COLOR DESIGN WORKBOOK

A Real-World Guide to Using Color in Graphic Design

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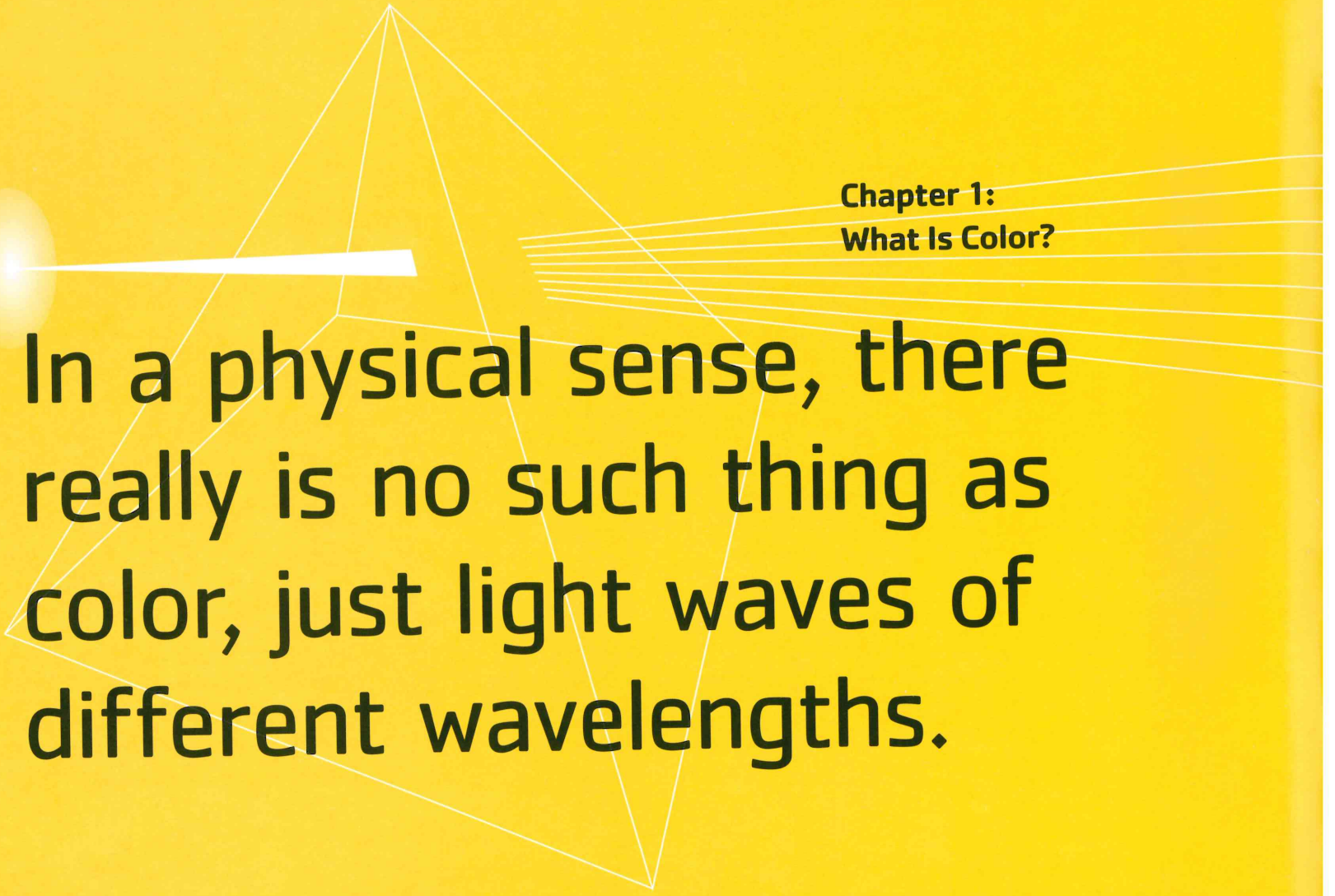


Chapter 1: What Is Color?

In a physical sense, there really is no such thing as color, just light waves of different wavelengths.

The human eye can distinguish among these wavelengths, so we see the world in color. Rays of light vibrate at different speeds. The sensation of color, which happens in our brains, is a result of our vision's response to these different wavelengths. When taken together, the various rays our eyes can distinguish are called the *visible spectrum*. This fairly narrow range of colors includes red, orange, yellow, green, blue, blue-violet (which scientists call indigo), and violet.

The visible spectrum. The colors that the human eye can experience are expressed in this gradient graphic. Reds have the longest wavelengths, violets the shortest. Contained in a ray of light but invisible to the human eye are infrareds (below red in the visible spectrum) and ultraviolets (above violet in the visible spectrum). In addition in the visible spectrum, the eye perceives black and white. White contains all colors of the spectrum and is sometimes described as an achromatic color. Black is the absence of all color—no visible light reaches the eye. Alternatively, an exhaustive combination of multiple pigments can reflect so little light that the eye perceives black.

Apparent Colors

Color is derived from light, either natural or artificial. With little light, little or no color is present. With a lot of light comes lots of color. Strong light produces intense color.

Seeing in Color

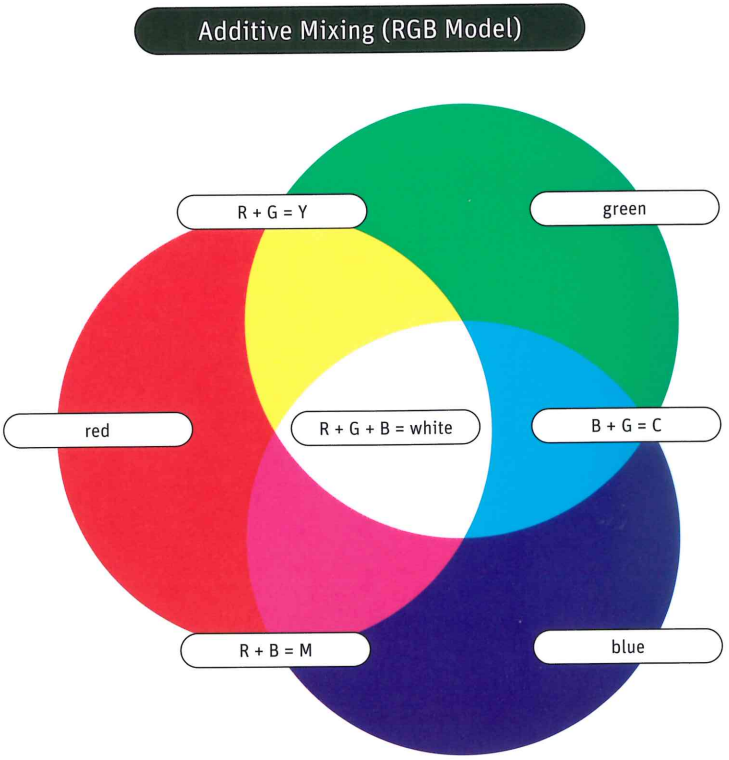
Our eyes have three types of color receptor cells, or cones: red, green, and blue. As a result, all incoming light is reduced to these three colors. All perceived colors are generated by a mixture of these three colors. However, not every color can be seen by humans; those that can are therefore called the *visible spectrum*. People can distinguish approximately 10 million colors; this visible spectrum is called the *human color space*. Not everyone's color-sensing cells respond alike, so identification of a specific color is highly subjective.

The study of color is where art and science meet, with numerous theories from both disciplines coming into play. It can thus be difficult to comprehend. To understand color perception, we need to understand the physics of light, which causes and affects our ideas of primary colors.

Primary Colors

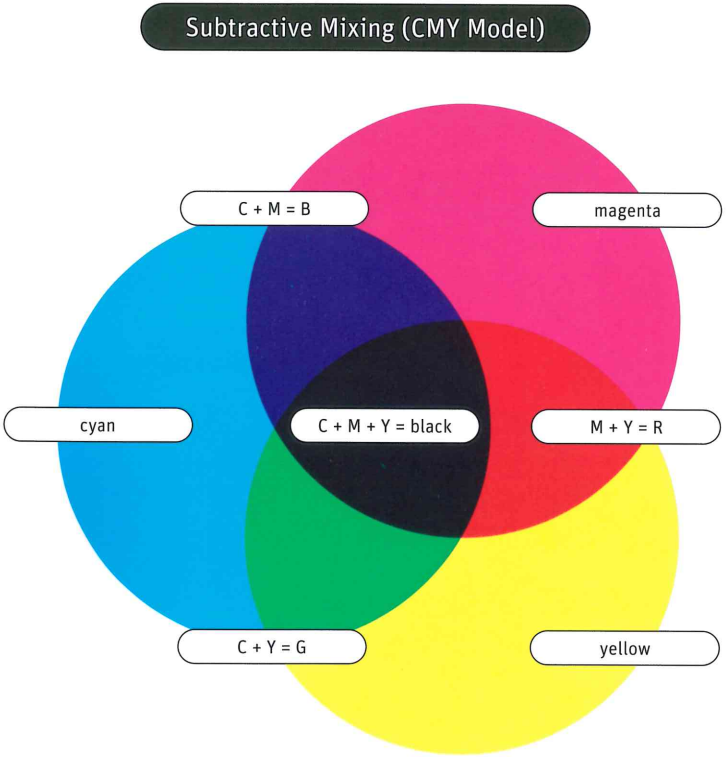
There are two types of primary color: additive and subtractive. As noted, our eyes have red, green, and blue (RGB) color receptors. RGB are the primary colors of pure light and are referred to as *additive* primary colors. The *subtractive* primary colors, made from reflected light, fall into two types: the printer's primaries, which are cyan, magenta, and yellow (CMY), and the artist's primaries, which are red, yellow, and blue (RYB). Artists' primaries, though nonscientific, are used as the basis for most color theory (*see chapter two*).

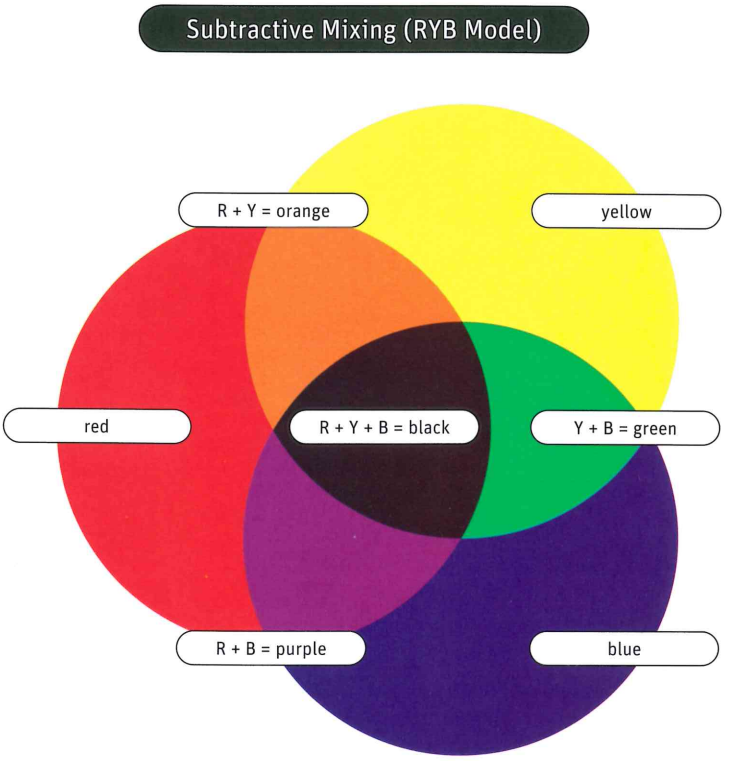
Designers utilize all three types of primary colors. They select colors using RYB and color theories. Then they generate layouts on computer screens in RGB, and then perhaps translate them into ink on paper with CMY—plus K, or black—to form the CMYK of four-color process lithography.



Additive Color: The RGB Primaries (Light) Visible spectrum colors are pure and represent the greatest possible brightness or intensity. Designers working with rays of colored light, as on computer screens, use additive colors, or RGB. When these colors overlap, other colors are produced: red and blue light form cyan; red and green light form yellow; and green and blue light form magenta. When all three additive primaries overlap, white light is produced. Thus, white light is the combined presence of all color wavelengths. We call them additive because all together, these primaries create white. RGB reflects actual human color receptors. Mixtures of these primary colors produce a large part of the human color experience. Television sets, computer monitors, cameras, and color scanners all produce mixtures of red, green, and blue light.

"He who wants to become master of color must see, feel, and experience each individual color in its many endless combinations with all other colors."—Johannes Itten





Subtractive Color: The CMY Primaries (Transparent Pigments)
All objects have physical properties that cause them to absorb some color waves and reflect others. Color, when applied to a surface such as canvas or paper, has the same characteristic. The sensation of color is produced when a surface absorbs all the wavelengths except those the eyes perceive. When color is experienced through reflected light, it is called *subtractive*. There are two sets of subtractive primary colors: the artist's primaries—red, yellow, and blue (RYB)—and the printer's primaries—cyan, magenta, and yellow (CMY) transparent inks and dyes. Coupled with black, known as K, we get CMYK, or four-color process. Each of these triads is combined to produce all visible color. In the subtractive CMY model, magenta combines with yellow form red, yellow and cyan form green, and cyan and magenta form violet (purple). In the case of both versions of the subtractive primaries, when all the primary colors are combined, black is produced—that is, no color is reflected.

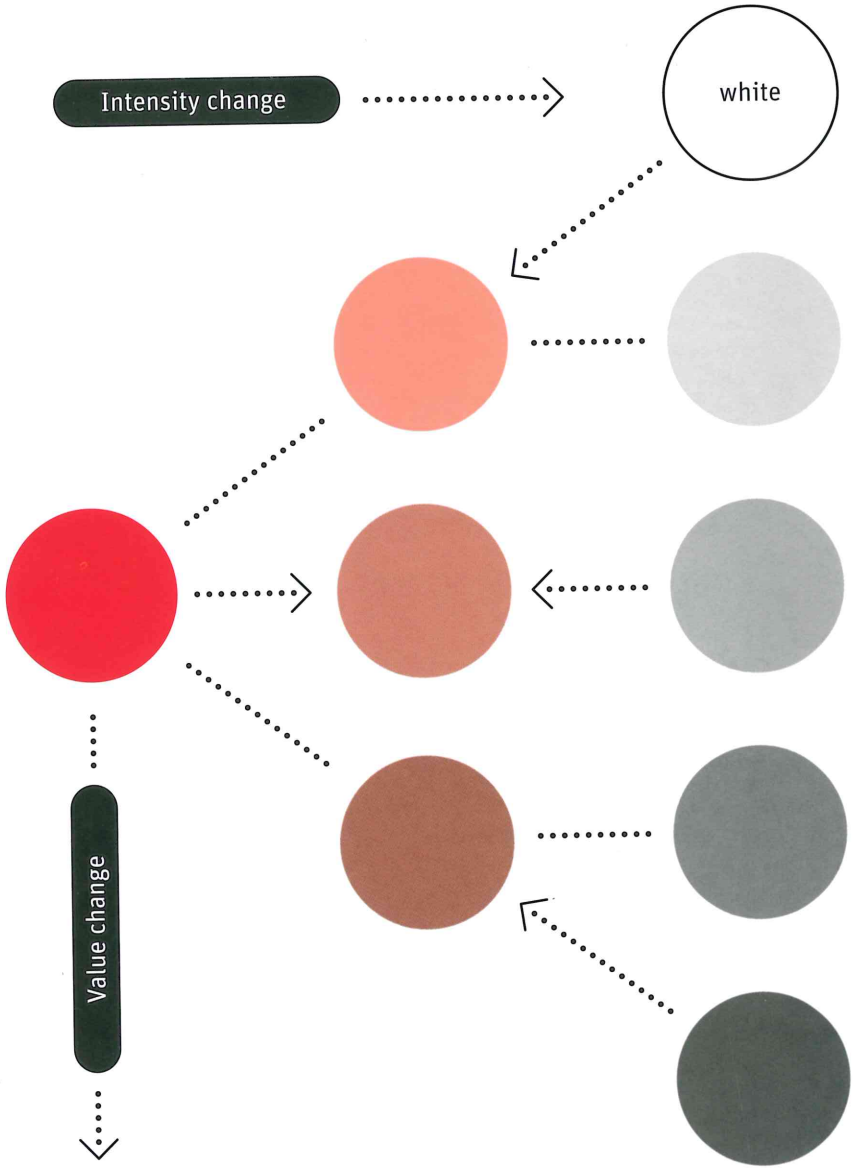
Subtractive Color: The RYB Primaries (Opaque Pigments)
In the RYB triad, red combines with yellow to produce orange, red and blue create violet (purple), and blue and yellow create green. RYB, the primary color system used in art classes, forms the basis of most color theory. As with CMY, when all the primary colors are combined, black is produced—no color is reflected. The secondary colors produced by the three triads indicate the purity of the colors that can be obtained by the different mixing methods. RGB produces pure CMY as secondary colors, and the CMY triad produces RGB as secondary colors, but they are duller than pure RGB light. The secondary colors resulting from RYB are even duller than those in the RGB or CMY triads.

The Properties of Color

Whether using the additive or subtractive primaries, each color must be described in terms of its physical properties. These properties are independent of each other, and each one must be measured or defined in order to fully describe the color. Scientific descriptions of color, or *colorimetry*, involve the specification of these color properties in either a subjective or objective system of measurement. The subjective system describes color in terms of hue, saturation, and brightness (HSB), while the objective system measures the dominant wavelength, purity, and luminance of colors.

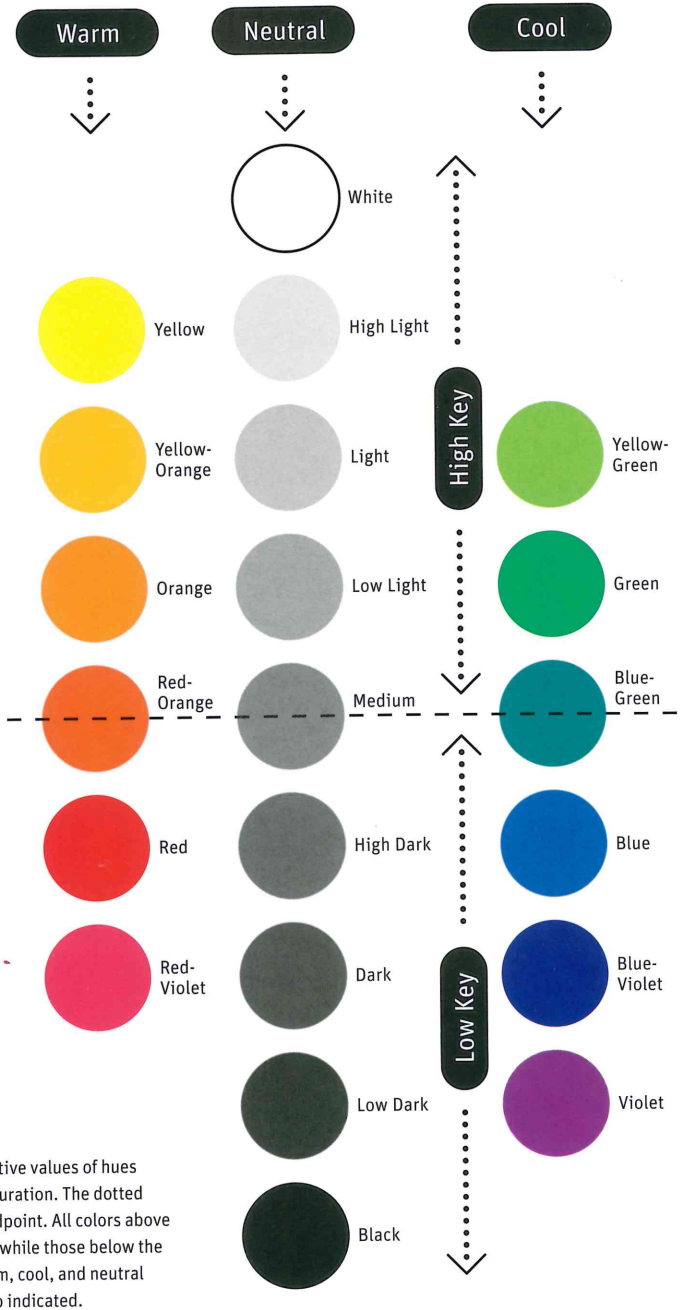
Hue is the common name of a color that indicates its position in the visible spectrum or on the color wheel. Hue is determined by the specific wavelength of the color in a ray of light. The description of a hue can be made more precise in comparison to the next hue (e.g., a certain blue might be more accurately called blue-green). *Saturation* refers to the intensity, strength, purity, or chroma—the absence of black, white, or gray—in a color. A vivid color has high or full saturation, whereas a dull one is desaturated. Saturation is a measure of the richness of a color. *Brightness,* or value, is the relative degree of lightness or darkness of a color, or its reflective quality or brilliance. A color can be more narrowly described as either light or dark (e.g., light blue or dark blue). The brightness of a color is changed by mixing it with white (to form a *tint*) or with black (to form a *shade*) in varying proportions. Graphic design software programs have tools for varying the HSB of colors.

Objective color notation was developed by the Commission Internationale de l'Eclairage (CIE) to provide a mathematical model for describing color. The CIE (in English, the International Commission on Illumination) is an international technical, scientific, and cultural nonprofit organization that sets standards on the science and art of lighting, vision, and colorimetry. Though CIE notation is not used by designers, it underpins color management in modern digital devices.



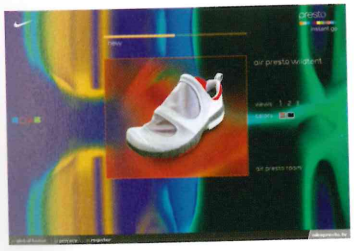
This chart demonstrates changes in saturation and value by adding or subtracting black, white, or gray. When white is added to a bright red, the value is lighter, and the resulting color is less saturated. Adding black to the red results in a dark red closer to the neutral scale because of saturation changes. If gray is added, the saturation is lowered, but the value is unchanged.

This chart demonstrates HSB. The top row shows three blue hues, the middle row is an example of three degrees of saturation of a particular blue, and the bottom row demonstrates three levels of brightness, or values, of blue.



This chart shows relative values of hues at their maximum saturation. The dotted rule indicates the midpoint. All colors above the line are high key, while those below the line are low key. Warm, cool, and neutral relationships are also indicated.

Rather than a traditional capabilities brochure showcasing high-profile client work, the designers created a visual journey through the creative process of Publicis, the U.S. branch of the world's third-largest communications company. This brochure boldly features Publicis' signature red almost exclusively in a series of unexpected visual relationships and verbal twists.
Carbone Smolan Agency



The colors and visual language for Nike Presto, a fashion product brand targeted toward trendsetting youth audiences in the Asia Pacific market, were born out of the collaboration of the firms Weiden + Kennedy Tokyo, Motion Theory, and Hello Design. The website has a high degree of music and color-driven interactivity. The graphics utilize the colors of the visible spectrum with vibrant dynamics meant to appeal to one of the most style-saturated corners of the world.
Hello Design

The poster for the 2000 International Biennial in Beijing, China, designed by Steff Geissbuhler, features a bright spectrum of colors that convey both internationalism and a sense of festivity. The rich blue background provides a dark field from which the other colors pop.
Chermayeff & Geismar

Chapter 2:
Color Theory

What Is Color Theory?

Color theory is a set of guiding principles that can be used to create harmonious color combinations. These ideas are represented in a variety of diagrams—color wheels, triangles, and charts that help designers understand color interactions, select and combine colors, and construct pleasing and effective palettes.

Diagrams such as this color wheel, which shows pure hues as well as tints and shades, serve as a guide for selecting and combining colors beyond the pure hues. Different color theory diagrams have different purposes. Some are simple and some are complex, but all are useful references when thinking about color and choosing color palettes.

A Brief History of Color Theory

Many measurement systems, but all color theory has one goal: to explain color relationships with an aim to create harmony.

We offer this brief account to familiarize designers with the major color theorists and their significant findings. We encourage further exploration of this topic to gain a deeper understanding of color theory.

Since ancient times, color theorists have developed ideas and interpretations of color relationships. Attempts to formalize and recognize order date back at least to Aristotle (384–322 B.C.E.) but began in earnest with Leonardo da Vinci (1452–1519) and have progressed ever since. Leonardo noted that certain colors intensify each other, discovering *contrary* or *complementary* colors. The first color wheel was invented by Britain's Sir Isaac Newton (1642–1727), who split white light into red, orange, yellow, green, blue, indigo and violet beams, then joined the two ends of the spectrum to form a circle showing the natural progression of colors. When Newton created the color wheel, he noticed that mixing two colors from opposite positions produced a neutral or *anonymous* color.

More than a century later, while studying the psychological effects of color, Germany's famed poet and playwright Johann Wolfgang von Goethe (1749–1832) furthered color theory. Goethe divided all colors into two groups. On the plus side he put the warm colors (red to orange to yellow) and on the minus side the cool colors (green to blue to violet). He noted that colors on the plus side produced excitement in viewers, while he associated the minus-side colors with unsettled feelings. In 1810 Goethe published *Zur Farbenlehre* (*Theory of Color*), in which he disagreed with Newton's conclusions about color. He believed that a scientific approach alone did not enable one to fully understand color. Goethe's observations of the human perception of color, rather than just the physics of light, allowed him to discover important aspects of color theory, including simultaneous contrast and color's relationship to emotion.

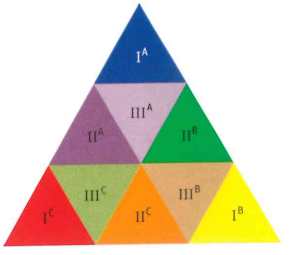
Louis Prang (1824–1909) was an influential pioneer of American chromolithographs and a noted educator whose 1876 book *Theory of Color* helped popularize the theory of red, yellow, and blue primary colors in American art education. Wilhelm Ostwald (1853–1932), a Russian-German Nobel Prize–winning chemist, developed a color system related to psychological harmony and order in the 1916 *Die Farbenfibel* (*The Color Primer*). His ideas about color harmony influenced future color theorists and the Dutch de Stijl art movement (see page 100).

The next major set of theories comes from the Bauhaus, the highly influential German art and design school (1919–1933) that focused on the integration of art and industry, encouraging an ideology of functional design. Bauhaus member Johannes Itten (1888–1967) was a Swiss color and art theorist who developed *color chords* and modified the color wheel. Itten's color wheel is based on a primary triad of red, yellow, and blue, and includes twelve hues. He studied color in terms of both design and science, and his experiments with light waves explored color relationships and visual effects. Following Goethe's lead, Itten delved into the psychological and spiritual aspects of color. His most important work, *The Art of Color,* is summarized in his treatise called *Itten: The Elements of Color.* Itten's theories still form the core of most art school color information.

Josef Albers (1888–1976) studied under Itten and also taught at the Bauhaus. His abstract art used mathematical proportions to achieve balance and unity. After immigration to the United States, his teachings at Yale University led to his book *Interaction of Color,* a crucial text on color theory. Albers' focus is on what happens when colors interact, and his experiments are a resource for creating subtle color compositions. Faber Birren (1900–1988) explored the relationship between color and expression. His research helped clarify the historical development of the triadic color system.

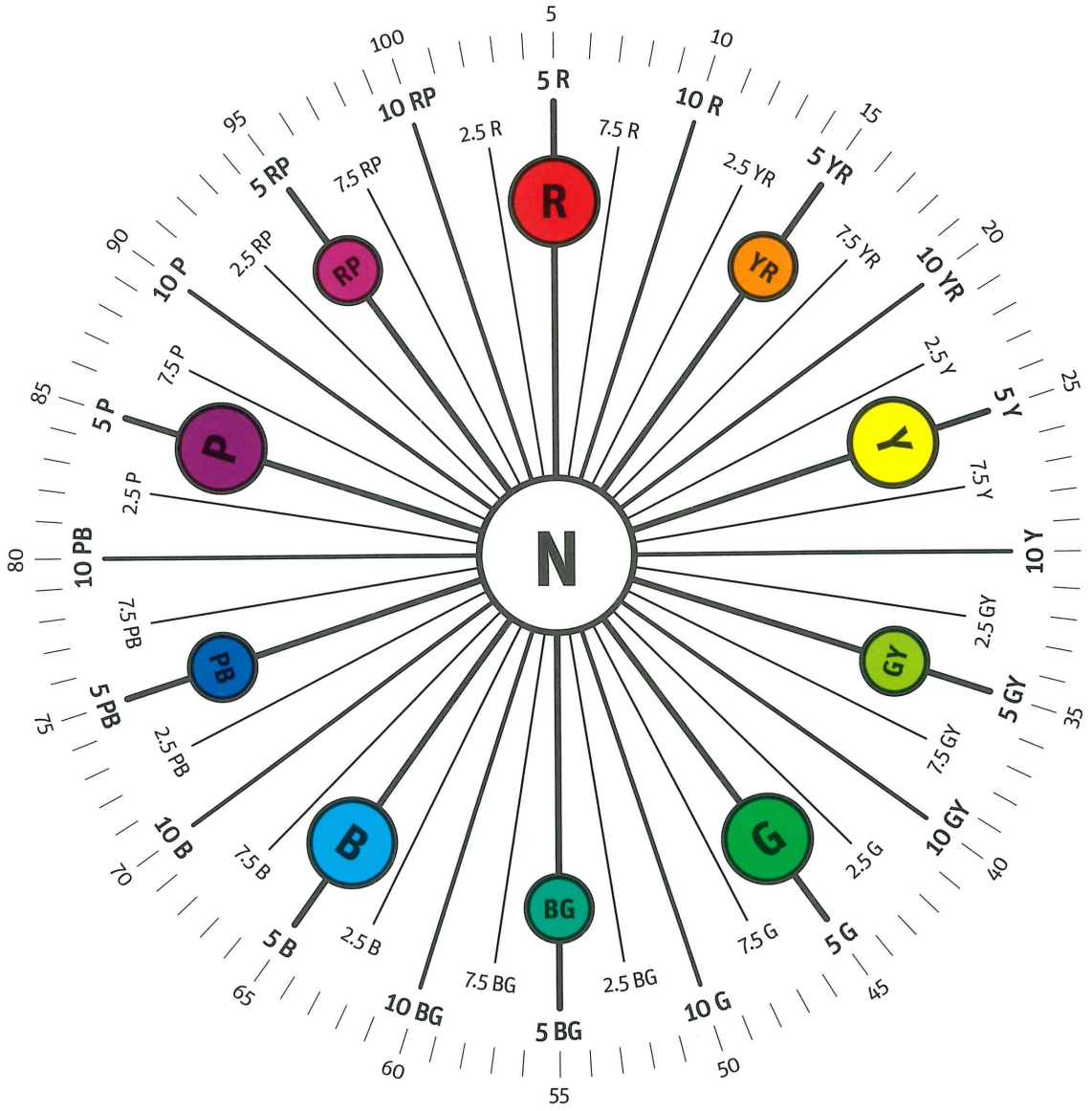
The American artist Albert Munsell (1858–1918) created a new and versatile color model around 1905. Munsell was inspired by the work of fellow American Nicholas Ogden Rood (1831–1902) and German painter Philip Otto Runge (1777–1810) to develop a three-dimensional color model that demonstrates relationships between full-spectrum hues as well as tints and shades. Munsell's important realization was that, when pure, some hues are more saturated than others, so color relationships are distorted when forced into a circle. He created what is known as the Munsell Tree, with hues arranged along branches of different lengths in order of saturation. Munsell's work was adopted by American industry as its material standard for naming colors. It has also influenced the color-space modeling of the CIE (Commission International de l'Eclairge).

