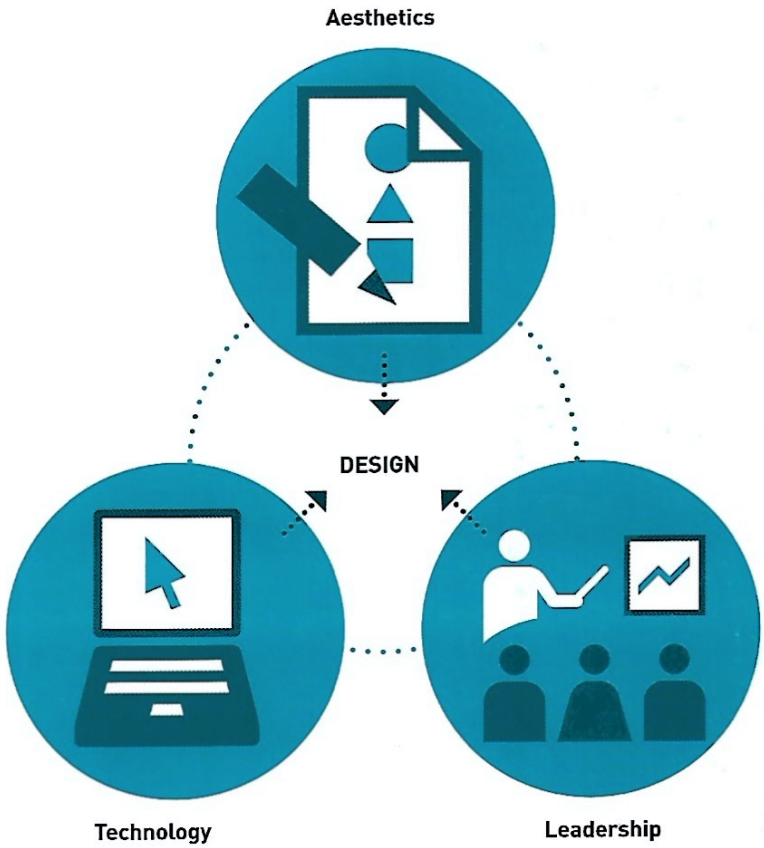
Historically, the designer's primary concern has been the visual presentation of a message.

In the modern marketplace, the emergence of the designer as author, business person, consultant, and thought leader has significantly augmented those traditional aesthetic skills.

However, our roots remain visual. Can we assign new value to those terms and tenets learned in the art-school classroom? Beyond beauty, what communication merits are apparent in the study of alignment, hierarchy, spatial placement, contrast, color theory, and typography?

A clear explanation of aesthetic decisions—framed by logic, supported by visual standards, and imbued with creative enthusiasm—assures design buyers that their money has been well spent. Better still, the appropriate application of these principles connects the audience with the intended message.

For the purposes of information design studies, most aesthetic principles can be organized into two overlapping categories: structure and legibility.



Traditional aesthetic and creative skills, combined with advanced technical competency and the ability to be a thought leader, from classroom to community to corporation, provide a firm foundation for the modern designer.

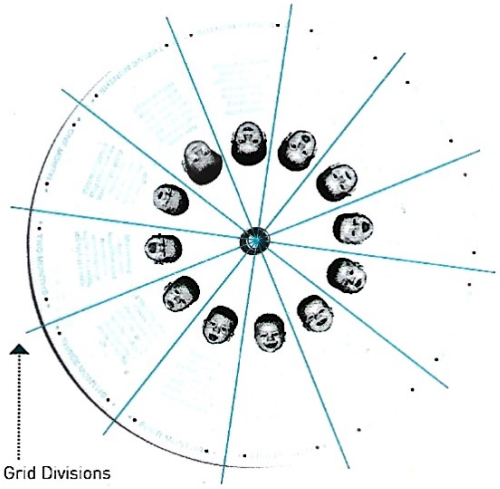
Designers use grids to organize content and manage the clarity of a message.

Newspapers, magazines, and periodicals are an obvious example due to their typographic grid systems, but grids can be applied to most print, digital, and even three-dimensional work. When you start looking you'll find them almost everywhere.

One of the initial focuses of a design education is learning to organize content and create hierarchy by using grid systems. After creative and conceptual development, the layout of the grid—ratios, number of columns, width of gutters and margins, horizontal and vertical relationships—is often the first aesthetic undertaking, one that will greatly affect the final look, feel, and usability of a design piece. For some students the grid can feel claustrophobic, limiting choices and restricting artistic license. But that reaction reflects a misunderstanding of the device.

With more practice—and with tight deadlines and copious information sets to juggle—the grid reveals itself as integral, and perhaps even inspirational: a foundation for order, an agent of clarity.

From an information design perspective, grids provide a canvas for content. A grid is an essential aesthetic device that will allow the designer to walk the reader through that content, one specific message at a time, without actually being there. Grid systems allow the designer to create visual clarity through organization, movement, and grouping.



↙

Grids are used to organize content in every type of media.

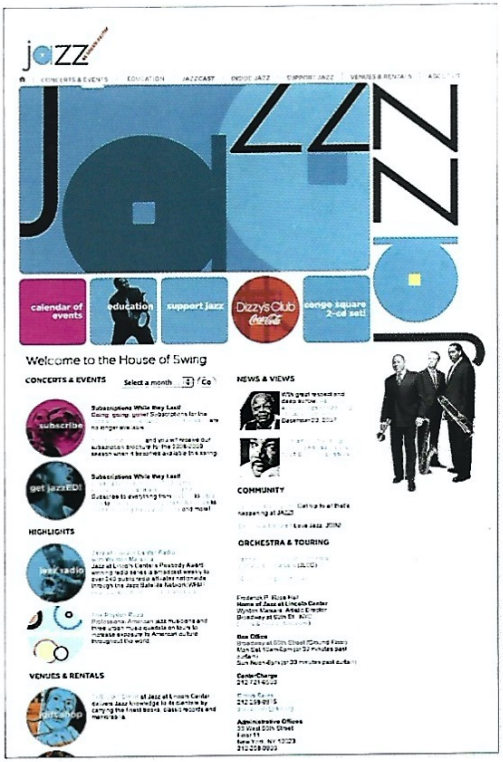
The circular grid on this card provides a frame for content, ensuring that it will consistently appear through the die-cut window above.

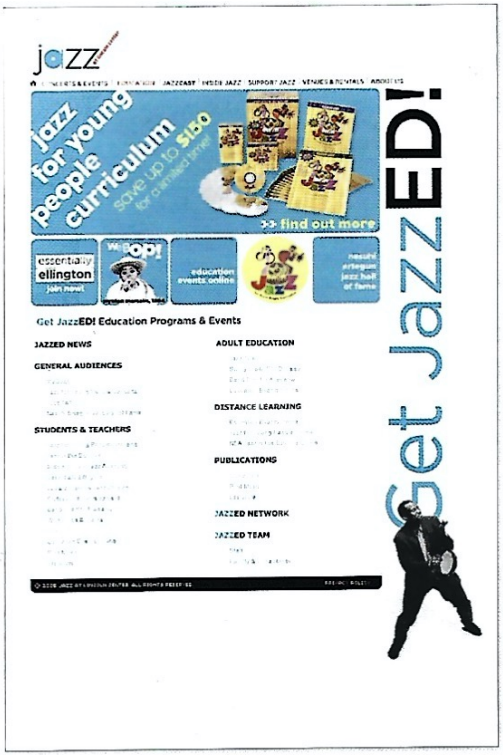
→

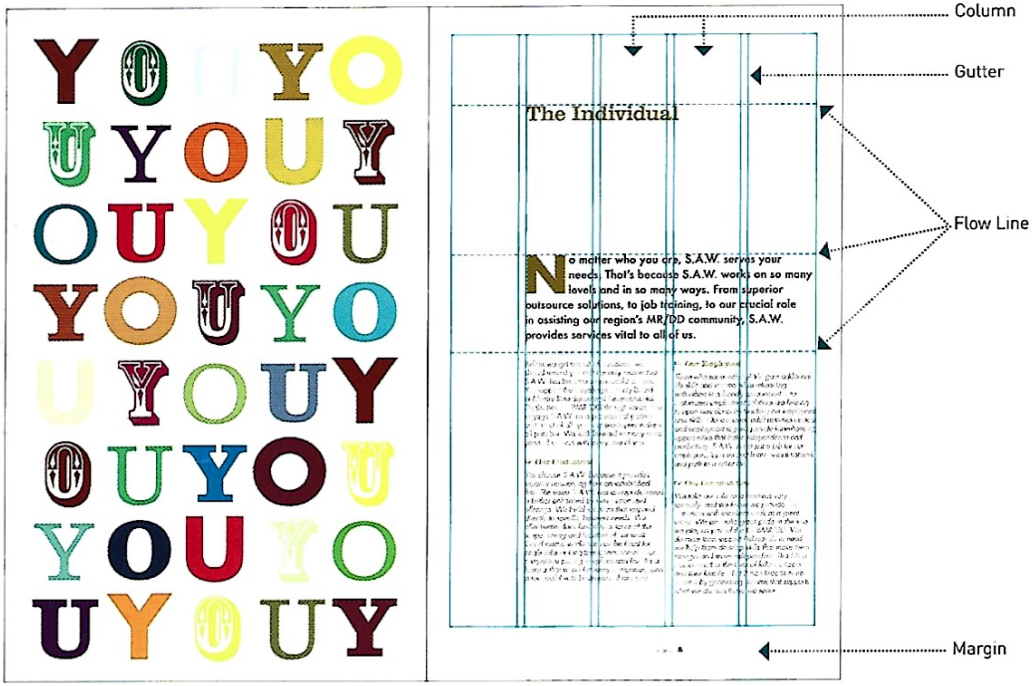
This website uses clear structural alignments to control complex amounts of content, creating a positive online user experience.

