1 THE ROLE OF COLOR IN DESIGN

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Color is essential for life.

—Frank H. Mahnke

Color pervades every aspect of our lives. It delights, informs, identifies, warns, embellishes the ordinary and brings beauty and drama to everyday objects. If black and white images bring us the news of the day, color writes the poetry.

The Role of Color in Design

The romance of color exists for everyone, but color has a unique role for design professionals. Forms, colors, and their arrangement are the foundation elements of design, and of these, color is arguably the most powerful weapon in the designer's arsenal. All fields of design share the same goal: to create a product or communicate an idea that engages the attention of its target audience, and to do this in the most immediate, informative, and appealing way possible.

Color provides the first impression of any product or image. It may also provide immediate or lasting identity. Whether something is a web page, a book jacket, an article of clothing, an automobile, toaster, garden, or anything else, more often than not it is color that foretells its success or failure in the consumer marketplace.

Even more, it is that *first* color impression that influences—and at times even determines—the success of a product. It has been estimated that up to 90% of initial judgments made about consumer goods are based on color alone, and in graphic design, images that include color are thought to be more than 80% more effective in drawing immediate attention than those in black and white. A skilled designer understands that power and how to use it to enhance the market appeal of any product. For designers, color means business—and to use it effectively, it's important first to understand exactly what is meant by "design."

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> Design: a plan or drawing provided to show the look and function of something before it is built.[1]
>
> Design: to devise for a specific purpose; also the creative art of the aesthetic of functional designs.[2]

Design is a process; a way of merging art and utility. The outcome of every design undertaking is a *product*: anything from a sports car to a stuffed toy; something as solid as a marble floor or as insubstantial as images on a screen. The goal of every design process is to present and promote—to *sell*—that product or idea, whether for short-term attention, like an advertisement, or long-term appeal, like an easy chair or a car. Good design is a well-balanced combination of art, function, and message. *Great design combines art, function, and message in a way that is seamless, informative, innovative, and memorable.*

The fine arts—images and objects such as paintings, sculptures, or works created in any of today's enormous range of alternative media—are meant to engage their audience in the work itself. A work of art *is* the product. Design is *about* a product.

Color as Language

Language is a collection of words used to communicate ideas and feelings. In a widely-accepted study, researchers Brent Berlin and Paul Kay determined that 98 languages had names for 11 basic colors. Simpler languages had fewer color names; more complex languages had more names. The languages studied gave names to colors in a consistent order of recognition: first, black and white (or dark and light), then red, followed by yellow and/or green, then blue, brown, orange, purple, and pink.[3]

Each word has the same meaning for speakers of the same language, although words may have slightly different meanings in regional settings. An American who orders "today's pudding" from a London menu may be surprised when served a slice of chocolate cake.

Dead languages are frozen in time, but living languages evolve and grow; adding words, abandoning words, changing meanings. The words for red, yellow, orange, yellow, green, blue, and violet are reasonably stable in all languages, but words for *variations* of these often change, are lost entirely, or are replaced by new words. Would anyone today order a sweater in puce, gamboge, zaffre, fulvous or amaranth, the color names of a century ago? Probably not, but the same sweater described as sky blue, mint green or apricot might appeal. *Color is a living language.*

Color words can be "signatures" that represent a non-color entity. Color words or phrases used in this way do not have universal meaning; they are directed at particular audiences. "Three cheers for the 'Red, White and Blue'" needs no explanation. Dartmouth is "Big Green" to its sports fans; Alabama opts for "The Crimson Tide." Color words used as codes for ideas or entities can shift in meaning over time. Those used to reference political points of view are particularly vulnerable to instability. In the United States, the "Red Menace" of the 1950s referred to Communism; today a "Red State" designates the exact opposite—a state where a majority of voters are politically conservative.

Writing is visible language: a way of preserving words and ideas. It is also a way of organizing and controlling the way that words and ideas are presented. *The color of written words influences the way in which the ideas they convey are understood.*

Color words are used as analogies as well; they are central to descriptive writing. No one has written more comprehensively, or with more eloquence and scholarship, on the imagery and symbolism of colors than Alexander Theroux:

> Fox-red *tenné* in the language of chivalry shows a somewhat burnt tone. And garnet red with its low brilliance and medium saturation is a sort of 'pigeon blood' or 'Spanish wine'. Cranberry red has a saucy sharpness to it, with a hint of yellow. Bluish red, popular in lipsticks, cardigans, and the aura of dramatic personalities …[4]

Culture, Color, and Time

A *culture* is a collective set of the values and beliefs of a particular social group. Each culture establishes what is important to that group; ideas that are passed down from generation to generation as traditions. Each culture also has its own language of social status and political meaning, including a language of color, and the symbolism of a single color or combination of colors is meaningful to that particular group. *Awareness of cultural differences in the language of color is critical to successful marketing of any product or image destined for the global marketplace.*