Artists, scientists, and scholars continue to contribute to color theory, a dynamic and fascinating subject.

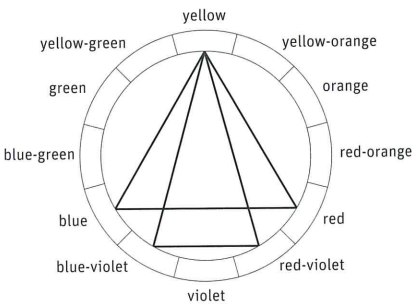


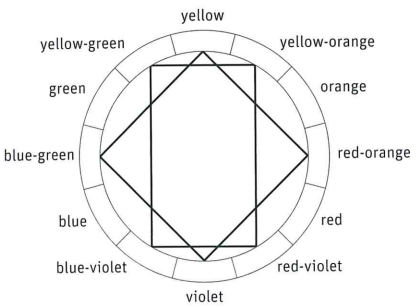
The Goethe color triangle is an equilateral triangle subdivided into nine equilateral triangles. The three primary colors (blue is I^A, and so on) are arranged on the outer edges, with secondary (purple is II^A, and so on) and tertiary (lavender is III^A, and so on) colors located inside. This is one method Goethe used to demonstrate color relationships. He believed that colors are linked to emotion, and his diagram demonstrates these connections. For example, he called I^C, II^C, III^C, and II^A a serene color scheme. Here again, the designation is completely subjective, as is true in nearly all color theories.

The Munsell Color Tree, when shown as a wheel (right), is divided into five primary or principal hues (R stands for red, y for yellow, etc.). Five intermediaries are also labeled with the initials of the surrounding principals (YR for yellow-red, etc.), producing a total of ten divisions. For even more accurate specification, the circle is divided into steps numbered clockwise from 5, at the top, to 100. This diagram is useful because it explains the rationale behind the Munsell color notation system. Designers may need to use the Munsell color notation system when specifying colors in manufacturing processes such as packaging and environmental design projects.



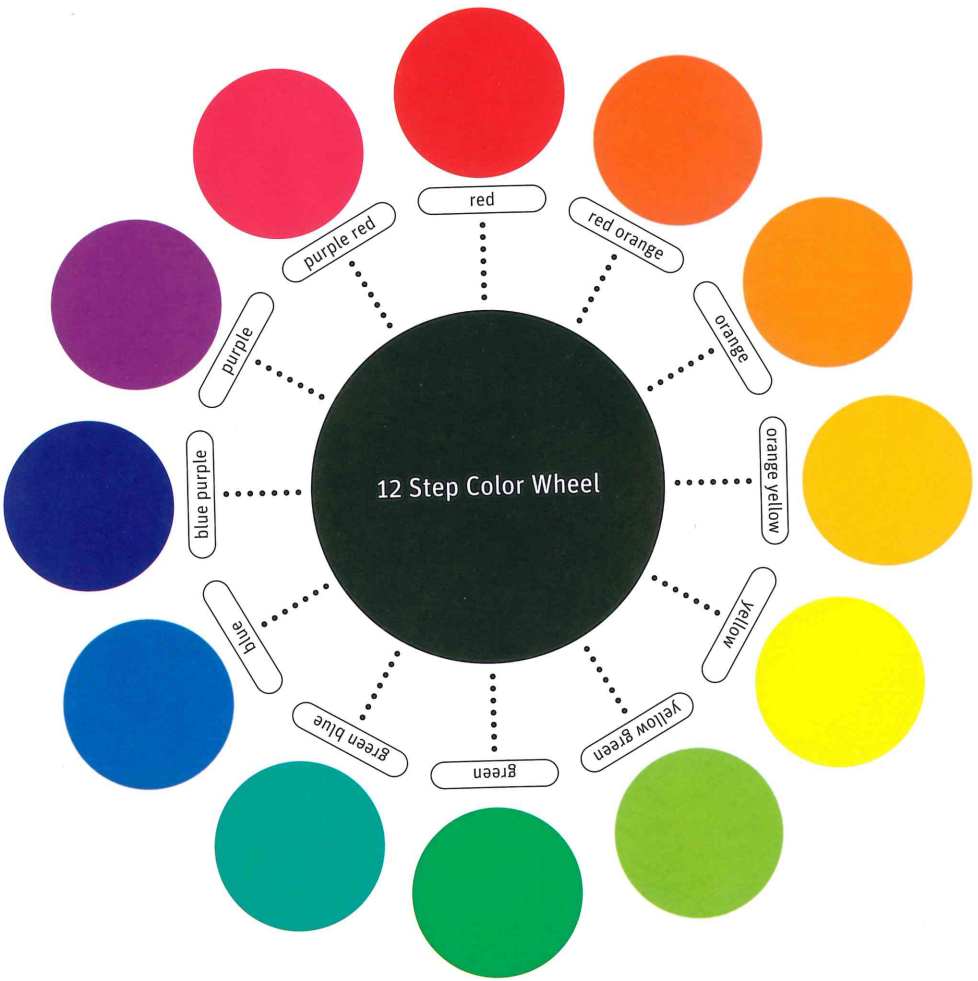
Johannes Itten held that color harmony was subjective. However, he developed a series of diagrams, such as these, for the construction of harmonious triads (three-color combinations, near right) and tetrads (four-color combinations, middle) in twelve-part color wheels. These groups of hues relate in pleasing ways. Spinning the center triangles or rectangles provides other successful combinations. His twelve-pointed star (far right) expands on the idea of a color wheel by showing hues along with tints and shades. The color star (right) is a more complex diagram of color interactions.





Color theory is, at its core, about developing aesthetically pleasing color relationships.

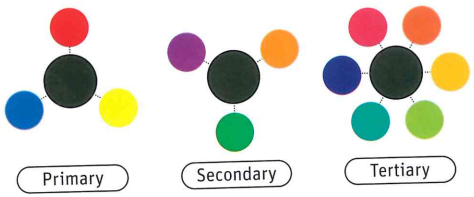
One of the best tools for visualizing color relationships is the color wheel. This wheel, originally developed by Sir Isaac Newton, can be constructed with just a few colors, or can be quite complex incorporating many color variations. Perhaps the most useful version is the twelve-step color wheel containing twelve equidistant pure hues, as shown below.

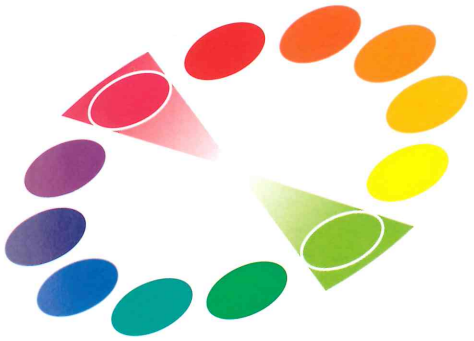


Successful color relationships can be referred to as "color harmonies." Whether they consist of similar hues that are soothing to the eye or are made of contrasting ones that excite the eye, color harmonies are often subject to personal preference. However, the study of art and design has given us some specific color theories, or guiding principles, that help us make effective decisions about color usage.

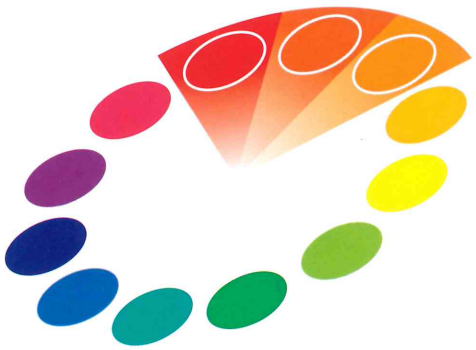
We recommend the use of the color wheel called the Subtractive Artists' Primary Colors (RYB), because picking colors is easiest with this set of primaries. The color wheel will help to select color combinations that balance each other. This balance is a result of all the colors in a chosen composition adding up to gray, or neutrality, in the eye/brain. This result will cause the work to just "feel right" to the viewer.

A color by itself will elicit an emotional and physical response, but the nature of the response can be altered by placing it in context with one or more colors. Color perceptions shift dynamically when aligned with other colors. Designers can vary color combinations to produce relationships that are allied or contrasting and therefore can affect viewers' impression.

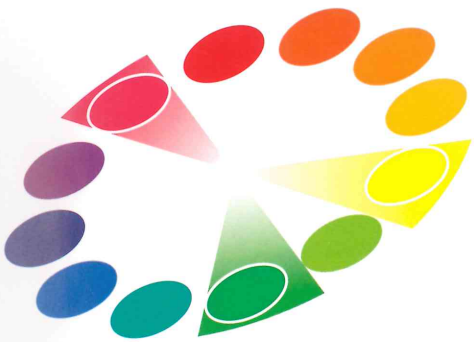




1. Complementary



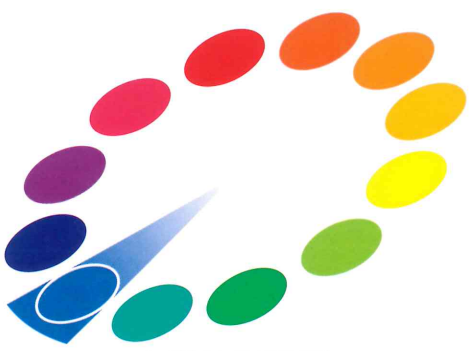
4. Analogous



2. Split Complementary

5. Triadic

3. Double Complementary



6. Monochromatic

Color Harmony

Here are six basic color relationship concepts that can be applied to an infinite number of color combinations.

1. **Complementary**
These are color pairs that are directly opposite each other on the color wheel. They represent the most contrasting relationships. The use of two complementary colors will cause a visual vibration and excite the eye.

2. **Split Complementary**
These are the three-color schemes in which one color is accompanied by two others that are spaced equally from the first color's complement. The contrast is toned down somewhat, providing a more sophisticated relationship.

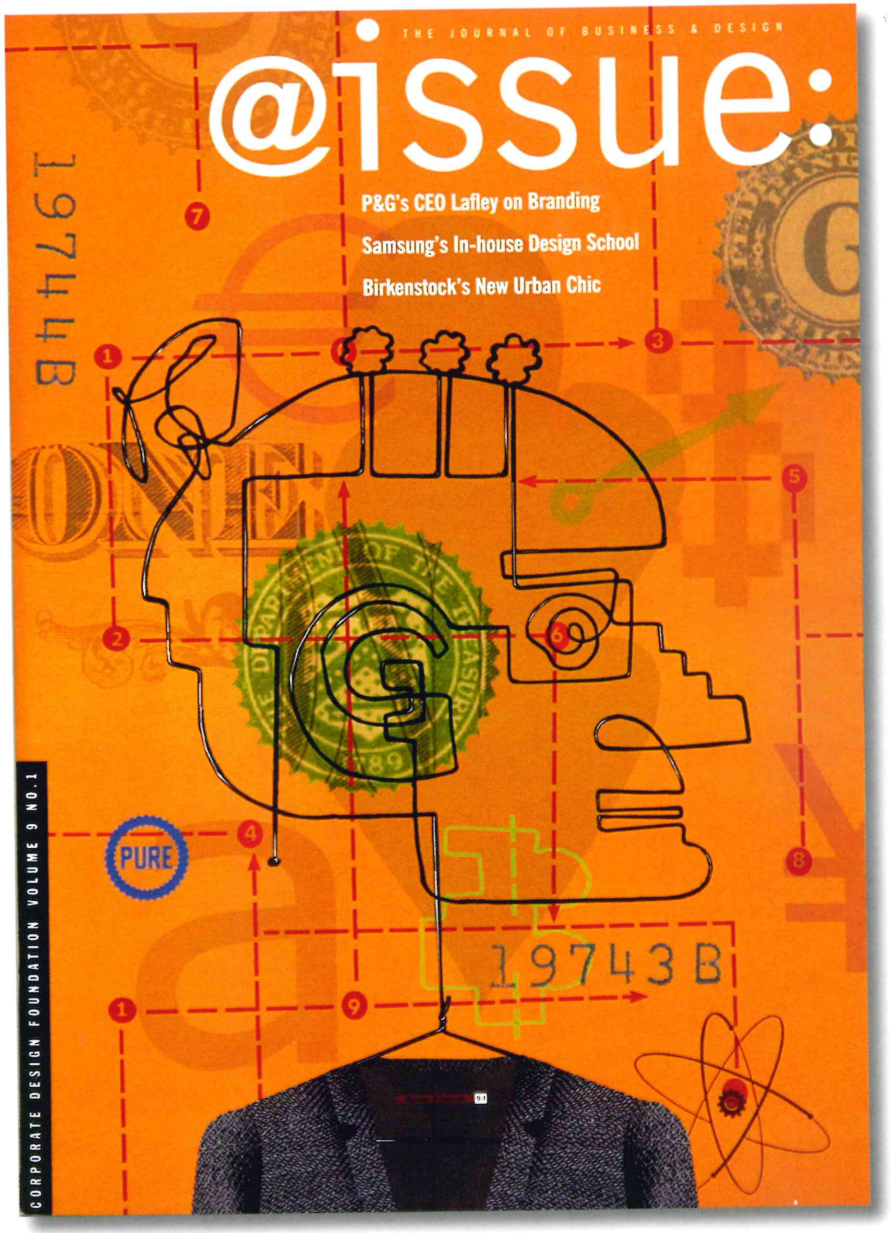
3. **Double Complementary**
This is the combination of two pairs of complementary colors. As complements increase the apparent intensity of each other, not all color sets will be pleasing. Avoid using equal volumes of the four colors to make the scheme less jarring.

4. **Analogous**
These are combinations of two or more colors that are spaced equally from each other on the color wheel. These colors have similar light ray wavelengths, so they are easiest on the eye.

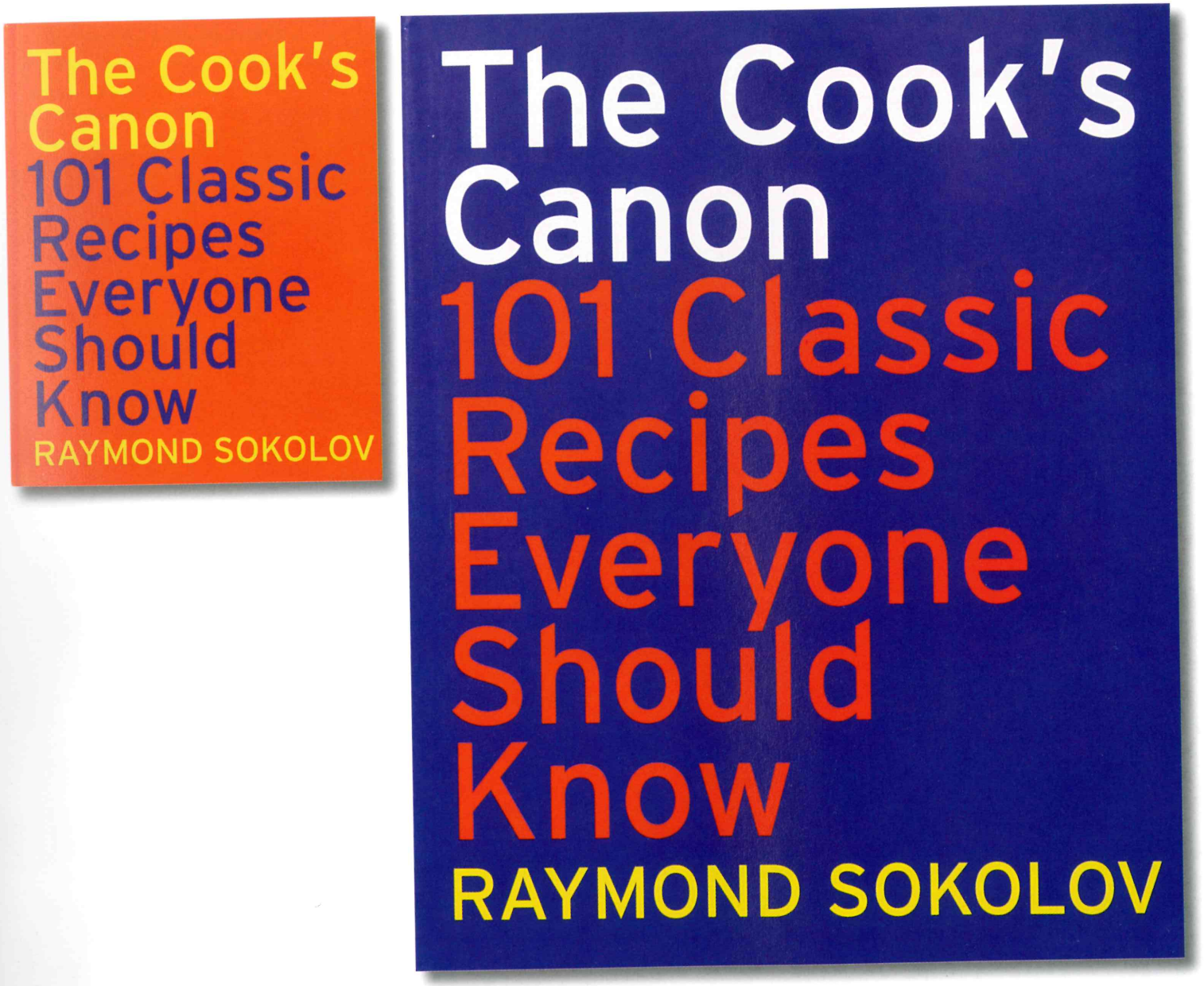
5. **Triadic**
These are combinations of any three colors that are spaced evenly around the color wheel. Triads with primaries are garish, but secondary and tertiary triads provide softer contrast. Triads in which two of the colors share a common primary (e.g., purple and orange share red) may seem more pleasing.

6. **Monochromatic**
These are color schemes made up of shades and tints of a single color. Use one hue and explore variety in saturation and lightness to form an allied combination of similar colors.

The packaging of the music CD series *Elemental Chill* has a beautiful palette of sophisticated muted colors in orange, red, green, and blue. When selecting a color scheme, it is important to consider the use of tints and shades of hues in order to create a pleasing and harmonious balance in the color system. Referring to color theory diagrams such as Itten's color star shown on page 16 allows designers to visualize color interactions.
Karlsson Wilker



This cover for *@ISSUE: The Journal of Business and Design,* published by Sappi Fine Paper and the Corporate Design Foundation, utilizes a predominantly analogous composition of orange and red with bits of black and gray. The design is complemented by a desaturated green symbol acting as a central punctuation in the design.
Pentagram



The *Cook's Canon* cookbook demonstrates a clever use of a classic complementary color scheme of orange and blue. Michael Hodgson designed the dust jacket in predominantly reflex blue, while the book cover itself is its opposite, orange. Using hues that are complements provide the most color contrast possible; the result is maximum excitement to the eye.

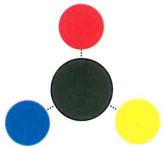
Ph.D

Chapter 3: Color Meanings

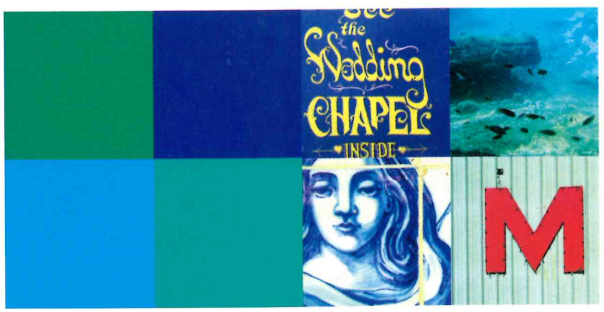
The human eye and brain experience color physically, mentally, and emotionally. As a result, colors themselves have meanings. Color symbolism is often a cultural agreement, and opinions about the associations are varied and sometimes conflicting.

The Color Index charts on the following pages provide a sampling of color meanings, associations, and anecdotal information about color. Be sure to investigate a particular color's meanings and associations before using it in a design project.

Color Index



Primary

	Color	Associated with	Positive	Negative
	Red	fire blood sex	**passion** **love** **blood** **energy** **enthusiasm** **excitement** **heat** **power**	aggression anger battle revolution cruelty immorality
	Yellow	sunshine	**intellect** **wisdom** **optimism** **radiance** **joy** **idealism**	jealousy cowardice deceit caution
	Blue	sea sky	**knowledge** **coolness** **peace** **masculinity** **contemplation** **loyalty** **justice** **intelligence**	depression coldness detachment apathy

Cultural links	In addition	Sample
Ivory Coast, Africa Dark red indicates death. **France** Masculinity **Most of Asia** Marriage, prosperity, happiness **India** Soldier's symbol **South Africa** Color of mourning	• Most visually dominant color • Suggests speed, action • Stimulates heart rate, breathing, and appetite • People appear heavier in red clothes. • Red cars are stolen most often.	 This souvenir tour book was created for the singer Cher's Farewell Concert Tour. Pictured here is the back cover of the book on which the color red predominates to convey the passionate, spicy side of Cher. Color is manipulated to feature a variety of reds. **Chase Design Group**
Buddhist cultures Priests wear saffron yellow robes. **Egypt and Burma** Signifies mourning **India** Symbol of merchant or farmer **Hindu cultures** Worn to celebrate the festival of spring **Japan** Associated with courage	• First color that the human eye notices • Brighter than white • Speeds the metabolism • Bright yellow is the most fatiguing color; can irritate the eyes. • Pale yellow can enhance concentration (used for legal pads).	 The cover of the *American Photography 17* book, featuring bright yellow with a hint of red, virtually shouts to passersby—the goal of the designer. The back cover is the reverse of the front, with red dominating the yellow. *AP17* is a handsome 432-page volume that presents the best photography of the year, as selected by a jury of publishing professionals. **344 Design**
Most of the world Considered a masculine color **China** Color for little girls **Iran** Color of mourning **Western bridal tradition** Means love **Worldwide** Most popular corporate color	• Blue food is rare in nature; unappetizing, suppresses hunger. • Causes the body to produce calming chemicals; relaxing • People are said to be more productive in blue rooms. • Blue clothing often symbolizes loyalty or trust.	 The front cover of Cher's souvenir tour book illustrates Cher's cool serene side with its blue tones. The designers used similar photos of Cher in both covers but altered them with color changes to develop the naughty and nice themes. **Chase Design Group**

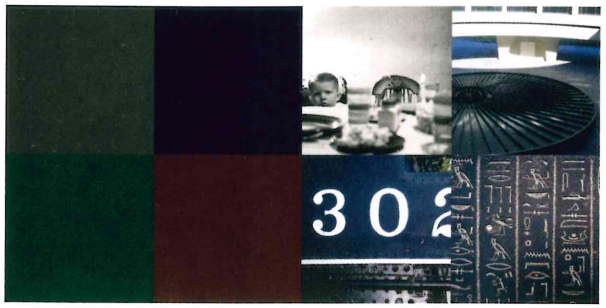
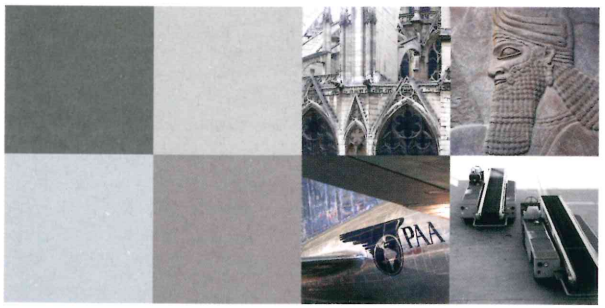
Color Index

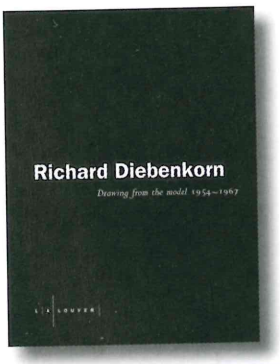
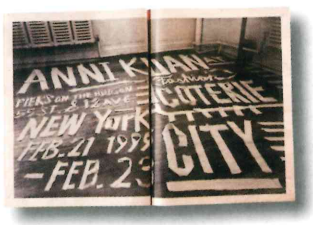
	Color	Associated with	Positive	Negative
	Green	plants the natural environment	**fertility** **money** **growth** **healing** **success** **nature** **harmony** **honesty** **youth**	greed envy nausea poison corrosion inexperience
	Purple	royalty spirituality	**luxury** **wisdom** **imagination** **sophistication** **rank** **inspiration** **wealth** **nobility** **mysticism**	exaggeration excess madness cruelty
	Orange	autumn citrus	**creativity** **invigoration** **uniqueness** **energy** **vibrancy** **stimulation** **sociability** **health** **whimsy** **activity**	crassness trendiness loudness

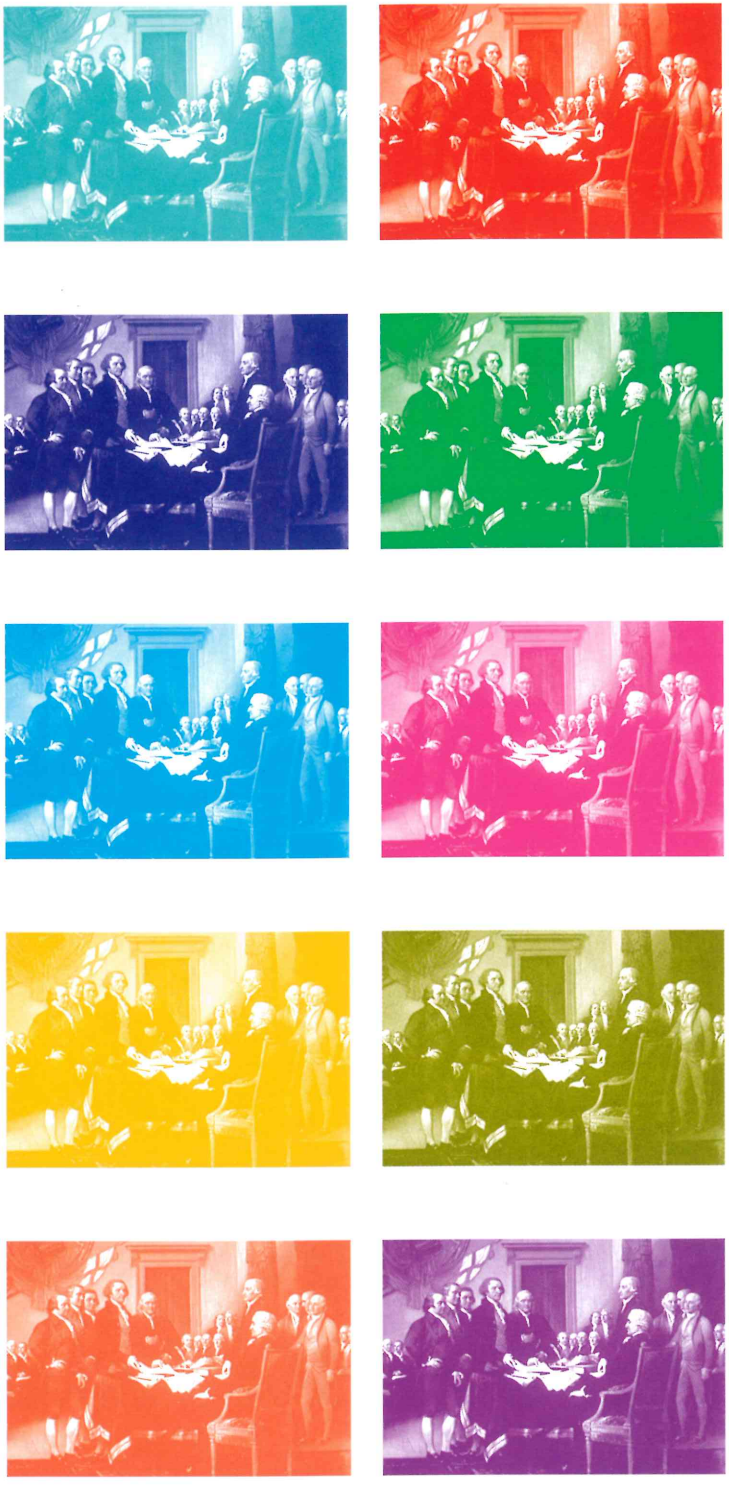
Cultural links	In addition	Sample
Islam Green is associated with paradise and is symbolic of Islam. **Ireland** Green is strongly associated with this country. **Celtic cultures** The Green Man was the god of fertility. **Native American cultures** Green is linked with the will, or man's volition.	• Green is the easiest color on the eyes. • Green is a calming and refreshing color, often used in hospitals to relax patients. • Green means "go"; everything is in order. • Green is said to aid digestion and reduce stomachaches.	 The U.S. Environmental Protection Agency (EPA) is dedicated to protecting human health and the environment. The obvious choice for the identity was a bright grass green to signify nature. Chermayeff & Geismar
Latin America Purple indicates death. **Thailand** Purple is worn by widows mourning a husband's death. **Japan** Purple represents ceremony, enlightenment, and arrogance.	• Purple has a feminine and romantic quality that is sometimes associated with male homosexuality. • Rare in nature, purple seems artificial. • In ancient times, purple dyes were expensive and worn by royalty and the wealthy only. • Purple is said to enhance the imagination and thus is used in decorating children's rooms.	 Encounter Restaurant is located in the 1960s futuristic "Theme Building" at Los Angeles International Airport. The logo, a deep intense violet to mirror the exterior lighting feature that plays across the building's exterior, sparks the imagination about the future. AdamsMorioka
Ireland Orange signifies the Protestant movement in Northern Ireland. **Native American cultures** Orange is linked with learning and kinship. **India** Orange signifies Hinduism. **Netherlands** Orange is the national color because the Dutch monarchs came from Orange-Nassau.	• Orange is an appetite stimulant. • Orange rooms get people thinking and talking. • Orange rooms speak of friendliness and fun. • Orange is used for visibility enhancement, which is why hunters and highway workers wear it.	 The Nickelodeon kids' TV network identity was originally designed by Tom Corey and utilizes white balloon type knocked out of any orange shape. Orange was chosen because it was little used in children's products at that time and because the color is a bit irreverent, which captured Nick's point of view. This electron logo is a new version of the classic in irreverent orange. AdamsMorioka