↓↘

Here the grid is used in an environmental setting to provide a tapestry of imagery.



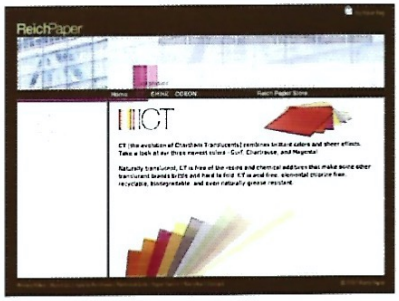


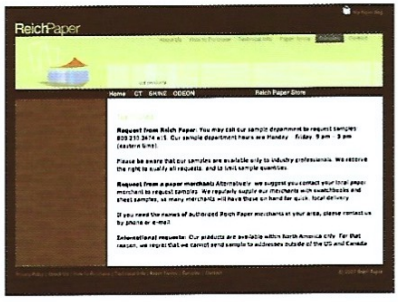


Basic grid structures include margins, columns, and gutters. Adding horizontal lines provides additional visual continuity. The most common horizontal inclusion is a "hanging line" or "flow line" from which headlines, quotations, or body copy can flow. Grids allow the designer to easily delineate segments of the layout for specific content.

Organization

The geometric divisions of a grid create a framework for typographic and pictorial content. On a micro level, they provide consistency on a single page; on a macro level, they do the same across chapters, volumes, or entire websites. Consistency is extremely important to usability. Viewers can process content more rapidly when they are familiar with the structure of information. Imagine the difficulty of traversing a website where the navigation was constantly moving, or speed-reading a paperback novel if the paragraph width changed dramatically from page to page. The organizational qualities of a grid provide easy and consistent access to content.

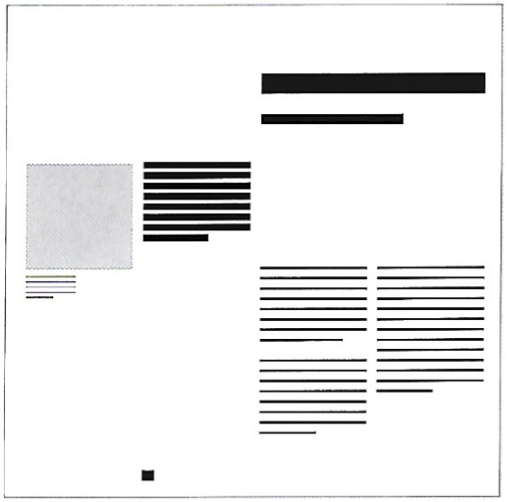


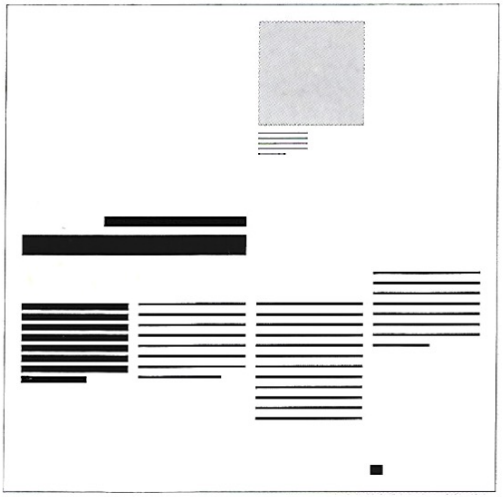


→ ***Repeating organizational structures (common grids, alignments, hanging lines, etc.) increases usability by providing the viewer with predictable formats for retrieving content. This website for Reich Paper provides users with a consistent viewing experience, focusing their attention on the information and not the interface with harmonious and familiar typographic, interactive, and wayfinding systems.***

Movement

Direct and implied alignments on the grid provide links between information sets and move the viewer's eye through the content of the page. Depending on the complexity of the layout, that movement may affect how long a reader remains engaged with a design piece. By using grid alignments and spacing choices to compartmentalize information sets, the designer can control large quantities of content. By controlling how the reader's eye moves through that content, the grid can also impart a sense of time or show direction. Considering eye movement and rhythm when working with a grid enhances the skimming and scanning of information, helping the viewer to locate relevant content quickly.

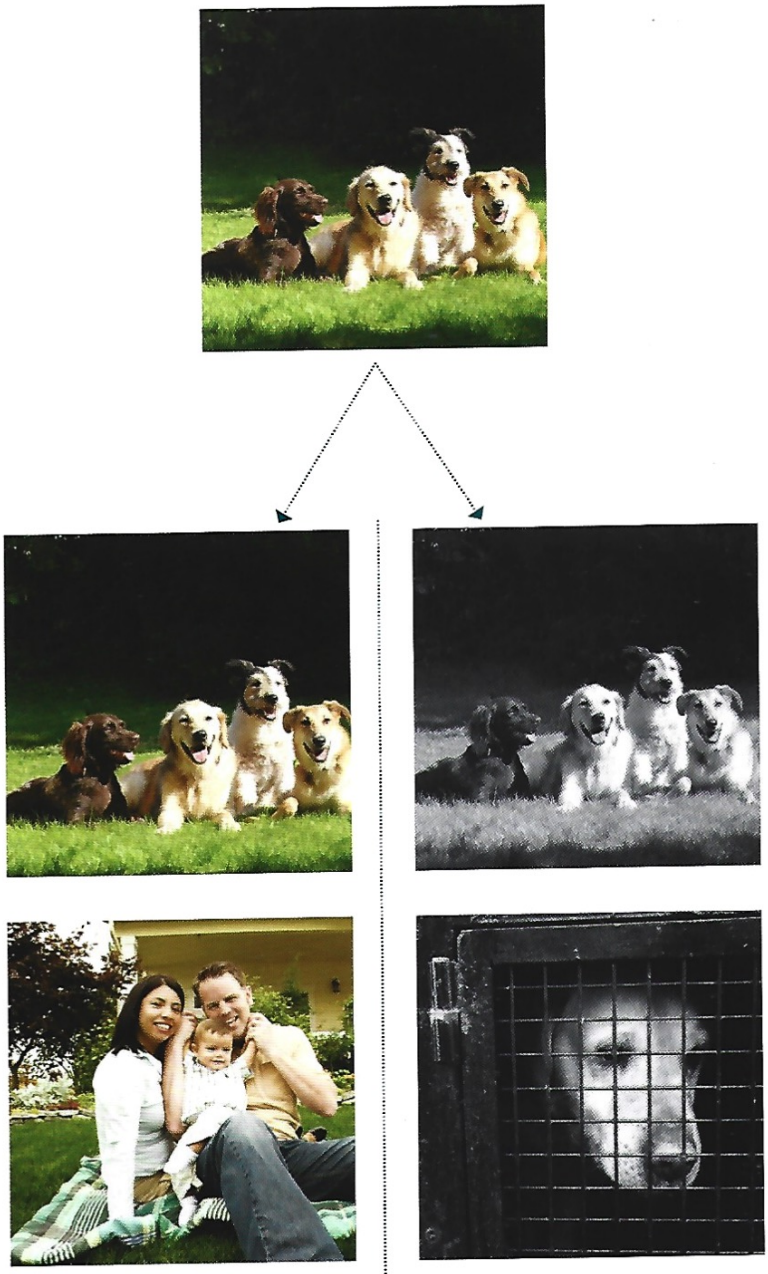




↗→ *Designers use grids to create dynamic movement on the page, convey a sense of space, and establish relationships between information sets. Consider how your eye moves around the three layouts shown here, all with the same amount of content on a common four-column grid.*

Grouping

In addition to providing a means of organization, grids allow the designer to connect groups of content by placing them in proximity and alignment with one another. Arranging information sets in this way creates new contexts and can suggest different meanings than if the sets were reviewed independently. Proximity and placement lead the viewer to believe that the items in the grouped information sets are related. For example, a paragraph about declining coral populations might be a part of a zoological study on the reproductive habits of polyp colonies, but when placed alongside a satellite photograph of melting icecaps and an annual temperature index, the grouping immediately evokes the topic of global warming. Visual communicators should be aware of this and ensure that the design always delivers the intended message.



↗→ ***Placement, proximity, and similarity can dramatically change the context of content. In this example, our emotional response to the dog image changes dramatically when it is placed with an image of a young family or converted to grayscale and paired with a photograph of a cage.***

Quick Tips

Borrow from the familiar
Not sure where to start when designing a grid? Use the Golden Ratio (also known as Golden or Divine Proportions) to determine page margins—the ratio of the longer part to the whole should be the same as the ratio of the shorter part to the longer part. The Golden Ratio is present in nature, art, and architecture, and thus creates a structure with which your viewer will immediately feel familiar.

