

THE ELEMENTS AND PRINCIPLES OF DESIGN

The Elements and
Principles of Design

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“What is design? A plan for arranging elements
in such a way as to best accomplish a particular purpose.”

Charles Eames




(Faimon & Weigand, 2004, p.13)

The purpose of two-dimensional design is visual communication.

Design is both a noun and a verb – it describes the thing created as well as the process of creating it.

A design is created with elements – line, shape, color, value and texture – that are put together using principles – unity, variety, emphasis, balance and scale.

Although design can be divided into elements and principles for the sake of discussion, it is only when these elements and principles work together to form a whole that a design is considered successful.

The credit for analyzing forms and structuring design theory goes to the Bauhaus, a school founded in Germany in 1919 (Brainard, 1998, p.4). The Bauhaus developed a fundamental grammar of the visual, of which the central elements - the ABCs, so to speak - were the trio of primary colored shapes    (Lupton & Miller, 1991, p. 4).

The metaphor the Bauhaus used is fitting; the elements of design can be compared to the elements of writing – words and punctuation – and the principles of design can be compared to the rules of grammar.

Design, like writing, involves problem solving, planning and organizing. In verbal communication, we choose which words to use and how to put them together to best

communicate our thoughts and ideas. In visual communication we choose which elements to use and how to put them together to best communicate our thoughts and ideas.

We would not randomly throw words and punctuation on a page and expect them to communicate.

Should we do the same with images?

Elements of Design

The elements of design are the pieces, the components, the building blocks of design.

Elements are like the ingredients in a recipe (Faimon & Weigand, 2004, p.13), the parts of a machine (Evans & Thomas, 2004, p 4.) or the notes in music. On their own, these elements may do little, but put together skillfully, they create a cake, a car or a concerto.

The elements of design include line, shape, color, value and texture. Put together skillfully, they create effective visual communication.

Line

A line is:

- A mark that is longer than it is wide (Brainard, 1998, p.26)
- An infinite number of points (Lauer & Pentak, 1995, p.108)
- The moving path of a point (Evans & Thomas, 2004, p.22)

A line can have different qualities – it can be curved or straight, thin or thick, loose or precise, delicate or bold, expressive or controlled. The qualities of a line will evoke different feelings; a curved line feels natural and organic, while a straight line feels manmade and mechanical. A delicate line feels soft and feminine, while a bold line feels strong and masculine.

A horizontal line reminds us of a calm horizon or a person lying down; it implies quiet and rest. A vertical line makes us think of a skyscraper or a person standing straight and tall; it feels strong and aspiring. A vertical line contains potential for activity, and so creates a more energetic feeling than a horizontal line. A diagonal line is like a bolt of lightning or a person leaning forward poised to run; it suggests energy and movement (Lauer & Pentak, 1995, p.114; Bevin, 1994, p.52). Diagonal lines are the most dynamic (Lauer & Pentak, 1995, p.114).

Not all lines are actual lines; sometimes we perceive lines that are not really there. Implied lines are created by a series of points, such as a dotted line or a group of people standing in a row (Lauer & Pentak, 1995, p.112). Psychic lines are not real at all, but are lines we feel; for example when a figure's eyes are looking in a specific direction (Lauer & Pentak, 1995, p.112) or when a line or shape is pointing at something (Stewart, 2002, p.1-3).

Shape

A shape is:

- An area created by an enclosing line (Arntson, 1998, p.45)
- An area created by color, value or texture (Arntson, 1998, p.45; Stewart, 2002, p.1-6)
- An area created by surrounding shapes (Stewart, 2002, p.1-6)

A shape is a two-dimensional object; it has height and width but no depth. A mass or volume is a three-dimensional shape (or is perceived as such); it has height, width and at least the appearance of depth. (Stewart, 2002, p.1-6)

Straight edges and angular corners create rectilinear shapes. Curves and rounded forms create curvilinear shapes (Lauer & Pentak, 1995, p.142; Stewart, 2002, p.1-10).