Color Index

Neutral

	Color	Associated with	Positive	Negative
	Black	night death	**power** **authority** **weight** **sophistication** **elegance** **formality** **seriousness** **dignity** **solitude** **mystery** **stylishness**	fear negativity evil secrecy submission mourning heaviness remorse emptiness
	White	light purity	**perfection** **marriage/wedding** **cleanliness** **virtue** **innocence** **lightness** **softness** **sacredness** **simplicity** **truth**	fragility isolation
	Gray	neutrality	**balance** **security** **reliability** **modesty** **classicism** **maturity** **intelligence** **wisdom**	lack of commitment uncertainty moodiness cloudiness old age boredom indecision bad weather sadness

Cultural links	In addition	Sample
China Black is for little boys. **Asia generally** Black is associated with career, knowledge, mourning and penance. **American, European, Japanese youth** Black is the color of rebellion. **Worldwide** Black denotes dark-skinned people of sub-Saharan African ancestry.	• Black clothing makes people look thinner. • Black humor is morbid. • Black makes other colors look brighter. • In color therapy, black is supposed to boost self-confidence and strength. • Black is often associated with secret societies.	 This L.A. Louver Gallery catalog for artist Richard Dievenkorn's black and white pencil drawings was given a black cover to suggest the exhibition works as well as to provide dignified elegance. **AdamsMorioka**
Japan and China White is a funeral color. **Worldwide** A white flag is a universal symbol for truce. **North America, Europe** White denotes light-skinned people of Caucasian ancestry. **India** Married women who wear white invite unhappiness.	• In some culture, it's considered good luck to be married in a white garment. • White is the perfectly balanced color. • White is so brilliant that it gives some people headaches. • White light can be blinding. • White is associated with angels and gods.	 Minimal graphic elements, primarily the design firm's logo, against a stark white background create a feeling of open space while being a self-promotion that celebrates the new year in this 2002 poster. **344 Design**
Native American Gray is associated with honor and friendship. **Asian** Gray means helpful people as well as travel. **America** The color gray is used to represent industry, in contrast to environmentalism, which is represented by green. **Worldwide** Gray is often associated with silver and money.	• Gray seldom evokes strong emotions. • Gray is a balance of black and white. • Gray is its own complement. • Grayscale means rendering an image in a range of blacks and whites. It also refers to a tonal scale of blacks and whites that is used in calibration and accurate reproduction of halftone images.	 This promo for fashion designer Anni Kuan features New York Laundromats. The gray effect is achieved by printing black ink on newsprint. The overall effect of the piece is a balanced yet gritty portrait of the city rendered in monochromatic images. **Sagmeister, Inc**



Chapter 4:

10 Rules of Color

There really are no right or wrong ways to use color. Some color design processes and color combinations work better than others, but there are many ways to achieve great results. We offer these ten rules as a way to approach color. The rules incorporate physics, theory, psychology, economics, aesthetics, and usage in order to effectively harness this powerful design element.

1. Convey information.
2. Create color harmony.
3. Attract and hold attention.
4. Remember that context is everything.
5. Consider that experimentation is key.
6. Know that people see color differently.
7. Assist in mnemonic value.
8. Think about composition.
9. Use standardized color systems.
10. Understand limitations.

1 Convey Information

The Right Color sends the Right Message

Color has the ability to evoke a response, create a mood, symbolize an idea, and express an emotion. Differences in particular aspects of color, such as a change in value or intensity, can further refine a color's tone and meaning. People have their own associations with color, but there are conscious and subconscious social and cultural connotations too. Every color has its own set of connections that convey information, with the color itself acting as a signifier of ideas—both positive and negative. (See Color Meaning, Chapter 3.)

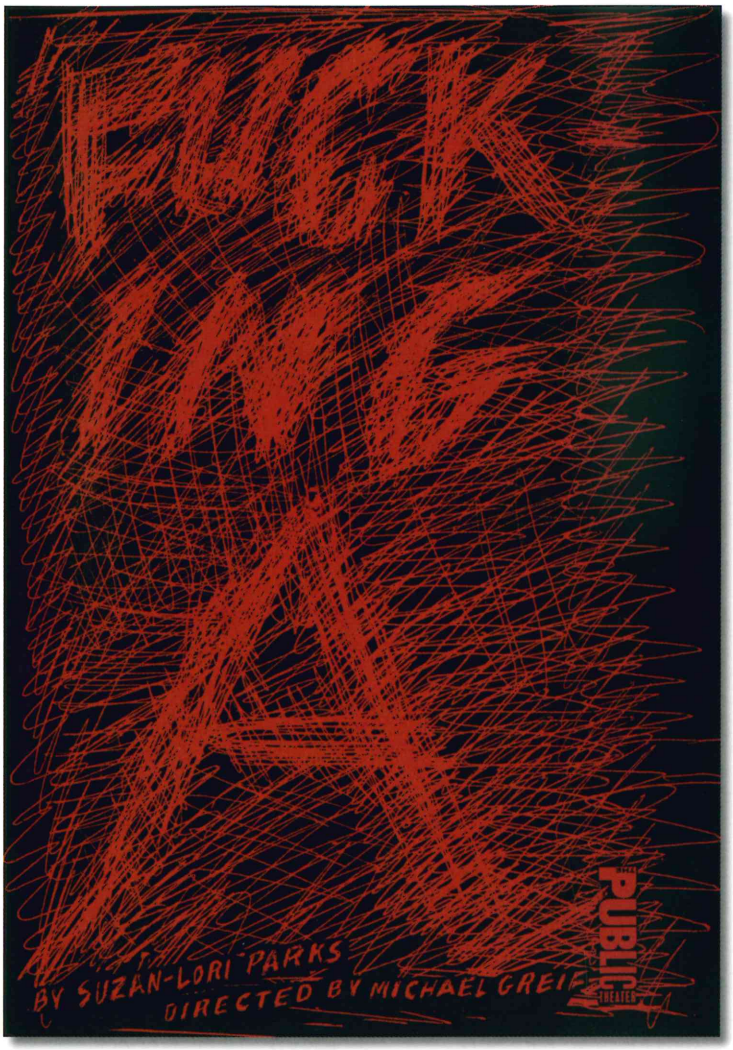
Sources of Color Meanings

All color meanings are relative; these interpretations are influenced by a variety of factors, including age, gender, personal experience, mood, ethnic identity, history, and tradition. Affinity for the particular colors of a nation's flag shows how tradition, nationalism, and history impact color responses.

Color preferences that predominate when a person comes of age (or nostalgia for a particular time in history) can cause resonance. For example, the earth-tone palette of harvest gold, avocado green, and burnt orange—central to 1970s color schemes—evokes strong associations in people who were teenagers then.

Color assignment based on gender, as in the Western tradition of pink for girls and blue for boys, is both adopted and subverted in children's products. However, it is rare for male-oriented objects to be colored pink in any culture. Are such differences between the sexes due to physiology or socialization? No one is quite sure, but a recent study found that

The color scheme of red and black supports the passionate emotional content of the play *Fucking A* which is promoted in this New York Public Theater poster designed by Paula Scher and Sean Carmody. *Fucking A* is Suzan-Lori Parks's contemporary reshaping of the classic novel *The Scarlet Letter*. Today, the *A* stands for abortion rather than for adultery. Wearing red letters was a public source of shame in colonial America, and the designers employ this concept and color convention in the poster for the play. **Pentagram Design, Ltd.**



More than just a visual phenomenon, color has emotional and cultural dimensions that can enhance—or impede—communication efforts.

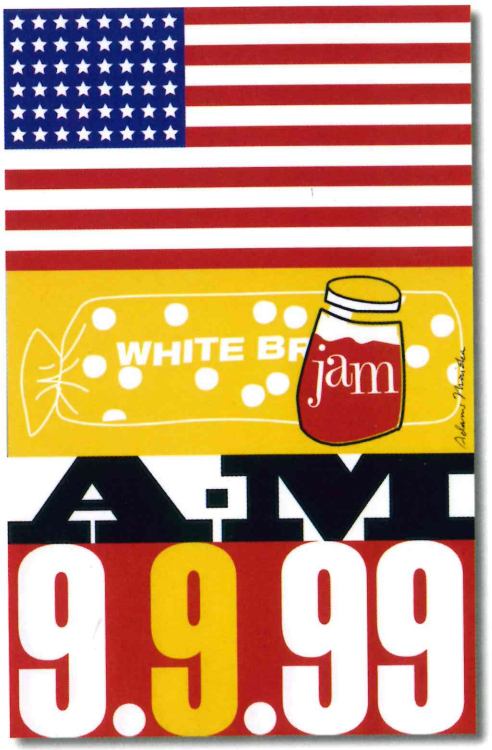
more women than men have a favorite color. Also, when asked for a preference between bright and soft colors, women tend to pick soft colors while men choose bright ones.

Age is another important factor related to color interpretation. Children and the elderly have an affinity for intense, bright colors. Teenagers like whatever their parents don't appreciate. In addition, a 1976 study showed the effects of color on mood. Groups of people were placed in different rooms—one colorful and complex, the other gray and sterile. Researchers recorded pulse rates as well as individuals' subjective emotional feelings. The results showed stress and boredom in the gray room, supporting the notion that color causes both physical and emotional responses, all of which could trigger judgments about specific colors.

Tapping into Color's Associations

Psychologists have suggested that color impression can account for as much as 60 percent of the acceptance or rejection of a product or service. When choosing colors to enhance the message being communicated, it is essential to anticipate audience perceptions. All color is relative, and people can have strong, often subconscious, prejudices against certain colors and color schemes.

It is a designer's job to select colors that elicit correct responses. They need to consider carefully for whom a piece is being created, and how internal and external audiences will read the design in terms of color alone. It's not just an aesthetic choice. Designers need to leverage color meaning to achieve their client's goals.

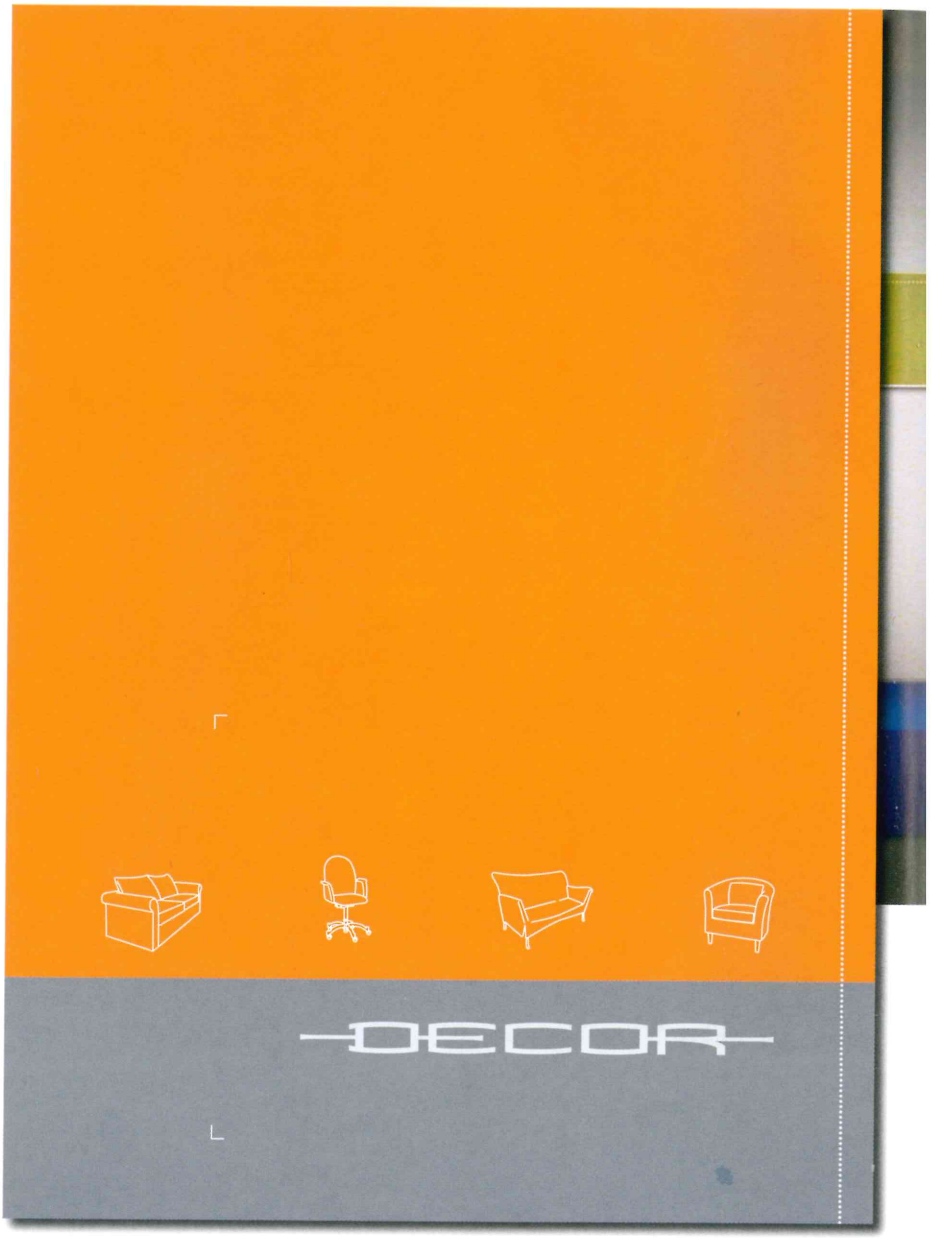


In this promotional poster for a lecture given by Sean Adams, the designer uses an image of the American flag as a prominent visual device. Since many people have the perception of AdamsMorioka as being the "All-American" design firm, the poster leverages that concept while gently lampooning it, using both color and imagery that echoes the theme. **AdamsMorioka**

Shown here is a representative sample of flags from countries around the world. Designers can take cues from these color palettes to create affinity, as well as discord, with their designs. Nationalism is often strongly associated with flag colors and is therefore a key factor in inherent color meaning for many people.

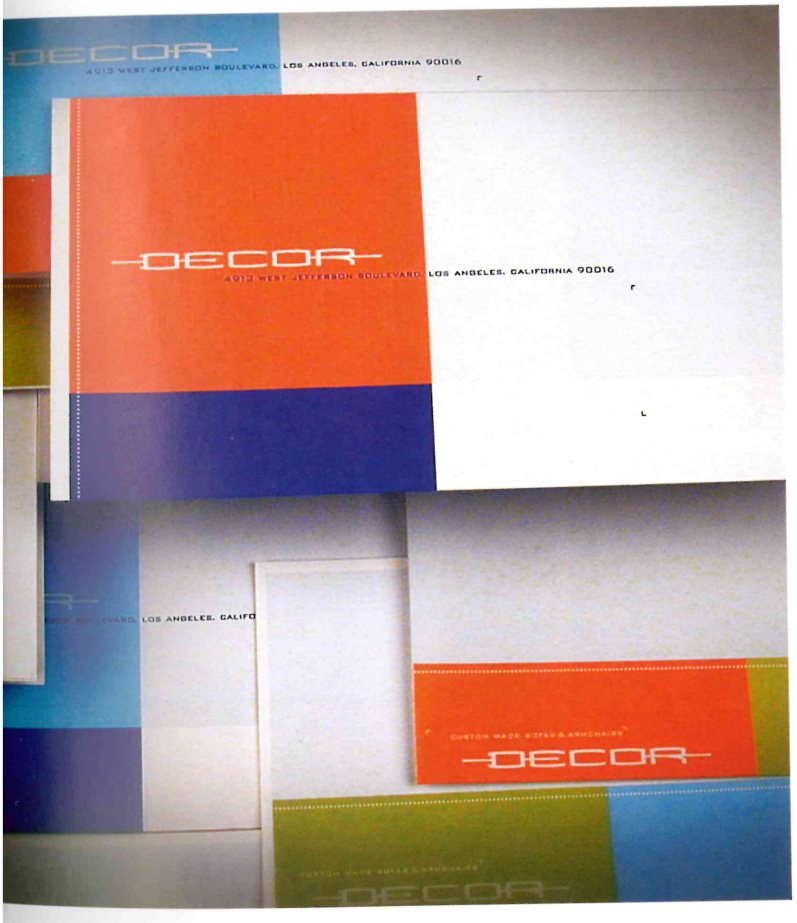
"Research reveals that all human beings make an unconscious judgment about a person, environment, or item within ninety seconds of initial viewing and that between 62 percent and 90 percent of that assessment is based on color alone."—The Institute for Color Research

The Blue Bar is the lounge in the Berkeley, a luxury hotel in Knightsbridge, London. Given the name, the obvious color choice for the graphics is blue. The color evokes various musical references as well, from "Blue Note Jazz" to "singing the blues" to "blue suede shoes." A cool blue hue adds a sophisticated edge to this promotional music CD package that mimics a matchbook.
Pentagram



Is there a difference in the way males and females respond to and interpret color? Yes. Some of the research leads us to wonder whether it is nature or nurture; regardless, the gender of the intended audience is an important factor to consider when choosing a color palette for any design project.

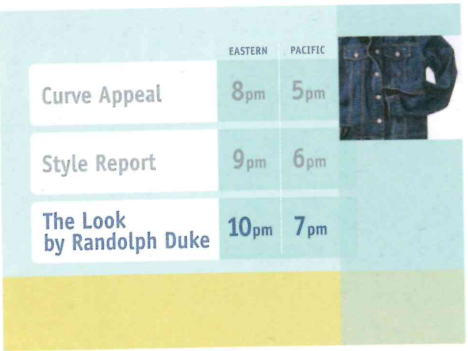
A 1934 study found evidence that the most pleasing color combinations were obtained from either very small or very large differences in hue, rather than medium differences. These were more frequently preferred by females than males. Based on this information, perhaps females can discern more differences in colors than males.

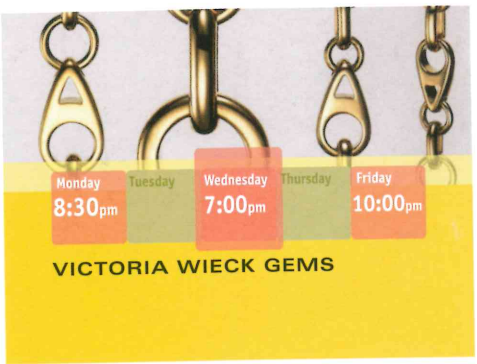


Creative director Yu Tsai chose blocks of vibrant color anchored by a cool neutral grey for the branding of Decor, a furniture manufacturing company with a thoroughly modern approach. Inspired by swatches of fabrics and the detailed process of stitching, the designers created a colorful identity system that illustrates and emphasizes Decor's style: minimalist and classy.
88 Phases

The colors—orange, pale and reflex blues, and a yellow-olive green—are arranged in squares that excite the eye and suggest special arrangements, such as floor plans. Orange, prominently used for Decor, is associated with youthful energy and chic sophistication.
88 Phases

Home Shopping Network is a retail shopping television network, a virtual on-air catalog offering everything from housewares to jewelry to clothing items. Color is used to draw in the target audience of twenty- to fifty-year-old women. The pastel palette creates a friendly yet subtly stimulating visual experience to persuade buyers to act immediately and make a purchase. The color scheme is similar to those found in many physical retail environments in which the target audience is used to shopping, therefore allowing the customer to make a direct association with previous purchasing experiences.
AdamsMorioka





In a 1959 study, researchers found that males were generally more tolerant of achromatic colors (colors with zero saturation and, therefore, no hue, such as neutral grays, white, or black) than females were. This led researchers to propose that females might be more color-conscious as well as more flexible and diverse in their color preferences. Researchers also found in a 1990 study that females are more likely than males to have a favorite color. When asked whether they preferred light versus dark colors, there were no significant differences between males and females. However, when asked to choose between bright or soft colors, the females preferred soft colors, while the males preferred the bright ones. What is the favorite color of each gender? There is no one answer—research seems to provide conflicting results. Another study of color identification and vocabulary was done with college students in 1995. Students were asked to look at and identify twenty-one different color chips. Females recognized significantly more

When Aiwa became a subsidiary of Sony Corporation, the consumer electronics brand repositioned itself to create stylish and innovative audio/video products for the youth market. Hello Design, in partnership with Weiden + Kennedy, The_Groop, and Oceanmonsters, designed and developed Aiwaworld TV, the main portion of Aiwaworld to serve up audiovisual "hybrid music." Above are four screens featuring the colorful animated world created for Aiwaworld TV. The designers used a parallax engine to create a 3-D experience in which users can explore a topsy-turvy world inspired by Japanese pop culture. A bright palette of colors echoes the comic book references, working to fully immerse the viewer in a kinder, more fun-filled world. No dominant color is used to convey a particular message in Aiwaworld TV; rather, it is a collection of colors taken from the Japanese anime genre, which has a youthful voice. The colors work to invite the viewer into a familiar yet new kind of storytelling. Aiwaworld TV not only complements existing Aiwaworld content but also provides an engaging experience that speaks to young audiences, creating a unique brand impression for the client.

Hello Design

elaborate colors than the males did. Findings also indicated that the differences in responses to color identification might be attributed to a difference in the way males and females are socialized.

"Colors are the mother tongue of the subconscious."—Carl Jung

Using Proprietary Colors to Convey Information

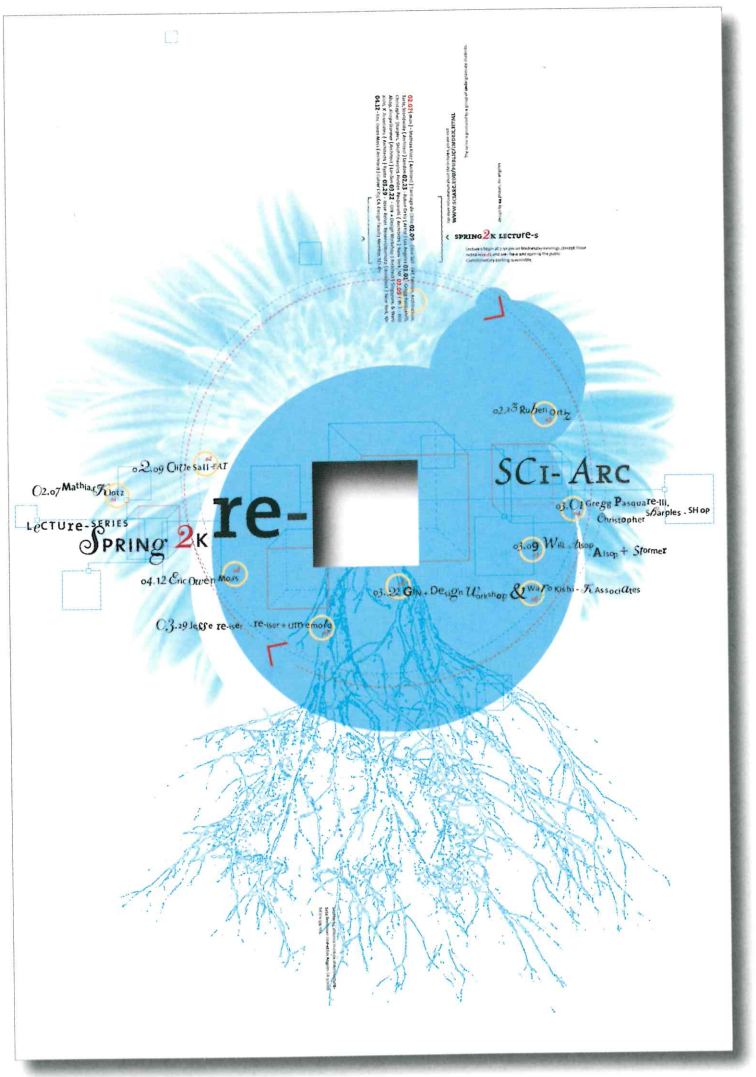
The idea of "owning" a color is one of the highest priorities in managing logos and corporate identities and is generally important to all design and advertising visual systems. Orange has been associated with the children's television network Nickelodeon for almost two decades. Pantone 659, a deep, dark blue, is used in the identity system of retail clothing giant The Gap and was also the name of one of the company's fragrance products. In these cases, color creates a symbolic link with the producer and its products. A bright golden yellow has been associated with photographic products manufacturer Kodak for decades. The color becomes a stand-in for the concepts of "kids' entertainment" or "trendy clothing" or even arguably, "photography."

Perhaps subverting standard meanings would help to make a color proprietary. What if a health-related product had a black or brown logo instead of the expected green one? Would organic food packaging jump off the shelf more if it were designed in unnatural, even day-glo, colors? What about a slick, high-tech company adopting an earthy organic color palette? All of these could separate a brand from its competition. Most clients would relish the idea of having color alone symbolize their company.

Color as a Convention

Color meanings are held deep in our subconscious. Color is a state of mind as much as anything. In a physical sense, there is no such thing as color, just light waves of different wavelengths. The human eye can distinguish between the wavelengths, so we see the world in color. However, the human brain perceives more. We *feel* color. It has biological, psychological, social, and cultural dimensions, all of which give it meaning and convey information.

Pale blue dominates this poster promoting the Spring Lecture Series at the Southern California Institute of Architecture (Sci-Arc), a leading-edge school of experimental architecture. The simple criteria was to incorporate the Latin prefix *re*—as in *rethink*, *reinvent*, *redefine*—so the designers played with the notion of everything coming full circle in the graphics. Organic shapes in delicate blue, overlaid by bold black typography and punctuated by bits of red and yellow, illustrate that an atypical color palette can effectively convey bold ideas. The die-cut square in the center of the poster even allows the viewer to recontextualize the graphics themselves.
88 Phases



2 Create Color Harmony

To a certain extent, pleasing color harmony is just like any other aspect of beauty: it is in the eye of the beholder. What is pleasing to one person may not be pleasing to another. Color harmony nevertheless is related to the organizing principles of all artwork: balance, variety, proportion, dominance, movement, rhythm, and repetition. These are some of the traditional metrics for determining whether or not a piece, be it fine art or graphic design, is pleasing and works.

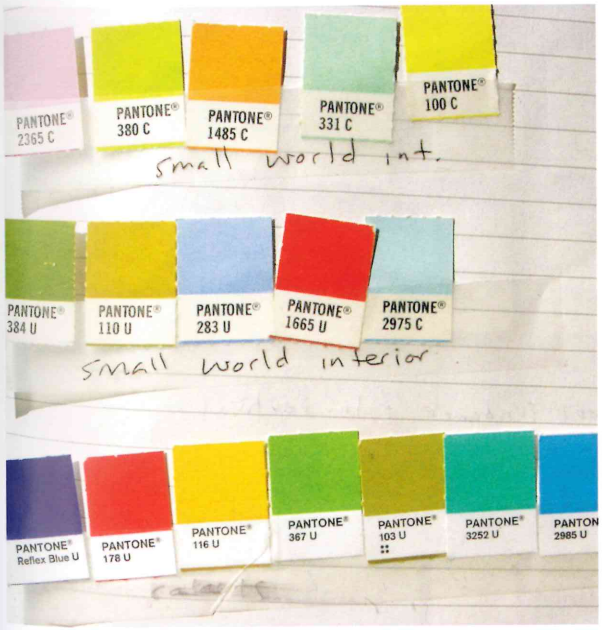
Making Color Choices

Keeping this in mind, designers need to select the colors for each and every project carefully. Some of their decisions may be based on their own preferences, while others may be heavily influenced by client input and preferences. Selecting inventive combinations of hues, along with specific tints and shades, is a practiced skill. The more you do it, the better you get.

Most designers seek a color scheme that engages the viewer and provides a balanced visual experience. The deliberate avoidance of harmony must be viewed as a means of inducing an agitated or chaotic reaction in the viewer. Designers must decide in what direction they are headed and for what reason. The starting point for all decisions about color harmony comes down to a creative interpretation of the message that needs to be communicated. What combination of colors will best convey the desired meaning? If those colors are clichéd and overused, what are the best alternatives? Can the effect be refined by a slight modification of color choice?

Adfusion is a company providing an emarketplace for media acquisition professionals. The corporate identity colors reflect energy and sophistication and allow for flexibility of application with its palette of five colors. Pure orange and red are used in conjunction with intermediary hues of yellow-green, blue-violet, and blue-green.
Robert Bynder Design

Harmony is a factor of cohesion—the pleasing relationships among graphic elements, especially color.



