

# 17 Geometric Aesthetics

Thursday, March 10, 2016 2:55 PM

Today:

All designers carry a sketchbook

New TA starting next week: Thomas

Problems posting video? Post to YouTube, then insert link.

Clay workshop from Bernt Savig, local sculptor and art instructor. \$20 per person in materials, modeling clay, armatures, tools.

Options. Start with an

- a. In class demo only, a Friday
- b. 2 hr hands-on workshop 5 pm. Dept buys and keeps materials.
- c. 2 hr hands-on workshop 5 pm. You buy and keep materials.

Geometric Aesthetics

Classical Composition

Universal Principles of Design topics

Symmetry

Area Alignment

Rule of Thirds

Fibonacci

Golden Ratio

## Classical Composition

Much comes from classical painting composition, dating far back. These rules are made to be broken.

[https://en.wikipedia.org/wiki/Composition\\_%28visual\\_arts%29](https://en.wikipedia.org/wiki/Composition_%28visual_arts%29)

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- 1 Elements of design
  - 1.1 Line and shape
  - 1.2 Colour
- 2 Principles of organization
  - 2.1 Viewpoint (leading the eye)
- 3 Compositional techniques
  - 3.1 Rule of thirds
  - 3.2 Rule of odds
  - 3.3 Rule of space
  - 3.4 Simplification
    - 3.4.1 Shallow Depth of Field
  - 3.5 Geometry and symmetry
  - 3.6 Creating movement
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Leading the audience's attention;  
what to touch first, what second?

- 6 References
- 7 Further reading
- 8 External links

Modern implementation in 2D graphic design, part of **Human-Computer Interface (HCI)** research  
Ware, Colin. *Visual Thinking For Design*. Morgan Kaufmann, 2010. Whole pdf <http://ehost.com.ua/IG-books/Visual%20Thinking%20for%20Design%20-%20Colin%20Ware.pdf>  
Table of contents: [http://www.amazon.com/Visual-Thinking-Kaufmann-Interactive-Technologies/dp/0123708966#reader\\_0123708966](http://www.amazon.com/Visual-Thinking-Kaufmann-Interactive-Technologies/dp/0123708966#reader_0123708966)

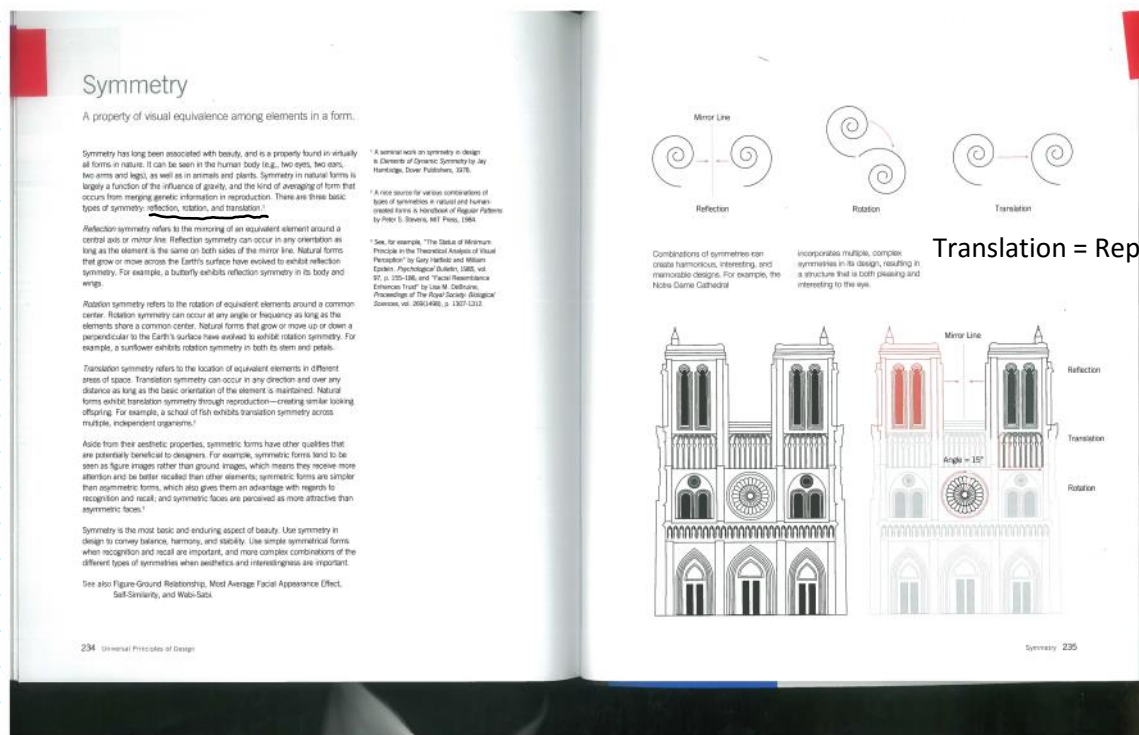
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## Universal Principles of Design topics



Good symmetry works. Asymmetry works. Broken symmetry is tricky.