In *Color, Environment, and Human Response*, Frank H. Mahnke describes the experience of color as a pyramid with six levels of response:[5]

personal relationship
influence of fashions, styles and trends
cultural influences and mannerisms
conscious symbolism-association
collective unconscious
biological reactions to a color stimulus

Each step upward in Mahnke's pyramid represents a narrower interpretation of a color experience. The lowest level is the innate, unlearned response to color; the physiological, unconscious response to a stimulus of light. The conscious part of the brain becomes a part of the response at the second level, where each sensation is identified by name. "Collective unconscious" responses, like the association of the color red (and also the *word* for red) with blood, are also involuntary and cross-cultural.

At the third level, colors or color combinations become visual codes that have meaning for specific populations; a language that is independent of words but culture-specific. Americans associate red, white, and blue with the United States, but the French, Chilean, and Yugoslavian flags (among others) display the same colors.

No matter what the culture, color words are understood as codes only when they are used in context. "Seeing red" is understood as rage; in a different situation, embarrassment. A "red flag" is a signal to be alert, and nobody

wants to be "yellow" or "blue." Green in one situation suggests youth or inexperience, in another, envy—or nausea. Shakespeare's aging Cleopatra speaks of her "salad days," when she was "green in judgment." In the twenty-first century, with global warming and the deterioration of the environment everywhere apparent, green has become an international rallying color of environmental politics and a powerful tool for advertisers. "Green" products carry an unwritten message: using them will help to save the planet (Figure 1-1).[6]



Figure 1–1. *Color Symbolism.* Concern for the environment is implicit in products labeled "The Green Promise." Benjamin Moore's® paints give assurance that its coatings meet the highest environmental safety standards. *Image courtesy of Benjamin Moore.*

Color, Form, and Arrangement: Communication without Words

A form alone, whether it is two- or three-dimensional and no matter what its size, has no special identity. A circle is just a circle (or a sphere), a square is a square (or a cube), a triangle is a triangle or a polyhedron.[7] A freeform figure is a "blob," and so on.

Words like "above," "below," "adjacent," "overlapping" describe the arrangement of forms. Color may be first element of design to capture a viewer's attention, but it is *only* first. Images and products made up of a specific color or combination of colors and distinctive in form and arrangement are a visual shorthand that communicates without any need for language. Images of this kind can convey social, religious, political, or military status, or warn, or direct, but no matter what the overall dimensions of the image—large or small—its forms, colors and their arrangement must be the same in order to communicate that precise meaning.

Many of these form and color symbols have near-universal recognition. A blocky, symmetrically-armed red cross against a white field communicates aid to victims of disaster—but if the colors are reversed, the image becomes something far less familiar: the national flag of Switzerland (Figure 1-2).

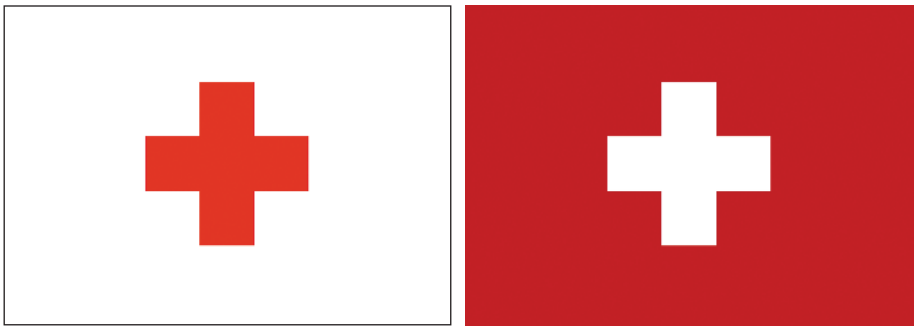


Figure 1–2. *Color and Form as Identity.* The image identifying the Red Cross is lost when its colors are reversed.

National flags are wordless messaging, their colors and arrangement painstakingly chosen to represent a particular culture and history. The flag of the Republic of Ireland is an ideal example. The majority of Ireland's population identifies as Roman Catholic and associates itself with vivid green; the "Emerald Isle." A minority population, traditionally Protestant, is represented by orange, an allusion to the Protestant King William of Orange whose army overthrew the Catholic King James II in the seventeenth century. The two populations, united today in a sometimes uneasy accord, share a flag that represents both religious difference and national unity: equal bands of green and orange at opposing ends are separated by white, a symbol of truce (Figures 1-3 and 1-4).



Figure 1–3. *Color as Historical Reference.* The colors of the flag of the Republic of Ireland evoke its history.



Figure 1–4. *Color Alone as Symbol.* Only different color combinations distinguish national flags that have identical forms and arrangement.