Sean Adams keeps a journal of color palettes as an easy reference guide to color schemes. At left, see pages for the Sundance Film Festival and the California Institute of the Arts (CalArts) color palettes. This logbook of ideas includes approved and unapproved color palettes and serves as a creative resource for thinking about color in all types of projects. AdamsMorioka

Eight Rules for Building a Color Palette

The following steps are recommended for creating timeless color schemes that are effective in all media and for all cultures. The steps are based on the research of Professor Hideaki Chijiwa, Musashino Bijutsu Daigaku (Musashino University of Fine Arts), in the book *Color Harmony: A Guide to Creative Color Combinations* (Rockport Publishers).

1. Figure out the purpose.
Think about why you are choosing a color palette and for what kind of client. Investigate color meanings and associations.

2. Review color basics.
Make sure you have reviewed basics such as hue, saturation, intensity, and the ways in which colors affect each other in relationship. Study layouts you like to analyze possible palettes for the current project.

3. Choose a dominant color, then accent colors.
Decide on an overall background color, or color for the largest areas, first. Then select possible accent colors. Sometimes the accent color is fixed. For example, a client may have a corporate color that must be used. In that case, keep the accent color in mind when selecting the dominant color.

4. Select shades, then vary them.
Because the shade of a color heavily impacts the overall impression, decide what feeling must be conveyed—bright and cheery, or perhaps serene and dignified. Note that colors of the same hue but of varying shades and tints can look very different and still remain harmonious. Varying the shades of hues to create contrast of light and dark can be effective and dramatic.

5. Look at compatibility of hues.
Having selected a preliminary color scheme and considered a variety of tints and shades, look at the overall compatibility of colors. Is the contrast pleasing? If not, go back to refine the palette with intermediate hues. For example, with green selected as the dominant color, perhaps red-orange would work better than pure red.

6. Limit the number of colors.
With a palette now chosen, review the number of colors. Two or three colors are usually enough. Four must be chosen with care, while five might be too many. Sometimes budget limitations as well as aesthetic considerations narrow the palette.

7. Put the colors into action.
Put the colors to use in a few typical pieces required by the client. Look at how they work together. If the color palette is successful, your designs will be harmonious. If not, further refinements are warranted.

8. Keep a logbook.
Once you have found color palettes that work, document them in a journal. Paste in color chips and include the client's name and a project description. The logbook will serve as a reference when choosing future color palettes.

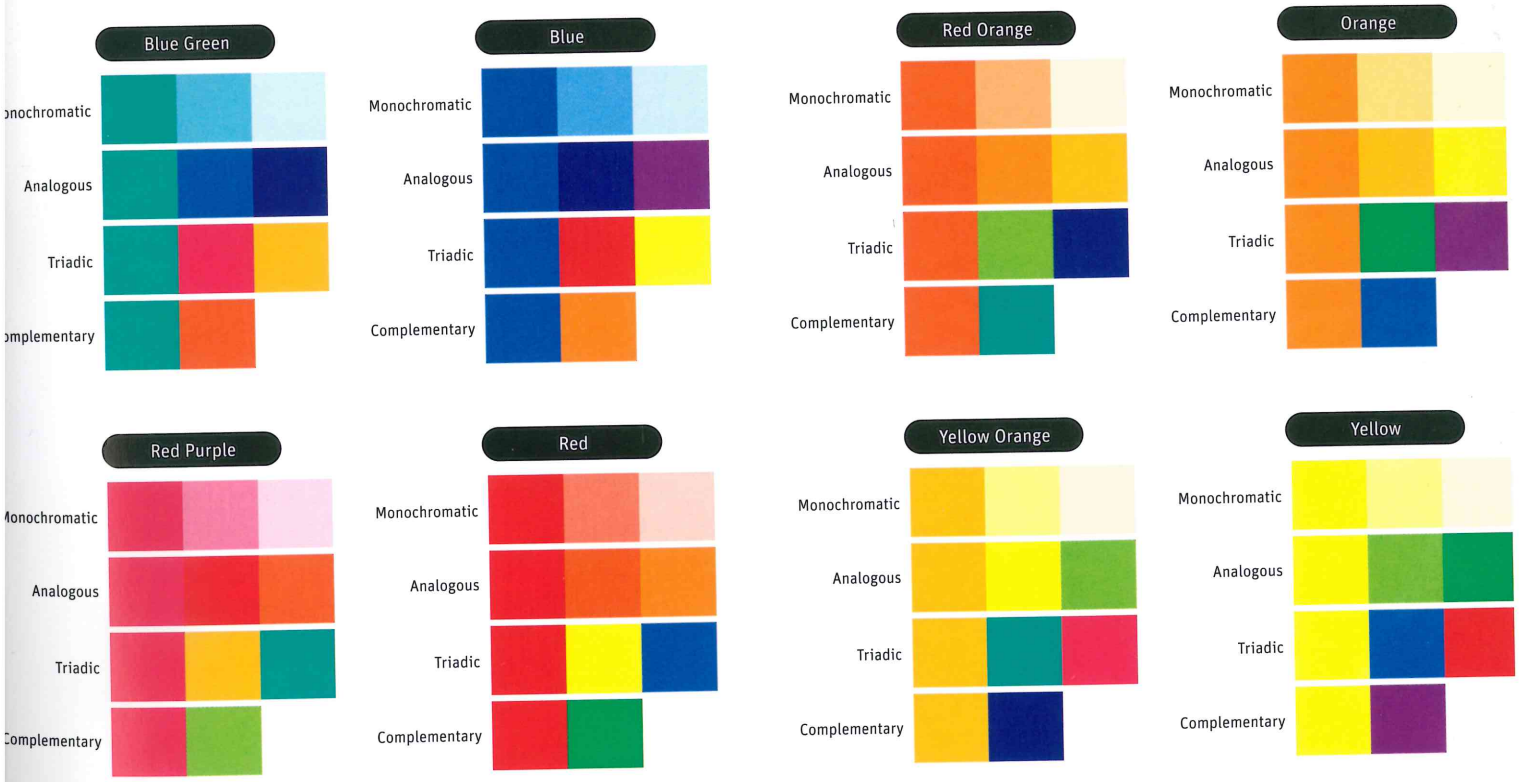
Combining Colors

The science of color harmony involves the categorization and determination of the dynamic symmetry in color groupings. Effectively doing so goes back to understanding and utilizing color theory to create color relationships such as complements, split complements, triads, analogies, monochromatics, and the like. (Please see Chapter 2.) Color science becomes art when a designer knows how to use colors, in what proportions, and for what purpose, to create a desired response.

Designers know that contrast intensifies color. Fully saturated colors create a lively impression. White and black alter the perception of other colors. Different types of color schemes have different positive and negative factors. For example, analogous color schemes (adjacent hues on the color wheel) are soothing to the eye and easy to create but lack contrast and vibrancy. Split complementary color schemes (a hue plus the two hues adjacent to its complement) are more sophisticated and nuanced than complementary color schemes (two hues directly opposite on the color wheel). Split complements have a strong visual impact but can be difficult to balance. Triadic color schemes (three hues equally spaced around the color wheel) offer contrast, but less contrast than a complementary scheme. Tetradic, or double complementary color schemes (two pairs of complementary hues), are the richest schemes with the most variety but are by far the hardest to balance. Monochromatic color schemes (variations in tints and shades of a single hue) are clean and elegant but lack contrast and often lack impact as well.

Naturally, there are always exceptions. Talented, creative people can take delight in stretching the boundaries of what works in color schemes. Color harmony fascinates designers. Experimenting with it allows them to develop their unique point of view. Color interactions are both optical and aesthetic phenomena. Designers must formulate a process for visualizing color combinations that allows them to shift with changing media, clients, and trends in color usage.

"Besides a balance through color harmony, which is comparable to symmetry, there is equilibrium between color tensions, related to a more dynamic equilibrium."—Josef Albers

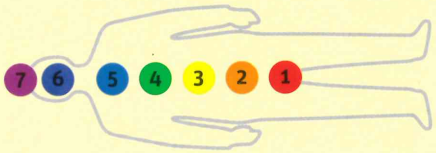


Color Harmony Chart

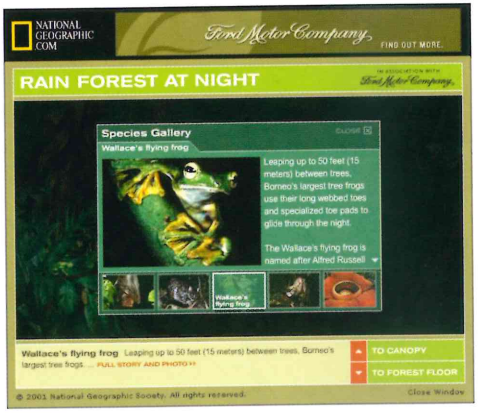
Shown here is a reference guide for creating pleasing color harmonies. Included for each of the hues of the twelve-step color wheel is an example of a monochromatic, analogous, triadic, and complementary color scheme. These samples can be used as a reminder of possible color combinations when beginning the process of building a color scheme for a project. Color harmony is often a fusion of the fundamentals of color physics tempered by aesthetic practice. Color can be used to dazzle, soothe, charm, irritate, agitate, or annoy—all through the choice of specific relationships.

Color on a Biological Level

Chromotherapy, or color therapy, is a practice that uses the seven colors of the rainbow spectrum to promote health and healing. It is based on the premise that certain colors are infused with certain specific healing energies.



Color has played a role in healing for different cultures. In ancient Egypt, people were treated in rooms designed specifically to refract the sun's rays into different colors of the visible spectrum. Practitioners of Ayurveda, especially in India, believe that specific colors correspond with each of the seven chakras, or energy centers, of the body.



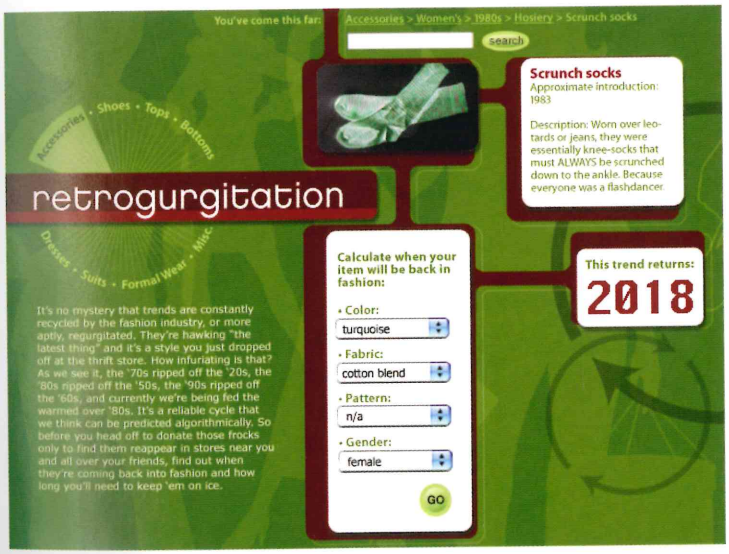
The website designs shown here are great examples of color harmony in practice. The National Geographic's *Earth Pulse* website, by Hello Design (left), uses an analogous color scheme featuring blues and greens that perfectly capture an undersea mood. The *Retrogurgitation* website, designed by Michele Moore Graphic Design (opposite, top left), is an entertainment site about the return of fashion trends. The site utilizes a complementary color scheme of red and green. Singer-songwriter Kirstin Candy's website, also by Moore (opposite, top right), uses a predominantly monochromatic palette of blue-violets to theatrically offset the color portraits of the artist. Moore's design for John Fogerty's website (opposite, lower right) effectively uses another analogous color scheme, this one with reds, golds, and oranges. The Michele Moore Graphic Design website home page (opposite, lower left) virtually eschews color by adopting a primarily black achromatic color scheme. This makes the minimalist white typography pop off the screen. In subpages on this site, the predominantly black color scheme allows full-color photos of the designer's work samples to stand out more vividly.

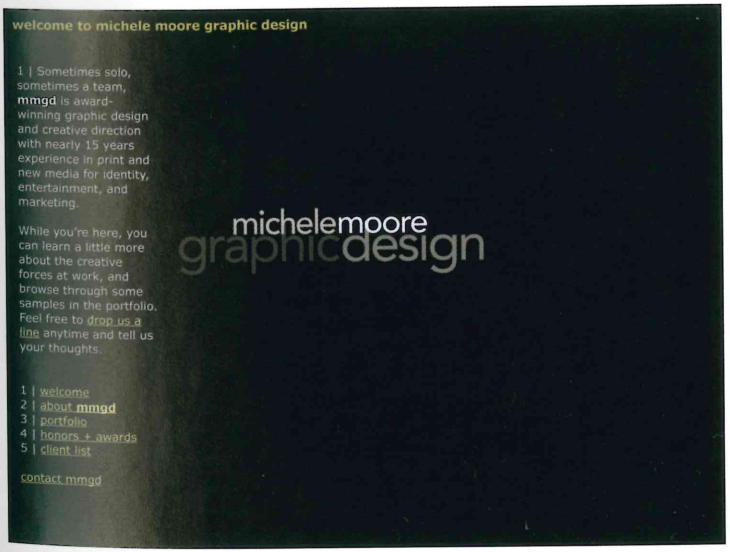
Hello Design • Michele Moore Graphic Design

Traditional Chinese medicine holds that each organ of the body is associated with a certain color. In Qigong, a self-healing art that combines movement and meditation, different organs and emotions are associated with both healing sounds and specific colors. Both practices use color to treat a wide variety of mental and physical imbalances.

In 1878, physician Edwin D. Babbitt (1828–1905) published *Principles of Light and Color,* in which he described his work on healing with colored lights. Dr. Dinshah P. Ghadiali (1873–1966) built on Babbitt's work, continuing to develop the practice of chromotherapy. Though controversial, Babbitt's work continues to inspire color therapists today.

Wearing specific colors, drinking colored water, meditating about a color, and being bathed in colored lights may all be relaxing. However, few clinical studies of color therapy have been conducted, which leaves open the question of whether or not chromatherapy is effective in treating disease.





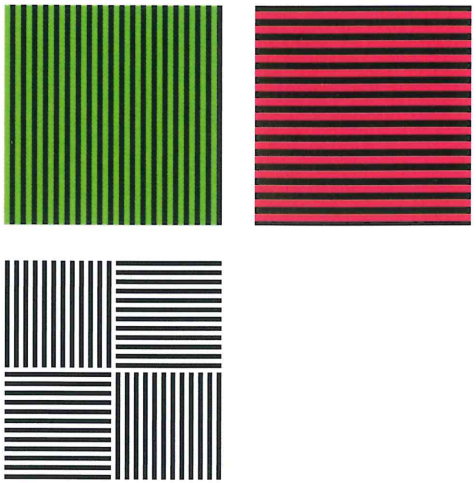
3 Attract and Hold Attention

As color is a visual language in and of itself, a designer can use it to attract the eye and focus attention on the intended messages in the work. Color can be used to irritate or relax, encourage participation or alienate—it is completely up to the designer. Josef Albers said, "Whether bright or dull, singular or complex, physiological or psychological, theoretical or experiential, the persuasive power of color attracts and motivates."

Color Physiology Influences Design

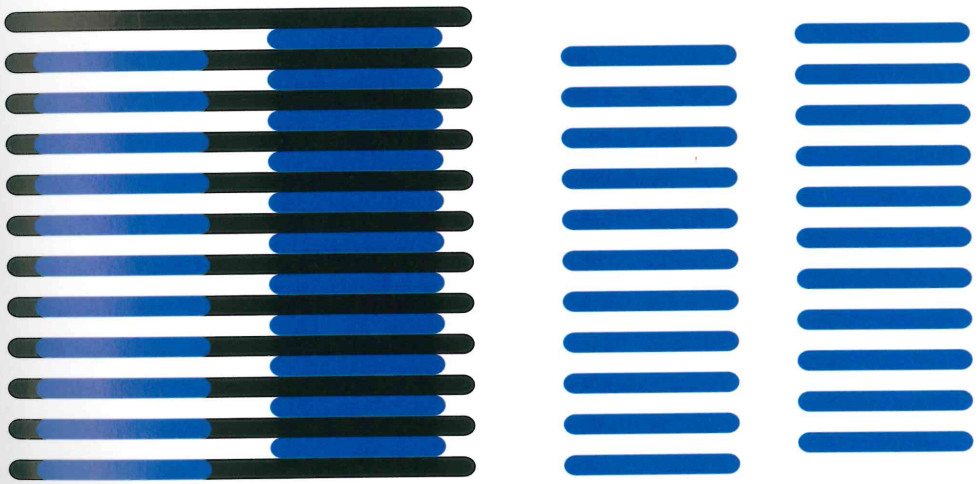
Strong visual statements can distinguish a designer's work and the client's message from the competition. Using physiological phenomena to get attention will also assist in this goal. Our brains and eyes participate with the designer to either accept or reject a particular design. As humans, we seek balance, especially in terms of color. For example, when exposed to a particular hue, our brains seem to expect the complementary color. If it is present, the combination looks vibrant. If it is absent, our brains tend to produce it to form a balance.

The eye naturally recognizes certain contrasts and colors, specifically the colors found in the rainbow spectrum. Perception of other colors, such as muted tertiary colors and tints and shades of spectrum hues, may require an intellectual shift to recognize. Since humans cannot see all possible colors, color perception is evoked by picking up on dominant wavelengths of spectral light. Dominant wavelength is the perceptual idea that gives us the concept of hue (e.g., if the dominant wavelength of an object is red, the object is perceived as being the color red). Therefore, the eye is nearly always drawn to what it can easily perceive. This is the scientific reason why a design utilizing primary colors attracts our attention instantly.



This optical illusion is known as the McCollough Effect. Look at the colored grids, above, for a few minutes. Then look at the black and white grids. There should seem to be a green haze around the horizontal lines and a magenta haze around the vertical lines. The cause of this effect is unclear, but it involves our neurotransmitters. The McCollough Effect demonstrates that color and orientation are two sources of stimulation in humans. Designers must consider not only the particular colors they choose but also their physical relationships, which affect perception and attention. This effect also demonstrates how our eyes and brains seek the complements of colors by creating the sensation of them.

This poster for a performance of the Stockholm Improvisational Theater attracts attention with a bold use of color and shape. The dark indigo-blue juxtaposed with a near-complementary yellow-orange and white creates the optical illusion of depth. Playing with optical dimension, enhanced by color choice, allows designers to fascinate the eye and draw the viewer in.
Sweden Graphics



This chart shows the Munker-White Effect. Even though the blue bars are identical (see right), when surrounded by different colors such as white or black, they appear to be completely different hues. This optical illusion also demonstrates a method for obtaining the appearance of more colors in a layout.

Optical Illusions Can Affect Design

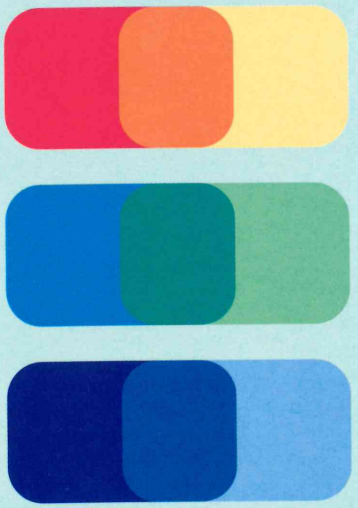
Fascinating insights into how humans perceive and interpret color can be gained by studying optical illusions. Although we don't have a complete model of the way color information gets processed by the eye and brain, scientific research offers glimpses of various phenomenon that can prove significant to our understanding of how color works in design compositions. Visualizations of certain color combinations often play tricks on us, as illustrated in the diagrams on these pages.

Many scientists have studied color, and their research can be helpful to creatives. Colors react to each other on many levels, so it is important for a designer to understand this and leverage it.

The Transparency Effect

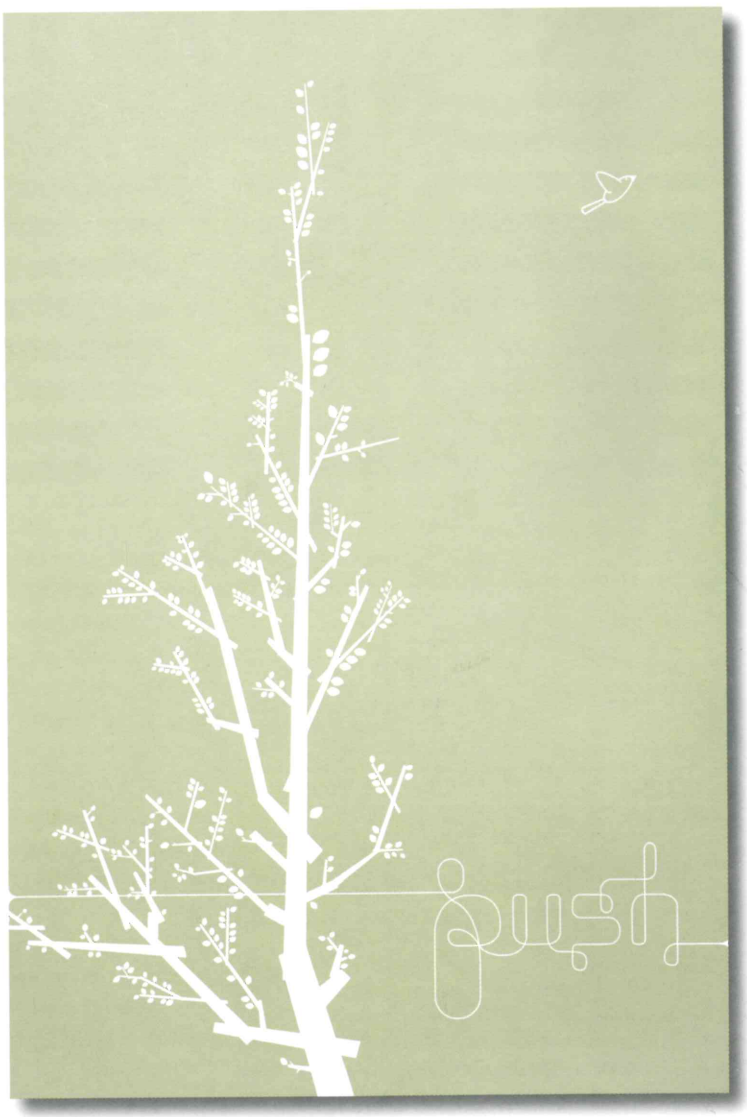
A perceptual phenomenon that can add to color compositions in design, especially in terms of creating special illusions, is called the Transparency Effect.

In color mixing, designers seek relationships between colors by altering hues with each other to create a specific hue. When two hues are mixed to form a third, the resulting color resembles both. If placed between the original two, the new mixed hue will not only be harmonious, but will also give a surprising illusion of transparency.

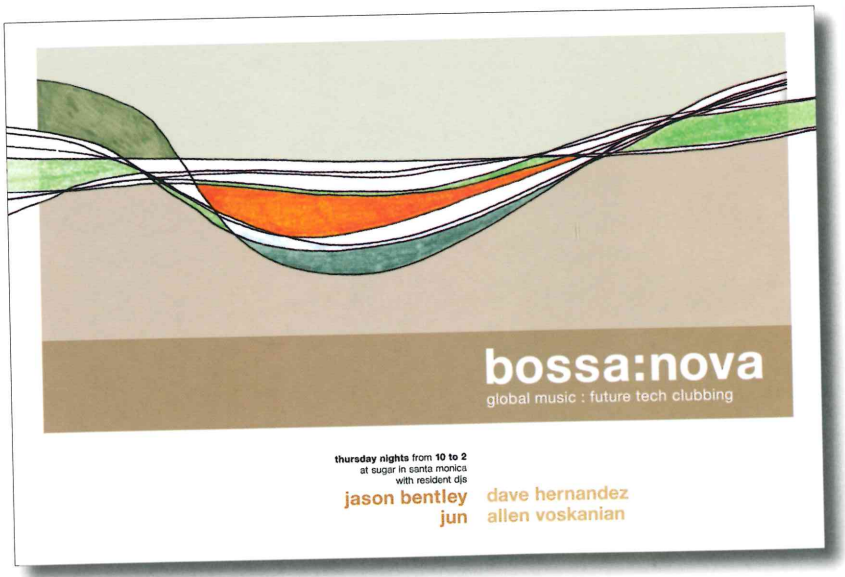


In cases shown above, the original two colors (the left ones and the right ones) look like overlapped transparent sheets that form the new middle color. These types of optical phenomena can be utilized to draw the eye into a design by achieving harmony and concordance among all the colors present.

"One way to make yourself stand out from the crowd is by using color in ways nobody else thought of." –Josef Albers



The two versions of promotional postcards for Bossa:Nova , a DJ collective that produces music/dance club performances, designed by Stefan Bucher, illustrate the way a change in color palette can effect mood in design. Different people respond to different color schemes, drawing in music lovers of various types, as in the smooth analogous blue green or the more lively complementary versions below.
344 Design



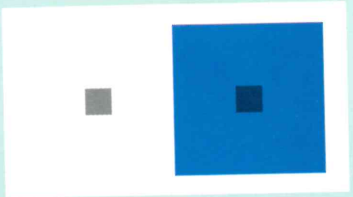
Another example of the way color interactions alter perception and get attention are these two posters created for the annual Push advertising and design conference. Similar in design, each poster incorporates a bird taking flight from a branch as a metaphor for creative freedom. Yet the posters look quite different due to the number of colors used. The single desaturated gray-green has a more subtle impact than the bolder near-complementary scheme at left.
Brand Integration Group/ Ogilvy & Mather NY

Afterimaging

A Color Perception Phenomenon

Another interesting color perception phenomenon is called afterimaging. Every color has an opposite, or complement. It is possible to determine a color's complement just by using our eyes. The rods and cones in our eyes vary in sensitivity to different light and will fatigue after prolonged exposure to a hue. Once fatigued, we will perceive the complement of that hue when we look away.

You can try this for yourself. Look at the flag image for several minutes, then gaze at a white sheet—you are experiencing an afterimage. Now stare at the blue square below. After a few minutes, look at the small gray square to its left. You should be able to see a square of the blue's complement—orange.



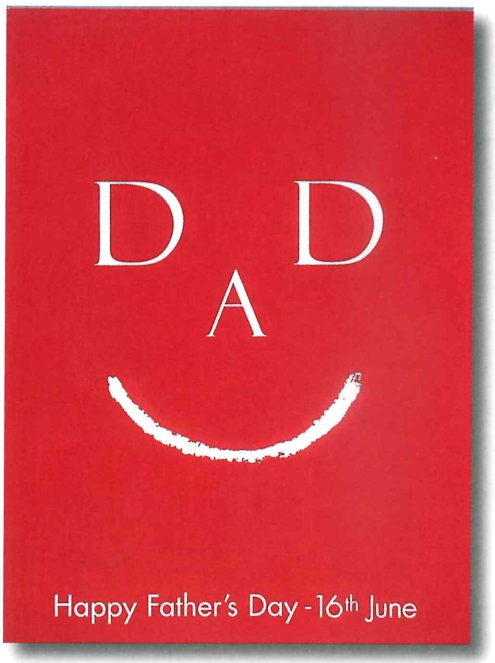
Afterimaging and other optical illusions are noteworthy because designers must understand that colors can significantly alter each other when juxtaposed.

Color and Human Emotion

Color is used in various forms of alternative medicine; color psychology is one example. This field, a relatively new area of research, is devoted to analyzing the effects that color has on human emotion. Some may call it a pseudoscience, but color psychology has its devotees worldwide.

Practitioners of color psychology, which is related to chromotherapy, note that many common physiological effects often accompany psychological responses to certain colors. However, variables such as age and cultural background may also affect responses.

Color can be used in a cityscape to attract attention. The large format banners for the BALTIC Centre for Contemporary Art in northern England are a striking combination of black and yellow. The color scheme evokes heavy industry as well as modern art.
blue river design



A bold red is used with the white of the stock in this poster to alert customers to Father's Day promotions at Boots, one of the United Kingdom's largest pharmacy chains. Red is one of the most visible colors in the spectrum. It stands out in any context and always demands attention.
Lippa Pearce

Color psychology is of particular significance to environmental graphic designers, whose color choices for installations and environments can greatly affect people's mood and actions. Color is an active influence on human consciousness.

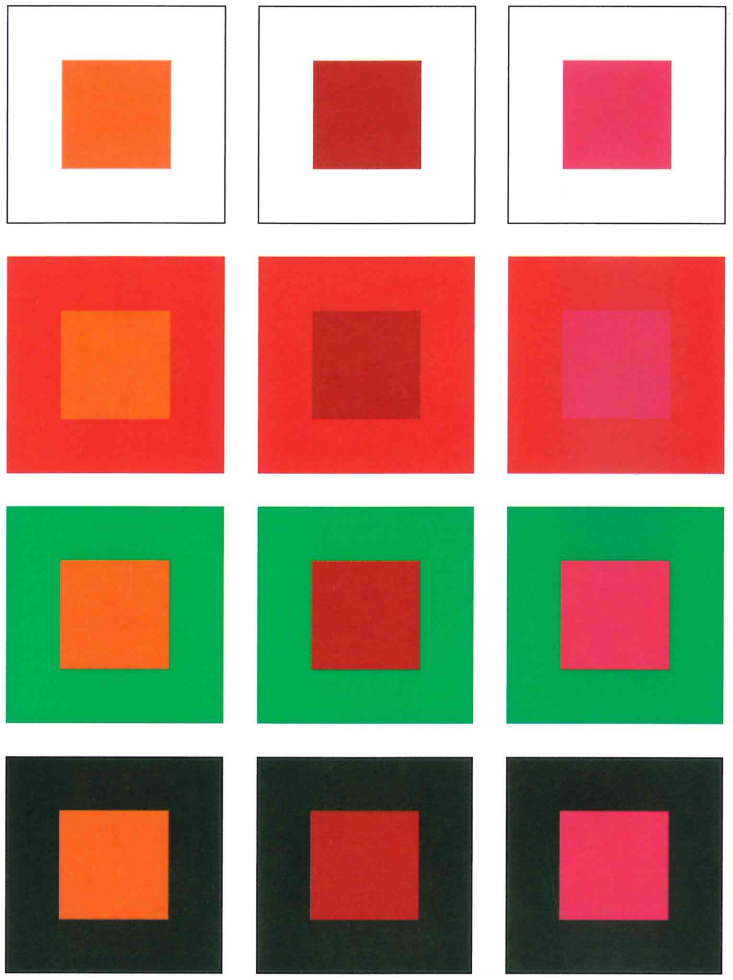
Color has an impact on us because every cell in the body responds to light, and color is light. So we react to it, literally, on a cellular level. Color affects our bodies, our minds, and our moods.