## Area Alignment

Alignment based on the area of elements versus the edges of elements.

With the advent of professional design and engineering software, elements in a design can be aligned with existing precision. However, the alignment supported by software is based on the edges of elements—including center alignment, which calculates a center based on the edges. This method works well when elements are relatively uniform and symmetrical, but less well when the elements are nonuniform and asymmetrical. In these latter cases, it is preferable to align based on the visual weight or area of the elements; a technique that must be performed using the designer's eye and judgment. Using edge alignment when area alignment is called for is one of the most common errors in graphic design.

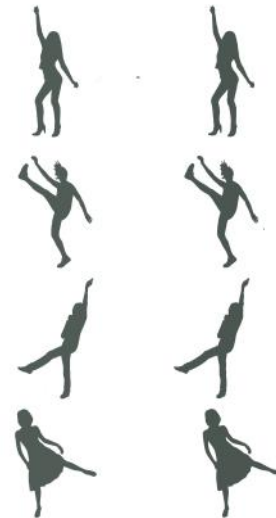
A satisfactory area alignment can be achieved by positioning an object along the area of alignment such that an equal amount of area or visual weight hangs on either side—if the object had mass, it would be balanced on the axis. Unlike the straight edge achieved by left- or right-aligning similar elements based on their edges, alignment based on area invariably creates a ragged edge. This requires that parts of elements hang in the gutters or margins when aligned with strongly rectilinear elements, but it represents the strongest possible perceived alignment that can be achieved for morphologically dissimilar elements.

The principle applies to text as well as graphical elements. For example, the horizontal center of a left-aligned text chunk with a right ragged edge, based on its area, would be to the left of a horizontal center based on its width—area alignment calculates the horizontal center in consideration of the reduced area of the ragged right edge, moving the horizontal center to the left, whereas edge alignment simply calculates the horizontal center as though the text chunk were a rectangle, with the right edge determined by the rightmost character. Other common text examples include pull quotes, which should be aligned based on the text edge and not on the quotation marks, and numbered or bulleted items, which should be aligned based on the text edge and not on the numbers and bullets, unless the specific intent is to subordinate the listed items.

Consider area alignment when incorporating dissimilar elements into a composition. When objects are simple and symmetrical, align based on their edges; otherwise, align based on their areas. Unless there is some extraordinary overriding consideration, always hang pull quotes, hanging numbers and bullets when listing items, except when the items are meant to be subordinate.

See also Alignment, Good Continuation, and Uniform Connectedness.

The left column is center-aligned based on the edges of the objects. The right column is center-aligned based on the area of the objects. Note the improvement achieved by using area alignment.



## Rule of Thirds

A technique of composition in which a medium is divided into thirds, creating aesthetic positions for the primary elements of a design.<sup>1</sup>

The rule of thirds is a technique derived from the use of early grid systems in composition. It is applied by dividing a medium into thirds both vertically and horizontally, creating an invisible grid of nine rectangles and four intersections. The primary element within a design is then positioned on an intersection of the grid. The asymmetry of the resulting composition is interesting to look at, and generally agreed to be aesthetic.

The technique has a long following in design circles due to its use by the Renaissance masters and its rough relationship to the golden ratio. Although dividing a design into thirds yields a ratio different from the golden ratio (i.e., the 2/3 section = 0.666 versus golden ratio = 0.618), the users of the technique may have decided that the simplicity of its application compensated for its rough approximation.

The rule of thirds generally works well, is easy to apply, and should be considered when composing elements of a design. When the primary element is so strong as to imbalance the composition, consider centering the element rather than using the rule of thirds—especially when the strength of the primary element is reinforced by the surrounding elements or space. If the surrounding elements or space do not reinforce the primary element, use the rule of thirds and add a secondary element (known as a counterpoint) to the opposing intersection of the primary element to bring the composition to balance. In designs where there is a strong vertical or horizontal element, it is common practice to align the element along one of the grid lines of corresponding orientation.<sup>2</sup>

See also Alignment, Golden Ratio, and Symmetry.

<sup>1</sup> Also known as golden grid rule.

