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Proportion A Key Principle for Achieving Beauty in Design

Beauty has various components which together create a pleasing impression in our minds. The human cognitive response to any art piece is a result of the conglomeration of the aesthetic and analytic response in the mind when one looks at an object. These components comprise texture, rhythm, tone, color, symmetry, gloss and shimmer, pattern, shape and form, the division of space within the parts of the art piece and various other defined or undefined factors. The defined factors are visually identifiable and have rationality behind their role in creating beauty while on the other hand; there exist various factors which cannot clearly be defined but play a major role in creating something that one perceives as beauty. The discussion here focuses on how mathematically derived proportion has played a significant role in creating immense beauty in some of the masterpieces from the fields of art, architecture and assemblages.

Proportion is the major principle which is most rationally analyzed in the study of design, depicting its role in creating beauty. Proportion is the relationship between various parts of an object or objects in a group. It can be recognized in several ways; it is the use of the design elements size and scale, evenly distributing the viewer's attention and the use of The Golden Ratio, perceived as the best model of proportion. Proportion is used to harmonize, create direction, build a focal point and create balance. The golden ratio, also known as divine proportion is achieved as golden section in oblongs and golden spiral in circular fashion. This best model of proportion emerges from the mathematical derivation Phi ($\Phi = (1 + \sqrt{5}) / 2 = 1.618$). It is quite widely said that beauty lies in the eye of the beholder, but there is sound basis in scientific study and evidence to support that what one perceives as beauty is based on how closely the proportions of facial and body dimensions come to Phi, which makes it evident that Phi is rooted deep into

our consciousness as a guide to beauty. Thus, wherever this proportion is successfully achieved, beauty becomes a sure shot. When we look at these art pieces, whether we consciously identify the Phi in the design or not, we definitely feel the beauty inherent in the object.

Phi is considered as the divine proportion and is achieved through various conglomeration in diverse shapes. The golden section is derived when we divide an oblong into two unequal halves in such a manner that one of them is a square. The relationship between the parts is described as the smaller part is to the larger part what the larger part is to the whole. This relationship is evident in various art pieces, which are rendered masterpieces in the perspective of beauty. The Vitruvian Man by Leonardo Da Vinci is the most talked about painting depicting this golden ratio. It is based on the correlations of ideal human proportions with geometry described by the ancient Roman architect Vitruvius. Vitruvius described the human figure as being the principal source of proportion among the Classical orders of architecture. The Vitruvian Man is painted on the principle that the human body is so designed by nature that the face, from the chin to the top of the forehead and the lowest roots of the hair, is a 1/10 of the whole height; the open hand from the wrist to the tip of the middle finger is just the same; the head from the chin to the crown is 1/8, and with the neck and shoulder from the top of the breast to the lowest roots of the hair is 1/6; from the middle of the breast to the summit of the crown is a 1/4. If we consider the height of the face itself, the distance from the bottom of the chin to the underside of the nostrils is 1/3 of it; the nose from the underside of the nostrils to a line between the eyebrows is the same; from there to the lowest roots of the hair is also 1/3, comprising the forehead. The length of the foot is 1/6 of the height of the body; of the forearm, 1/4; and the breadth of the breast is also 1/4.

The golden ratio in spiral is best depicted in Leonardo Da Vinci's legendary work Mona Lisa, where he painted the face of the woman based on Fibonacci series. The spiral growth of the face is derived from the Fibonacci sequence 1,1,2,3,5,8,13,21,34,55,89 and so on. Leonardo Da Vinci is



sometimes referred to as the Man of Math. Both the art pieces are masterpieces based on the golden ratio and depict 1:1.618. Other art pieces created by Vinci include The Last Supper and Madonna of the Rocks depicting golden rectangle and golden pyramid respectively. In The Last Supper, golden rectangles can be seen from the dimensions of the table which Jesus sat, to the wall and window.

Greek Architecture has numerous examples where golden ratio is achieved. The pieces are considered amazingly beautiful. The Parthenon by Phidias is regarded as the finest example of Greek architecture. Some studies of the Acropolis, including the Parthenon, conclude that many of its proportions approximate the golden ratio. The Parthenon's façade as well as elements of its façade and elsewhere can be circumscribed by golden rectangles. The dimensions of the façade represent the perfect golden ratio. Golden ratio is found throughout the plan of the building. The floor plan area is a $\sqrt{5}$ rectangle; the length is $\sqrt{5}$ times as long as the width of the ancient temple. Another legendary creation by Phidias is Statue of Zeus (one of the Seven Wonders of the Ancient World) in the Temple of Zeus at Olympia depicting great proportions creating immense beauty.

The most famous monument of ancient Egypt, the Great Pyramids of Giza is believed to have been built around the golden ratio. The largest of the pyramids in Giza contains the use of phi and the golden ratio. The golden ratio here is represented as the ratio of the length/height of the triangular face to half the length of the square base.