Based on research of a typical retail environment, color was used to differentiate a new line of Stanley automotive parts. In a strategic attempt to draw attention away from other products, a vivid burnt orange was chosen as the new core color for the brand.
Hornall Anderson Design Works

Here, vibrant primary colors are employed to cause the Sony StreetBox line of music products to stand out to German teenagers. Graphic treatments played against urban-inspired imagery and package formats work well because of the strong color palette.
Format Design

4 Remember That Context Is Everything

Color is always seen in context. Sometimes that context is proximity to another color, which alters its meaning or even the perception of the color itself. At other times the context is the environment surrounding the color—for example, the white of a page or the physical environment as a whole. The perception of color is always shifting, never fixed. All colors appear more brilliant when set against a black background. Conversely, they seem a bit duller on a white background. Complementary colors make each other appear brighter, yet the effect on the brain, when taken in total, is a balanced neutral gray. Certain color triadic schemes seem more garish or more sophisticated, more lively, or more sedate.



A study in color contrasts—three different red squares, each with its own vertical column, are set on the same color backgrounds—white, red, green, and black. Note how the colors shift in relation to each other. Colors mutually influence each other, altering perception. Provocative color effects can be achieved with very slight variations in hue, as demonstrated here.

All Color Is Relative

The constant experimentation that occurs in the design process brings to light which colors are most pleasing to a particular designer's eyes. By understanding that all color is relative, designers can observe for themselves the effects colors have on each other. Sometimes a slight variation in tint or shade is enough to create the required emotional and aesthetic feeling.

Proximity to Other Colors

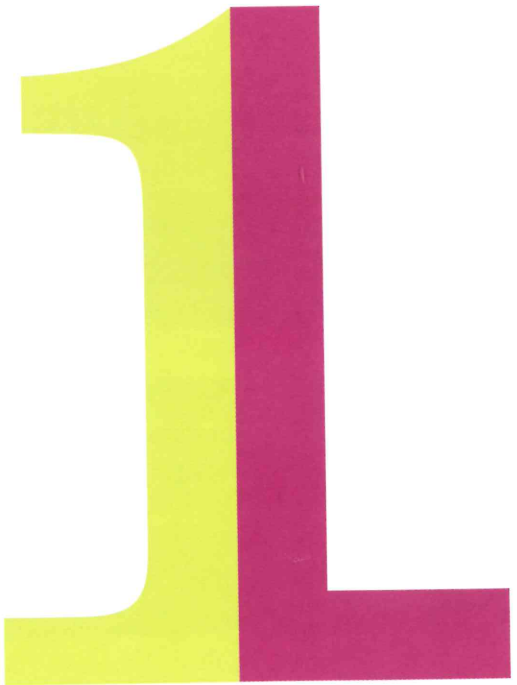
Optical color mixing, also referred to as *partitive color* or *simultaneous contrast,* is another important contextual phenomenon. This is the color perception that results from the combination of adjacent color areas by the eye and brain. Human perception mixes colors that are next to each other and forms a color impression based on the entire composition. The viewer may perceive colors that are not actually present. If it is imperative that a specific color is perceived first by the viewer, be sure to keep this phenomenon in mind.

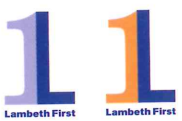
"A color has many faces." —Josef Albers

In addition, a hue's position on the color wheel can affect the perception of other hues. Hues that are next to each other have an easier relationship than those that are opposite each other, which results in active complementary contrast. The concept of the advancing and receding natures of colors must also be considered. Warm colors always advance and seem nearer, while cool ones recede and seem more distant. Designers can achieve an optical fluttering of the edges of the colors in their layouts, creating an impression of lively movement. Alternatively, they can make transitions nearly invisible and ease the flow of the eye by using more harmoniously related colors. Juxtapositions of colors cause interactions, enhancing or distracting from the intended message. Proximity literally changes the character of a color. All of these context-related aspects of color can be utilized to either the advantage or the detriment of a design. Success is a matter of the intent of the piece and the skill of the designer.

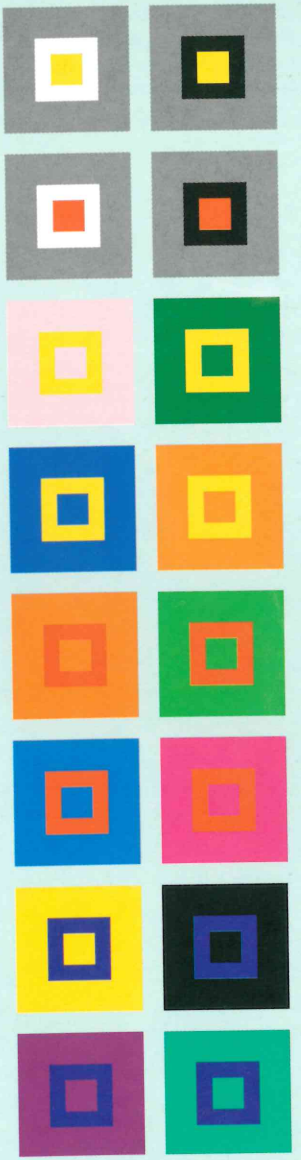
Environmental Influences Change Color Perception

The end use of the piece—its particular medium—must be considered as well. A design for a retail environment involves different considerations than a design for television broadcast, for example. Both applications require that the design be seen, be understood, and communicate a given message. However, the color considerations may be totally different. A retail product package color is probably chosen in relation to other products—if every other competitor is pink and purple, then perhaps orange is a better choice. The color helps the product stand out. This is an example of the context influencing the concept as well as creating an idea that is context specific.





Lambeth First is a partnership of community groups in the Lambeth area of south London. Different color combinations used for the logo represent a variety of voices, allowing color to express a multicultural context. **Atelier Works**



An illustration of color effects—how one color impacts another. Notice how the same yellow and blues look very different on the various background colors. Some combinations vibrate, some are soothing. Although the colors are used in equal amounts, some combinations make the middle squares look larger or smaller. Colors can be completely altered in expression by different juxtapositions or different contexts.

The Science of Color Comparison
Several German scientists and artists have noticed, researched, and written about the laws of chromatic contrast as well as the active role of the brain in the development of color relationships and perceptions.

Johann von Wolfgang Goethe greatly advanced color research. He was one of the first to draw attention to and describe the phenomena that can accompany colors in contrast to one another. He is most famous, however, for his approach to the treatment of color. He argued that light, shade, and hue are associated with emotional experience. His unorthodox theories of the character of light and color influenced abstract painters such as Wassily Kandinsky and Piet Mondrian.

Another influential thinker about color interaction was German physicist and meteorologist Johann Friedrich Wilhelm von Bezold (1837–1907). His professional expertise was the physics of the atmosphere, especially electrical storms, but his contribution to color physics came from his hobby—rug making. Bezold's uncle, Gustav, was a prominent art historian, which also may have influenced his foray into color research.

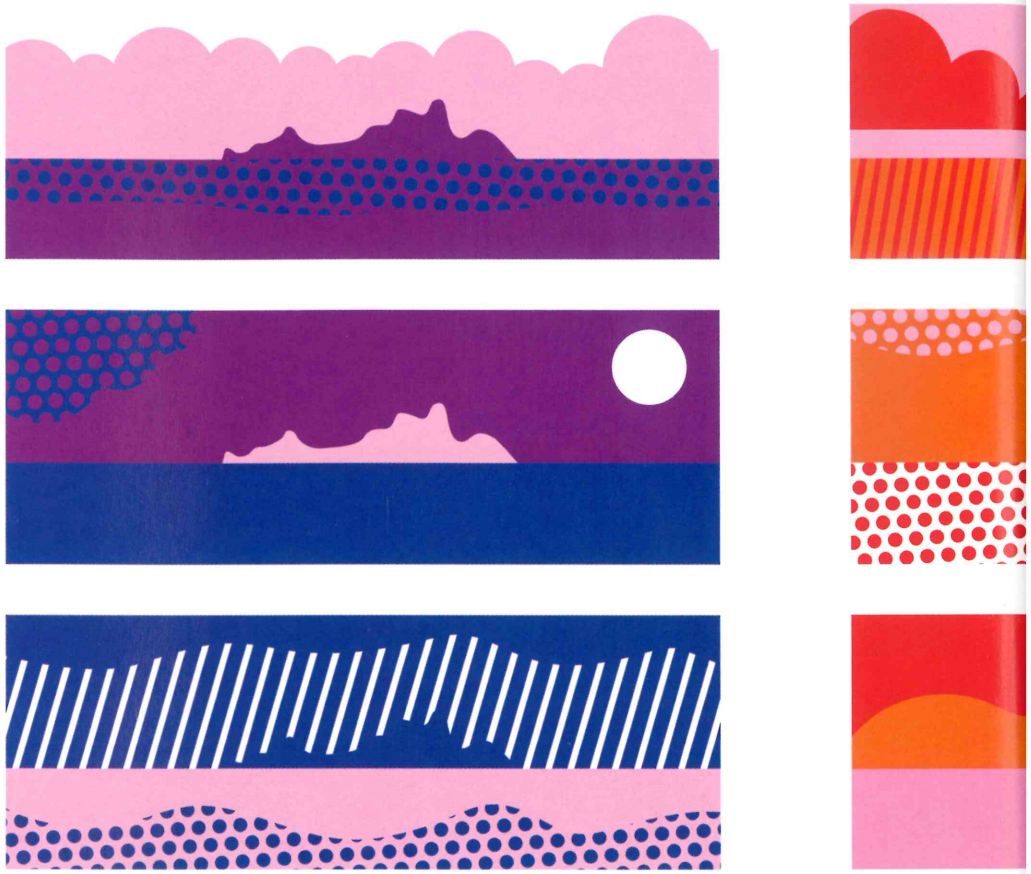
Light affects color

Color is light, but light also affects color. Whether it is the depiction of a real-world scene in a color illustration or the calculation of how a colored graphic may appear in its actual usage location, illumination is a factor that the designer must understand.

To create the illusion of depth in a particular piece, a designer may wish to show shadows when one form overlaps another. Whether cast by single or multiple light sources, shadows are commonly approximated by creating a shape that includes some of the complement of the original color. Also, warm light tends to cast a cold shadow, and vice versa.

Another aspect of color and light is color constancy—the tendency in human perception that allows us to compensate for various conditions and types of illumination. Color constancy is a psychophysical response that lets us recognize colors, and therefore objects, no matter what the light is like—whether it is low or bright, fluorescent, natural, or incandescent. We see an object as a certain hue because it reflects more of a particular wavelength of a specific color of light—so a tangerine looks orange because it reflects more orange light than other objects near it. Further, due to color constancy, that tangerine will seem orange to us in bright sunlight or by candlelight in a darkened room because our visual system compensates for changing illumination.

Chromatic adaptation allows for changes in environments as well. This is demonstrated when a person walks from full sunlight into a building. At first, the environment seems very dark, then our eyes gradually adapt, and true colors become apparent. Our eyes and brains are constantly adjusting to varying light conditions.



A series of three full-page illustrations that accompany a *Raket* magazine article on the human fascination with islands. Nonrepresentational colors are used, stepping away from a natural color scheme. Color is used to create an abstraction of the idea of islands. The series shows that varying the color palettes in this context causes changes in the reading of images that are structurally similar.
Sweden Graphics

Bezold noticed that certain strong colors, when evenly distributed, entirely changed the effect of his rug designs. This effect is now known as the Bezold Effect. He is also known for the Bezold-Brücke Phenomenon, which is the changing perception of colors under the effects of increased light intensity; in other words, the apparent brightness of hues changes as illumination changes. His 1874 book *Die Farbenlehre in Hinblick auf Kunst und Kunstgewerbe* (*Color Theory with a View Toward Fine and Commercial Arts*) documents these findings. His work influenced Josef Albers.

Justus Oehler designed a visual system for the 2006 cultural festival celebrating the 250th birthday of composer Wolfgang Amadeus Mozart in Salzburg, Austria. Oehler's visual system is based on a series of diagonal typographic blocks. This piece demonstrates the principle of optical mixing, in which the position of colors next to each other affect the appearance of each color. The effect can be seen here in the identity manual. The juxtaposition of these color blocks gives the illusion of even more colors and creates a lively design.
Pentagram

Simultaneous Contrast

One of the important early studies of the science of color harmony was done by French chemist Michel Eugène Chevreul (1786–1889). Chevreul introduced a systematic approach to seeing colors in his 1839 *De la loi du contraste simultané des couleurs et de l'assortiment des objets colorés* (published in English as *The Principles of Harmony and Contrast of Colors*). The book is both historically and aesthetically significant.

Chevreul was appointed the director of dyeing at the Manufacture Royale des Gobelins (the Gobelins Royal Tapestry Works) in 1824. He came to realize that many of the problems encountered in the firm's weaving had to do with how and which colors affected each other. His findings, set forth in his book, deal with simultaneous contrast.

Simultaneous contrast is a form of color mixing referred to as *medial*. This color mixing is how our eyes and brains combine colors that are next to each other to form a particular color impression. Chevreul's work on the physics of color and color effects had a great impact on the world of art. Particularly affected were the Neoimpressionists, especially the Pointillist painters Georges Seurat and Paul Signac.

In a busy, cluttered context, such as the ITC Telecom World Trade Show in Geneva, the HP Telecom booth stands out. Colors from the new HP palette were used to delineate content areas within the booth. As it was the first trade show to showcase HP's new look and feel, the color scheme served a dual purpose: as navigation to help visitors find the areas and topics they were interested in, and as a way to bring the corporate colors to life in three dimensions, signaling the emergence of the new HP brand.
Stone Yamashita Partners

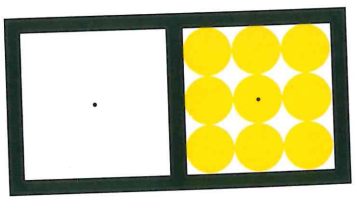
The Relativity of Color

Josef Albers was a German artist and educator. He was one of the original teachers in the Bauhaus who immigrated to the U.S. and was responsible for major innovations in art education. As an artist, Albers is best known for his series of abstract paintings *Homage to a Square*; as a color theorist, he is known for his book *Interaction of Color*, published in 1963.

Albers's work demonstrates that "a color has many faces." He explored the subtle relationships among colors, and his methods of studying and teaching allow artists and designers to discover these relationships for themselves through a series of practical exercises. Among the principles Albers sought to illustrate are positive and reversed grounds (what happens when the colors of the feature elements and the backgrounds are exchanged), transparency effects (see page 47), spatial relationships (how to create the optical illusion of depth), vibrating and vanishing boundaries (see page 76), and proportional variances (see page 77). In addition, he demonstrated how all of these affect art and design.

In *Interaction of Color,* Albers takes the reader through a series of experiments, such as the one illustrated below, right, that lead to knowledge and understanding of color relationships. These exercises, too numerous and in-depth to explore here, can be used by designers to teach themselves more about color in a hands-on manner, and we recommend doing so. The Albers course, often taught in design schools, helps designers recognize and develop their own inclinations and aptitude with color.

Context became inspiration for the identity for Slade Gardens, a community adventure playground. Experiencing the park, designer Ian Childers noticed his children, dressed in bright red clothing, enjoying the elaborate green play structures. This observation resulted in the logo and its signage application.
Atelier Works



One of Albers' many experiments to show the illusion of double or reversed afterimaging, often called contrast reversal, is illustrated here. Look at the yellow circles, at left, for a minute. Now shift your eyes quickly to the lefthand square. You might expect to see the complement of yellow. However, yellow diamond shapes, mirroring the negative space between the circles, appear instead.
Josef Albers

5 Consider That Experimentation Is Key

Experimenting with color is a way of challenging a designer's imagination and often results in a variety of unexpected new solutions. Whether through changing contrast, volume, and proportion; stretching conventional notions of color harmony; or altering color temperature; new dynamics of color interaction are always possible.

Allowing one color to dominate, in contrast to others, focuses attention on design elements in that color and allows them to communicate a distinct message. Layouts that feature strong contrasts between colors in terms of hue, saturation, and value have the greatest possibilities for expressive effect. However, designers must work to unify the contrasting elements without destroying the strength and impact of the piece.

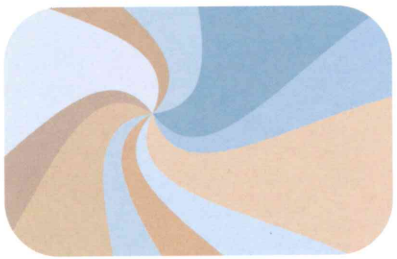
Adjusting volume or proportion—that is, experimenting with the amounts of each color used can provide interesting results. For example, a small—dark spot of color, because it is of lower value, can dominate a large light area. Also, a small amount of a warm color can dominate a larger area of a cool color, although both may have the same intensity. Proportion can be used to make a design appear light by incorporating a large area of a light hue. Conversely, large amounts of dark values make the design appear dark, even somber. Alternating color based on saturation rather than proportion completely changes the perceived visual mix of color.

Designers can use color, in either free-form or text-based layouts, as they do other graphic elements. Experimenting with colors allows designers to develop keen observations about color interactions.

"Why do two colors, put next to each other, sing? Can we really explain this? No."—Pablo Picasso

The show packaging for MTV's spring break programming features the concept of bringing bathing suit patterns to life. Creative director Todd St. John changes color palettes and gender reference to provide different interpretations of spring. Experimenting with the animation of line, proportion, and color creates variations on a theme. These variations allow for nuances in the concept yet create a strong cohesive package of promos. **Hunter Gatherer**

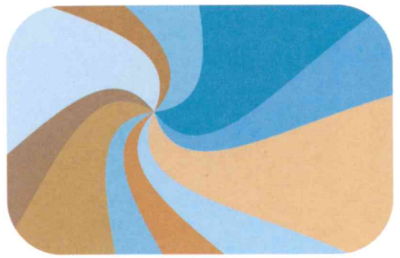
This chart illustrates two types of dominance. *Contrast dominance,* seen in the vertical series of squares on the left, shows that contrast increases with levels of intensity or saturation. On the right, *value dominance* is shown in three compositions: first, all tints; then pure hues; and, finally, all shades.



low contrast

light value

moderate contrast



medium value

high contrast

dark value

Ideas for Experimentation

There are many approaches to the idea of experimenting with color. Sometimes looking at the process from a slightly new perspective can add life and freshness to a designer's work. Here are things to consider:

- Use a restricted palette; impose your own limits on the range of colors.
- Try using colors you dislike to see if you can make a pleasing arrangement.
- Use only your favorite colors.
- Deliberately aim for concord or, alternatively, for discord.
- Choose pairs of contrasting colors.
- Subordinate your own choice of colors and work only with the client's preferences.
- Vary the scale of color usage. Allow for dominance.
- Design by choosing a mood for the piece first.
- Choose colors before shapes.
- Alter the rhythm and flow of your colors to see what happens.
- Always echo your colors. Repetition causes harmony.
- Look to the masters of fine arts, such as your favorite painter, and utilize their palettes.

Color in Professional Sports
Color has always been used to represent affiliations and loyalties, and, as such, plays a big part in professional sports.

Colors are chosen by sports teams and approved by their respective leagues. Designers and marketing experts often weigh in on the decision as well because team merchandise is big business. Colors are kept simple to translate for marketing and advertising purposes. Fashion trends seem to affect choice. Most important, colors must look good in motion when the athletes are playing. Intense colors capture the kinetic energy of sport. In theory, team colors add a psychological edge to the team's performance. According to a Cornell University study analyzing the penalty records of twenty-eight National Football League teams from 1970 to 1986, four teams wearing black uniforms were among the

The Power of Contrast
Exploring the notion of contrast is an effective experimentation tool. Contrast is the perceived difference between adjacent colors in a design. The highest levels of contrast appear between the achromatic colors—black and white. Complementary colors also have high chromatic contrast. Contrast levels allow for aesthetic expression and determine legibility.

The famed color theorist Johannes Itten observed the following seven types of contrast:

1. **The contrast of hue:** the juxtaposition of colors at their most intense.
2. **Light-dark contrast:** formed by juxtaposition of light and dark values, including those in monochromatic compositions.
3. **Cold-warm contrast:** juxtaposition of hues that are considered warm (red, orange, yellow) or cool (violet, blue, green). Three-dimensional depth is easy to achieve with this type of contrast because of the advancing (warm) and receding (cool) characteristics of the colors.
4. **Complementary contrast:** the juxtaposition of hues opposite each other on the color wheel.
5. **Simultaneous contrast:** the contrast formed when adjacent hue boundaries perceptually vibrate as they optically mix.
6. **The contrast of saturation:** the juxtaposition of more and less saturated colors.
7. **The contrast of extension, also called the contrast of proportion:** formed by assigning proportional field sizes in relation to the visual weight of a hue.

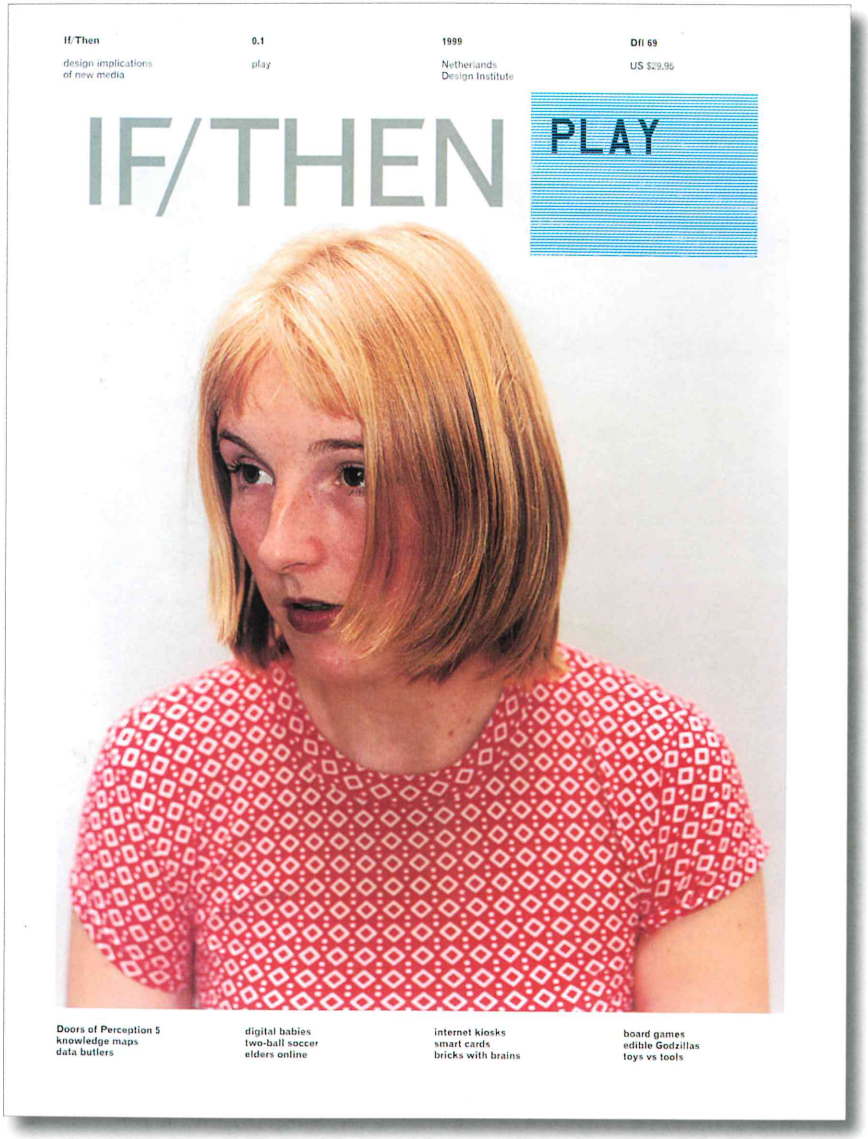
1 2 3

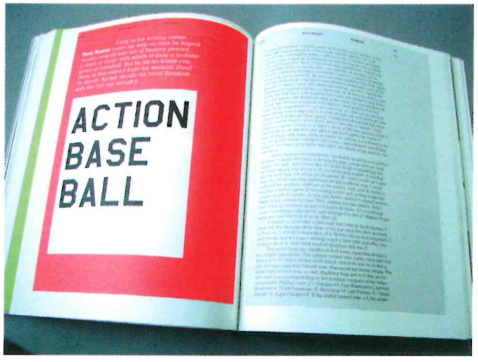
most penalized. Similarly, the three most penalized National Hockey League teams during that same time period wore black. These findings indicate that black may be the color associated with the most aggressive sports teams.

Our informal look at U.S. professional sports teams finds that the top four colors in order of frequency of use are: Basketball: blue, red, yellow/gold, and black; Football: blue, black, red, and yellow/gold; Baseball: blue, red, and black, with yellow/gold a distant fourth; and Hockey: blue and red, with black and yellow/gold tied for third. Interestingly, the colors for each sport are the same, but the order of frequency differs.

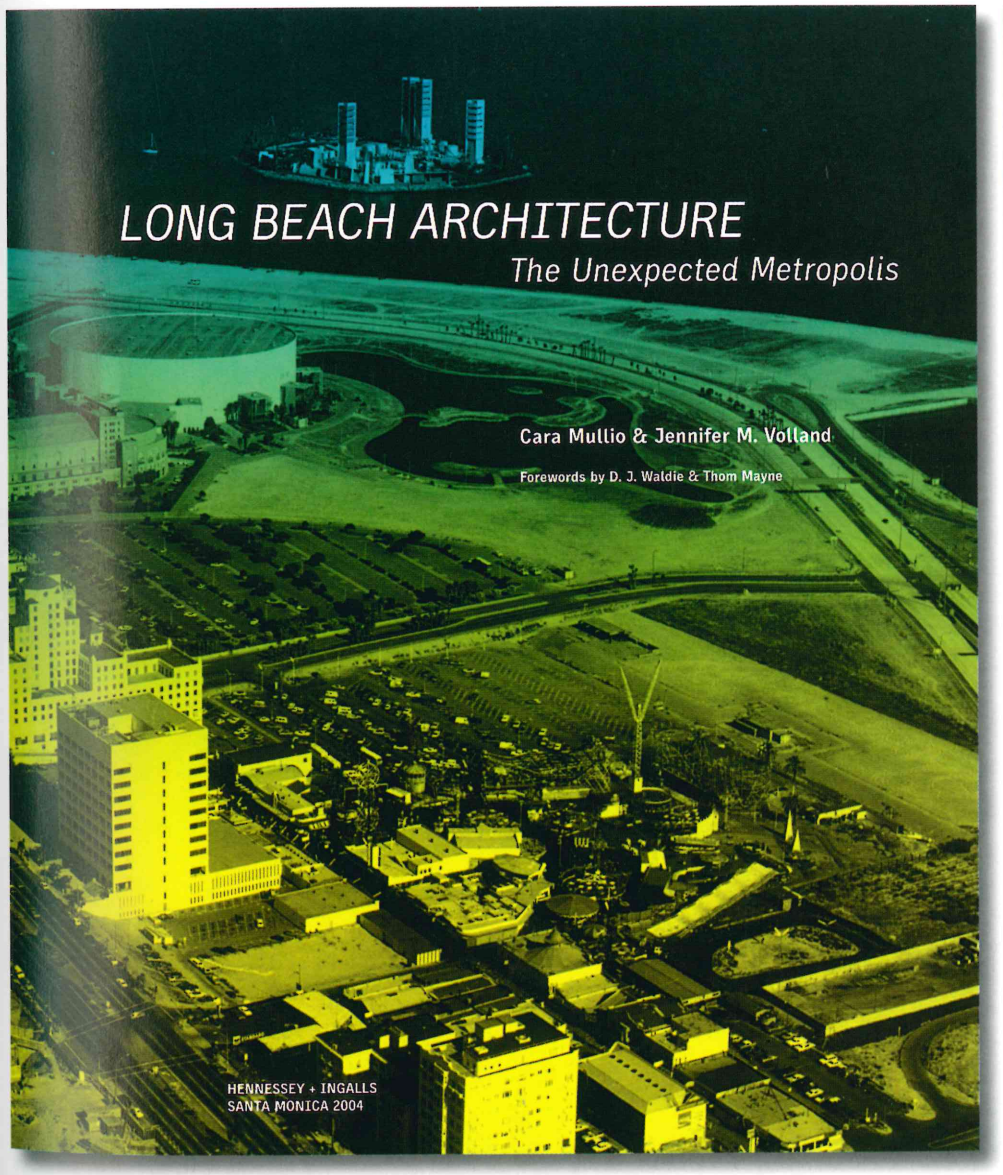
Different types of contrast provide a variety of experiments in color relationships. All of these can be used as springboards for new ideas about colors in designs.

