ineffective Usage of Colors

##### Example 1. Using Warm Colors Effectively.



[a]

[b]

[a: <http://www.genesystems.com/ztejas2/main.htm>]

[b: <http://www.alligator.com/studio/index.html>]

The warm colors include red, red-violet, and brown. Warm colors give vibrant and energetic feeling to the page. Therefore, readers can have hyper feelings from the web page. When those colors have high contrasts, the site can appeal to Generation Xers

in a catchy way. However, you should be careful about designing such pages. A high-energy page can overpower the reader and cause psychological headaches.

The above web pages provide a hyper energy to readers. Readers can get strong images from both sites. The combination of many warm colors demands an instant attention. However, a designer should consider the purpose of the web site. For example, site "a" provides a strong image of the site but the purpose of the site is to provide information about a restaurant. All the information about locations, menus, etc is written in white on a black background between the violet and red walls. It is hard for readers to read all contents easily and to guess why they use these strong color schemes. It can give visitors a feeling that the restaurant is busy, frenetic, and not a relaxing place to eat.

Although site "b" uses similar warm colors, a designer tries to increase an effect of the colors by providing less text to read and big pictures of the studio. Those warm colors on this site provide an image of jazz appropriately which is the purpose of this web site. Readers can imagine a rich soul music and a sound of saxophones through the site.

When a designer decides to use these warm colors on the web, he/she should be aware of the effects of those colors. Careful selection that matches an image of the web site can create a high-powered page that could send message of the importance and images of the site.

## Example 2. Using Triadic Colors Effectively



[a]



[b]

[a: <http://www.kmart.com/>]

[b: <http://www.sunsetbooks.com/Magazine/Sections/Home/HomeFrameSet.html>]

Triadic colors use three colors equidistant from each other on the color wheel. This can include the primary, secondary, and intermediate colors. For example, the above web sites use triadic colors such as red, yellow, and blue. This combination color scheme usually gives a sense of balance between the colors. As we can see on the "b" site, the red and yellow graphic in the top center of the site gives a sense of balance and good contrast on the page. The "a" site creates a little confusion and may cause a psychological headache. Although "a" uses triadic colors mainly, there are too many colors on the page. These authors chose to make the entire page with a triadic combination but the designers of "b" used a single graphic which achieves the effect much more effectively. In site "a" readers can easily be overwhelmed by the colors and lose what is important on the page. If a designer takes away some of the colors and keep main triadic colors, the web pages can give readers more balanced feelings and help them search more effectively.

### Example 3. Using Bright Colors Effectively on a Background and a Foreground



[a]



[b]

[a: <http://cookbook.virtualave.net/kitchen/kidsfavorites.htm>]

[b: <http://www.oranges.com/>]

Bright colors make a page loud and obvious so they grab readers' attention well. However, a designer who uses those bright colors as a background and a foreground should be very careful not to diminish the readability of the content.

While both web sites use the monochromatic colors as a background and a foreground, "b" conveys the message more efficiently than "a". The simple graphics and contrast by using big and bold fonts convey the image of the web site to readers without being a big eyesore. Although "a" could grab readers' attention at first, there is not enough contrast on the text and links to help readers read and navigate easily on the web page.

Monochromatic and analogous colors on the color wheel can be good to use for subtle changes and provide mellow soothing mood. However, using them as foreground and background colors should be avoided without special reasons (such as shown in "b"). In order to increase a readability and a legibility of "a", using complement colors (e.g., violet) as a text and links can be recommended. However, a high contrast can reduce a

readability of a text. Achieving balance in color is very crucial to convey the contents without diminishing readability and a legibility.

#### Example 4. Color Symbolism by Culture



[a]



[b]

[a: <http://www.bloomberg.com/products/life.html>]

[b: <http://www.daewoo.com/>]

The symbolic meaning of color can differ culture by culture. If your audience includes people from a culture different from your own, you need to consider seriously what meanings those cultures associate with the color scheme you intend to use. For example, to Americans purple conveys an image of royalty as shown in "a", whereas Koreans think that is feminine and romantic color. Therefore, Koreans would never use purple to make professional web sites. Instead, pastels or sky blue will be more frequently used to convey the images of trust and development as shown in "b".

Besides, in the case of "b", the consistent color schemes throughout the web pages increase the sense of familiarity and professionalism whereas "a" provides poor professionalism by using irregular color schemes and commercial packages.

## Summary

A web page is one of the most effective tools to communicate with a lot of people all over the world. When a web designer understands a target audience, a purpose and goals of the site well, he/she can create a web page to deliver messages. However, a web page does not deliver only contents but also images, impressions, and emotions through a virtual space. The interpretation of the text and the response to the message is greatly influenced by the context in which they are presented. One of the most important elements of that context is color. In order to convey them efficiently and effectively, a web designer needs to have professional design strategies such as arranging colors and graphics, etc.

Colors have emotional and psychological impacts. One of the most crucial elements needed to convey effective messages on a web is through the appropriate choice of color schemes. When you want to send a message communicating strong hyper energy to your readers, you would choose warm color schemes (i.e., color range from red-violet to yellow in a color wheel). When you want to sooth and mellow your audience, you would use cool color schemes (i.e., color range from violet to green-yellow in a color wheel). Analogous and monochromatic colors give a feeling of harmony whereas complementary colors provide powerful high contrast. As a web designer, you should be aware of effects of the color.

However, in any case, the use of color must extend beyond the foreground and the background. A designer should not sacrifice readability, legibility, and even accessibility of a web site. One can choose a white, a colored, or a patterned background for the pages. A white background increases legibility and makes the page elements stand out.

Colored and patterned backgrounds can enhance a mood. However, one should not sacrifice readability, even at lower resolutions.

The colors for your text and links are an important consideration when ensuring that your site is legible. You must make sure that the colors you choose balance well with the background. For example, one should not choose complementary colors to the background. Those colors can be difficult to read or might disappear into the background. Links should be distinguishable from the body text, even after it has been clicked.

In sum, although What You See Is What You Get is a basic rule on a web, people can have different experiences with web pages depending on the colors. Designers also need to remember that their perfect designs may not be parsed as they intended. Different browsers may render colors differently. Therefore, when dealing with colors, one needs to use the browser-safe colors in order not to cause dithering problems and to have the colors to be recreated as intended by the designer. Besides, one needs to be aware of the fact that even browser-safe colors can display differently on different operating systems and monitors. Therefore, constant trial and error test is always needed.

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\*This paper is written by Hye-Yeon Lim for the course EDC 385G Interactive Multimedia Design & Production at the University of Texas - Austin.