Geometric shapes such as circles, squares, triangles and rectangles (Zelanski & Fisher, 1996, p.87) are crisp, precise and mathematical with straight edges and consistent curves (Stewart, 2002, p.1-11). Natural, or organic, shapes are found in nature (Brainard, 1998, p.38), such as rose flowers, tree branches or bamboo leaves. Abstract, or stylized, shapes are natural shapes that have been altered or simplified to reflect the essence, rather than the actual representation, of an object (Bevlin, 1994, p.81-87). Nonobjective, or nonrepresentational, shapes are created with no reference to a subject (Stewart, 2002, p.1-12); they represent nothing other than the pure shapes we see (Lauer & Pentak, 1995, p.141).

Color

Color is:

- A property of light (Lauer & Pentak, 1995, p.224)
- Visible when light is emitted or reflected
- Determined by the wavelength of light (Bevlin, 1994, p.110)

Additive color is created from emitted light such as a video screen, a computer monitor or theatrical lights. The additive primary colors are red, green and blue and all other additive colors are derived from them (Bevlin, 1994, p. 112). Combining two primary colors yields a secondary color: magenta from red and blue, cyan from blue and green and yellow from red and green (Bevlin, 1994, p. 112). Combining all three additive primaries results in white (Stewart, 2002, p.2-2); shining stage lights of red, green and blue in the same area creates a white spotlight. The absence of all additive primaries (in other words, no light) results in black (Stewart, 2002, p.2-2).

Subtractive color is created from light reflecting off a pigmented surface (Stewart, 2002, p.2-2). The subtractive primaries are red, yellow and blue and combined they form the

subtractive secondaries orange (red and yellow), green (yellow and blue) and purple (blue and red) (Bevlin, 1994, p. 112). Combining all three subtractive primaries results in black (Stewart, 2002, p.2-2); mixing paints results in dark colors (although rarely a true black). The absence of all subtractive primaries (in other words, no pigment) results in white (Stewart, 2002, p.2-2); an albino has no pigment, nor does a blank canvas.

The three properties of color are hue, value and saturation. Hue refers to the pure state of a color; it is the name we give a color, such as red or blue (Bevlin, 1994, p.113). Value refers to the lightness or darkness of a color (Bevlin, 1994, p.113). Adding white to a hue creates a lighter value, or tint (adding white to red creates pink) and adding black to a hue creates a darker value, or shade (adding black to red creates maroon) (Stewart, 2002, p.2-4). Saturation, also referred to as intensity or chroma, refers to the brightness or dullness of a color (Bevlin, 1994, p.114). High saturation colors are close to the pure hue of a color (Zelanski & Fisher, 1996, p.232); they are bright and vivid like pure red or pure yellow. Mixing pure colors with either gray or the color's complement (the opposite color on the color wheel) creates low saturation colors (often called muted colors or neutrals) (Zelanski & Fisher, 1996, p.232).

Temperature is the heat or coolness a color creates psychologically (Stewart, 2002, p.2-8). The warm colors red, orange and yellow remind us of fire and sunlight and so they create a sense of warmth in an image (Lauer & Pentak, 1995, p.237). The cool colors blue and green remind us of water and plants and so they create a feeling of coolness in image (Lauer & Pentak, 1995, p.237). Warm colors tend to feel brighter and more energetic, while cool colors tend to seem calmer and more relaxed.