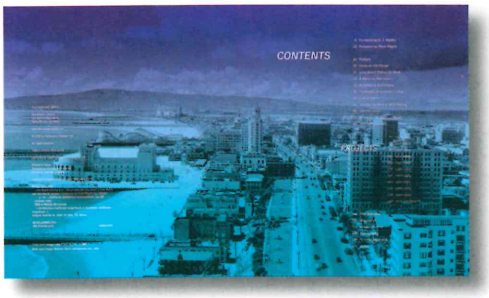
"Color is a means of exerting a direct influence on the soul."—Wassily Kandinsky





The *IF/THEN* book about digital technology was designed to incorporate a sense of discovery and play. A variety of large-format black-and-white images are contrasted with rich color fields that are supplied by the insertion of different-colored paper stocks or printed as large areas of solid color. Display type in large point sizes contrasts with pages of smaller book type. Experimentation with scale, contrast, and color humanizes the high-tech subject of the book and allows access to the material.
Mevis & Van Deursen





Long Beach Architecture: The Unexpected Metropolis incorporates an interesting and unusual use of color. Transparent color blocks are superimposed on black-and-white architectural imagery. Often, the blocks are subtle gradients of near-complementary colors. This use of color enlivens the industrial nature of the photography and creates an almost surreal posterization. True to the name of the book, the design offers an unexpected presentation of the urban landscape.
Michael Worthington

6 Know That People See Color Differently

Color vision is a result of the way our eyes and brains interpret the complexities of reflected light. What we see is a result of different wavelengths of light stimulating parts of the brain's visual system. The three types of light receptors, called *cones,* are located in the retina of the eye and recognize these different wavelengths of light. Not every human being's receptors and interpretations of color are quite the same. In addition, some people have inherited genetic conditions, such as color blindness, that further affect color perception.

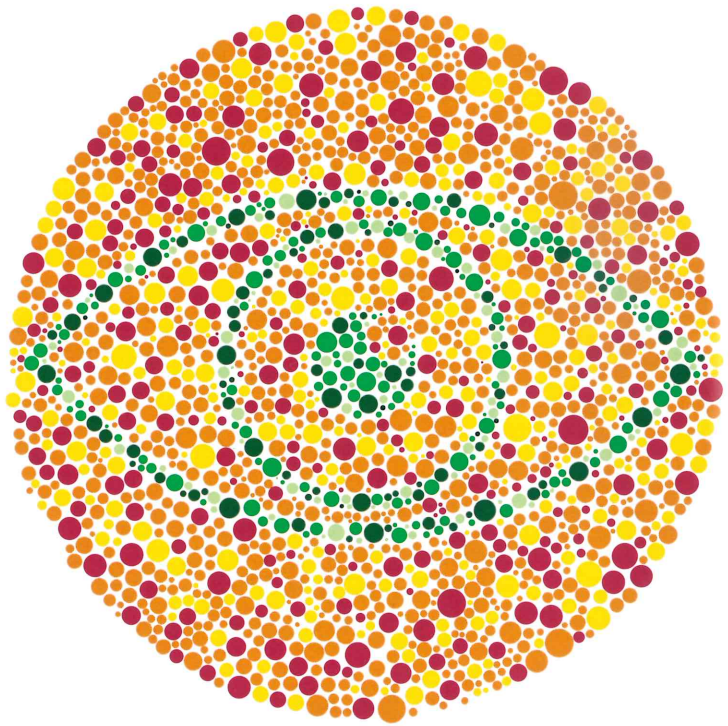
Color Blindness Limits More Males

Color blindness, of which several varieties exist, affects more males than females. People with monochromatic color blindness lack all cone receptors in their eyes and cannot see any color. People with dichromatic color blindness lack either red-green or blue-yellow receptors and cannot see hues in these respective ranges. People with color weakness, or anomalous trichromatism, can perceive a color but need greater intensity of the associated wavelength in order to see it normally. The natural aging process in humans may also reduce color vision and acuity.

Physical factors are one way that people see color differently. Another factor is technological. Color is read differently in print and on the screen. Pure RGB light appears different than reflected light (usually CMYK). Colors may also appear different because not every computer monitor and television screen is color-corrected and calibrated properly. Designers cannot be sure how their color choices are being experienced in these media.

Color Alterations for Artistic Reasons

Designers may alter color perception deliberately for artistic and semiotic reasons. They may choose to subjectively or artistically change what would be considered the accurate, normal, or natural color of things, and instead render it in a different color. When a color is the real and actual expected hue, it is called a local color. If it is unexpected or abnormal, it is referred to as occult color. For example, a piece in which an apple is rendered in shades of blue would be an occult representation. A blue apple would cause the viewer to question why this familiar object is depicted in a strange and unnatural color and perhaps prompt deeper interaction with the design. This color alteration is essentially a creative interpretation or abstraction of the idea of seeing color. So when we say that people see color differently, there are a variety of issues that need consideration when designing.



This simulation of a color blindness test graphic is like those used to diagnose red-green difficulties. People with this type of color vision deficiency cannot see the eye shape within the pattern. Several diagnostic tests are used in determining color blindness.

An Artistic Interpretation of Color

Dutch painter Vincent van Gogh (1853–1890) made a significant contribution to art through his astonishing use of color. Van Gogh used colors deliberately to capture mood and emotion rather than create realistic reproductions.

Technological advances in the chemistry of artists' pigments in the late 1800s, along with his own exposure to other Impressionists' work, freed van Gogh to use bright, intense color in his work. His palettes expanded, taking on the characteristics that made him famous.

Van Gogh painted rapidly, often using paint straight from the tube in thick impasto brushstrokes. His imaginative, vibrating, urgent color schemes changed the direction of art. He is one of the great fine art masters whose work can inspire designers.

DCM (Doll Capital Management) sought to highlight the clear difference that makes its technology venture fund attractive to Asian investors. Bold graphics utilizing financial icons give an elegant simplicity to the presentation. Red was chosen as the dominant color because of its symbolic connection to luck in Asia. However, the similar tonal values in some of the monochromatic icon illustrations could be difficult for some vision-impaired people to fully appreciate.

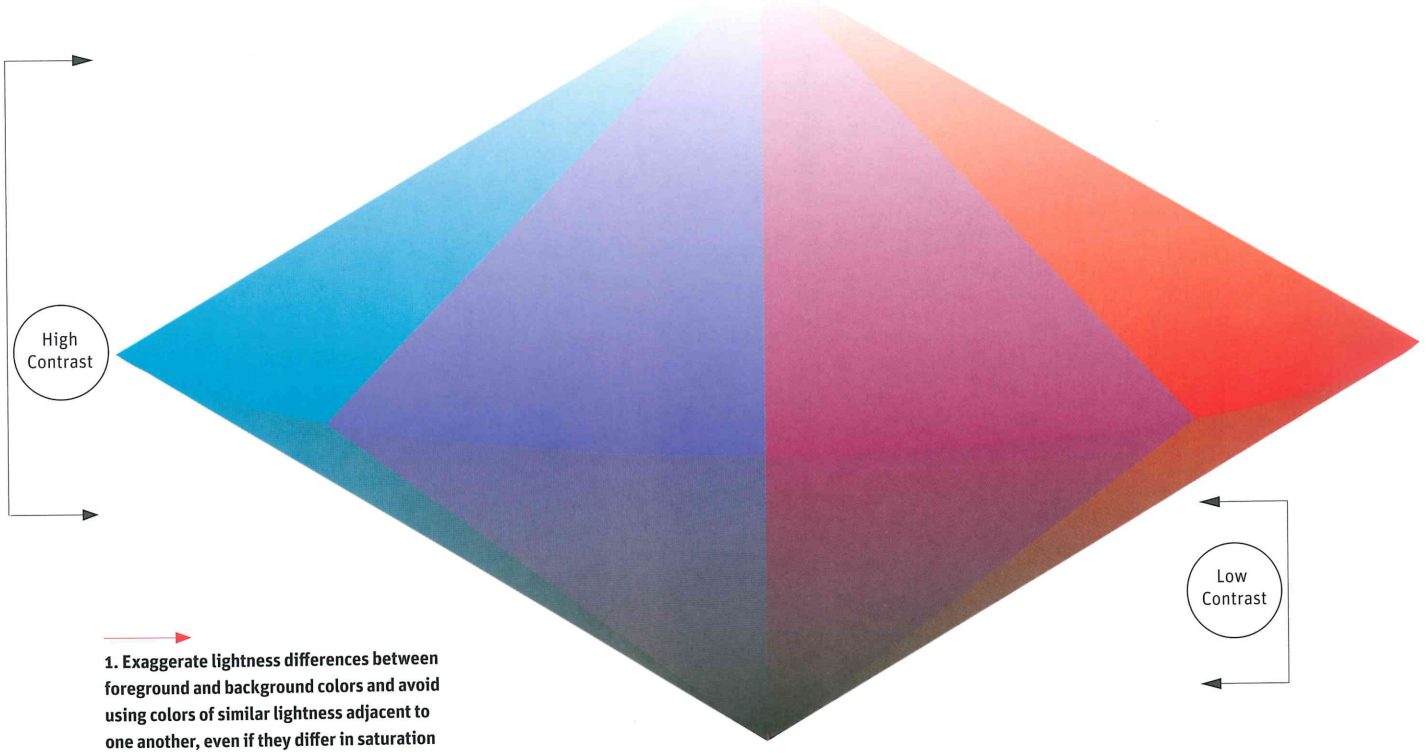
Gee + Chung Design

Effective Color Contrast

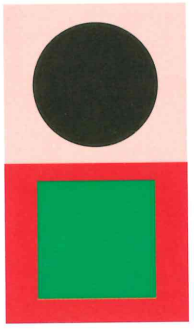
***Designing for People with Partial Sight and Color Deficiencies* by Aries Arditi, Ph.D**

Dr. Aries Arditi is Senior Fellow in Vision Science at Lighthouse International. The following information is based on his earlier work with Kenneth Knoblauch. It is reprinted here by permission of the author.

These are the three basic guidelines for making effective color choices that work for nearly everyone. Following the guidelines are explanations of the three perceptual attributes of color—hue, lightness, and saturation—as they are used by vision scientists.



1. Exaggerate lightness differences between foreground and background colors and avoid using colors of similar lightness adjacent to one another, even if they differ in saturation or hue.

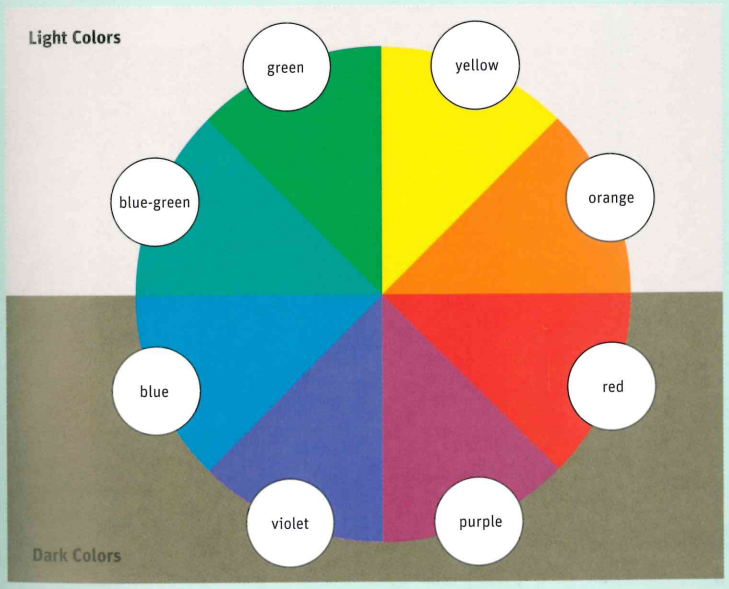


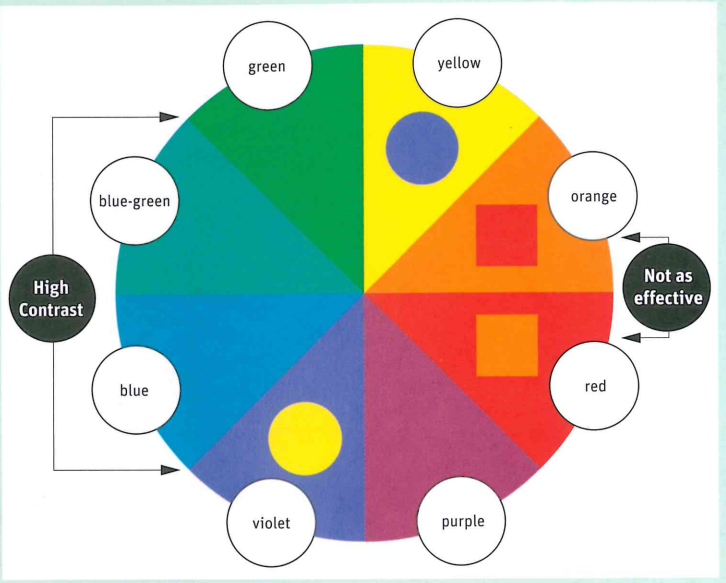
Effective

Not as effective

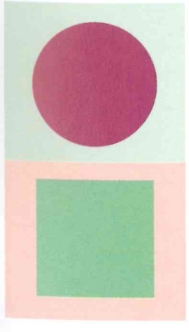
Don't assume that the lightness you perceive will be the same as the lightness perceived by people with color deficits. You can generally assume that they will see less contrast between colors than you will. If you lighten the light colors and darken the dark colors in your design, you will increase its visual accessibility.

How does impaired vision affect color perception? Partial sight, aging, and congenital color deficits all produce changes in perception that reduce the visual effectiveness of certain color combinations. Two colors that contrast sharply to someone with normal vision may be far less distinguishable to someone with a visual disorder. It is important to appreciate that the contrast of colors, one against another, that makes them more or less discernible, rather than the individual colors themselves. Here are three simple rules for making effective color choices:





2. Choose dark colors with hues from the bottom half of this hue circle against light colors from the top half of the circle. Avoid contrasting light colors from the bottom half against dark colors from the top half. The orientation of this hue circle was chosen to illustrate this point.

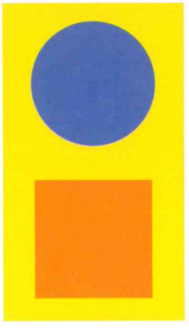


Effective

Not as effective

For most people with partial sight and/or congenital color deficiencies, the lightness values of colors in the bottom half of the hue circle tend to be reduced.

3. Avoid contrasting hues from adjacent parts of the hue circle, especially if the colors do not contrast sharply in lightness.



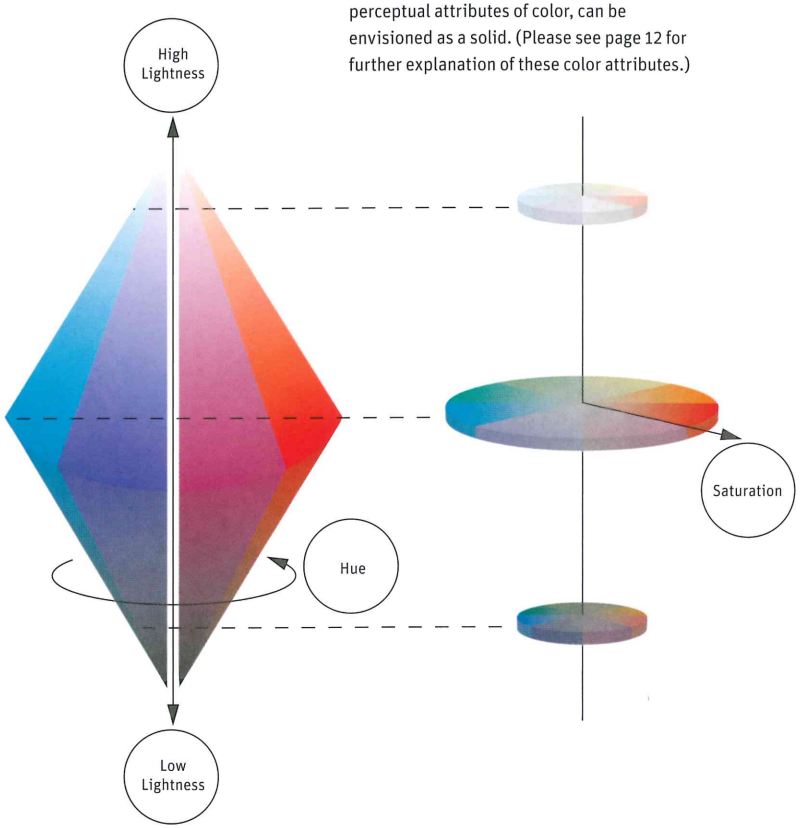
Effective

Not as effective

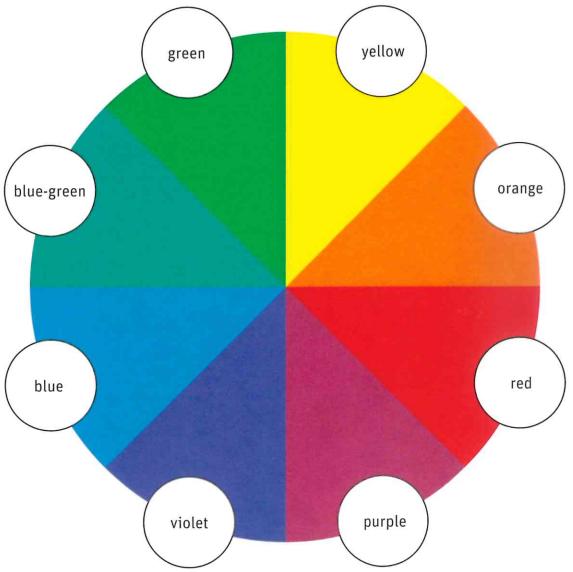
Color deficiencies associated with partial sight and congenital deficiencies make it difficult to discriminate between colors of similar hue.

"It is the contrast of colors, one against another, that makes them more or less discernible, rather than the individual colors themselves."
—Aries Arditi, Ph. D

Hue, lightness, and saturation, the three perceptual attributes of color, can be envisioned as a solid. (Please see page 12 for further explanation of these color attributes.)



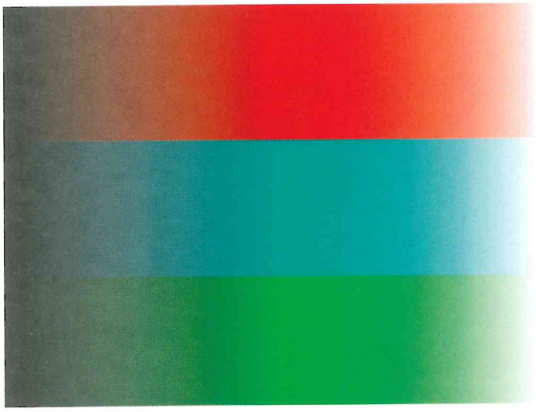
Hue varies around the solid; lightness varies from top to bottom; saturation is the distance from the center.



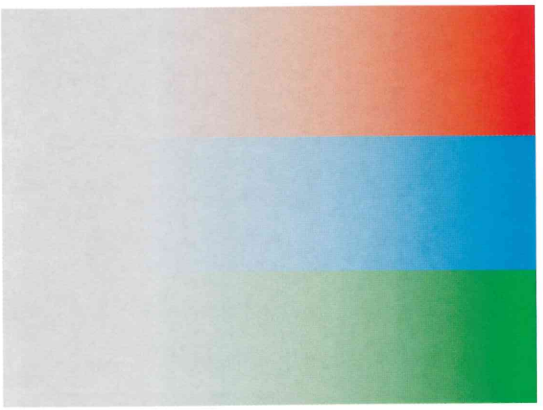
Hue is the perceptual attribute associated with elementary color names. Hue enables us to identify basic color categories such as blue, green, yellow, red, and purple. People with normal color vision report that hues follow a natural sequence based on their similarity to one another. With most color deficits, the ability to discriminate between colors on the basis of hue is diminished.

About Lighthouse International

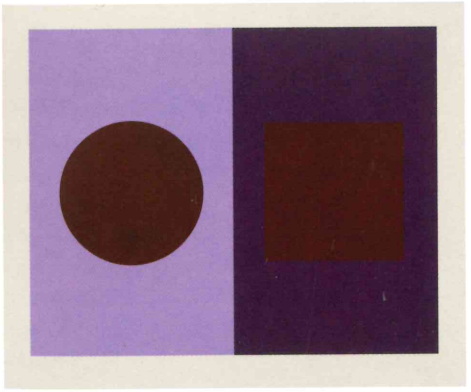
Founded in 1905 and headquartered in New York, the nonprofit organization Lighthouse International is a leading worldwide resource on vision impairment and vision rehabilitation. Through its pioneering work in vision rehabilitation services, education, research, prevention, and advocacy, Lighthouse International enables people of all ages who are blind or partially sighted to lead independent and productive lives. The Arlene Gordon Research Institute of Lighthouse International works to expand knowledge in vision impairment and rehabilitation. Dr. Aries Arditi, a senior fellow for the Institute, has written several books and brochures of use to designers on computers, typography, color, and signage. The website is www.lighthouse.org.



Lightness corresponds to how much light appears to be reflected from a colored surface in relation to nearby surfaces. Lightness, like hue, is a perceptual attribute that cannot be computed from physical measurements alone. It is the most important attribute in making contrast more effective. With color deficits, the ability to discriminate colors on the basis of lightness is reduced.



Saturation is the degree of color intensity associated with a color's perceptual difference from a white, black, or gray of equal lightness. Slate blue is an example of a desaturated color because it is similar to gray. A deep blue, even if it has the same lightness as slate blue, has greater saturation. Congenital and acquired color deficits typically make it difficult to discriminate between colors on the basis of saturation.



To a person with color-deficient partial sight, the left-hand panel might appear like the right-hand panel appears to a person with normal color vision. With color deficits, the ability to discriminate colors on the basis of all three attributes—hue, lightness, and saturation—is reduced. Designers can help compensate for these deficits by making colors differ more dramatically in all three attributes.

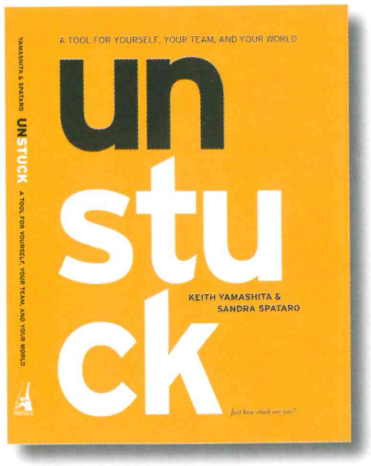
7 Assist in Mnemonic Value

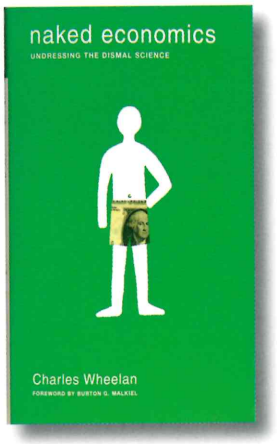
What designer doesn't want his or her work to be memorable to the audiences for which it was created? Color can be a powerful ally in that pursuit. Color can work as a mnemonic device itself, aiding people's memories. The word *mnemonic* comes from the Greek *mnemonikos*, which means "mind."

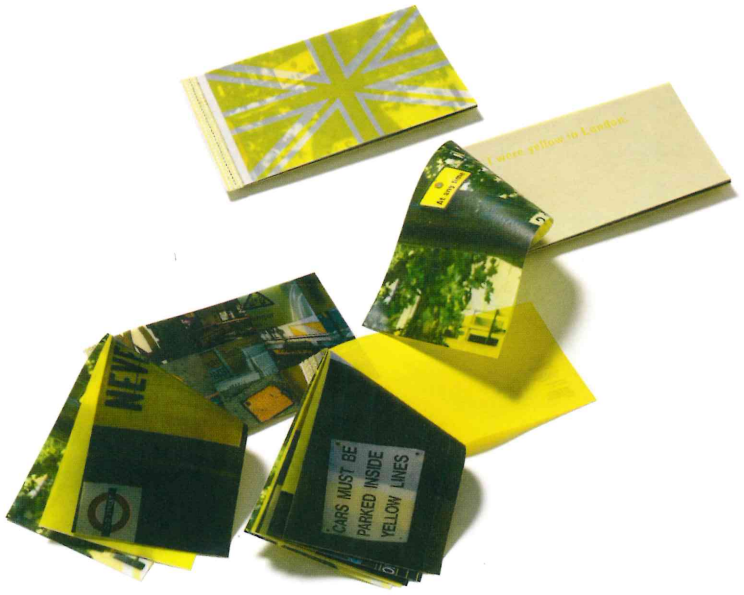
Many psychologists researching the process by which humans see and process visual information conclude that it is influenced highly by color. For example, the May 2002 *Journal of Experiential Psychology: Learning, Memory, and Cognition* reported the findings of one study that indicated that people did not remember falsely colored photographic scenes any better than those same scenes in black-and-white. They remembered the natural-colored images the best. Relating to psychology, it also seems that when people think of a certain color, their minds form a corresponding color model; when they think pink, they actually visualize a rosy hue.

Color Associations Aid Memory

Different cultures have different associations with colors. Hues such as red and blue are not just colors; they are emotions, feelings, reflections, and memories. Seeing or thinking about color produces certain reactions in people. Color associations often become part of the semantic structure of color names themselves. For example, magenta, one of the first aniline dyes, was discovered shortly after the Battle of Magenta, which occurred near the northern Italian town of Magenta. The color was named for the battle and, therefore, indirectly for the town. Chartreuse is a yellow-green color named for the famous French liqueur of the same name. These types of associations are endless and can be leveraged to associate clients' products and services with colors.







All three of these book designs utilize color in mnemonic ways. Yellow-orange is used on the cover to signal that *Unstuck* is a departure from a traditional business information book, making it memorable. In the United States, green is associated with money, making it a perfect dominant color for a book called *Naked Economics*. *Yellow in London* eschews the traditional British national colors of red, white, and blue to mirror a foreigner's unconventional perspective on the city. It is memorable because it is unexpected.

Unstuck,
Stone Yamashita Partners

Naked Economics,
Powell

Yellow in London,
Usine de Boutons

Color is memorable. Marketing research indicates that more than 80 percent of visual information is related to color.

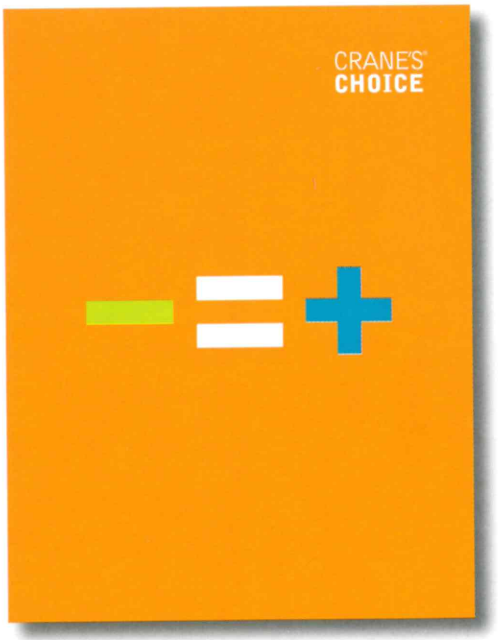
Color Symbolism Is Culturally Linked

Interestingly, the world seems divided into groups with similar ideas about color symbolism. In a 1999 study published by Kawade Shoboh Shinsha, a Japanese professor named Hideaki Chijiiwa grouped countries as follows: China, Taiwan, and Russia; Japan, Korea, and Finland; the Netherlands, Germany, Italy, the United States, Canada, New Zealand, Australia, and Singapore; France, Brazil, and Portugal; and India, Laos, and Bangladesh. Cultural factors are at work here, and understanding the similarities and differences in audiences will always make for better design in our increasingly global community. (For a look at color associations, see the Color Index in Chapter 3.)

Cultural, political, and linguistic factors, including both abstract and symbolic components, affect our perception of colors. Color motivates a response because of memories. A person may buy the green-colored soap packaging because it reminds him or her of fresh-mown grass, for example. Couple visual information with the expected fragrance—green soap that actually smells like grass—and the design is even more effective.

Proprietary Color

A further enhancement is the idea of developing a proprietary color that represents a client. Associating distinctive colors with products and services is one of the cornerstones of brand identity work. Some of the world's most memorable companies have strong connections to color—think of Kodak's chrome yellow and Fuji's bright green film boxes. Whether or not it is possible to trademark a color is an ongoing battle, generating many lawsuits, but color is undisputedly an important branding tool.



Both the – = + (Less Equals More) and the +=+ (More Equals More) promotions for Crane & Co.'s fine paper features a near-complementary color palette. The Kiehl's Education Resource Binders are an achromatic black and white color scheme. Both of these pieces are memorable because of their elegant simplicity and bold color choices.
Chermayeff & Geismar for Crane & Co.
Liska & Associates for Kiehl's

"Dude, Where's My Car?"

by Victoria Lam

These are spreads from a book entitled *Dude, Where's My Car?* This book represented an explorative study on how to make parking structures more memorable. The typical parking structure is bare and monotonous. As a result, users tend to erase the experience from their mind, hence the tendency to forget the location of one's car. I wanted to take this banal subject and place and propose something new as a way to intervene in the cyclical, repetitive nature of the everyday. One way in which I explored this was through the use of color. Rather than use color in a standardized way, I tried to link it to associations. For instance, if a user parked on the red floor, on the wall would be objects associated or identified with the color red. I conducted memory studies, specifically evaluating mnemonic devices, and understood that the mind thinks better in pictures. Thus, I tried to utilize an existing standard within parking structures (in this case, color) but to expand it in a way that was more functional as well as more aesthetic.

If a user were parked on the green floor, how could green be employed to transform the drab environment into something more aesthetically pleasing? What if different shades of the same color decorated the spaces on the ground? What if colored lighting enhanced the color of the level? What if objects associated with that color adorned the walls? In my memory research, I also learned that what resonates in the mind is what is extraordinary or unfamiliar. Representing something out of scale or in a manner the eye is not accustomed to aids in recall. I incorporated this idea into the green floor. Objects associated with the color green were represented not only out of context but out of scale.

