The Art and Science of...
Design and Color

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AIGA (American Institute of Graphic Arts), the professional association for design, defines graphic design as:

A creative process that combines art and technology to communicate ideas. The designer works with a variety of communication tools in order to convey a message from a client to a particular audience.

According to AIGA, design is an investment that gives a business a competitive advantage by building customer trust and loyalty. And an important element of design is innovative and effective use of color.

Understanding color

When starting a design project, one of the graphic designer's first tasks is to select a color palette with attributes that represent the client and appeal to the audience. This requires an understanding of the meaning of colors and how the color spectrum is structured.

A color circle or wheel shows the relationship of one color to another by arranging them in a logical sequence that mimics what happens when colors are mixed. The most familiar color wheels consist of primary, secondary, and tertiary colors. Primary colors cannot be made by mixing other colors. Secondary colors are made by mixing two primary colors, and tertiary colors are made by mixing one primary and one secondary color.

The primary, secondary, and tertiary colors are arranged sequentially around the color wheel so that primary colors are equidistant and the secondary and tertiary colors fall in between. Colors that are directly opposite one another on the color wheel are called complementary colors, while those that are side-by-side are called analogous colors.

The oldest of all color circles is based on subtractive color and uses cyan (light blue), magenta, and yellow colorants as the primary colors (though blue, red, and yellow can also be used). Combining all three primary subtractive colors produces black, while combining two primary colors produces violet (purple), orange and green, formed by mixing equal amounts of red and blue, red and yellow and blue and yellow respectively. Color painting, photography, and printing use the subtractive color circle.

An additive color circle is based on red, green, and blue light as primary colors. Combining the three primary additive colors produces white light. Combining two primary colors produces the secondary colors of cyan, yellow, and magenta (blue + green = cyan; red + blue = magenta; green + red = yellow). Sir Isaac Newton developed the additive color wheel in 1706 after observing that when white light passes through a spectrum, it separates into wave lengths of six different colors — violet, blue, green, yellow, orange, and red. He called this a spectrum. Computer screens, television sets, and theater lights use the additive color circle.

"An additive color circle is based on red, green, and blue..."

Full color printing uses the subtractive color wheel with primary colors of cyan, magenta, and yellow. Cyan is the complement of red which means that it absorbs (subtracts) red; magenta absorbs green; and yellow absorbs blue. When paper that reflects light is covered with a colorant like ink, the ink subtracts parts of the white light shining on the paper. Because printing inks are transparent, any light that has not been absorbed by the ink is reflected back to the viewer from the paper. This reflected light is what produces the specific color seen by the viewer. By varying the amount and color of ink on the piece of paper, the full visible spectrum of light can be seen by the viewer.

"Full color printing uses the subtractive color wheel..."

The effect of color

The primary colors of the additive and subtractive systems are associated with meanings that can be thought of as the color's personality. These symbolic meanings are something that people consciously or unconsciously use when evaluating a color palette and can provoke a positive or negative reaction. Some meanings differ by culture: white is a symbol of purity in the United States so it is used for weddings; in China it is a symbol of death so it is used in funerals.

Developing a color palette

"If your business or organization already has a logo, use its predominant color as the basis for the color palette..."

If your business or organization already has a logo, use its predominant color as the basis for the color palette (Color 1). Next select a color that contrasts (Color 2). If you want to use a third color, pick the complement of either Color 1 or Color 2. Using contrasting colors helps achieve a balanced look, though be aware that too much contrast might appear aggressive. Use the lightest color of the three for large areas like a background, and the most vibrant color where you want to attract attention.

The meaning of color

As part of her web site, Color Matters, Jill Morton, MFA, a color consultant and former college professor, offers a thorough explanation of what colors mean globally. Her work is based on the Global Color Survey, a 19-question survey that can be completed online. The following information is excerpted from her website.

Red is the color of extremes: passionate love, seduction, violence, danger, anger, and adventure. It is a magical and religious color. In ancient days, red was almost as rare and as expensive as purple. Today's intense red dyes come from crushed insects (the lac beetle and the cochineal). Red is one of the top two favorite colors of all people and the most popular color used on flags in the world (about 77% of all flags include red). Red is the international color for stop.

