International Journal of Advanced Research in Physical Science (IJARPS)
Volume 9, Issue 12, 2022, PP 9-11
ISSN No. (Online) 2349-7882
www.arcjournals.org

Golden Background of Beauty

Janez Špringer*

Cankarjeva cesta 2, 9250 Gornja Radgona, Slovenia, EU

Corresponding Author:** ***Janez Špringer, *Cankarjeva cesta 2, 9250 Gornja Radgona, Slovenia, EU*

Abstract: *The golden ratio and average hyperbolic – elliptic unit as a background of beauty have been discussed.*

Keywords: *Golden ratio, average hyperbolic – elliptic unit, beauty*

1. Introduction

The subject of interest of this paper is to compare golden ratio and average hyperbolic – elliptic unit since the former is assumed to be an important ingredient of beauty.

2. Definition of Golden Ratio

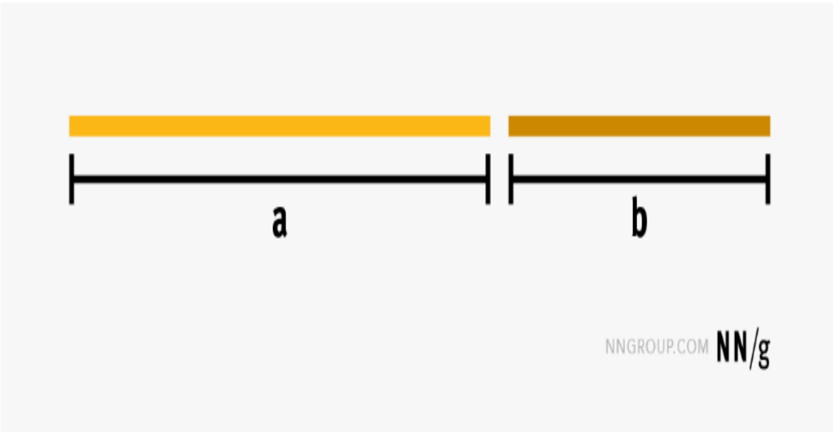

Figure1. *Two segments in golden ratio* $\phi = \frac{a+b}{a} = \frac{a}{b}$. *[1]*

Golden ratio $\phi = \frac{a}{b}$ is positive solution of the next quadratic equation:

$$(\phi)^2 - \phi - 1 = 0. \tag{1}$$

Being

$$\phi = \frac{1+\sqrt{5}}{2}. \tag{2}$$

3. The Role of Golden Ratio

The golden ratio has been used to analyse quantities found in nature, architecture, painting, and music [2]. When used, it is often assumed to create an organic, balanced, and aesthetically pleasing composition, thought to be favoured by the human eye. A study by Giacomo Rizzolatti and Cinzia Di Dio [3] suggests that human brains are hard-wired to prefer human bodies with proportions in the golden ratio. In their study the original image reflecting the golden ratio strongly activated sets of brain cells of participants with no background in art. Since the distorted images without golden ratio did not provoke such an effect it appears that beauty is partly an innate quality. Examples of buildings and works of art that have proportions in the golden ratio range from the pyramids in Giza, the Parthenon in Athens, and Da Vinci's Mona Lisa.