Parking structures are often perceived as monolithic eyesores within cityscapes. I wanted my ideas to address this issue. What if the different-colored lights on each floor served to illuminate the building and create a fabric of colors that could vary in intensity depending on the occupancy of each level? The grid would constantly shift in color, and it would also function to communicate to passersby how full or vacant the structure was.

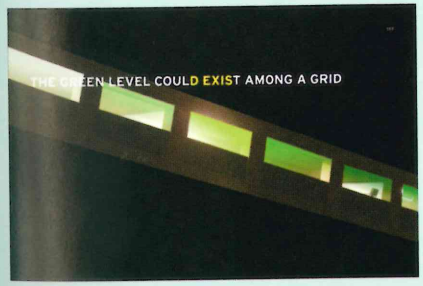
In terms of the design of the book, I employed color as a navigational device. The three sections of the book (introduction, memory studies, and case studies) were noted by different color tabs that fell into the gutter of the spreads.

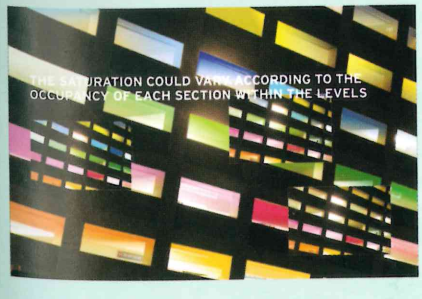
Overall, color was an important strategy for the subject of this book. I tried to provide an alternative to the common experience that users encounter when they park their cars. The entirety of the space can be not only more memorable but also more experiential.

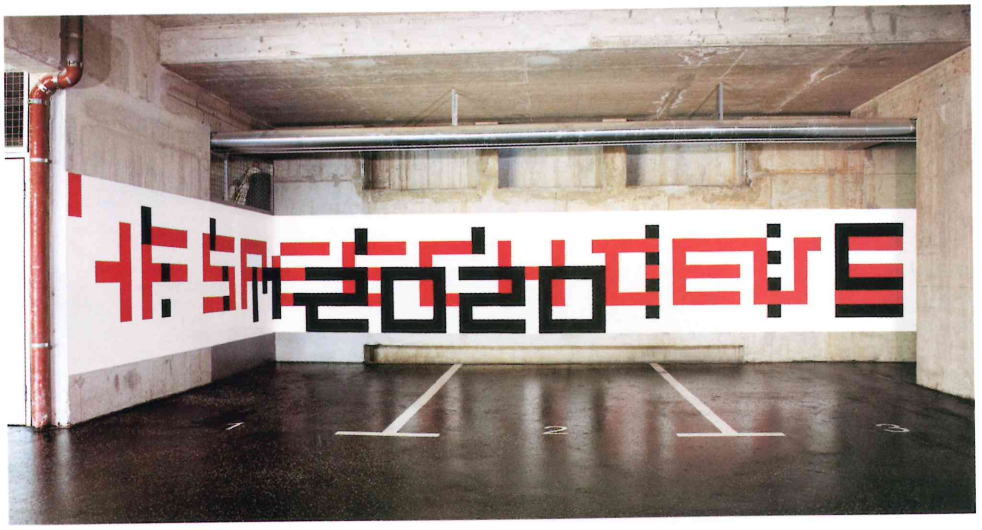
Victoria Lam is a Los Angeles–based graphic designer with a BA (with honors) in modern culture and the media from Brown University and an MFA in graphic design from California Institute of the Arts.

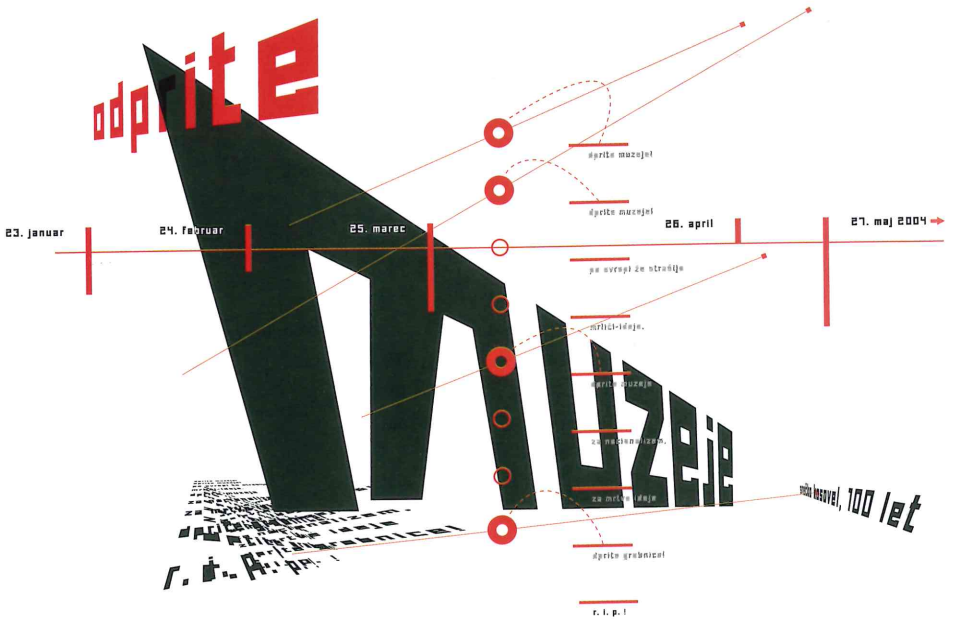
Various spreads from the thesis book, *Dude, Where's My Car?* show how color might be used as a mnemonic device in parking lots and garages. Typically mundane and forgettable, parking structures could employ colorful images of red items to signify the "red floor" rather than simply marking support structures with red numbers and letters as a location device. Lam's research indicates that people actually remember color in context, such as the images seen above, even more accurately.
Victoria Lam

At right, schematics using colored lights in conjuction with colors painted on parking spaces themselves, this is another method of using color to aid memory.
Victoria Lam









Here is an example of color graphics used in an actual garage designed by Edouard Cehovin. Large black, white, and red graphics positioned on the walls of a parking garage assist motorists in locating their cars and enliven the traditionally dull environment. The different-colored shapes can be used effectively as mnemonic devices.
Kontrapunkt

Color Temperature

We can identify a sensation of temperature when referring to colors—some are cool (greens, blues, violets) and some are warm (yellows, oranges, and reds). There is a contrary aspect to color temperature because color can rarely be warm and cold at once.

Warm colors are often associated with strong emotion and heat, while cool colors are linked to calmness and the refreshing chill of sky and sea. We feel color temperature—red literally makes our pulse race, while blues slows heart rates.

Considered specifically at the time of color selection, variations on and utilization of color temperature can be useful in causing designs to be more memorable and to better serve the needs of clients and their customers.

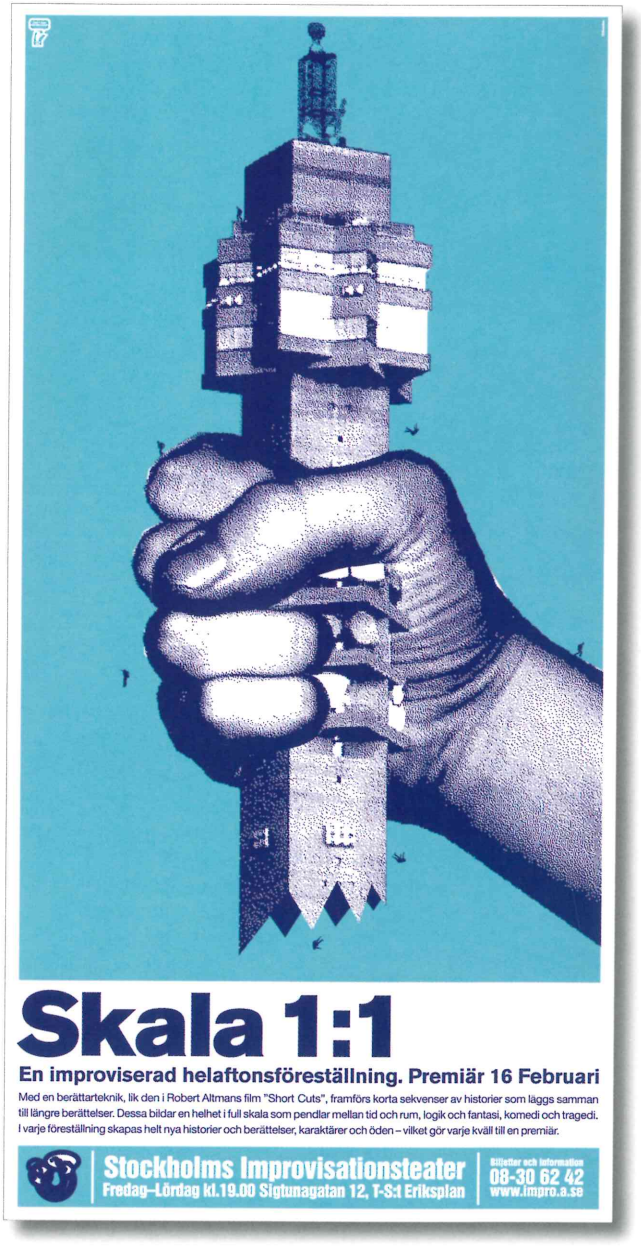
Cool Colors

Here are examples of designers working with cool colors in interesting ways. From a theater poster in Stockholm to a contract furnishings showroom environmental design to upscale dog toy packaging, cool shades of blues and greens are the unanimous choice.

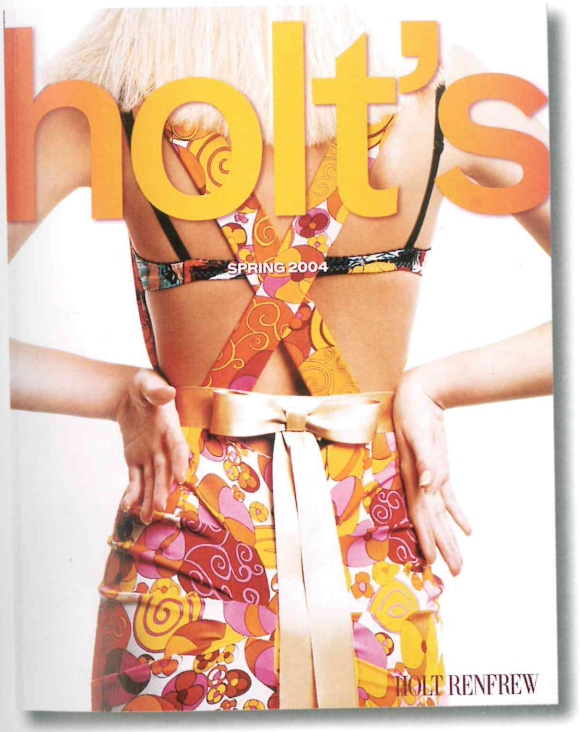
Blue Skala,
Sweden Graphics

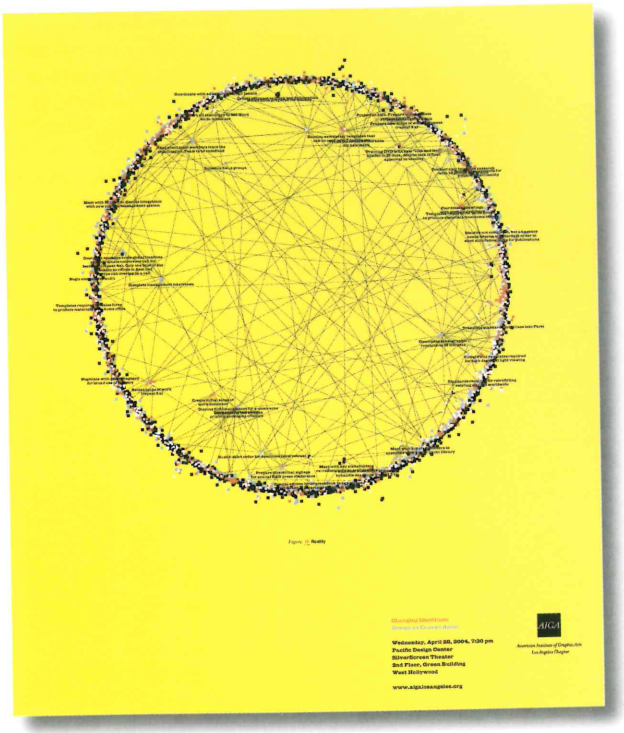
IFC Group Showroom,
Carbone Smolan Agency

For The Dogs,
Concrete



Saturation is the degree of color intensity associated with a color's perceptual difference from a white, black or gray of equal lightness. Slate blue is an example of a desaturated color because it is similar to gray. A deep blue, even if it has the same lightness as slate blue, has greater saturation. Congenital and acquired color deficits typically make it difficult to discriminate between colors on the basis of saturation.





Warm Colors
Warm colors work to boost appeal in these projects, including bright earth tones for a specialty coffee store, gradient oranges for a department store catalog cover, high-impact yellow for an AIGA event poster, and melting red-orange for a television spot. Warm colors tend to advance, bringing the message to the viewer.

Holt's,
Concrete

Changing Identities
for AIGA Los Angeles,
KBDA

Terra Vida Specialty
Coffee Store,
Hornall Anderson
Design Works

Fuse,
Hunter Gatherer

8 Think About Composition

Artists have been pursuing the ideal standard for proportion and composition since ancient times. The classical Greeks established the Golden Mean, also called the Golden Section or Golden Proportion, as a mathematical ratio and unifying force. The Golden Mean is a standard proportion for width in relationship to height in which the division of a given unit of length equals the ratio of the longer part to the whole. So, if the longer part is called x, and the shorter part 1–x, then 1–x is to x as x is to 1. The Greeks understood that a small part relates to the whole, both in life and art. Other creative scholars and practitioners employ their own methods. The selection and positioning of design elements, specifically the ratio of the individual parts to one another, is a matter of the designer's personal judgment. Balance, symmetry, hierarchy, space, repetition, and rhythm are all organizing principles to be considered and used. Unquestionably, color affects all of these principles.

Color can be used to make the eye travel, comfortably or not, and pick up information from a design. Transitions can be produced using line, shape, contours (edges of shapes), and motifs in various colors for both images and typographic elements in compositions. The repetition of elements and colors create a kind of rhythm, whether a smooth flow or a jerky visual movement, as dictated by the designer's choices. The echoing of colors is a kind of repetition that brings unity to a composition. Repetition does not require exact duplication of elements; similarity, or near likeness, works. Variations in hues and their specific placement create interest, while intervals of visual silence (e.g., a dark solid-color background) between repeating elements provide rest stops for the eye. Areas of pure white and pure black boost impact and contrast.

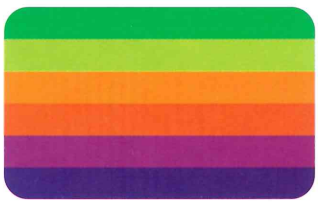
Some designers choose to disregard traditional ideas about proportion and balance in order to emphasize extremes of scale. This creates emphasis and communicates messages through exaggeration. Differences in the scale and proportion of a color can create a focal point in a design composition.

Contour Color Study
Whether few or many colors are used, variations in composition can dramatically change a design. The four squares shown here demonstrate different proportions of color usage. Note the vibrating contours and their effect on eye movement. Also visible is the effect of vibrating and vanishing boundaries between colors.

Color can be used as a visual linking device to build balanced and effective compositions.

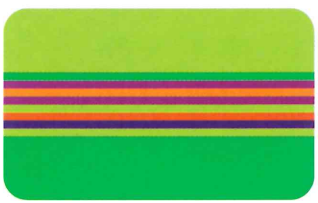
Proportion and Saturation Study
Two pairs of color schemes—one a pair of complements, the other a triad—are shown here in differing ratios. Note how the ratio changes impact how each color is perceived and how these shifts affect the mood of the composition.

Equal proportions of the complementary colors blue and orange.



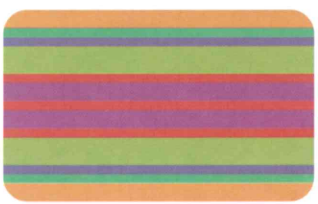
Hues of a double triad (green, red-orange, violet) used in equal proportions.

Proportions reassigned to allow dominant (blue) and subordinate (orange) areas.



Proportions reassigned to allow dominant (green), subordinate (violet), and accent (red-orange) areas.

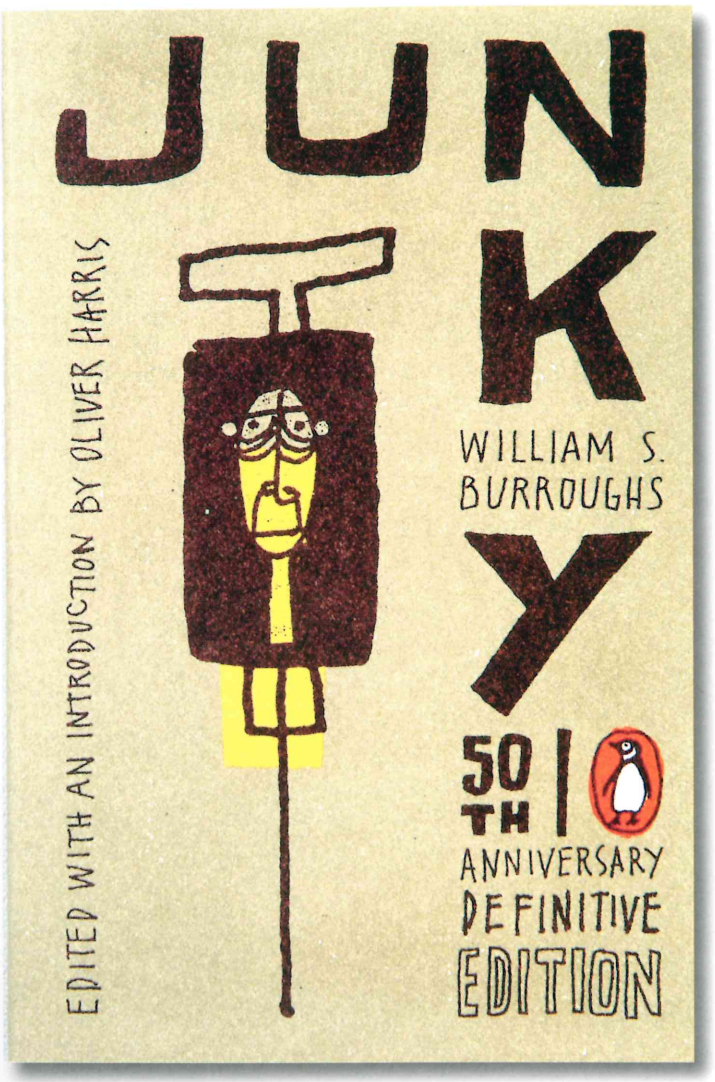
Proportions and saturation modified, full blue on top, pure orange with a slightly desaturated blue in the middle, and desaturated blue below.



Proportions and saturation modified to display a lower level of contrast, although the central red-orange vibrates against the green areas due to their complementary relationship.

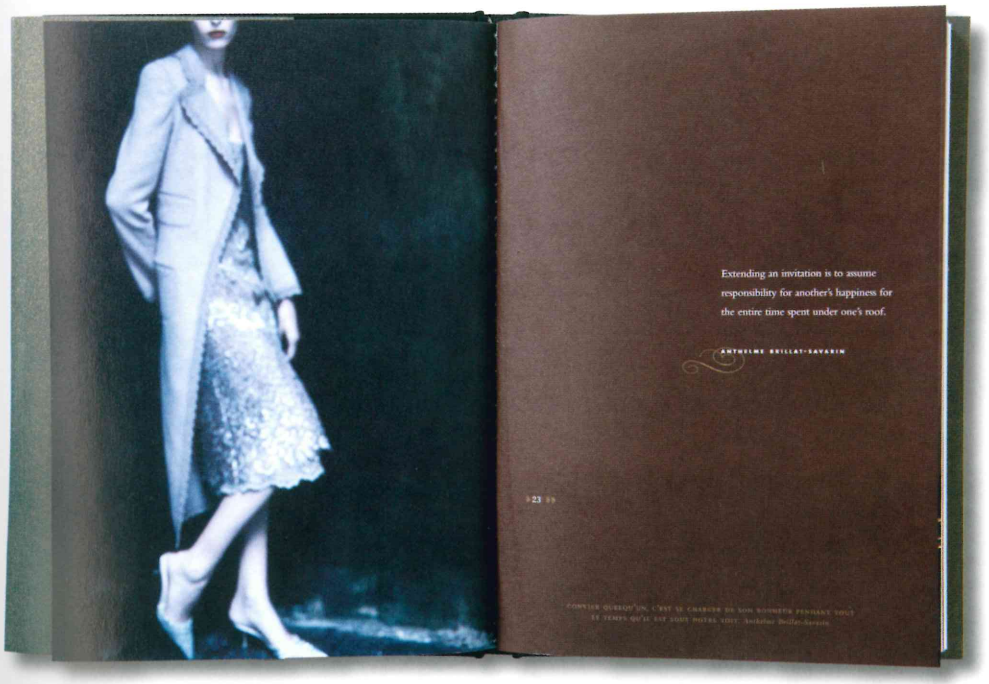
FIDM (Fashion Institute of Design & Merchandising) Museum and Galleries, under the creative direction of Tamar Rosenthal, presented the *Marimekko: Fabrics, Fashion, Architecture* exhibition to spotlight this internationally renowned design company. The event was sponsored in part by Crate & Barrel, which created in-store displays using the exhibition poster. The composition of poster and environment reflect Marimekko's signature style.
Vrontikis Design Office

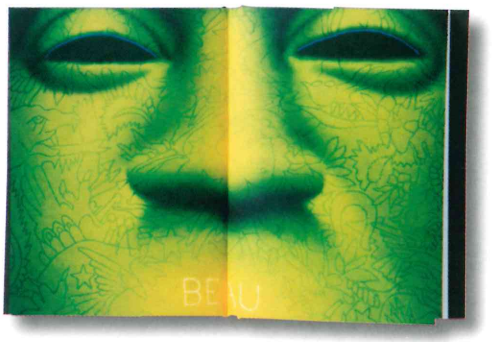
"All colors are the friends of their neighbors and the lovers of their opposites."—Marc Chagall



The book cover for the fiftieth anniversary definitive edition of William S. Burroughs' breakthrough novel *Junky* has a distinctive handmade quality. The composition features a hand-lettered title, a character illustration, and a hand-drawn version of the publisher's logo. The bright spots of yellow and orange leap out of the neutral background.
Powell

The Gartner Annual Report, designed by Bob Dinetz, has a graphic motif of vertical bars that repeats in several colorways throughout the book. These patterns are printed on translucent stock, allowing them to enhance and alter the typographic compositions on adjacent pages.
Cahan & Associates



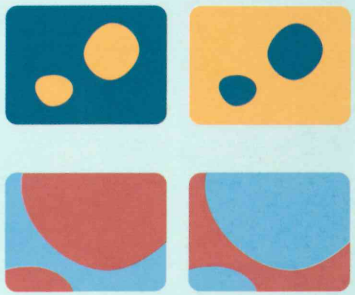


With this in a special limited-edition hardbound book, Hyatt International launched their exclusive Park Hyatt Paris-Vendôme. The book captures the grandeur and soul of the city in a series of minimally colored photographs with bold compositions, fluctuating between images with no background and images whose background make up the majority of the composition. This continually changing viewpoint brings action and life into the piece.
Louey/Rubino Design Group, Inc.

The Principle of Figure and Ground

Figure and ground is an important principle in design. When we see relatively large plain elements as backgrounds to smaller, more distinct ones, we are experiencing *figure and ground*. This principle contradicts the assumption that smaller objects are always less significant—sometimes they dominate, especially due to color choice.

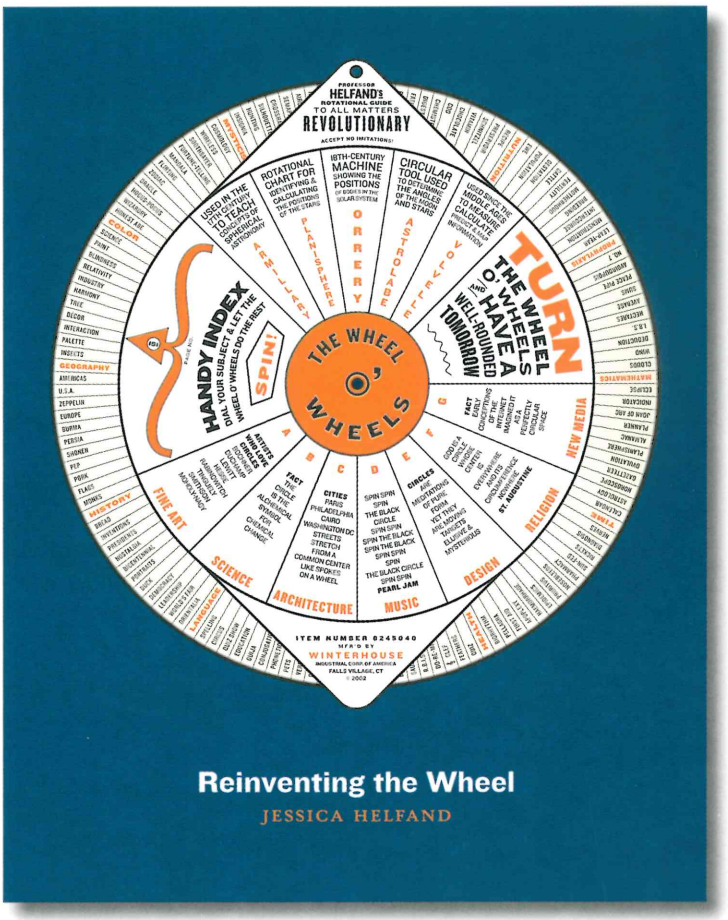
Compositions in which the figure and ground are not immediately distinguishable often seem lifeless and uninvolving. Elements that differ in color and value from the background draw the eye in first almost regardless of their hue. Light figures on a dark ground often seem more luminous, sometimes even mysterious—an effect exploited by Renaissance painters, for example.



The figure and ground principle, coupled with color theory ideas such as the observation that warm colors advance and cool colors recede, or that complementary colors provide rich contrast, allow a designer to create dynamic compositions.

Symmetry is a distinct organizing principle in composition that can be further enhanced through the use of color.

Symmetrical Balance
Symmetrical balance is achieved by mirroring often identical elements in a composition. Symmetry can be quite static, but this *Old York* poster, commemorating the 9/11 tragedy in New York City, achieves movement through the repeating shapes of the gradient orange clouds that surround the white focal point of the Twin Towers.
Sweden Graphics



Radial Balance
The *Reinventing the Wheel* book cover is a great example of radial balance—a composition balanced around a focal point. The designers created a volvelle, a calculation consisting of concentric circles, adapting an existing piece by retrofitting it with their own content. The complementary colors add punch to the design.
Winterhouse Editions

Closure or Visual Grouping
Early twentieth-century German gestalt psychologist Max Wertheimer investigated how humans see form, pattern, shape, or total configuration in terms of group relationships rather than individual items. He discovered that several factors, such as proximity and size, help objects relate visually.

Closure, or visual grouping, is the tendency humans have to complete or unify incomplete patterns and information by bringing together the elements in their mind. Visual closure occurs when isolated elements are identified and recognized, even though a piece is missing or incomplete. Color assists in closure.

The phenomenon occurs when a designer provides minimal clues, yet the viewer brings the gestalt, or "whole effect," of closure, creating recognition and meaning in the pattern. Closure is illustrated when the halftone dots in four-color-process images pull together in a viewer's mind to create recognition. For Wertheimer, closure helped explain how artists create structural organization in their work.

Approximate Symmetry
The poster for the film *Wolfsschlucht* demonstrates approximate symmetry, a composition in which elements that are not identical have the same apparent weight. The diagonal color blocks are not equal. The green, however, is balanced by the hue's complement in the form of a solid red figure on the right.
Format Design

Asymmetrical Balance
Also known as *occult balance*, asymmetry is the most emotionally active form of compositional balance, as seen in this poster for an AIGA Los Angeles event about typographic evolution. Dissimilar elements, with no clear center point, are pulled together to create a pleasing off-kilter unity. Color plays a large role in the connectivity of the image, particularly with the background being a unifying gradient orange hue.
88 Phases

9 Use Standardized Color Systems

Increasingly, designers work across several media, including print, online, broadcast, packaging, and environment. Care must be given to create consistent reproduction results in a variety of manufacturing processes and materials. Consistent colors are managed through the use of standardized color systems.