Some combinations of form and arrangement are so distinctive that they retain their meaning even when illustrated in different colors; even in the absence of color. The international symbol for radiation hazard, initially represented as a magenta or black trefoil on a yellow ground, then as black on yellow, is now displayed in other colors while maintaining its distinctive forms and arrangement,[8] and a new symbol has now been developed for international use (Figures 1-5 to 1-7).[9]

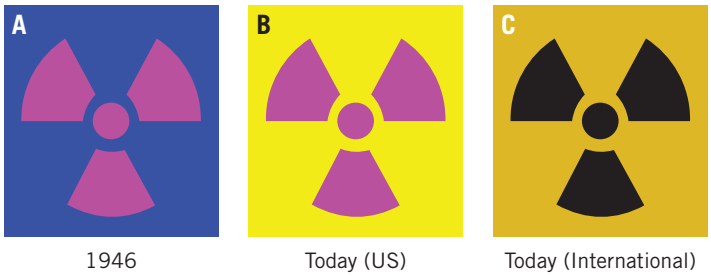


Figure 1–5. *Form and Color Together as Warning.* The traditional international symbol for radiation danger appears in several color combinations.



Figure 1–6. *Form and Color Together as Warning.* A new international symbol for radiation danger is not yet in universal use.[10]



Figure 1–7. *Form Alone as Warning.* No matter what the color (or no color at all), this message is unmistakable.

Clothing and Color: Social Messaging

Clothing is a universal form of social communication. Garments at every level from haut couture to construction overalls carry color associations that acknowledge (or challenge) cultural expectations. Funeral directors do not wear bright orange ties. Newborns are not swathed in black.

The use of color to communicate identity and social status has long roots in history. In ancient Rome, only the emperor and others of high status were permitted by law to wear "Tyrian Purple," a color that required 250 000 tiny mollusk shells to make a half ounce of dye. In ancient China, the emperor alone wore yellow. Garments of particular colors meant to identify the wearers' role and status are worn still today. The saffron robes of Buddhist priests are instantly recognizable. An elaborate calendar of colors exists for Roman Catholic priests, the everyday black of their vestments changing to a rainbow of options at different periods in the liturgical calendar. Present-day social groups use clothing color to assert identity as well: Goth culture proclaims itself in black, unmistakable, unrelieved black (Figures 1-8 and 1-9).



Figure 1–8. *Clothing Color as Traditional Social Identity.* Robes of sharp yellow-orange identify Buddhist monks, a tradition of centuries.



Figure 1–9. *Clothing Color as Contemporary Social Identity.* Goth culture proclaims itself in unrelieved black.

Nearly all cultures have traditional colors for special occasions, but even long-held traditions can change over time. Most Western brides wear white for their wedding day, but until 1840, when Queen Victoria chose white for her gown, a bride simply wore her best dress—often black—which was also the color of mourning in the West, both then and now. Indian brides for centuries were garbed gloriously in red, a color associated with a revered Hindu goddess, fertility, and passion, promising a happy conjugal future. An Indian bride today may choose more individual colors for her wedding, but most include red in some way as a nod to that tradition, while in India and the Far East, white remains—by tradition—the color of mourning.

Uniforms use both color and style to identify their wearers as distinct from the general population. The US Army has required, permitted, and prohibited colors for every conceivable situation, including hair color and lipstick.[11] Whether a uniform is military, industrial, law enforcement or anything else, both design and color are meant to be so distinctive that the wearer's role is unmistakable. When Paul Revere rode to warn that "the Redcoats are coming," no further information was needed (Figure 1-10).



Figure 1–10. *Color as Corporate Identity.* Commercial uniforms identify the wearer's enterprise. UPS drivers' uniforms are the same distinctive color as their trucks (and are never mistaken for FedEx).

Uniforms are not necessarily without humor. Disneyworld's lighthearted staff uniforms charm visitors while fulfilling their function of identifying their wearers' role: ready to help and entertain park visitors. And some "uniforms" are singular statements: one figure below is instantly identifiable, the other would not enjoy the same immediate recognition (if at all.) (Figure 1-11).



Figure 1–11. *Clothing Color as Identity.* One "uniform" provides instant recognition … and one does not.



Figure 1–12. *OSHA Colors.*



Figure 1–13. *Safety Color.* The yellow of a school bus prompts drivers to exercise caution.

Color Coding

Color *coding* plays a critical role in conveying safety information for many *vigilance tasks*; situations that call for immediate response. Some colors have become so important in communicating ideas that their meanings have been legislated. In 1970 the United States Congress created The Occupational Safety and Health Administration (OSHA) to ensure that the colors of safety equipment, garments, signage and emergency messaging were consistent in both government and private industry. OSHA Red is recognized world-wide as an indicator of danger: red says "STOP." OSHA yellow indicates caution; orange, dangerous machinery, or equipment. Safety colors are closely linked in memory to the situations in which they appear, and are processed very rapidly. An OSHA yellow rain slicker helps to protect the traffic policeman. The same yellow as paint on a chair suggests nothing about safety at all (Figures 1-12 and 1-13).