Look both ways
In addition to vertical columns, horizontal flowlines (implied alignments or actual linear elements from which body copy or other content consistently hangs) and a baseline grid (horizontal alignments between type sets) create a more consistent viewing experience.

For web work, think proportionally
When designing for the web, don't think of columns in terms of fixed width, because webpages are resized according to browser width and viewer preference. Concentrate instead on creating structural value by focusing on proportional relations between page elements (based on ems). Essentially, the user sets the scale and your design expands to fit.

For more information on how grids work from a cognitive perspective, read these theories in Chapter 4:
- ***The Gestalt Principles of Perception (p. 64)***
- ***Eye Tracking (p. 66)***

For more information on how grids support communication paradigms, read these theories in Chapter 5:
- ***The Principle of Least Effort (p. 86)***
- ***Uncertainty Reduction Theory (p. 88)***

Structure

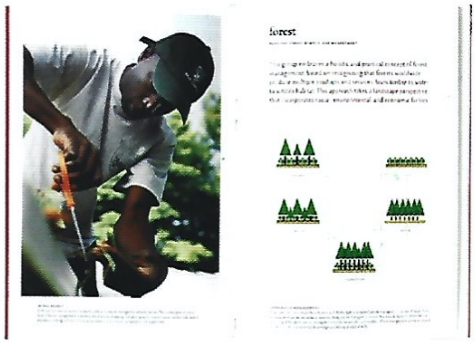
Hierarchy

In the context of graphic design, "hierarchy" refers to the ordering of pictorial and typographic information sets so that the viewer can quickly gain an understanding of their relative importance.

The user's comprehension of an informational hierarchy requires two processes: first, a quick grab or overview; and second, a more detailed consumption of the content. In the quick-grab stage, the user is searching for the fundamental message, and average attention spans dictate that there are only seconds for them to find it. The use of color, anomaly, dramatic contrast, and positioning can all affect the focal point of a design piece. That focal point, the first thing that really catches the viewer's eye, strongly influences their overview of the message. As readers proceed through levels of information (body copy, captions, footnotes, supporting charts and graphs, etc.), they process how that content supports the core message. During the detailed consumption phase, typographic differentiation, grid structures and consistent alignments, principles of contrast, and color coding can help the reader connect and rank information sets.

Graphic and informational hierarchy should be apparent in every design piece, but are especially important for complex information design projects. In these cases, using aesthetic principles to create a clear hierarchy leads the user through complex content in a way that is both logical and accessible. It also alleviates phenomena like map shock and information overload (see p. 75), instead turning overwhelming streams of data into a positive learning experience.

Designers need to understand their core content so that the hierarchical systems they create support and reinforce the message. Sometimes, altering the order of information can affect its meaning. It is imperative to examine hierarchy throughout the various phases of design development.



LOCAL INTEREST
Southern Connecticut serves as a classroom for urban and restoration ecology. Several rivers enter Long Island Sound in New Haven, and nearby university research sites include the 7,800-acre Yale Myers Forest. On one-day trips and during summer-long projects, students find many varied opportunities to study ecology without going far afield.

ecology

ECOLOGY, ECOSYSTEMS, AND BIODIVERSITY

This group's aim is to understand the complex interrelationships between humans and the diverse organisms living in ecosystems. Faculty and student members study how organisms interact with one another and with their physical and chemical environments, and they analyze the causes of changes in global species distribution and abundance. They do so by integrating chemistry and biology, biophysics, physiology, genetics, evolution, mathematical modeling, and the social sciences.

FOOD WEBS AND BIODIVERSITY
Experimental research examines the effect of top predators in maintaining plant species diversity. (A) A goldenrod species should dominate, yielding low diversity. (B) Grasshoppers prefer grasses (thick arrow) but will eat herb species, including goldenrod (thin arrow), reducing its dominance. (C) Scary spider predators cause grasshoppers to stop eating grass and to hide in and forage on goldenrod, leading to highest plant species diversity (D).

Clear visual hierarchy is fundamental to graphic communication. It allows readers to skim and scan large fields of content and determine what is useful, usable, and relevant to their needs without having to read each and every word. These spreads from the Yale School of Forestry and Environmental Studies viewbook are excellent examples of visual hierarchy at work. They clearly direct the viewer to pertinent information sets, making the navigation of sometimes complex content quick and easy.

For related information on how users process complex information sets, read these theories in Chapter 4:

- ***Perception of Graphic Statistical Displays: Cleveland's Task Model (p. 68)***
- ***Miller's Magic Number (p. 60)***
- ***Information Overload (p. 75)***

For more information on how visual hierarchy connects to communication paradigms, read these theories in Chapter 5:

- ***LATCH (Location, Alphabet, Time, Category, Hierarchy) Organization (p. 82)***
- ***The Principle of Least Effort (p. 86)***
- ***Information Literacy (p. 91)***

Quick Tips

Reading is fundamental
Start a design project by familiarizing yourself with the core content. This will help you rank the information sets that need to be presented before you even start sketching. Don't forget to consider graphic elements that are features of the medium in which you're working (page numbers, common navigational elements, etc.).

Bigger isn't always better
To continually engage your viewer, explore different ways to create hierarchy. Employ color, spacing, position, or other graphic devices to create that initial focal point.

Legibility

Color

Most designers are enamored with color. Sure, a select few stick firmly to modernist themes of white, black, and red in their work, or hold forced allegiance to a corporate style manual's limited palette—but enter studios and homes and you'll likely find a cacophony of hues.

Our art-school experiences have trained us well. We daydream about color pairings in the shower, can instantly produce the number of our favorite Pantone chip when asked, and organize our closets by tone.

We're well versed in technical and production issues related to color, too. Web designers consider variances between the way different monitors and platforms display color, and how luminosity affects color pairings. Print designers adjust for the way paper will absorb ink, how ink changes based on the hue of the stock on which it's printed, how saturation and value change from coated to uncoated stocks, and how varnishes affect tone. This industry-specific knowledge, focused on the production of our craft, is invaluable.

However, if information design is to focus on the needs of the end user, a thorough understanding of the audience's perception of color is also necessary. Physical, environmental, and cultural influences affect the way we see and interpret color.

1. For a clear explanation of color blindness for the layperson, read "Can You Tell Red from Green?" by Dr. Alex Wade, available at the Vischeck website: http://www.vischeck.com/info/wade.php

This interactive wall display at the Nobel Peace Center in Oslo, Norway, uses color to clearly delineate information about Nobel Laureates, helping visitors engage with each award winner's personal history.

Physical Considerations

Visual Deficiencies

Perfect vision is a rare thing. Deficiencies are evident in every audience, market, and country. Perhaps you are wearing glasses as you read this text? Our eyes grow with our bodies and the sight of a child may be very different from that of her grandparents. Congenital or hereditary vision problems and the effects of age and environment all affect our perception of color. While no designer can forecast the visual vicissitudes of each individual audience member, general evaluations of a group's ocular abilities and requirements can influence design decisions.

Aging Eyes

It's no secret that our vision deteriorates as we grow older. Most estimates begin the descent in middle age—our forties and fifties. The aging or elderly eye may experience difficulty in low-light situations, and with differentiation of color.

Color Blindness

It is roughly estimated that one in 20 individuals will exhibit some kind of color-vision deficiency. The term "color blind" generally indicates a difficulty distinguishing between red and green, rather than a complete inability to perceive color. Men exhibit color blindness with a much greater frequency than women. Our bodies are always adapting, and thus individuals with color blindness often differentiate shapes instead of hues. This may make them better at finding objects in monochromatic settings, or making distinctions in camouflage.[1]