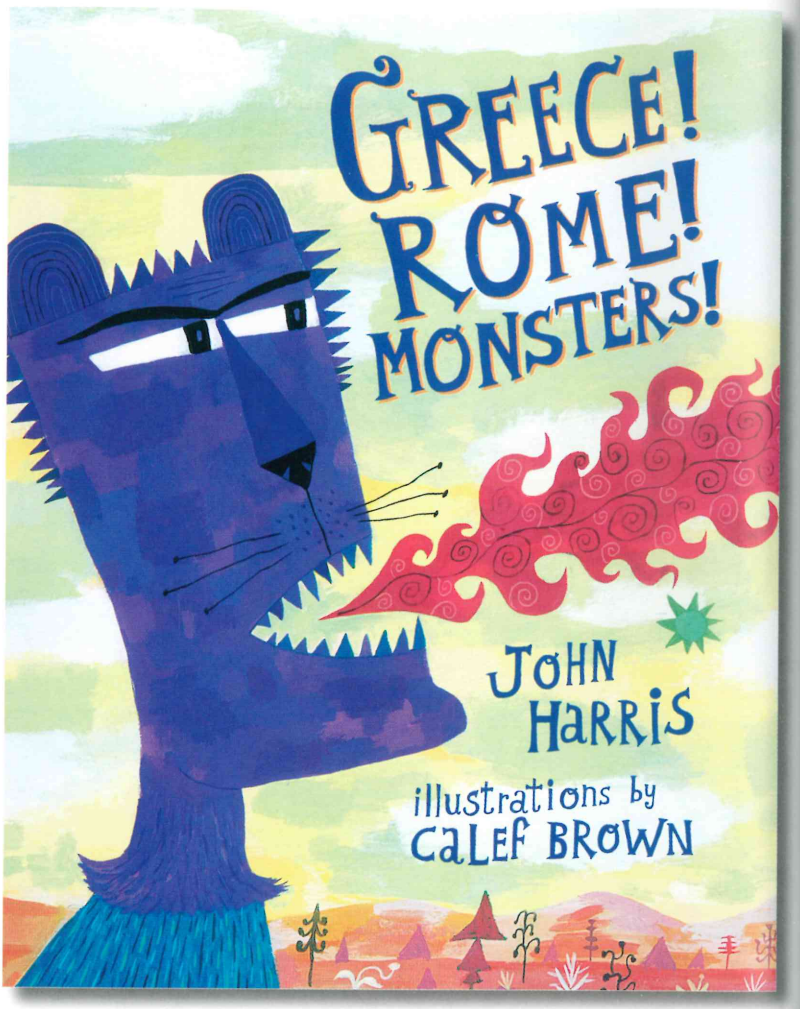
Several Choices of System

For inks on paper, designers use the PANTONE® Matching System, TOYO, ANPA, or DIC (Dai Nippon Ink Colors). In the United States, the most ubiquitous color formula specification system, especially for spot colors, is PANTONE®, with colors referred to as PMS and a series of numbers (e.g., PMS185 is a bright red). These standardized colors are offered in thousands of hues as well as specialty inks such as metallics, tints, and fluorescents. Standards for soy-based ink colors are also available. Most graphic software systems (especially Adobe products), computer monitors, and ink-jet printers include palettes and simulations that correspond to these standard color systems. However, it is critical that digital devices such as monitors be properly calibrated to correctly simulate colors.

Offset lithography is a four-color process whereby layers of cyan, magenta, yellow, and black (CMYK) are applied to paper surfaces in varying amounts via dot patterns. Larger presses often include additional units to accommodate spot colors and may even have coating units to apply finishes such as varnish and aqueous coating. Standardized process color guides, which show percentages for each of the CMYK values, are available in SWOP, a printing standard used in the United States and Asia, and EURO (for Euroscale), used in Europe.

Color systems offer specification guides in a variety of formats, including binders with tear-off chips and fan-style guides. These guides also show what the colors look like on coated and uncoated paper stocks.

Greece! Rome! Monsters! is a children's book that introduces mythological stories in an innovative and engaging way. The challenge was to reproduce illustrator Calef Brown's vivid paintings in four-color process. Designer Jim Drobka incorporates hand-lettered typography that responds to the illustrations. The palette is focused on a strong and unusual purple and lime green combination that had to be accurately produced in the original English and subsequent international editions. The use of standardized color systems allowed for consistent color reproduction.
Getty Publications



"We don't tend to think of paint chips as information infrastructure. Yet when everyone in the world is using the same ones, they become a communications protocol. The effect is equivalent to that of any network standard—it amplifies the scale and interconnectedness of how things get made. It greases the wheels of big, fast global culture."

—J. C. Herz, *Wired*, "Living Color" October 2002

Some of the latest innovations in standardized color systems are in digital color matching. For example, PANTONE® has a guide that matches spot colors with their process color equivalents and the output from several digital press systems. Guides like this ensure that a client's logo on stationery matches that in ads and brochures.

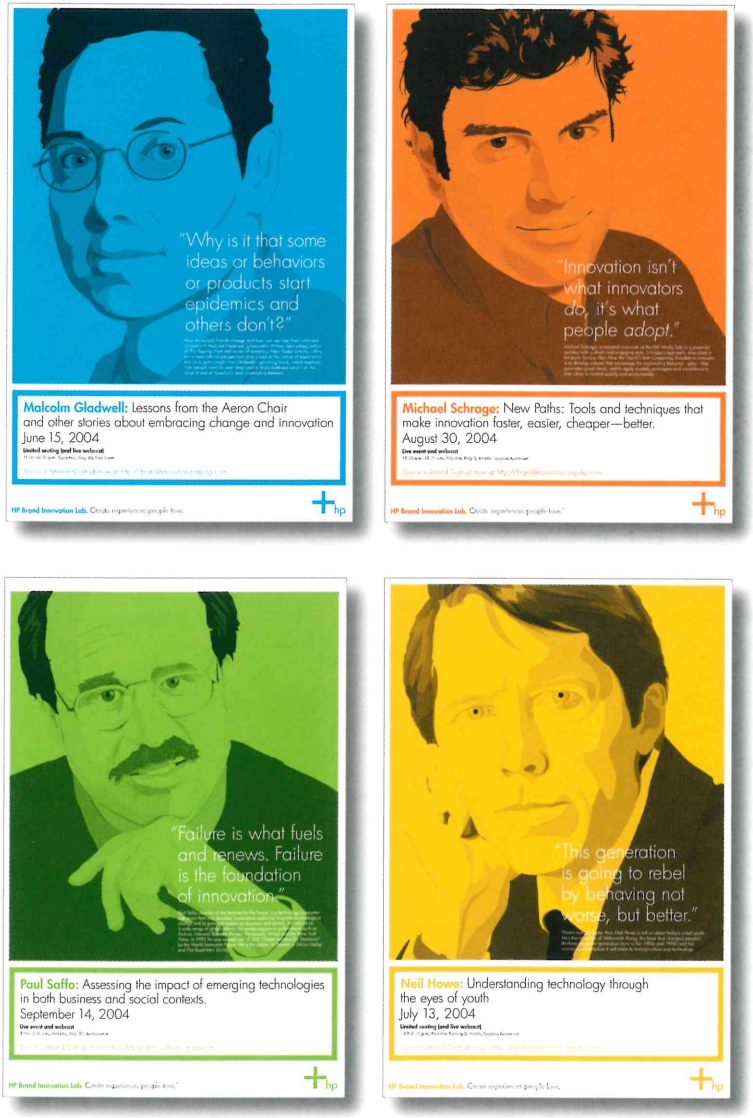
Color Standardization Beyond Print

Architects and environmental graphic designers also use a version of the PANTONE® system, as well as others, to specify textiles, paints, and plastics. Often, these must coordinate with printed components as well.

For color on screens, whether for online or broadcast, different color systems are used. To specify online colors, there are several guides for Web colors that correspond to print-based notation systems. However, graphics software, especially those for website creation, are equipped with Web-safe calibrations. For television, consistent color specification in the NTSC (in the United States) or PAL (in Europe and Asia) color space used by broadcasters is problematic. (See page 93 for further explanation of broadcast color.) The variance in preproduction, postproduction, and at-home viewing screens can be very different. There are no guides per se, but graphics software programs can convert standard CMYK colors into RGB, and good approximations of standard colors can be expected.

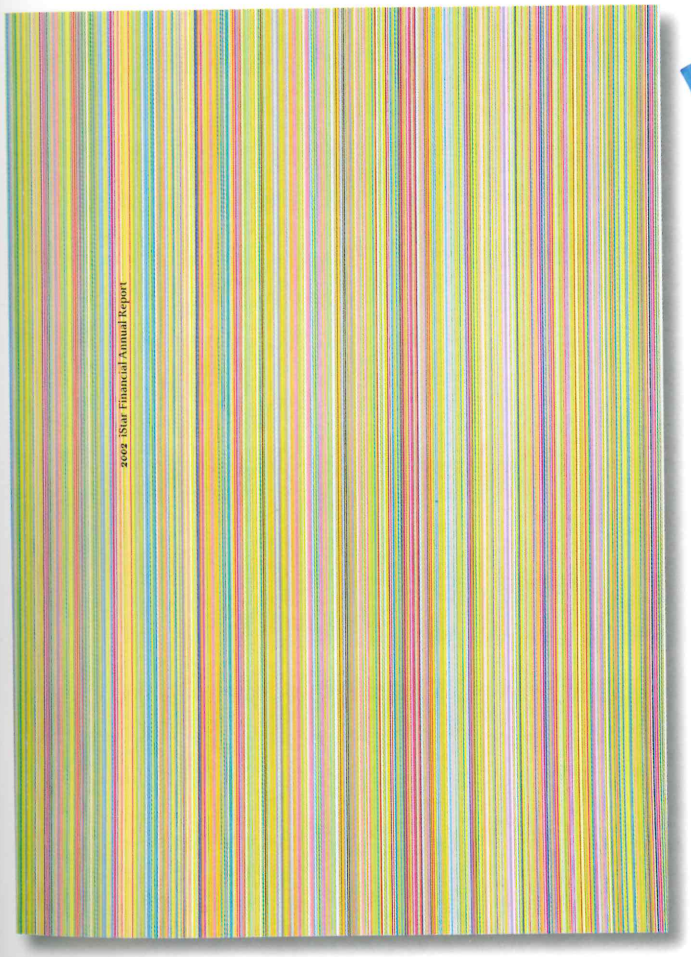
Color management is a complex technical issue. It is also an area that is constantly changing technologically. Designers must stay abreast of latest developments and consult with their suppliers as well as their software manufacturers' websites. They should also take advantage of the many resources and products offered by GretagMacbeth, one of the industry leaders in color management.

Posters for the HP Brand Innovation Lab's Speaker Series feature the speakers' photos rendered as monochromatic outline drawings set against a single field of one of HP's corporate colors. Spot colors like these can be consistently specified using standard color formulas.
Stone Yamashita Partners



International Contract Furnishings sought to unify its collection of companies and thus established the ICF Group to provide a consolidated selling system. Marketing efforts include printer materials, advertising, online promotions, and retail stores, all designed for maximum brand coherence. That means there must be a consistent application of the corporate identity across a variety of reproduction processes and materials, as seen here.
Carbone Smolan Agency

"Color is my day-long obsession, joy, and torment."
—Claude Monet



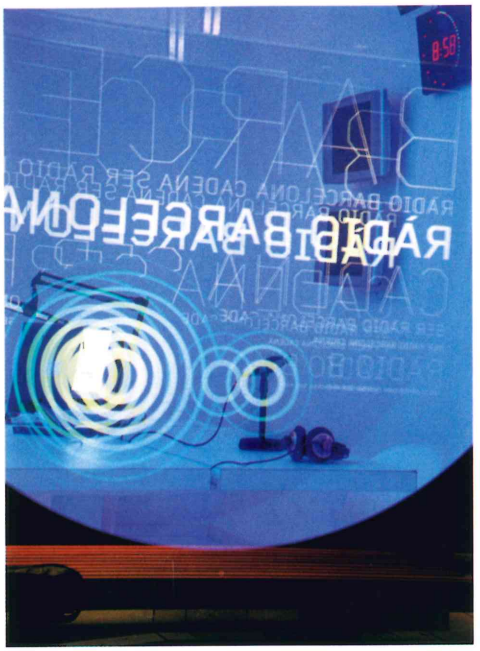
Working with fluorescents can be tricky, but creative director David Koehler puts them to good use in the Star Financial Services Annual Report. Used as both an undercoat layer for four-color images as well as big full-bleed color blocks, fluorescents make this book stand out. Standardized guides are also available for fluorescent ink colors.
Addison Co.

These HUGA T-shirts are for sale through the designer's online store. Being able to consistently produce the same color over time is a concern for the company. Standardized specification and color formulas for silk-screening inks make this possible and can be guaranteed if the same silk-screen ink manufacturer is used for all products. Many designers use PANTONE® coated color chips when specifying color for silk- screening.
Hunter Gatherer

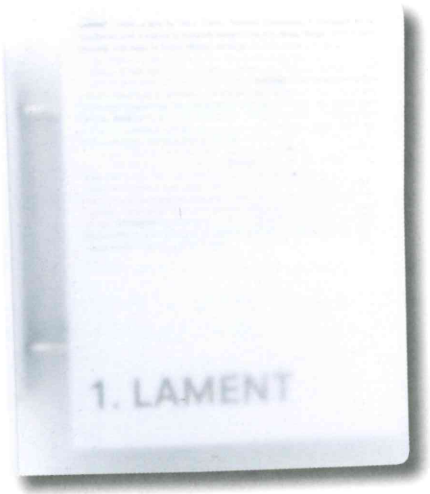
Color in Politics

Since the days of ancient Rome, competing political factions have used color to symbolize their group's ideologies. There are exceptions, from country to country, but the following standard associations of color and politics generally apply worldwide.

The Green Party is associated with environmentalism, and green is often used to represent Islamic parties. Blues typically represent conservative parties, except in the United States, where blue is associated with the more leftist Democratic Party. Red is historically associated with socialism or communism but now also represents the Republican Party in the United States. Both anarchism and fascism have used black, while white has been linked nearly universally to pacifism, most likely due to the white flag of surrender. Yellow is often used to represent libertarianism and liberalism. Other colors have been employed, but these are the enduring colors of politics.



The Radio Barcelona exhibition required design in several media. Color had to be managed, so standardized color systems were used to achieve consistency in items such as painted walls, printed materials, and silk-screened merchandise. Rich, deep blacks, punctuated by geometric patterns in white and pale blue, distinguish the design and give it a sense of both technology and mystery.
BASE Design



Instead of a single gallery guide for the American Tableaux exhibition, eight versions were produced, suggesting the plurality of interpretive possibilities contained in the theme. A new guide was available each month during the eight-month run of the show. All guides were then bound into a single plastic notebook shown above right, and at left. Color differentiates each guide, as seen in the index, above left.
Walker Art Center

Designing for PANTONE®

Pentagram's London office had the opportunity to design in service of standardized color systems when they worked for PANTONE®. The firm was engaged to develop a new identity and package design for PANTONE® that reflected an intent to add the general customer to the company's target audience while retaining the existing professional business-to-business focus.

Designers John Rushworth (Partner-Graphics) and Daniel Weil (Partner-3D) and their teams positioned PANTONE® to consumers at large as the color authority that enables them to make color-sensitive decisions about products purchased online, from fashion and cosmetics to lifestyle products and home furnishings. The solution was to transform the chip icon, well known to professional color specifiers, such as designers, into a fun-style swatch guide. This is a format that consumers typically understand from buying paint and wallpaper.

Pentagram also redesigned the PANTONE® matching system guides for designers and printers, reaffirming their fundamental value as unique and comprehensive technical references while enhancing their usability. Each manual is now color-coded by system and held in clothbound binders to convey a tangible sense of quality. The typographical language suggests an accessible and ordered authority, inspiring confidence in the technical qualities of the brand.

10 Understand Limitations

It has been said that necessity is the mother of invention, and naturally, that applies to graphic design as well. Sometimes budget constraints are a limiting factor that wears down and frustrates designers. Stretching design dollars does not mean that down and dirty must be ugly and ineffective. Effective color usage can provide impact and beauty on a limited budget. Financial concerns are not the only reason for limiting the number of colors specified; sometimes it is a question of aesthetics as well.

Using only a few colors, perhaps on colored stocks, can result in a rich-looking piece. Pushing the boundaries with limited resources often means pushing the limits of production technology or thinking of new ways to incorporate old manufacturing techniques and materials. Stretching design dollars means embracing and leveraging limitations. However, it is best to understand the client's budget up front so designs can be formulated within it.

Delivery Media Affects Color

There is a vast difference between the way color works on coated versus uncoated paper stocks. It is important to design and prepare artwork correctly for the paper type being used in order for the specified colors to look their best. Uncoated stocks absorb more ink, so color tends to sink or flatten unless separations are made to compensate for this.

Halftone dots in color images tend to spread and deform on uncoated paper, a problem known as dot gain. Therefore, scanning and separations must compensate by opening the dots more so colors will appear to be at normal densities.

Coated stocks are made by casting the paper against highly polished, heated steel drums. The result is a harder surface that provides what is known as ink holdout, meaning that the color stays on the surface and is not absorbed into the paper. Both paper types have their own appeal, and colors will look great on each if the designs are properly prepared.

Color on screens—computer monitors or television sets—has its own limitations. The designers' biggest challenge is their inability to control the end product; each screen's calibrations and display properties are beyond the reach of standardized color specifications. For example, Macintosh and Windows operating systems use different platforms and protocols, and color can look very different in each.

Manufacturers work within a variety of technical parameters. Consumers can also make personal adjustments in image quality and color saturation. The result is that designers never really know whether their work is being viewed exactly as they intended it to or not.

This is the program for the *Tag Des Dutchmen Films in Tbilisi* film festival. Budget constraints required that it be printed with two colors, cyan and black, on the back of the event poster. The program contains a schedule, film descriptions in two languages, and still images from each movie. Transparencies, pattern, and typography all work to produce a strong visual statement seemingly unhindered by budget.
Andrea Tinnes

"Design depends largely on constraints."
—Charles Eames

Miracle Creations is a designer toy shop in Singapore that sells interesting collectibles sourced from around the world and manufactures its own unique handmade toys as well. A corporate identity package was created that incorporates a series of magical and fairy tale creatures illustrated as silhouettes. The stationery is all fit on a large A2 sheet, separated by perforations that provide the design with an interestingly interactive twist. Only Rhodamine Red (in positive and reverse color formats) was used, in order to limit costs. The red is fun and stands out against the stark white, giving the piece a surreal feel because it is an unnatural color for the imagery used.
Kinetic

Color on Paper

The key to great color on paper is working closely with your printer both in preproduction and on press. The dimension of color is always a concern, especially if you like very saturated, vibrant colors like we do at AdamsMorioka. Here are some tips for great results:

- Tell your printer up front if you'll be specifying coated or uncoated paper stock.
- Get samples of the paper. Ask for "commercial printed samples" because these are actual print jobs from designers like you, and you can see real-world results. If your printer has run this stock before, ask for these samples as well.
- Provide your printer with any production and technical information you may have from the paper manufacturer. They often have great guidelines.
- Make sure your scans and separations for uncoated stocks compensate for dot gain.
- Make sure to compensate for the color of the paper itself. For example, reduce yellows in scans of images to be used on a cream-colored stock to achieve an accurate reproduction.
- Let your printer know in advance if you'd like to use specialty inks such as soy based, metallics, or fluorescents.
- Request an "ink drawdown," which is a sample of the ink you've chosen on your actual paper stock.
- Add fluorescent ink touch plates under large areas of four-color process to add vibrancy to image color on uncoated papers. Using UV inks will also add richness to colors on uncoated stock.
- On press, make sure your printer takes both a wet and dry ink-density reading. Because uncoated stocks take longer to dry, the variances could be dramatic. Make sure the printer records this if there is a possibility of future reruns on the job.
- Preparation saves time, money, and disappointment and is the key to getting great color on paper.

How We Perceive Color over Time
Aging is a natural human limitation. Color perceptions and preferences change with a person's age.

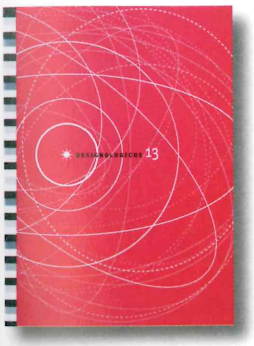
A study in Germany conducted by anthropologist Dr. Manuela Dittmar showed that age group differences in both males and females affected color preferences significantly. With advancing age, people's preference for blue steadily decreased, while the popularity of green and red increased.

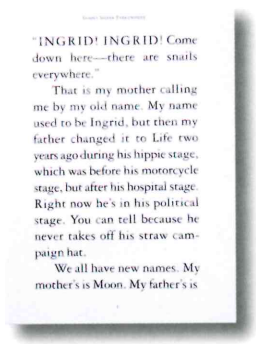
The results suggest that color preferences can change over the course of the adult lifespan. These changes might be attributed to alterations in the ability to discriminate colors, the yellowing of the crystalline lens of the eye, and the decreased functionality of the retina's blue cones.

SamataMason was the Creative Director for this Appleton Paper promotion, consisting of a series of small books created by different designers and contained in a black case. Each book interprets the same theme and utilizes the same black and red color palette. The directive of the series was to "offer meaningful thoughts and insights in a frenetic age of meaningless information and vapid graphic metaphors," as described by one of the book designers, John Bielenberg. Subjects included numerous translations of jokes, poetry, showcases, a sociological study of designers, and a personal diary. It is interesting to see the variety of graphic results using the same set of color limitations.

SamataMason, Creative Directors

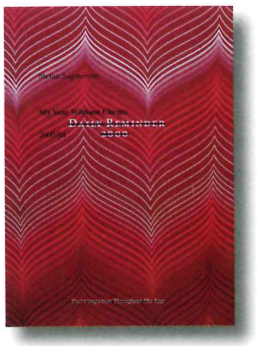
"Limitations motivate creativity."
—Sean Adams

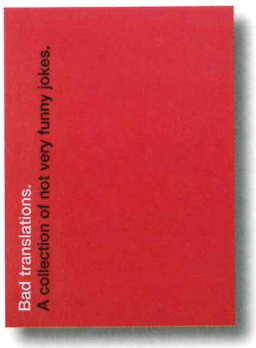


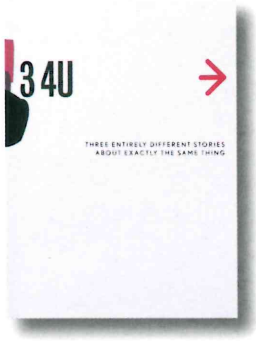

"INGRID! INGRID! Come down here—there are snails everywhere."

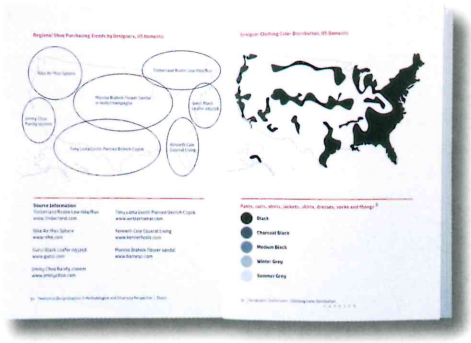
That is my mother calling me by my old name. My name used to be Ingrid, but then my father changed it to Life two years ago during his hippie stage, which was before his motorcycle stage, but after his hospital stage. Right now he's in his political stage. You can tell because he never takes off his straw campaign hat.

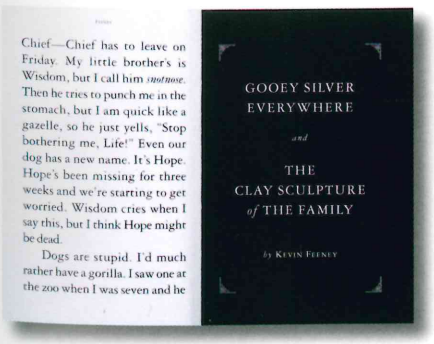
We all have new names. My mother's is Moon. My father's is





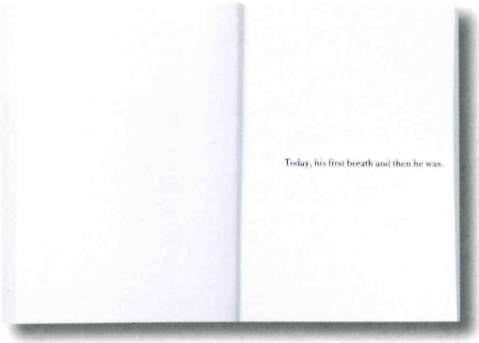


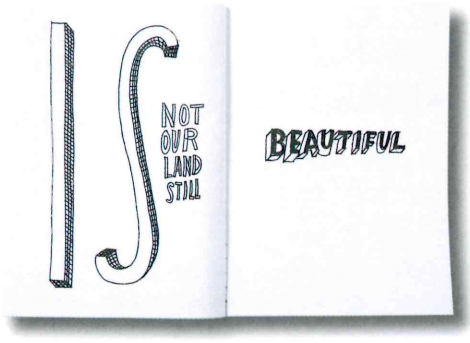



Chief—Chief has to leave on Friday. My little brother's is Wisdom, but I call him *stoptuse*. Then he tries to punch me in the stomach, but I am quick like a gazelle, so he just yells, "Stop bothering me, Life!" Even our dog has a new name. It's Hope. Hope's been missing for three weeks and we're starting to get worried. Wisdom cries when I say this, but I think Hope might be dead.

Dogs are stupid. I'd much rather have a gorilla. I saw one at the zoo when I was seven and he

GOOEY SILVER EVERYWHERE
and
THE CLAY SCULPTURE *of* THE FAMILY
by KEVIN FEENEY


Today, his first breath and then he was.

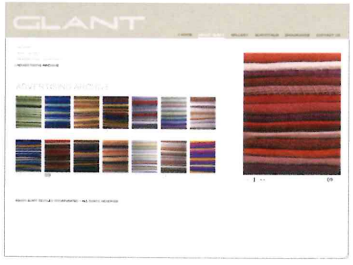


Above are the Appleton Utopia books created by AdamsMorioka, Concrete, John Bielenberg, Michael Mabry, SamataMason, Howard Belk, and Stefan Sagmeister.

Using color on screens should carry this warning: WYSIPNWYG (What You See Is Probably Not What You'll Get).

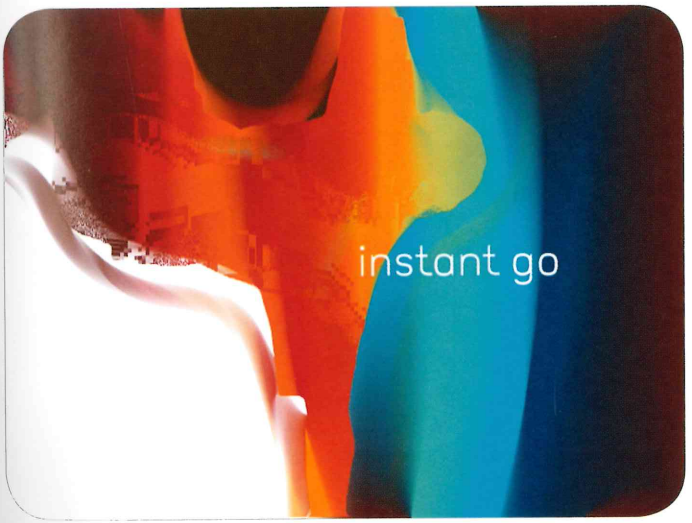
Motion Theory and Weiden + Kennedy/Tokyo collaborated to merge graffiti, an urban art form, and sophisticated motion graphics to promote Nike Presto to a Pan-Asian market. Colorful graffiti paintings literally come off the wall in animated television commercials. Graphics are intercut with Tokyo and Shanghai street scenes set to the music of Japanese DJ Uppercut, all toward the goal of capturing the spirit of art, music, and culture of contemporary Asia.

Wieden + Kennedy/Tokyo
Motion Theory



The Glant website takes advantage of the unique qualities of design for the web. Glant designs and manufactures fine textiles, primarily for use in interior design, in the United States and Europe. Built mostly in HTML, the site functions as an online catalog, so reproductions of product textures and colors are critical. The use of a neutral gray background throughout the site creates a unified feeling and allows the photos of the Glant products to stand out on screen.

Methodologie



Color On Screen: Design for Web & TV

by Victor Bornia

If you are color-obsessed, bristling at anyone who mistakes your eggshell for white, you may need to ease up when it comes to designing for the screen.

Color and Web Design

Any use of color online—intended for viewing by the masses on personal computer screens—is far more of a hit-or-miss affair than color on paper. Once the design is online, it will be viewed on different platforms (Macintosh, Windows, etc.), each with their own gamma curves on different monitors (e.g., CRT, LCD), each set to brightness and contrast levels that no designer can control. That deep, lush burgundy you specified might be blown out to fire engine red, while that subtle pattern of darker hues you designed as a background may well end up a solid black. However, the disparities are not that ridiculous now that technology has advanced, and most people view websites in 24-bit color.

Basic Web Design Tips

- Test your design on both Macintosh and Windows computers. See the resulting variances for yourself.
- Try simulating a variety of brightness and contrast levels to see how your design stands up.
- Understand graphics formats. The basic rule is that images composed of solid colors (type, icons, etc.) should use GIF; photos or complex images should use JPEG. Try both when exporting your graphics for the Web to see what works best—that is, creates the smallest files with the best-looking result.

Color and Broadcast Design

The problem with designing for broadcast is similar to taking your design to the computer screen (which is RGB) and preparing it for print (to CMYK). However, rather than go flat or dull, colors now explode. This is because the standard television color space for video in the United States is NTSC (National Television System Committee). PAL (Phase Alteration by Line) and SECAM (Systeme Electronique Couleur avec Memoire), in Europe and Asia, all use a different gamma curve for luminance than your computer monitor. For example, any dark or muddy areas in your design may well blossom into vivid detail when viewed on an NTSC monitor.

Video also uses a different color space (YUV instead of RGB) and is often subject to limitations on what can be recorded onto a particular format (e.g., videotape). As a result, what you see on your computer monitor will only get you so far in predicting what you will see on video. Only using an NTSC monitor allows you to see what the design will really look like. The good news is that most video software allows for a simple FireWire connection to an NTSC monitor, so you can keep tabs on the results as you design (you'll need a FireWire NSTC breakout box as well). Also, most video graphics software (e.g., Adobe Aftereffects, Apple's Final Cut Pro, etc.) have a built-in shortcut—a broadcast safe filter that attempts to automate the process of making your colors ready for television.

Basic Broadcast Design Tips

- Always view your work on a properly calibrated NTSC monitor. If that is not possible, use a television with a video-in jack. It will serve as a NTSC monitor and will be more accurate than viewing on your computer monitor.
- Do not trust built-in filters exclusively to go broadcast safe. Use your own eyes; sometimes desaturating an image works best. At other times, adjustments to the brightness or contrast will be required.
- Test designs in their final delivery format. Laying off to VHS affects images differently than MPEG-2 encoding required for DVD.
- Read books by Trish and Chris Meyer, especially *Creating Motion Graphics*. They provide excellent advice.

Victor Bornia made the transition from print to Web (producer for an online music magazine) to motion graphics (led workshops in Aftereffects for Adobe) to visual effects (member of the Emmy Award–winning team in 2001 for Star Trek: Voyager*). He currently works as a 3-D animator in Los Angeles.*