The American National Standards Institute (ANSI) is an independent, non-governmental organization which, like OSHA, strives for standardization in safety colors. ANSI is an association of private industry representatives, technical experts, and policy makers who meet to reach a consensus on safety matters. It is the sole United States representative to the International Organization for Standardization, which works toward the adoption of uniform safety colors by all nations. ANSI standards are voluntary and its colors echo those of OSHA, but it is through their efforts that many safety colors today have been adopted internationally.

OSHA and ANSI color standards are used most often in industrial design, but architects, graphic, interior and fashion designers employ them in the same ways: to arouse a unconscious association, to emphasize, alert, warn, or direct. The basement of New York City's Bellevue Hospital is a labyrinth worthy of Minoan Crete, but lines painted OSHA yellow on the floors lead visitors safely—if not exactly briskly—to exits.

OSHA and ANSI color standards are clearly designated, but designers who work within their palette must stay alert to changes in meaning. Both colors and application requirements are updated regularly to meet new needs and to improve earlier standards, and the use of OSHA colors is enforced under Federal law.

When safety colors appear with simultaneous and *conflicting* information, the areas of the brain that respond to color competes with other parts of the brain in structuring a response. The resulting delay and confusion in understanding the color message, called the *Stroop interaction*, take place because the importance of equal and competing elements of information must be sorted out.[12] The word **BLUE** written in **RED** causes a brief hesitation in the flow of reading. An octagonal green traffic sign that says "STOP" would be misperceived, and response to it delayed, with potentially fatal results (Figure 1-14).

The workplace is not the only industry that relies on color coding for safety. Pharmaceutical companies call upon specialty research firms to specify the color of individual medications, which enables patients with multiple needs to discriminate more easily between them, a mandate that includes over-the-counter as well as prescription items.

In some instances the color (or colors) of specific *products* are mandated by law. In an effort to discourage smoking, the Australian government in 2012 employed market researchers to determine what the general public considered to be the ugliest possible color. The "winner" was a dull, drab, dark brown, and legislation was passed requiring that all tobacco products available in Australia use this color for their packaging. That same packaging requirement has been followed by many countries, including France, the United Kingdom, and many others (Figure 1-15).[13]



Figure 1–14. *Stroop Interaction.* Comprehension is delayed when different parts of the brain respond to simultaneous and conflicting information.



Figure 1–15. *By Popular Vote* … the ugliest color of all.[14]

Notes

1 *Concise Oxford English Dictionary*, 12th Edition (New York: Oxford University Press, 2011).
2 *Merriam Webster Collegiate Dictionary*, 11th Edition (Springfield, MA: Merriam-Webster, Incorporated, 2020).
3 https://en.wikipedia.org; wiki Brent Berlin.
4 Alexander Theroux, *The Primary Colors* (New York: Henry Holt and Company, 1994), 167.
5 Frank Mahnke and Rudolf H. Mahnke, *Color in Man-Made Environments* (New York: Van Nostrand Reinhold, 1982), 11.
6 The Benjamin Moore Green Promise: "Every product that has the Benjamin Moore Green Promise designation has exceeded the most stringent standards for environmental safety and superior performance. These premium 'green' paints stand out for their low VOCs, low odor, unparalleled quality and performance with unlimited color selection. There's a perfect Benjamin Moore Green Promise product to suit every budget and lifestyle."
7 A three-dimensional shape with flat faces, straight edges and sharp corners.
8 https://www.mub.eps.manchester.ac.uk/nuclearhitchhiker/the-history-of-the-radiation-warning-symbol
9 https://remm.hhs.gov/radsign.htm
10 https://remm.hhs.gov/radsign.htm / U.S. Department of Health and Human Services /Public domain.
11 ALARACT 055/2023 DTG: R 061507Z JUL 23 UNCLAS SUBJ/ALARACT 055/2023 – UNITED STATES ARMY APPEARANCE AND GROOMING MODIFICATIONS BY JSP ON BEHALF OF HQDA, DCS, G–1 1. (U) REFERENCES: 1.A. (U) HEADQUARTERS, DEPARTMENT OF THE ARMY, SECRETARY OF THE ARMY MEMORANDUM (APPEARANCE AND GROOMING POLICIES FOR THE UNITED STATES ARMY), 30 April 2021.
12 Jules B. Davidoff, *Cognition through Color* (Cambridge, MA: MIT Press, 1991), 113–126.
13 Australian Government, Department of Health and Aged Care: www.health.gov.au›topics›tobacco-control. With permission of Commonwealth of Australia.
14 With permission of Commonwealth of Australia.