Red captures attention. It is one of the most visible colors (second only to yellow) of the spectrum, so is used on fire engines and stop signs to trigger alertness. Red focuses behind the retina, forcing the lens to grow more convex to pull it forward. Therefore, we perceive that red areas are moving forward. Eight percent of the male population has a red-green color vision deficiency and cannot see red at all.

Yellow is the most luminous of all the colors and captures attention more than any other. It is the color of happiness, optimism, enlightenment, creativity, sunshine, and warmth, but also cowardice, betrayal, egoism, and madness. Yellow is the color of caution and physical illness (jaundice, malaria, and pestilence). Sources of yellow pigments are toxic metals (cadmium, lead, and chrome) and urine.

The Art and Science of... Design and Color (cont.)

Because yellow is the most visible color of the spectrum, the human eye processes it first. Peripheral vision is 2.5 times higher for yellow than for red. Yellow has a high light reflectance value, and therefore it acts as a secondary light source. Excessive use of bright yellow (such as on interior walls) can irritate the eyes.

Blue is the #1 color favorite of all people globally. In nature it is the color for water and sky, but is rarely found in fruits and vegetables. Blue has more complex and contradictory meanings than any other color, depending on the shade. Dark blue = trust, dignity, intelligence, authority. Bright blue = cleanliness, strength, dependability, coolness. Light/sky blue: peace, serenity, ethereal, spiritual, infinity. Most blues convey a sense of trust, loyalty, cleanliness, and understanding, though blue also evolved as a symbol of depression in American culture. Aristocracy is blue-blooded in all European languages.

Blue is the most commonly used color for corporate identity, and 53% of the flags in the world contain blue. Blue is sharply refracted by the eyes. This causes the lens to flatten and to push the blue image back, so blue areas are perceived as receding and smaller. Blue has very few connections to taste or smell, so may act as an appetite suppressant.

Green is a symbol of ecology and the environment, and can be a verb. It signifies growth, rebirth, and fertility and is universally associated with nature. Traffic lights are green all over the world. Approximately 5% to 8% of men and 0.5% of women are color blind to green.

Purple is rare in nature, and the expense of creating it has given purple a supernatural aura. The earliest purple dyes date back to about 1900 B.C. when it took 12,000 shellfish to extract 1.5 grams of the pure dye — just enough for a single Roman toga. Accordingly, purple was used primarily for garments of the emperors or privileged individuals. More than any other color, purple symbolizes magic, mystery,

spirituality, the subconscious, creativity, dignity, royalty, nobility, and luxury to most people in the world.

Purple is the hardest color for the eye to discriminate. Variations of purple convey different meanings: light purple = light-hearted, floral, and romantic; dark purple = more intellectual and dignified. The negative meanings of purple are decadence, conceit, and pomposity. Purple is also a color of mourning.

Orange is a polarizing color — people either love it or hate it. It is the only color of the spectrum whose name was taken from an object (the fruit). Orange symbolizes energy, vitality, cheer, excitement, adventure, warmth, and good health. But it can also be abrasive and crass, suggesting bad taste and a lack of serious intellectual values.

There are many shades of orange: dark orange (terra cotta or cayenne); red-orange (persimmon); pure orange (pumpkin); yellow orange (mango); pink orange (salmon); light orange (melon). Darker oranges offer a sense of comfort; lighter oranges are soothing and healthy.

Color us helpful

Our job is to guide you through the steps needed to help you develop a color palette or select a color that is the right one for the job. Call us at 513.248.2121 to get started.

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"Because reversed type attracts attention, use it sparingly."

QUESTION:

Can I print text in white ink?

ANSWER:

Not really. Often what appears to be white text is actually reversed type – a printed background with the type "knocked out" so the paper color shows through. Here is an example of reversed type:

REVERSE TEXT

There is an opaque white ink, but it is used as an undercoat to mute the paper color so it won't affect the perception of the ink color.

It can be hard to keep reversed type readable. The delicate hairline serifs on some typefaces can be filled in by a spread of the surrounding ink, as can type in a small point size. To keep reversed type readable, follow these guidelines:

• Fonts: Use sans serif fonts or make serif fonts bold.

• Point size: Avoid small point sizes, especially if using a serif typeface.

• Spacing: Increase the leading (i.e., the space between lines) and the letter spacing.

• Contrast: Ensure adequate contrast between the text and the background. White type reversed out of a light blue background will be much harder to read than if it is reversed out of a dark blue background.

Because reversed type attracts attention, use it sparingly.