Golden Ratio

A ratio within the elements of a form, such as height to width, approximating 0.618.[1]

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 $bc/ab = ab/ac = 0.618$.[2]

The golden ratio is found throughout nature, art, and architecture. Pinecones, seashells, and the human body all exhibit the golden ratio. Piet Mondrian and Leonardo da Vinci commonly incorporated the golden ratio into their paintings. Stradivari utilized the golden ratio in the construction of his violins. The Parthenon, the Great Pyramid of Giza, Stonehenge, and the Chartres 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.[3]

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. Geometries of a design should not be contrived to create golden ratios, but golden ratios should be explored when other aspects of the design are not compromised.[4]

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

[1] Also known as *golden mean*, *golden number*, *golden section*, *golden proportion*, *divine proportion*, and *sectio aurea*.

[2] The golden ratio is irrational (never-ending decimal) and can be computed with the equation $(\sqrt{5}-1)/2$. Adding 1 to the golden ratio yields 1.618..., referred to as Phi (ϕ). The values are used interchangeably to define the golden ratio, as they represent the same basic geometric relationship. Geometric shapes derived from the golden ratio include golden ellipses, golden rectangles, and golden triangles.

[3] The seminal work on the golden ratio is Über die Frage des Golden Schnitts [On the question of the golden section] by Gustav T. Fechner, Archiv für die zeichnenden Künste [Archive for the Drawn/Graphic Arts], 1865, vol. 11, p. 100–112. A contemporary reference is "All That Glitters: A Review of Psychological Research on the Aesthetics of the Golden Section" by Christopher D. Green, *Perception*, 1995, vol. 24, p. 937–968. For a critical examination of the golden ratio thesis, see "The Cult of the Golden Ratio" in *Weird Water & Fuzzy Logic* by Martin Gardner, Prometheus Books, 1996, p. 90–96.

[4] The page spread of this book approximates a golden rectangle. The page height is 10 inches (25 cm) and the page width is 8.5 inches (22 cm). The total page-spread width (17 inches [43 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 LCW Chair, Apple iPod MP3 Player, and da Vinci's Vitruvian Man.