Color schemes, or color harmonies, have been developed to help designers choose colors that work well together (Stewart, 2002, p.2-10). The color wheel, a visual representation of the

subtractive primary, secondary and tertiary colors, forms the basis for color schemes. A monochromatic color scheme involves variations, usually in value, of a single hue (Lauer & Pentak, 1995, p.244). Monochromatic schemes are highly unified, but may lack variety (Stewart, 2002, p.2-10). An analogous color scheme uses adjacent colors on the color wheel, as well as their tints and shades (Lauer & Pentak, 1995, p.244). Analogous color schemes are also unified, but have more variety than monochromatic schemes (Stewart, 2002, p.2-10). A complementary color scheme is created with colors that are opposite each other on the color wheel (known as complements) (Lauer & Pentak, 1995, p.244). When complements are mixed together (mixing yellow and purple paint, for example), they desaturate or neutralize each other, but when they are placed next to each other they increase each other's intensity (Stewart, 2002, p.2-10). A split complementary color scheme uses the two colors adjacent to the color's complement for balance (Lauer & Pentak, 1995, p.244). A split complementary scheme offers a wider range of possibilities than a complementary scheme (Stewart, 2002, p.2-12). A triadic color scheme involves using three colors equally spaced on the color wheel (Lauer & Pentak, 1995, p.244). Triadic colors schemes are lively (Lauer & Pentak, 1995, p.244) and can be used where a strong impact is needed (Stewart, 2002, p.2-10).

Value

Value is:

- Relative lightness or darkness (Zelanski & Fisher, 1996, p. 189)
- Dependent on context (Lauer & Pentak, 1995, p.212)
- Related to color (Lauer & Pentak, 1995, p.212)

Value contrast refers to the degree of variation between light and dark (Lauer & Pentak, 1995, p.212). The highest value contrast is obtained using just black and white (Brainard, 1998, p.46). The narrower the range of values, the lower the value contrast (Lauer & Pentak, 1995, p.215). When the range is limited to light values it is referred to as high key; a limited range of dark values is called low key (Lauer & Pentak, 1995, p.215).

Value is often used to add volume to a shape (Brainard, 1998, p.46-47); gradual shading on a circle will make it look like a sphere. Value is also used to create the illusion of space (atmospheric perspective); areas with high value contrast come forward while those with low value contrast recede into the distance (Lauer & Pentak, 1995, p.218). Value can add emphasis; areas of high contrast will stand out in areas of low contrast (Lauer & Pentak, 1995, p.218).

Value can evoke feelings or moods. Low value contrast creates a subtle, restrained effect that feels calm and quiet (Lauer & Pentak, 1995, p.215). High value contrast evokes drama and conflict (Lauer & Pentak, 1995, p.215). The light values of high key images convey the sense of happiness and lightness (Zelanski & Fisher, 1996, p.210), mid-range values evoke sadness and depression (Zelanski & Fisher, 1996, p.210), and the dark values of low key images create feelings of fear and mystery (Lauer & Pentak, 1995, p.215). In terms of visual weight, darker values feel heavier than lighter values (Stewart, 2002, p.1-20).

Texture

Texture is:

- The surface quality of an object (Lauer & Pentak, 1995, p.153)
- Roughness or smoothness (Brainard, 1998, p.54)
- The sensation of a tactile surface (Zelanski & Fisher, 1996, p.150)

Actual, or tactile, texture can actually be felt (Lauer & Pentak, 1995, p.153). In two-dimensional design, actual texture is in the feel of the canvas or the surface of the paper. Actual texture can also be created by the thickness of the paint (Lauer & Pentak, 1995, p.154) or through collage (Zelanski & Fisher, 1996, p.151-155).

Visual, or simulated, texture can't actually be felt but is suggested (Lauer & Pentak, 1995, p.158). Visual texture is perceived when we take in visual sensations, but we interpret them tactilely (Zelanski & Fisher, 1996, p.150).

Visual textures can be created by reproducing the value and color patterns of actual textures (Lauer & Pentak, 1995, p.158); darks and lights can be used to suggest the furrows in bark (Zelanski & Fisher, 1996, p.156) or the three-dimensional roughness of a stone surface. Visual texture can also be created by repeating marks or shapes (Stewart, 2002, p.1-16). Letters and words (text) on a page create a visual texture (Zelanski & Fisher, 1996, p.162) and changing the size and spacing of the text changes the look and feel of the texture (Evans & Thomas, 2004, p.31).