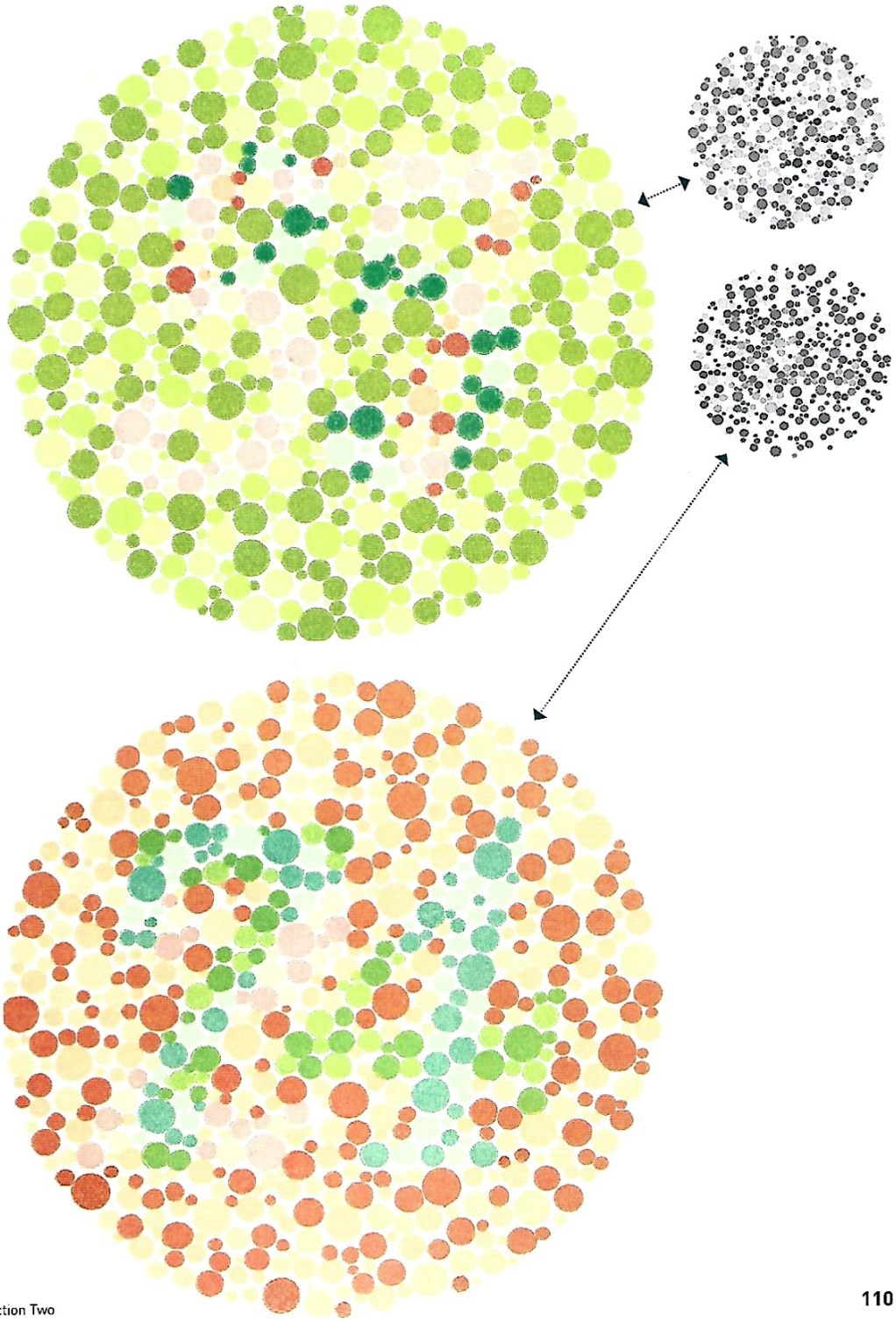
Original Image

Protanope Simulation

Dueteranope Simulation

Tritanope Simulation

→ ***Websites like vischeck.com allow designers to upload images or web designs to determine how the work may appear to the visually impaired. Here, three common types of color blindness have been simulated.***



→↘

The Ishihara Color Test, designed by Japanese professor Dr. Shinobu Ishihara in 1917, is still a common tool used to diagnose color blindness. Individuals with normal color vision should easily discern the numbers 57 and 74 in these dot patterns. Individuals with color deficiencies may see different numbers, or no distinguishable numbers at all.

Typography and Older Viewers

by Paul J. Nini, Professor of Design, The Ohio State University

Thirteen percent of the population [of the United States] is currently over 65 years old. In 30 years that group will double to 66 million people. People change as they age. Sensory, cognitive, and motor abilities decline. Graphic and visual communication designers may soon find themselves routinely creating information that must meet the needs of older viewers.

The main premise behind Universal or Inclusive Design is that by designing for those with the lowest ability, we ensure that everyone can easily use the results of our work. In the case of choosing appropriate typefaces for use with the aging eye, it is best to follow the ADA (Americans with Disabilities Act) guidelines on this subject. These standards ensure that more uniform typefaces are used, and that overly thick or thin stroke widths, and overly condensed (thin) or expanded (wide) letter proportions are not used.

Sans-serif styles tend to work best—as opposed to serif styles, which often have very thin areas within the letterforms. It's also very important that there be good visual contrast between the actual type and the surface on which it appears. Finally, the larger the type size the better, as testing designed for communications with older viewers routinely reveals.

For a more detailed discussion of design decisions for older audiences, read Professor Nini's article "Typography and the Aging Eye: Typeface Legibility for Older Viewers with Vision Problems" at http://www.aiga.org/content.cfm/typography-and-the-aging-eye

↑→↘ ***As we grow older, we begin to lose the ability to differentiate color clearly, and many people suffer from a loss of ocular focus. This airport sign accounts for those visual deficiencies by employing dynamic contrast of hue and value, and by using an appropriately legible font. These images approximate various levels of ocular degeneration.***

Environmental Change

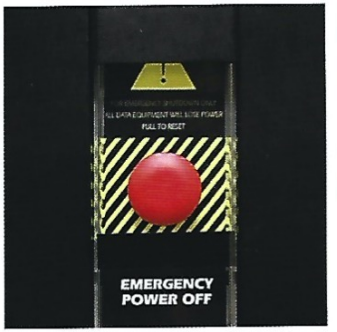
Lighting can have a dramatic effect on the perception of color—you've probably encountered this when altering the paint color on the walls of your home. There are, literally, day and night differences (natural lighting versus artificial lighting). When color is flooded with light it will appear washed out, and when it is poorly lit the same hue appears much darker. Natural light changes tone based on the sun's position in the sky and any exterior objects through which it might be filtered (consider the change in daylight when seen through the leaves of a tree). Artificial lighting can vary widely, too. Numerous options are available for specific energy consumption, illumination, and color-casting needs. It is imperative that designers spend time contemplating where, when, and how their work will be viewed. The details of lighting are especially influential on environmental design projects.

Atmospheric changes can also have a significant impact on color perception. Consider your own experiences trying to read road signs in heavy rain, snow, or fog. When designing for projects that will directly encounter the elements, or low-light/low-visibility situations, be sure to combine color and contrast for the greatest effect.

Color and contrast help us immediately recognize a change in our physical environment, or indicate importance in an interface. Dramatically contrasting stripes are often used to mark edges or stairs in industrial spaces. Color coding of emergency levers, buttons, and switches helps workers to act quickly in crisis situations. Color may well be the fastest way to convey a simple message.

Color	Meaning	Application
Safety Red PMS 1797 C	*Stop, Danger*	Signifies fire protection equipment, "danger," and "stop."
Safety Orange PMS 165 C	*Warning*	Signifies dangerous parts of machinery or electrical components which can crush, cut, or shock.
Safety Yellow PMS 124 C	*Caution*	Signifies physical hazards created by non-moving objects which can be fallen over or into, struck against, or between which one may be caught.
Safety Green PMS 341 C	*Safety*	Signifies areas and equipment associated with First Aid.
Safety Blue PMS 287 C	*Information*	Signifies safety information; used on informational signs and bulletin boards.
Black + White Process Black	*Boundaries*	Signifies housekeeping and traffic areas.
Safety Purple PMS Purple C	*Radiation*	Signifies x-ray, alpha, beta, gamma, neutron, and proton radiation.

The US Department of Labor's Occupational Safety & Health Administration (OSHA) has produced guidelines for color-coding work environments. In this chart, each color is listed alongside its meaning and workplace application. For example, red indicates danger and should be used for emergency stop buttons on machinery.



↑ *Some emergency vehicles in the United Kingdom use bright yellow and green checkered patterns to ensure visibility in low light and foggy conditions. When compared with the use of red, a common color for emergency vehicles in the US, visibility contrasts are striking. Many optometrists have noted lime green as a highly visible color, and suggest its use in emergency scenarios.*

↑ *Color is often used in the workplace as a quick indicator of different functions. Universal color coding on emergency buttons creates safer working conditions.*

↑ *In many environments, marking edges and boundaries with contrasting colors can help to ensure safety.*

Cultural Considerations

Our interpretations of a color's meaning are highly influenced by culture. Numerous influences mold these interpretations, from religion to politics, linguistics to popular trends. Bridal dresses and mourning colors vary dramatically between cultures. Red and blue, when mentioned in unison, are instantly associated with politics in the United States. The Chinese celebrate the arrival of a baby girl with blue. In Islamic cultures, green is associated with paradise. In the United States, that same hue is the color of money, environmental movements, and low-calorie food.

For clear communication and unambiguous information delivery, it is essential to understand the needs, customs, and attitudes of the end user. Therefore, investigations into cultural perceptions of color are essential whenever designing for a new audience, market, or global campaign.

↗→ *In many western cultures, white is the color most commonly associated with bridal gowns, but Indian brides are traditionally clothed in red. Colors carry different meanings across cultures, nations, and traditions. Be sure to have a clear understanding of your audience before making color selections.*

Quick Tips

70 is the magic number
When designing with color, dramatic contrasts in hue and value, saturation, and brightness make for the most legible message. This simple rule addresses a great many vision problems, from aging to color blindness. The Americans with Disabilities Act (ADA) best practice suggests a 70 percent contrast between an object (type or icon) and its background.[2]

Test your assumptions
The World Wide Web Consortium (W3C) has utilized international standards to create color brightness and difference tests that help designers and developers determine whether RGB and hexadecimal color pairings maximize contrast for ease of viewing. Online color-contrast calculators utilize the W3C standards for almost instantaneous analysis of color pairings. Check out a particularly helpful example at: http://snook.ca/technical/colour_contrast/colour.html

Don't fade away
When designing for outdoor or light-saturated spaces, be sure to consult your fabricator regarding the environmental effects on materials and color retention.

You say "tomato," I say "red"
Keep in mind that perceptions of color are often highly individual. Physically, we all have different numbers of rods and cones in our eyes that may affect color recognition. Psychologically, we know best what we use most, so an audience of fashion designers or artists may immediately differentiate between subtle color differences like plum, violet, and indigo, where a group of investment bankers will see only purple.