4. Golden Ratio in Da Vinci's Mona Lisa

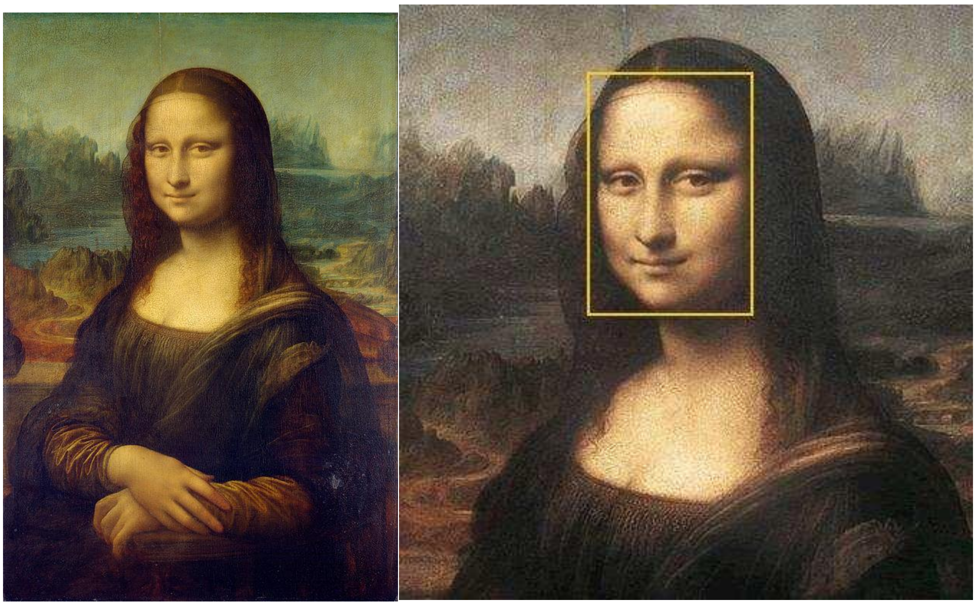

Figure2. *Mona Lisa's face inside a perfect rectangle [4]*

According to section 2 Mona Lisa's face is objectively beautiful because it lies inside a perfect rectangle with height (a) to width (b) golden ratio $\phi = \frac{a}{b} = \frac{1+\sqrt{5}}{2} \approx 1{,}618 \ldots$ If so, we can only add that objective beauty could be attributed to a slightly larger ratio of height to width, too, namely the ratio of the average hyperbolic – elliptic unit $s(1)$ to elliptic unit 1 (See appendix):

$$\frac{\mathrm{s}(1)}{1} = 2 - \frac{1}{\sqrt{1+\pi^2}} \approx 1{,}696 \ldots \tag{3}$$

Since:

$$\phi = \frac{1+\sqrt{5}}{2} \approx \mathrm{s}(1) = 2 - \frac{1}{\sqrt{1+\pi^2}}. \tag{4a}$$

Or

$$\phi = 1{,}618 \ldots \approx \mathrm{s}(1) = 1{,}696 \ldots \tag{4b}$$

5. Conclusion

The very possibility of hyperbolic and elliptical spheres coexisting in the present world is beautiful in itself

Dedication

To my dear friend Maksimiljan Sternad Milč, the painter, and to Bertrand Russell, the philosopher

Figure3. *About coexistence [7]*

References

[1] Kelley Gordon. The Golden Ratio and User-Interface Design. October 31, 2021

[2] https://en.wikipedia.org/wiki/Golden_ratio

[3] Di Dio, C., Macaluso, E., and Rizzolatti, G. (2007). The Golden Beauty: Brain Response to Classical and Renaissance Sculptures. PLOS ONE. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0001201

[4] Saari, Teppo-Heikki & Leppänen, Jarno & Mangs, Karl & Savelainen, Antti. (2008). Mat-2.4177 Seminar on case studies in operations research: Generating aesthetically pleasing lattice structures. 10.13140/RG.2.2.11427.96808.

[5] Springer J. Double Surface and Fine Structure. ˇ Progress in Physics, 2013, v. 2, 105–106.

[6] Janez Špringer (2017) "Friction on Double Surface" International Journal of Advanced Research in Physical Science (IJARPS) 4(3), pp. 1-3, 2017

[7] https://quotefancy.com/quote/773527/Bertrand-Russell-It-s-coexistence-or-no-existence

Appendix

The average hyperbolic-elliptic path $s(n)$ is expressed by the elliptic path n as follows [5], [6]:

$$s(n) = n\left(2 - \frac{1}{\sqrt{1+\frac{\pi^2}{n^2}}}\right). \tag{a}$$

And for the elliptic unit $n = 1$ the next average hyperbolic-elliptic unit $s(1)$ is given:

$$s(1) = 2 - \frac{1}{\sqrt{1+\pi^2}}. \tag{b}$$

Citation: *Janez Špringer (2022) "Golden Background of Beauty" International Journal of Advanced Research in Physical Science (IJARPS) 9(12), pp.9-11, 2022.*