Principles of Design

The principles of design are guidelines used for putting elements together to create effective communication (Brainard, 1998, p.92).

The elements are the “what” of a design and the principles are the “how” (Faimon & Weigand, 2004, p.25). Using the recipe metaphor - the elements are the ingredients and the principles are the directions.

The principles of design, perhaps even more than the elements, are difficult to separate from one another even for the sake of discussion, as it is only when they are working together that an effective design is created.

Unity

The principle of unity is perhaps the most important of the design principles, yet it is often the most difficult to understand (Brainard, 1998, p.112). Unity is the fundamental principle of design and it is supported by all the other principles (Evans & Thomas, 2004, p.5). If a design is not unified, it cannot be considered successful (Bevlin, 1994, p.125).

Unity creates an integrated image (Lauer & Pentak, 1995, p.18) in which all the elements are working together to support the design as a whole (Brainard, 1998, p.112). A unified design is greater than the sum of its parts; the design is seen as a whole first, before the individual elements are noticed (Lauer & Pentak, 1995, p.21). Unity can be compared to harmony (Lauer & Pentak, 1995, p.18), integrity (Bevlin, 1994, p.126) or wholeness (Brainard, 1998, p.123).

Unity is based on the gestalt theory of visual perception (Lauer & Pentak, 1995, p.23), which states that the eye of the viewer seeks a gestalt or unified whole (Arntson, 1998, p.75). This means that the viewer is actually looking for a connection between the elements, for some sort of organization, for unity in the design (Lauer & Pentak, 1995, p.23).

A gestalt is created because the mind simplifies and organizes information. It does this by grouping elements together to create new wholes. Understanding how the mind groups elements (by proximity, similarity, alignment and continuation) helps us understand how unity can be achieved.

Proximity is based on grouping by closeness (Lauer & Pentak, 1995, p.24); the closer elements are to each other, the more likely we will see them as a group (Arntson, 1998, p.76).

Proximity is one of the easiest ways to achieve unity (Lauer & Pentak, 1995, p.24).

Repetition is based on grouping by similarity (Arntson, 1998, p.75-76); elements that are similar visually are perceived to be related. Any element can be repeated – line, shape, color, value or texture – as well other things such as direction, angle (Lauer & Pentak, 1995, p.26) or size (Brainard, 1998, p.112). Repetition helps unify a design by creating similar elements and is one of the most effective ways to unify a design.

Alignment consists of arranging elements so that their edges are lined up (Lauer & Pentak, 1995, p.30). The common alignment allows the eye to group those elements together. A grid is often used to create unity through alignment, not just in a single design but also between related designs (the pages of a magazine or book, for example) (Lauer & Pentak, 1995, p.30).

Continuation means that something (a line, an edge, a curve, a direction) continues from one element to another (Lauer & Pentak, 1995, p.29). The viewer's eye will follow the continuing line or edge smoothly from one element to other (Arntson, 1998, p.76) and the mind will group the elements because of this connection. Implied lines are one example of continuation.

Variety

Variety means “to change the character” of an element (Brainard, 1998, p.114), to make it different (Stewart, 2002, p.3-1).

Variety is the complement to unity and is needed to create visual interest (Evans & Thomas, 2004, p.5). Without unity, an image is chaotic and “unreadable”; without variety it is

dull and uninteresting (Lauer & Pentak, 1995, p.38). Good design is achieved through the balance of unity and variety; the elements need to be alike enough so we perceive them as belonging together and different enough to be interesting (Faimon & Weigand, 2004, p.30).

Varying the elements creates variety. Ways to vary elements include (Brainard, 1998, p.114):

- Line - thinness, thickness, value, color, angle, length
- Shape - size, color, orientation and texture, type
- Color – hue, value, saturation
- Value – darkness, lightness, high-key, low-key, value contrast
- Texture – rough, smooth

An effective way to integrate unity and variety is by creating variations on a theme. Just as a composer can repeat and vary a musical theme throughout a composition, a designer can repeat and vary an element throughout a design.