Avoid eye strain
For information design purposes, avoid simultaneous-contrast color pairings that create a visual vibration when viewed together, and also combine to distort hue. Simultaneous contrast is most intense when the colors paired are complementary and of the same approximate value (see pp. 116–7).

For more information on how color functions from a cognitive perspective, read these theories in Chapter 4:

- ***The Gestalt Principles of Perception (p. 64)***
- ***Difference Threshold (p. 62)***

For more information on how color connects to communication paradigms, read these theories in Chapter 5:

- ***AIDA (Attention, Interest, Desire, Action) (p. 80)***
- ***LATCH (Location, Alphabet, Time, Category, Hierarchy) Organization (p. 82)***
- ***Information Literacy (p. 91)***

2. The Society for Environmental Graphic Designers (SEGD) provides white papers, courses, and publications that make the ADA guidelines easier for designers to understand. For more information, go to http://segd.org/

Contrast, or the study of visual oppositions, is easy to comprehend: light versus dark, small versus large, geometric versus organic—the options seem almost endless.

Contrast is to design what salt is to cooking. Layouts are simply dull without it (and too much makes them unpalatable). But beyond qualitative statements, contrast can greatly influence the legibility of a design piece. Contrast has a direct influence on the effectiveness of all the interrelated principles discussed in this chapter. The use of contrast to control information utilizes the human ability to see patterns, notice differences, and fixate on anomalies. These components of perception and cognition can be manipulated to help the information designer create structure, control hierarchy, sequence information, and ultimately create meaning.

Listed here are the most common ways to create visual contrast:

Color

There are a number of ways to achieve contrast with color:

Contrast in Hue

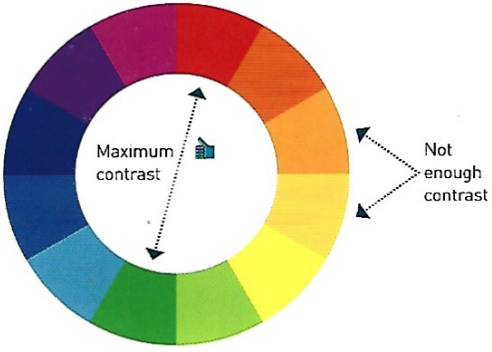
Position on the color wheel can help to determine the degree of contrast between two colors—the more distance that separates them on the color wheel, the more contrast there will be. Complementary colors—those opposite each other on the color wheel—provide the greatest contrast. Analogous colors—those located next to each other on the color wheel—provide the least.

Contrast in Value

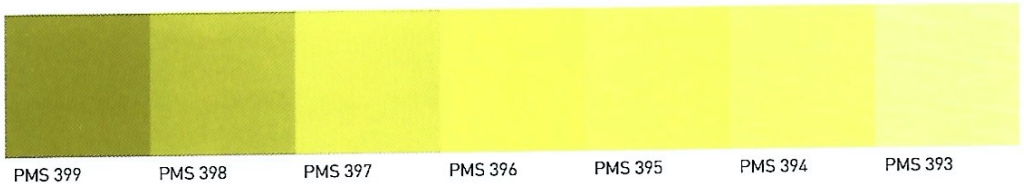
Contrast also depends on the relative lightness or darkness of a color (imagine where it would fall on a grayscale from white to black).

Contrast in Saturation and Intensity

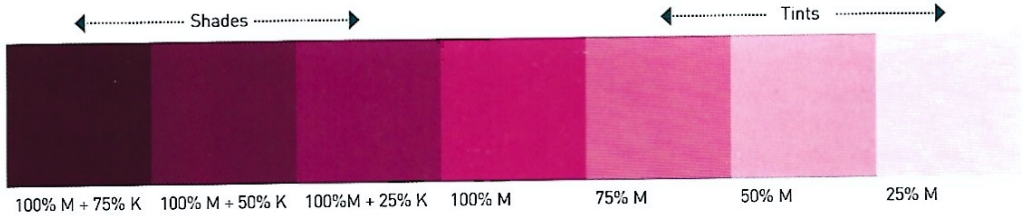
Saturation refers to the purity of a hue. Pure, saturated colors are bright. They can be modified by adding white (tints) or black (shades). A color's intensity can be changed by adding portions of its complement (when mixed, complementary colors form neutrals or brown). A great deal of contrast can be gained by pairing a bright color with a neutral.



Distance between segments on the color wheel is an indicator of hue contrast. Colors positioned close together are more difficult to differentiate. Complementary colors—those in opposite positions on the wheel—have maximum hue contrast. However, value contrast should also be a consideration. Complementary colors that have the same value can create simultaneous contrast, which frequently causes eye strain.



Contrast in value refers to the lightness or darkness of a color. In this strip of Pantone colors, significant value contrast appears between PMS 399 and PMS 393.



A color's purity can be changed by adding black to create tints, or white to create shades.

It is important to provide significant contrast between type and its background. The ADA recommends a change of 70 percent in value, and suggests that for signage, dark type on a light background is more legible.

In the top row, although dynamically contrasting in hue, the type and background values are too similar. This creates simultaneous contrast—the type appears to vibrate, and is difficult for the viewer to read.

In the middle row, value contrast between type and background is insignificant, creating legibility problems.

In the bottom row, type and background pairings have exaggerated value and/or hue contrasts, making each pair easier to read.

Orientation

An object's orientation (right-side up, upside down, sideways, diagonal), relative to other elements in the composition, can create meaning by focusing attention on anomaly. Orientation can also be linked with motion.

Position

Position refers to the physical location of an object within a frame of reference. Dramatic or unexpected shifts in position can create dynamic contrast, or change visual focus. Alignment of position implies connectivity. Position, like orientation, is often linked with motion.

Shape

We often ascribe personality, meaning, or emotion to different shapes (as we do with colors). Circles are more "fun" than squares because they remind us of things that bounce. Curvilinear, organic shapes are more natural, sensual, and creative than those that are geometric. And geometric shapes may allude to precision, math, or science. Contrasts of shape therefore engage both our ability to notice form, and our cognitive associations with those configurations.

Size

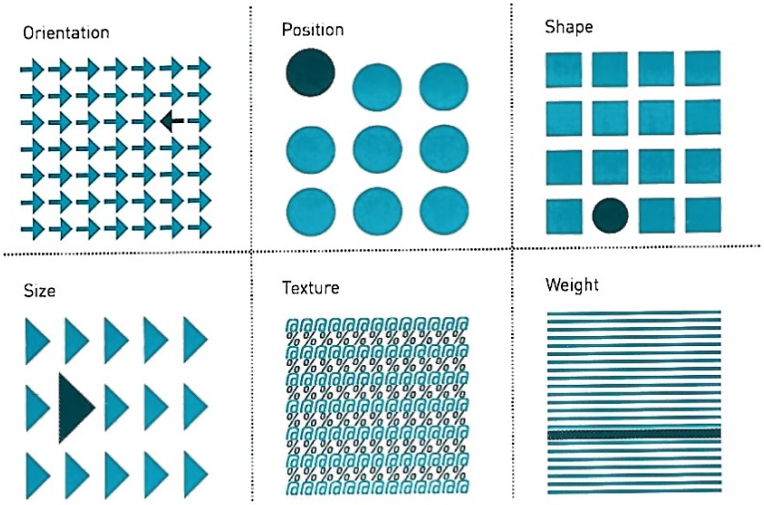
Size has an immediate correlation with worth or significance. The size of one object compared to another can influence context, hierarchy, and meaning.

Texture

Shifts in tactile quality or pattern can create focal points, or differentiate information sets.

Weight

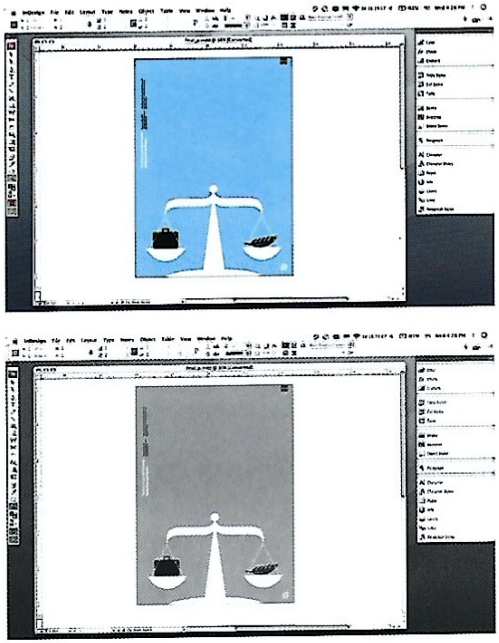
The optical weight of an object is a visual cue to its hierarchical importance. By altering this attribute, designers can make objects dominant or recessive. For example, line elements of various weights can be used to guide a viewer through successive steps in a set of instructions. A bold line might separate each step, with lighter lines used to subdivide information within those sections.



Contrast can be created by manipulating orientation, position, shape, size, texture, and weight.

For more information on how contrast works from a cognitive perspective, read these theories in Chapter 4:

- ***The Gestalt Principles of Perception (p. 64)***
- ***Difference Threshold (p. 62)***
- ***Eye Tracking (p. 66)***



↑ ***When working, periodically change your monitor to grayscale to check the value contrast of your work. In the Mac OS X operating system, this option is located in System Preferences under Universal Access.***

Quick Tips

Go grayscale
When designing in color, do a quick check of value contrast by turning your monitor to grayscale or printing to a grayscale printer. If graphic elements and typography appear to blend together, adjust the colors accordingly to create more contrast.