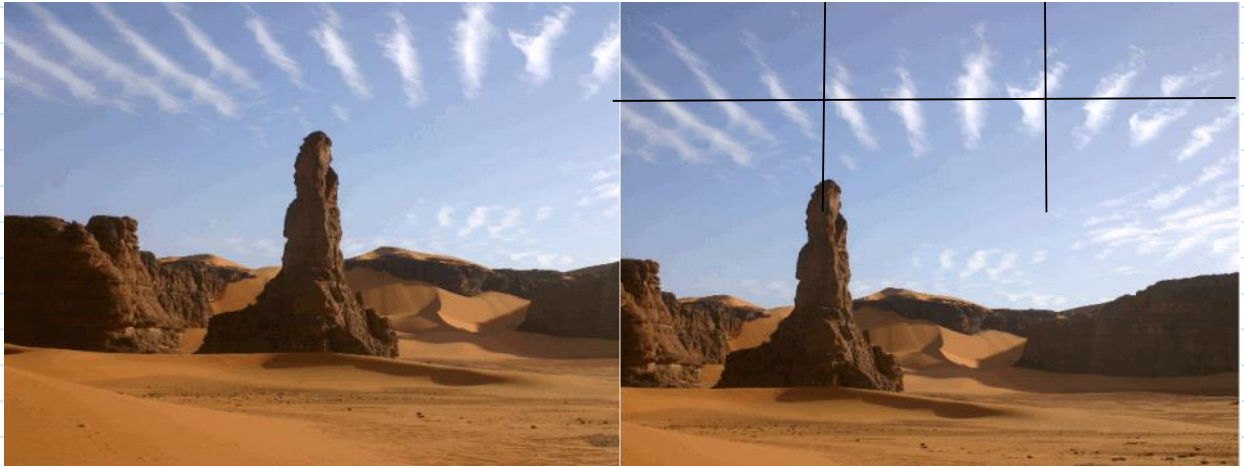
<sup>2</sup> A nice introduction to compositional concepts is *Design and Composition* by Herbert Goldhamer, Prentice-Hall, 1967.



The engagement (shown here the Muhammad Ali-Joe Frazier fight in Manila, Philippines 1976) even without using the rule of thirds, placing the heads of both fighters in opposing intersections on the grid.

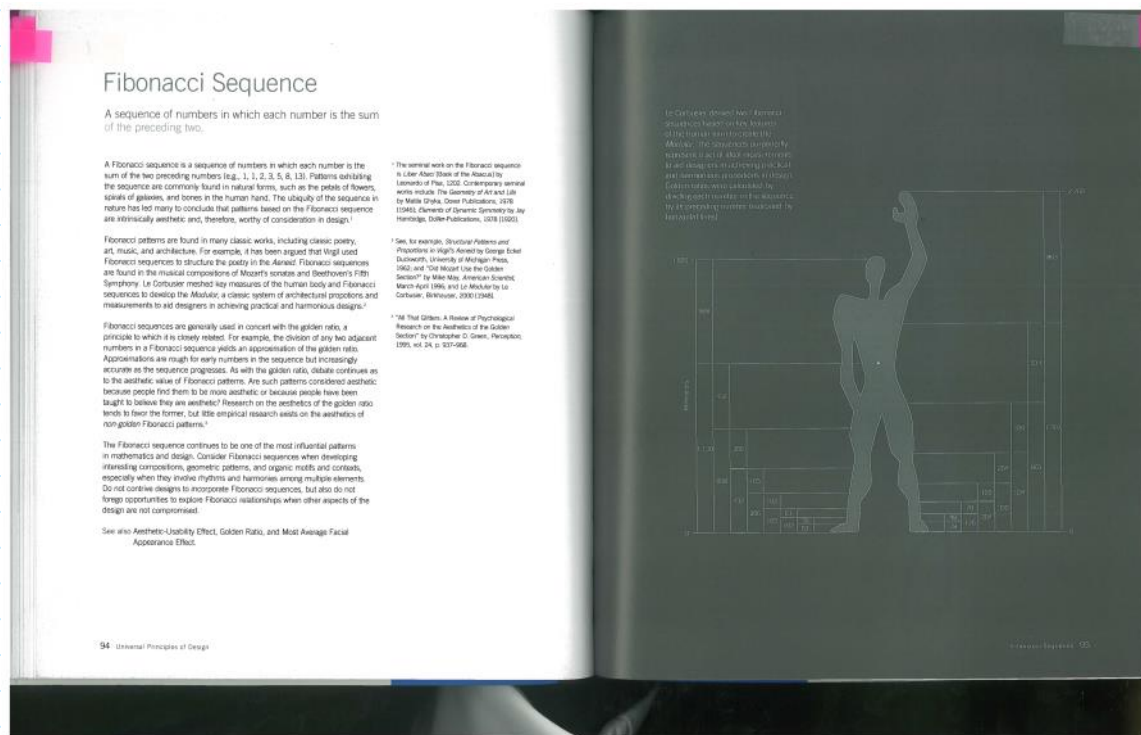
This is a strategic fight from the Muhammad Ali-Joe Frazier fight in Manila, Philippines 1976. The camera is on the left, and the fighters are on the right. The rule of thirds is used to place the fighters in opposing intersections on the grid.