Emphasis

Emphasis creates a focal point in a design (Lauer & Pentak, 1995, p.42); it is how we bring attention to what is most important (Stewart, 2002, p.3-15). Emphasis is what catches the eye and makes the viewer stop and look at the image (Bevlin, 1994, p.156). Without emphasis, without getting the viewer to look at the image, communication cannot occur (Stewart, 2002, p.3-17).

Emphasis can be created by contrast. An element in contrast with something else is more easily seen and understood (Faimon & Weigand, 2004, p.75); something different attracts the eye (Lauer & Pentak, 1995, p.44). Any of the elements can be contrasted: line (a curve in the midst

of straight lines) (Bevlin, 1994, p.156), shape (a circle in a field of squares), color (one red dot on a background of grays and blacks), value (a light or dark area in the middle of its opposite) (Bevlin, 1994, p.127) and texture (rough vs. smooth) (Bevlin, 1994, p.127). Contrast can also be created by contrasting orientation in space (horizontal, vertical, diagonal) (Lauer & Pentak, 1995, p.44), style (a geometric shape in an otherwise naturalistic image) and size (Lauer & Pentak, 1995, p.44). An anomaly, or something that departs from the norm, will also stand out and grab our attention, for example a person wearing a snowsuit on a tropical beach.

Emphasis can also be created by placement. Implied lines all directed toward the same place can create a focal point there (Lauer & Pentak, 1995, p.49). Isolating an element from the others by its position in space will also create emphasis (Lauer & Pentak, 1995, p.49).

An important thing to remember about emphasis is that if everything is emphasized (all text is large and bold, all images are animated or flashing, everything is in bright colors) then nothing will stand out, nothing will be emphasized, nothing will grab the viewer's attention (Stewart, 2002, p.3-15).

Balance

Balance is the equal distribution of visual weight in a design (Lauer & Pentak, 1995, p.73). Visual balance occurs around a vertical axis; our eyes require the visual weight to be equal on the two sides of the axis (Faimon & Weigand, 2004, p.110). We are bilateral creatures (Brainard, 1998, p. 95) and our sense of balance is innate (Lauer & Pentak, 1995, p.73). When elements are not balanced around a vertical axis, the effect is disturbing and makes us uncomfortable (Faimon & Weigand, 2004, p.110).

Symmetrical, or formal balance, is also known as bilateral symmetry (Bevlin, 1994, p.143). It is created by repeating the reverse of a design on the opposite side of the vertical axis (Stewart, 2002, p.3-9); each side, in essence, becomes the mirror image of the other (Lauer & Pentak, 1995, p.77). Symmetrical balance is considered formal, ordered, stable and quiet (Bevlin, 1994, p.144). It can also be boring (Brainard, 1998, p.96). Symmetrical balance is often used in architecture.

While symmetry achieves balance through repetition, asymmetry achieves balance through contrast (Arntson, 1998, p.61-69). Asymmetrical, or informal balance, involves different elements that have equal visual weight (Lauer & Pentak, 1995, p.80); the weight is equal but the elements are not identical (Brainard, 1998, p.97).

Visual weight is influenced by:

- Position – the further out an element is from the center, the heavier it will feel (Arntson, 1998, p.65); a large object placed near the center can be balanced by a smaller object placed near the edge (Lauer & Pentak, 1995, p.87)
- Size – larger feels heavier (Arntson, 1998, p.66)
- Texture – an element with more complex texture is heavier visually than one with a simple texture or no texture at all (Arntson, 1998, p.66)
- Isolation – an isolated element has more visual weight (Arntson, 1998, p.66)
- Value – darker feels heavier (Faimon & Weigand, 2004, p.106)
- Value contrast – the higher the value-contrast, the heavier the weight (Arntson, 1998, p.67)
- Quantity – multiple small objects can balance one larger object (Stewart, 2002, p.3-11)