Less and more
You don't need to incorporate every form of visual contrast to create a dynamic layout. Instead, pick a single contrast pair and really maximize the concept (for example, turn big/small into huge/tiny).

Provide stability
Is contrast dependent on continuity? In complex information sets, yes. The hierarchical effects created by contrast lose their value if there's no place for the viewer's eye to rest. So use familiar structures and type treatments to support dramatic effect.

Legibility

Typography

All of the aesthetic principles in this chapter can apply to typography. However, type has unique characteristics, and specific issues must be borne in mind when making typographic decisions for information design projects.

Attentiveness to legibility and readability will help the end user access your message clearly. While to the layperson these two words may sound like synonyms, typographically speaking they are quite different.

Legibility refers to the traits that affect recognition of individual letters and words. As we read, we recognize the shape of familiar words, rather than processing each single letter to make a phonetic group. This allows us to process content much faster. The legibility of type can be discussed in terms of shape, scale, and style.

Readability refers to clarity and the speed at which typographic content can be read in large quantities (paragraphs, pages, volumes). Readability is related to a font's legibility but is also subject to design and layout decisions. Assuming that the type is legible, readability is a function of size, spacing, and alignment.

A typeface with high legibility/readability can be read much more quickly than one with low legibility/readability. That classification alone doesn't render the typeface good or bad, but rather indicates its suitability for specific tasks. While a script font might set the appropriate tone for your cousin's wedding invitations, imagine trying to navigate with street signs set the same way. That's why fonts are often classified as "display" or "text." Think of the former as appropriate in small doses, while the latter are suitable for more intensive reading. You might also consider how quickly your user needs to access the information you're delivering (there's a reason why Exit signs aren't set in Soda Script). On every project, designers make choices that balance stylistic needs with direct communication issues. Close attention to legibility and readability can help inform those choices.

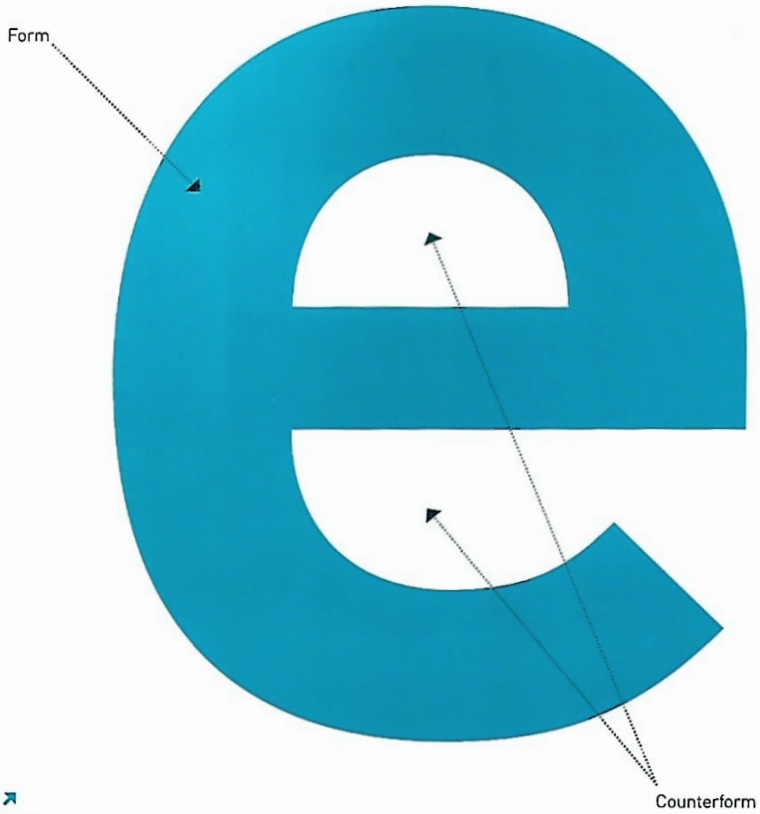
People read the shapes of whole words, not the individual letters themselves

← *Readers recognize the shapes of familiar words, rather than reading each individual letter.*

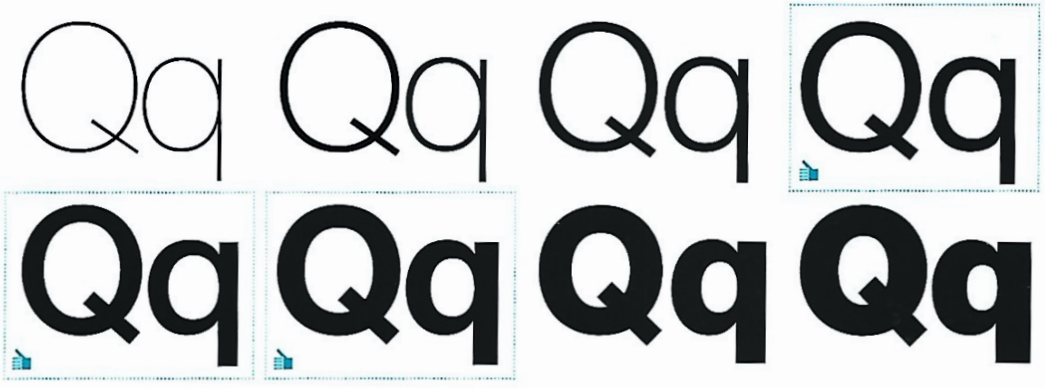
Typographic Legibility Considerations

Shape

In typography, shape is discussed in terms of form and counterform. Form refers to the positive shapes, or straight and curved lines (strokes) that make a letter. Counterforms (sometimes simply referred to as counters) are the negative spaces knocked out of the letterform—the half-circles forming a lowercase "e," for example. The relationship between the positive stroke and the negative counter affects the legibility, or quick recognition, of the letter. Too much contrast, on either side of the equation, makes it difficult to read quickly. If a font has extremely thick strokes with very small counters it takes longer for the eye to decode it as an alphabetical shape. Conversely, if a font has extremely thin strokes with very large counters it requires more visual effort to decipher the form from the negative space. The most legible fonts have a well-balanced proportion of form and counterform.



Letters are created by positive and negative shapes. The positive shape is referred to as the form, the negative shape is called the counterform, or counter.

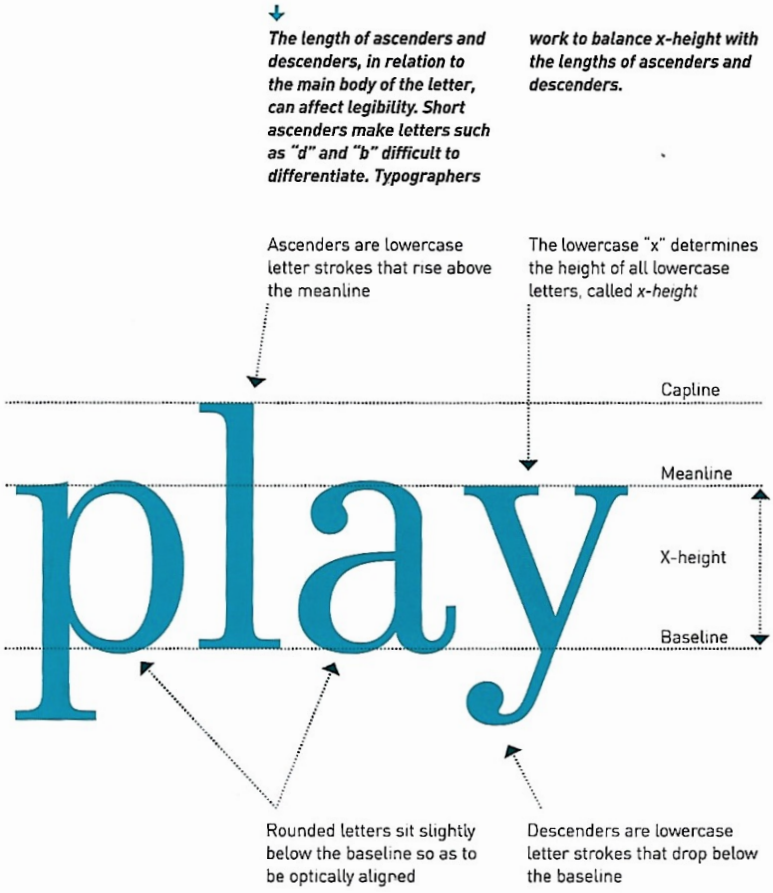


The ratio of form to counterform plays an important role in a letter's legibility. When strokes are very thin, and counters large, the letter is more difficult to identify, and similarly with thick strokes and small counters. Letters exhibiting a well-balanced proportion of form and counterform are the most legible.

Scale

The scale of a letterform is dictated by a number of proportional factors, including:

X-height to Cap Height: The term "x-height" describes the height of the main body of lowercase letters in a given typeface—not including the ascenders (the upward strokes on b, d, f, h, k, l, t) and descenders (the downward strokes on g, j, p, q, y). It is measured by the height of the lower case "x," hence the name. "Cap height" is the measurement of the capital letters from the baseline (an imaginary line upon which the letters sit) to the top. Each typeface has a unique ratio between the height of its capital and lowercase letters, which is instrumental in its overall legibility. Typefaces exhibiting tall x-heights are thought to be easier to read because they appear larger than those exhibiting short x-heights when viewed at the same point size. But exaggerated x-heights at either extreme negatively affect legibility as they distort the commonly recognized shape of the letterform.