[https://en.wikipedia.org/wiki/Rule\\_of\\_thirds#/media/File:RuleOfThirds-SideBySide.gif](https://en.wikipedia.org/wiki/Rule_of_thirds#/media/File:RuleOfThirds-SideBySide.gif)

The rule of thirds was first written down by John Thomas Smith in 1797.



<https://soundcloud.com/robertinventor/fibonacci-rhythm-no-bar>

<https://www.facebook.com/david.canright.1/videos/vb.1534748873/10205137603829769/?type=2&theater> Music with both pitches and rhythm determined by Fibonacci series

## Golden Ratio

A ratio within the elements of a form, such as height to width, approximating 0.618.<sup>1</sup>

The golden ratio is the ratio between two segments such that the smaller (BC) segment is to the larger segment (AB) as the larger segment (AB) is to the sum of the two segments (AC), or  $AB/BC = AC/AB = \phi$  (1.618).



The golden ratio is found throughout nature, art, and architecture. Phidias, LeCorbusier, and the human body all exhibit the golden ratio. Pat Mordant and Leonardo da Vinci commonly incorporated the golden ratio into their paintings. Stravinsky utilized the golden ratio in the construction of his violin. The Parthenon, the Great Pyramid of Giza, Stonehenge, and the Charles Cathedral all exhibit the golden ratio.

While many manifestations of the golden ratio in early art and architecture were likely caused by processes not involving knowledge of the golden ratio, it may be that these manifestations result from a more fundamental, subconscious preference for the aesthetic resulting from the ratio. A substantial body of research comparing individual preferences for rectangles of various proportions supports a preference based on the golden ratio. However, these findings have been challenged on the theory that preferences for the ratio in past experiments resulted from experimenter bias, methodological flaws, or other external factors.<sup>2</sup>

Whether the golden ratio taps into some inherent aesthetic preference or is simply an early design technique turned tradition, there is no question as to its past and continued influence on design. Consider the golden ratio when it is not at the expense of other design objectives. Sometimes if a design should not be continued to create golden ratios, but golden ratios should be explored when other aspects of the design are not compromised.<sup>3</sup>

See also Aesthetic-Usability Effect, Form Follows Function, Rule of Thirds, and Waist-to-Hip Ratio.

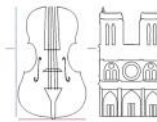
<sup>1</sup> Also known as golden mean, golden number, golden section, golden proportion, divine proportion, and sectio aurea.

<sup>2</sup> The golden ratio is irrational (never-ending decimal) and can be computed with the equation  $(1+\sqrt{5})/2$ . Adding 1 to the golden ratio yields  $\phi^2$ ... referred to as  $\phi^2$  (1.618). The values are used interchangeably to define the golden ratio, as they represent the same basic geometric relationship. Geometric shapes formed from the golden ratio include golden spirals, golden rectangles, and golden triangles.

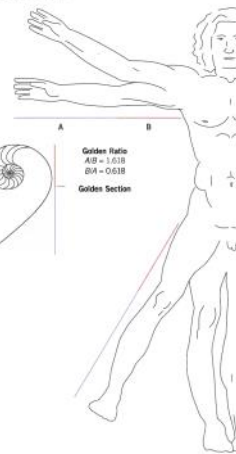
<sup>3</sup> The seminal work on the golden ratio is *Der neue Proportions-Gesetz* (On the Number of the Golden Section) by Gustav T. Fischer, *Archiv für das mathematische Wissen* (Archive for the Mathematical Sciences), 1962, vol. 11, p. 159-172. A contemporary reference is "The Golden Ratio: A Review of Psychological Research on the Aesthetics of the Golden Section" by Christopher G. Green, *Perception*, 1995, vol. 24, p. 937-966. For a critical examination of the golden ratio theory, see "The Call of the Golden Ratio" in *Neuro Water & Fluids* (ed. by Martin G. Gasser, Rosenblatt Books, 1996), p. 90-96.

<sup>4</sup> The page format of this book approximates a golden rectangle. The page height is 10 inches (25.4 cm) and the page width is 8.3 inches (21.1 cm). The total page-unfold width (17 inches (43.2 cm)) divided by the page height yields a ratio of 1.7.

In each example, the ratio between the blue and red segments approximates the golden ratio. Note how the ratio corresponds with a significant feature or alteration of the form.



Examples are the Parthenon, Stradivarius Violin, Notre-Dame Cathedral, Nautilus Shell, Eames Low Chair, Apple iPod MP3 Player, and da Vinci's Vitruvian Man.



Golden Ratio  
AB/BC = 1.618  
AC/AB = 0.618

Golden Section