- Orientation – a diagonal orientation carries more visual weight than a horizontal or vertical one (Stewart, 2002, p.3-13)
 - Shape – elements that have more complex shapes feel heavier than those with simple shapes (Arntson, 1998, p.68)
 - Color – the brighter and more intense its color, the heavier the element will feel
- Asymmetrical balance is casual, interesting (Brainard, 1998, p.97) and more dynamic

than symmetrical balance.

Radial balance occurs when all the elements radiate out from a central point (Lauer & Pentak, 1995, p.90) and the visual weight is distributed equally (Brainard, 1998, p.101). Radial balance creates a strong focal point in the center of the design (Lauer & Pentak, 1995, p.90). Clock faces and daisies are examples of radial balance.

Crystallographic balance, or an all-over pattern, is created by repeating elements of equal weight everywhere (Lauer & Pentak, 1995, p.90). Emphasis is uniform; there is no distinct focal point (Lauer & Pentak, 1995, p.90). Quilts and chessboards are examples of crystallographic balance.

Space

Space, in two-dimensional design, is essentially flat; it has height and width, but no depth. There are certain visual cues, however, that can create the illusion of space in the mind of the viewer (Zelanski & Fisher, 1996, p.122). By using those cues, artists and designers can create images that are interpreted as three-dimensional (Lauer & Pentak, 1995, p.166).

Size is one of the easiest ways to create the illusion of space (Lauer & Pentak, 1995, p.168). A larger image will appear closer than a smaller one because we observed (very early in

life) that objects appear to become smaller as they get farther away (Lauer & Pentak, 1995, p.168).

Overlapping is another easy way to suggest depth in an image (Lauer & Pentak, 1995, p.173). When objects overlap each other, the viewer perceives the one that is covering parts of other to be in front and the one that is covered to be in the back (Zelanski & Fisher, 1996, p.134).

Compositional location refers to where a form is positioned vertically in the image. The bottom is seen as the foreground, the part of the image that is nearest the viewer and the top as the background, the part farthest from the viewer (Zelanski & Fisher, 1996, p.134-135). The higher an object is placed in the image, the farther back it is perceived to be (Lauer & Pentak, 1995, p.174).




Atmospheric perspective uses value, contrast and color to give the illusion of space (Lauer & Pentak, 1995, p.176). Atmospheric perspective is based on the fact that the farther something is away from us, the more the atmospheric haze may obscure our view of it (Zelanski & Fisher, 1996, p.136). By lightening the value, lowering the value contrast, softening the edges, decreasing detail and muting the color, you can mimic the effect of atmospheric haze and create the illusion of increasing distance (Lauer & Pentak, 1995, p.176). Increasing the bluish cast of an image also creates a sense of depth because cool colors recede and warm colors come forward (Lauer & Pentak, 1995, p.242).

Linear perspective is based on the visual phenomenon that as parallel lines (such as railroad tracks) recede into space, they appear to converge at a distant point (Lauer & Pentak, 1995, p.179; Zelanski & Fisher, 1996, p.122). Linear perspective not only evokes a feeling of great depth, but it also creates a strong focal point at the place where the lines converge (Lauer & Pentak, 1995, p.179).




Using these visual cues in combination with each other strengthens the illusion of depth.

Conclusion

Most people do not think writing a sentence is anything extraordinary, yet they feel designing is something that only artists and creative people can do. What they overlook is the fact that they have been taught verbal communication in school (year after year!), but they have had little, if any, training in visual communication.

We learned to write sentences, to put together the elements of writing using the principles of grammar to communicate verbally. We can learn to design as well, to put together different elements using certain principles to communicate visually. If we can learn to write a sentence, we can also learn to design. It's as simple as   .

Resources

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