The length of ascenders and descenders, in relation to the main body of the letter, can affect legibility. Short ascenders make letters such as "d" and "b" difficult to differentiate. Typographers work to balance x-height with the lengths of ascenders and descenders.

The x-height of a typeface plays a key role in its legibility. For example, this is 15pt Baskerville.

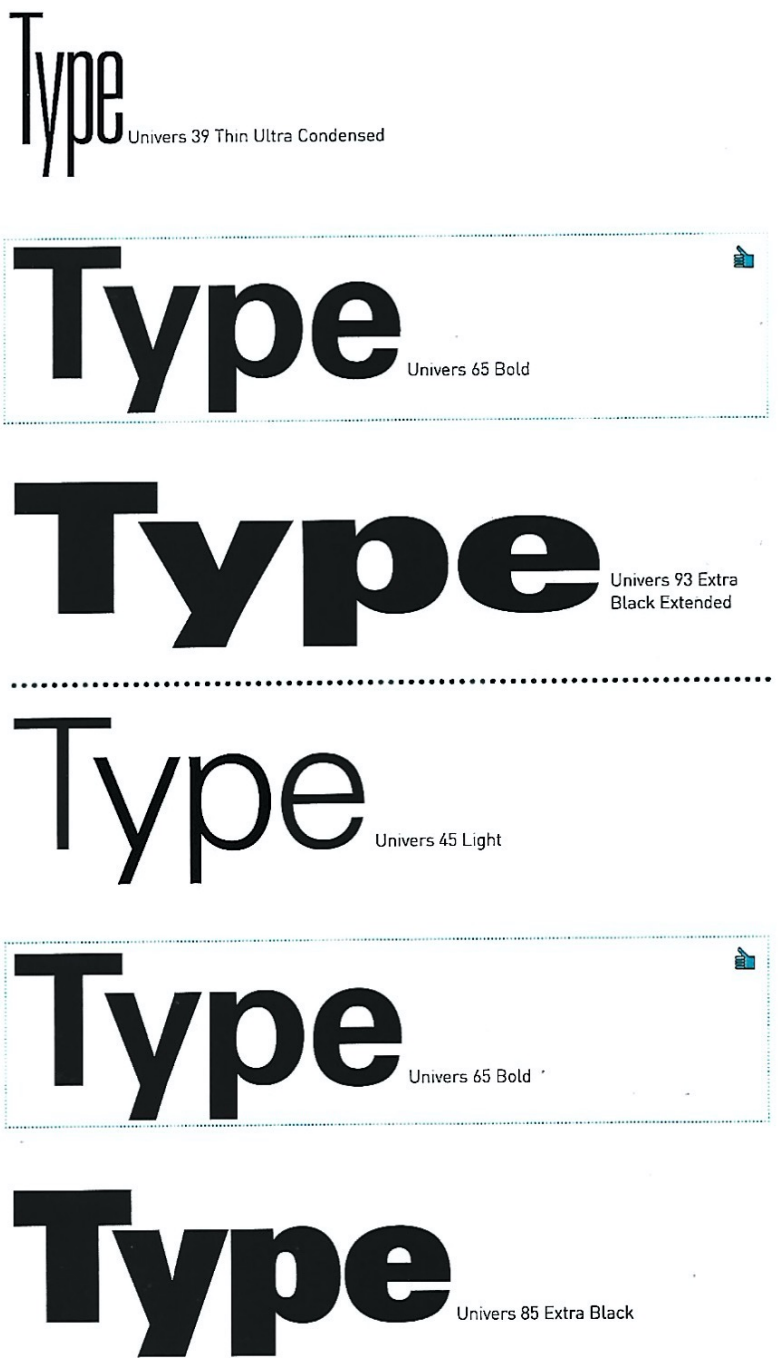
This is 15pt Helvetica Neue 55. Looks bigger, doesn't it? That's because it has a taller x-height.

15pt Mrs. Eaves! Now that is a small x-height!

X-height is determined by the height of the lowercase "x" in a typeface. Higher x-heights appear more legible, especially at smaller sizes.

Width to Height: A font's width-to-height ratio determines how wide each letter appears. The most legible typefaces have fairly equal width-to-height ratios. Imagine that each letter loosely forms a square. When that balance tips and the width is significantly greater than the height, the typeface becomes "Extended." Imagine a letter in that scenario forming a horizontal rectangle. When the balance tips significantly in favor of height, the font is called "Condensed." Imagine those letters as vertical rectangles. Letters that are too wide or too narrow decrease legibility.

Stroke Width to Height: The relationship between stroke width and height determines the optical weight of the letterform, making it light, regular, bold, etc. Increases or decreases in stroke weight have a direct effect on the form and counterform of the letter—which, as discussed previously, affects legibility. Extremely thin and extremely heavy fonts are harder to read than those of average width (often called Regular).



↗ ***A letter's width-to-height ratio is another important factor in legibility. Letters that appear very tall and thin, or wide and fat, negatively affect rapid recognition. For both legibility and readability purposes, a balanced proportion is best.***

→ ***Form and counterform are affected by changes in stroke weight. Thin fonts exaggerate counterform, and heavy fonts exaggerate form. Both extremes make the letters harder to recognize and read quickly.***

Style

Type comes in numerous styles: serif and sans serif, display and text, roman and italic, classic and experimental, to name only a few. Different styles can evoke emotional responses. Editorially, a font may appear whimsical, serious, edgy, romantic, clinical—the possibilities are endless. While there may be an appropriate application for just about every typeface under the sun, not all are suitable for the purposes of information design. When delivering a clear, unambiguous message directly to a specific audience, type choices should focus on accessibility. The most versatile typefaces are balanced in weight and proportion, and should possess no anomalous forms, decorative details, or exaggerated characters. Whether serif or sans, historically crafted or created with Fontographer, successful information design type selections have distinct individual letterforms that are easily recognized on their own and feel unified when in a group.

ROSEWOOD

Brush Script

FILOSOFIa

Display

Helvetica

Centennial

Verdana

Text

↑ ***Most typefaces can be divided into one of two categories: display fonts, which are decorative; and text fonts, designed for readability and versatility. When choosing fonts, think carefully about which category is appropriate for the intended use. (Imagine trying to read a novel set in Rosewood, or being excited about a circus advertised in Helvetica.)***

The three fonts at the top represent display choices.

The three fonts below represent text choices.

Helvetica and Centennial were designed specifically for print purposes, Verdana specifically for the web.

Typographic Readability Considerations

Size

We've all experienced the correlation between type size and readability, whether we're squinting to read the fine print in a contract, struggling through large quantities of text on the web, or missing a turning due to a poorly sized street sign. There are a number of dimensional adjustments that can make written content easier for the user to access.

Type Size

Type size is measured differently according to medium. In print design, type is measured in points (there are 72 points in an inch, or 28.35 points in a centimeter). Web design measures type in ems—an em is an international standard of measurement in which one unit is equal to the point size of the font currently in use. Ems are a dynamic measurement, so when a user sets his or her on-screen size preferences, the type scales proportionally—merging the designer's aesthetic vision directly with the user's viewing needs. Environmental design references type size in terms of architectural measurements (Imperial Units, US Customary Units, or the Metric System).

Choosing the correct type size is driven by variables of font design, application, and audience. When designing for the elderly or visually impaired, special provision should be made.[1] Proven rules about type size are hard to find and debate continues to rage among typographers. The following axioms, combined with a strong understanding of the user's needs and a little bit of common sense, should guide you in the right direction:

In the book Stop Stealing Sheep & Find Out How Type Works, *expert typographer Erik Spiekermann (designer of the Meta and Officina type families) suggests that printed body copy should be no smaller than 9 points and no larger than 14.These measurements apply to traditional type styles and x-height plays a crucial role in making size determinations.*

The low resolution of computer monitors, combined with the general distance between our eyes and the screen, create different size requirements for typographic content online. Several usability studies[2] have indicated that setting online body copy at a size equivalent to 12–14 points increases the time a user will spend reading a web page. Remember the equation: 12 points = 16 pixels = 1 em (approximately).