Phi and the use of the golden ratio are evident in the design of Notre Dame in Paris. The west facade of the church embarks the presence of the use of the golden ratios creating great visual impact. The building has 8 golden rectangles. The Taj Mahal displays golden ratio in the width of its grand central arch to its width, and also in the height of the windows inside the arch to the height of the main section below the domes.

Michelangelo's sculpture David is a perfect example of the most pleasing proportions and represents the Renaissance emphasis on the ideal. The sculpture is based on the ancient Greek model of the ideal and rationality reflects in the portrayal of perfection in the human body. The proportions of David conform to the golden ratio from the position of the navel w.r.t. the height to the placement of the joints in the fingers. In Michelangelo's painting of The Creation of Adam is also an example of golden ratio. In the painting, the finger of God touches the finger of Adam precisely at the golden ratio point of the width and height of the area containing them both.

One of the major guides to proportion in visual art is Law of Margins, most applicable in creating mounts and frames for art pieces. According to this, when a vertical

mount is created, the bottom margin should be the widest, the top next, and the sides narrowest; and in the horizontal oblong, the bottom margin is the widest, the sides next and top narrowest. The proportion in the three dimensions should be obtained as 5:7:11. If this ratio is obtained, the most pleasing effects are created in the form of frames.

Proportion is a key principle in determining the impression of beauty created by an object. Scales, larger than life create a remarkable visual impact in the viewer's mind. Chuck Close, considered to be a photorealist painter, revolutionized photorealism by expanding the scale of his work to an enormous size. Photorealism is a movement that began as a reaction to minimalism and abstract expressionism. He is also known for devising a complex and ordered system that enabled him to create portraits with exacting realism in such a massive scale. Close's approach to portraiture was to not only make his subjects massive in size, but to represent them in an extremely realistic and forthright manner, including their flaws. Mark and Lucas are one of the most recognized works of Close which depict a larger than life image of a face. The huge sizes and remarkable scales are the most distinctive features of the art pieces.

Joseph Cornell, influenced by the Surrealist movement, is best known for his assemblages, sculptures which consist of a combination of three-dimensional objects collected, arranged, and connected in some way in different proportions. Cornell combined and placed diverse objects in small scale box constructions. The effect is that of a miniature world full of magic and possibilities. Although the scale of the boxes is small, the world within the box is as large as the imagination makes it. One of the most renowned assemblages is Cassiopeia I, which has a potential of making one imagine an entire solar system. Within the boxes the objects relate in some way or the other but remain suggestions rather than narratives. Cornell leaves it to the viewer to fill in the gaps and make their own interpretation about the assemblage.

The beauty in the popular Japanese flower arrangement popularly known as Ikebana lies in the proportions between the three major lines/ stems i.e. Shin, Soe and Hikae. Shin denotes Heaven and is the longest of the stems in the arrangement. Soe represents Man and is $\frac{2}{3}$ of Shin in length. Hikae, representing Earth is the smallest stem of all and is $\frac{1}{3}$ of Soe. The scale of the three major stems in the arrangement is major determinant of the beauty it creates.

Proportion is applicable in every form of visual art. If scales are proper, the other principles of design become remarkably easy to obtain. Good proportion leads to balance in design creating symmetry or asymmetry and distributing the visual weight around the centre, rhythm to



create visual connectivity, emphasis to highlight the most important part of the design and harmony by relating diverse parts into a whole in order to create unity for the sake of oneness and variety in order to create interest.

References:

1. http://www.worldmysteries.com/illusions/sci_illusions_1.htm
2. Elam, K. 2001. *Geometry of Design, Studies in Proportion and Composition*. Princeton Architectural Press
3. Huntley, H.E. 1970. *The Divine Proportion: A Study in Mathematical Beauty*. Dover publications, Library of congress
4. Tung, K.K. 2007. *Topics in Mathematical Modeling*. Princeton University Press
5. Livio, M. 2002. *The Golden Ratio: The Story of Phi, The World's Most Astonishing Number*. Broadway Books , New York
6. Doezi, G. 1994. *The Power of Limits: Proportional Harmonies in Nature, Art, and Architecture*. Boston: Shambhala Publications, Inc
7. Bejan, A. 2009. The golden ratio predicted: Vision, cognition and locomotion as a single design in nature. *International Journal of Design & Nature and Ecodynamics*. Vol. 4, No. 2, 97-104
8. Kapusta, J. 2004. The Square, the Circle and the Golden Proportion: A New Class of Geometrical Constructions. *WEB Journal FORMA* Vol. 19, (No. 4), 293-313.
9. Kappraff J. 2004. Introduction: In Search of the Golden Mean. *WEB Journal FORMA* , Vol. 19 (No. 4), 287 - 289.
10. <http://britton.disted.camosun.bc.ca/goldslide/jbgoldslide.html>
11. <http://www.pacegallery.com/artists/80/chuck-close>
12. <http://www.wavecomposition.com/article/issue-2/gazing-fixedly-upon-infinity/>
13. <http://www.goldennumber.net/architecture/>