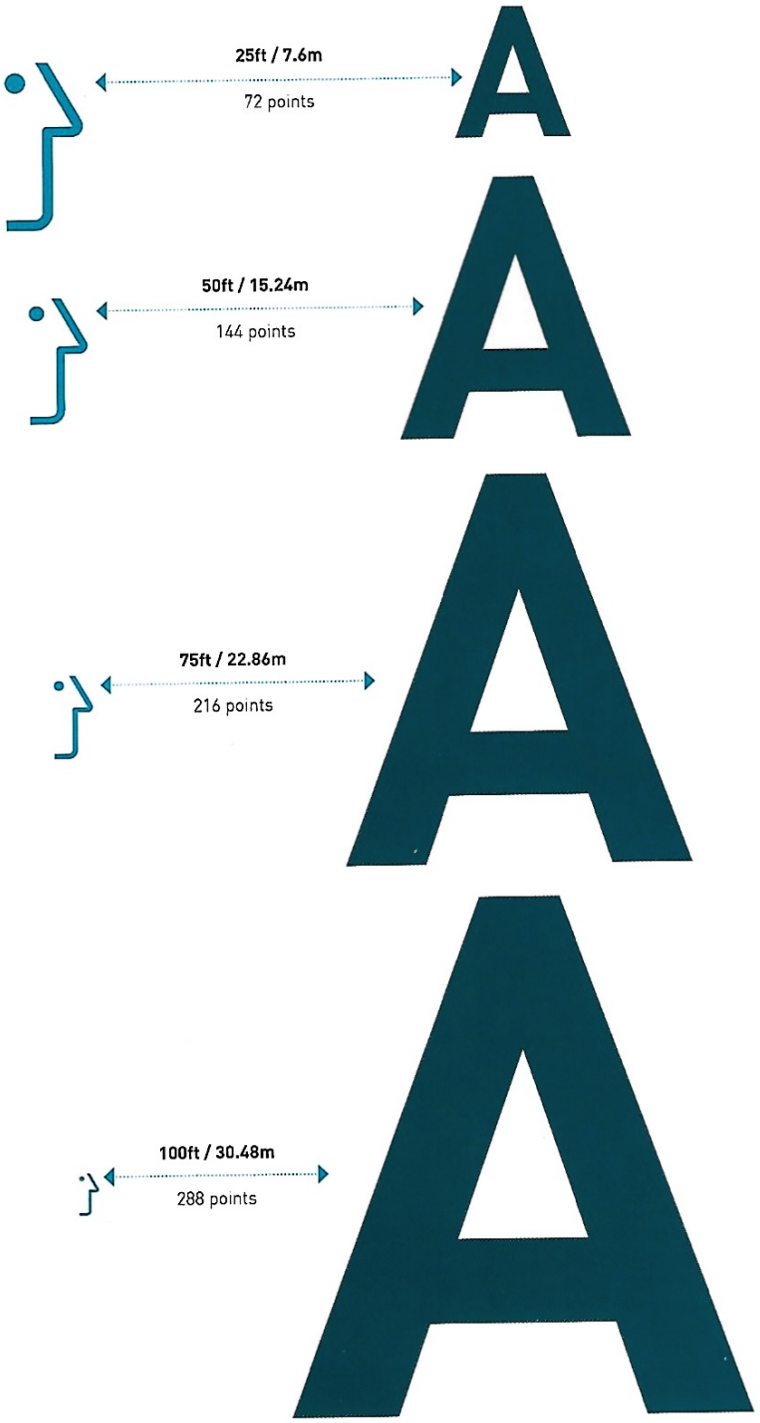
When determining type size for environmental signage or exhibit design, always consider the distance between the viewer and the content. Additional environmental factors such as lighting and atmosphere may determine a need for increased dimensions (see p. 126).

Baskerville 9pt Baskerville 12pt	Futura 9pt Futura 12pt
Bodoni 9pt Bodoni 12pt	Helvetica 9pt Helvetica 12pt
Garamond 9pt Garamond 12pt	Univers 9pt Univers 12pt

Text copy sizes ideally range between 9 and 12 points. Here are some popular serif and sans-serif options shown at those sizes. Note the optical differences due to changes in x-height.

1. For more information about designing for the aging eye, see "Typography and Older Viewers" on p. 111.

2. For more about desired line lengths for web design, read *Usability News* (a software usability research newsletter from Wichita State University) vol. 4, issue 2, "The Effects of Line Length on Children and Adults' Online Reading Performance" and vol. 7, issue 2, "The Effects of Line Length on Reading Online News."



Column Width and Line Length

Line lengths and column widths have a direct impact on our ability to access information rapidly. If columns are too narrow, words become hyphenated and viewers are unable to grab a significant amount of content in their scan path. If columns are too wide, our eyes have difficulty relocating the starting point of each new line of text. Both can create eye strain and adversely affect reading time.

Over the last century, several scientific studies have been conducted to determine the readability of different line lengths. Early studies of print found that line lengths of approximately 4in (10cm) were the most readable. Contemporary studies of online text suggest 7in (18cm) line lengths to be optimal for that medium.[4]

→ ***Narrow columns can create an awkward reading experience by creating truncated lines of type. Conversely, columns that are too wide can make reading difficult because the reader may have a difficult time locating the starting point of the next line of text .***

← ***When designing typography for an environmental application, the ADA suggests an increase of 72 points for every 25 feet / 7.6 meters of viewing distance.***

Line lengths and column widths have a direct impact on our ability to access information rapidly. If columns are too narrow, words become hyphenated and the viewer is unable to grab a significant amount of information.

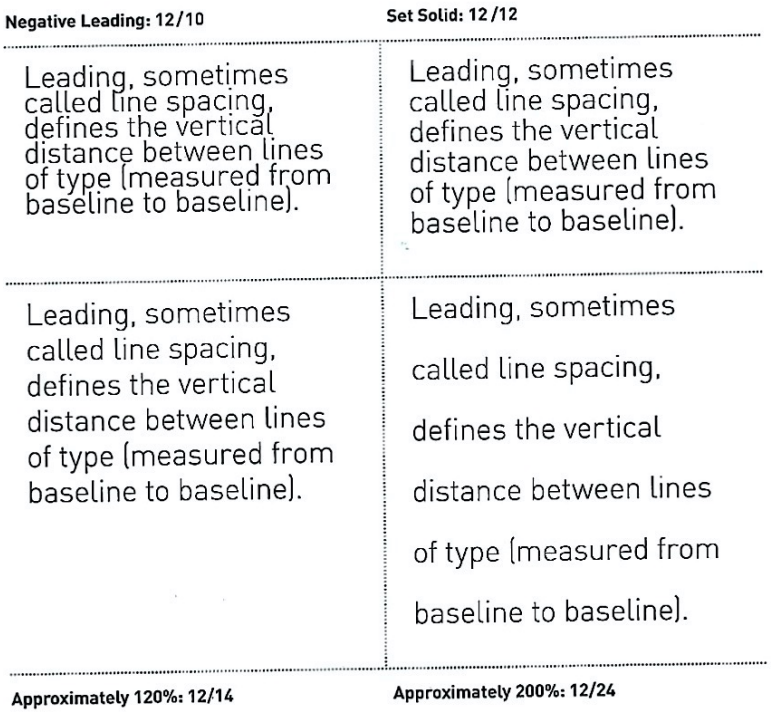
Spacing

Spatial considerations, from minute adjustments between letter pairs to the density of entire paragraphs, can affect the ease and speed with which we process text. Typographic intervals are discussed in terms of leading and letter spacing:

Leading

Leading, sometimes called line spacing, defines the vertical distance between lines of type (measured from baseline to baseline). It is another factor that affects the readability of typography. Leading variations within a design create a tonal palette for text and can enhance hierarchy decisions. However, in terms of long-term readability, moderate line spacing is optimal. When leading is too tight it can interrupt the natural flow of reading, creating areas of tension caused by colliding ascenders and descenders. Tight leading can also detract from our ability to recognize individual words by camouflaging their shapes with awkward negative spaces. Conversely, when leading is too loose, it can slow reading time and hinder our ability to locate the starting point of the next line of type in a paragraph of text. Most page-layout applications set the default leading to 120 percent of the type point size for maximum readability (for example, 10pt type would sit on 12pt leading).

4. For a more detailed overview of studies on optimal line length, read "Optimal Line Length" from the *UI Design Newsletter*, November 2002. Available at http://www.humanfactors.com/downloads/nov02.asp



→ ***Leading, the spacing between lines of type, can affect the readability of typography. When the leading is too tight, ascenders and descenders collide, rendering text illegible. When the leading is too loose, it is difficult for the viewer to locate the start of the next line of text, particularly if combined with a long line length.***

Quick Tips

Type suggestions from the ADA
According to ADA guidelines for accessible signage, characters on signs should possess a width-to-height ratio between 3:5 and 1:1.

ADA guidelines also suggest that point size (cap height) should increase by 1in (2.54cm, or 72 points) for every 25ft (7.62m) of distance.

Create the perfect match
Pairing a serif font with a sans-serif font creates clear typographic contrast. Avoid pairing two different sans serifs, or two different serifs, as the average reader doesn't immediately observe the difference (thus confusing the hierarchy).

Don't yell at the reader
Setting type in capital letters certainly makes a word or a line stand out. However, setting whole paragraphs that way negatively affects readability (and possibly tone).

Make accessible type choices
Serif fonts with extreme thick/thin stroke contrast, such as Bodoni, may be beautiful but can be difficult for some viewers to process because hairline strokes may blur or disappear, especially at small text sizes.

Learn the two-step
To enhance hierarchy, try using two steps of differentiation in your type choices. For example, if body copy is text-sized and black, make captions smaller and italic, or subheads larger and a different color. Apply the two-step technique to your entire type system.

For more information on how cognition affects typography, read these theories in Chapter 4:
- ***The Gestalt Principles of Perception (p. 64)***
- ***Difference Threshold (p. 62)***

For more information on how typographic principles connect with communication paradigms, read these theories in Chapter 5:
- ***LATCH (Location, Alphabet, Time, Category, Hierarchy) Organization (p. 82)***
- ***The Principle of Least Effort (p. 86)***
- ***Uncertainty Reduction Theory (p. 88)***