

Rav's Beautiful Ratio

An Excursion into Aesthetics

Mois Navon

Beautiful Tzitzit

R. Hiya son of R. Natan taught: R. Huna bar Yehudah said R. Sheishet said R. Yirmiyah bar Abba said

Rav said:

- "If the greater portion of the tekhelet [i.e., tzitzit tassel] was braided, it is valid;
- and even if one braided only a single *hulya* [of three wraps], it is valid;
- and the way to beautify (*noyei*) the tekhelet is one-third braid (*gdil*) and two-thirds fringe (*anaf*)" (*Men. 39a*).

One-third / Two-thirds

- **Rashi** - the main (*ikar*) implementation of the mitzvah is according to Rav's ratio.
- **R. Tam** - it is a "*hidur*" to maintain Rav's ratio.
- **Rambam** - it is imperative to maintain Rav's ratio when using tekhelet.
- **Tur, Shulhan Aruch, Rama** - it is imperative to maintain Rav's ratio.
- **Maharshal, Hazon Ish** - *noy* can be fulfilled without employing Rav's ratio.
- **Mishna Berura** - everyone agrees that - *l'chathila* - must tie according to Rav's ratio.

Beauty: In the Eye of the Beholder?

- "The antimony of taste": is aesthetic value subjective or objective?
- Beauty can be said to be defined both as something which is appreciated uniquely by the subject, the object of which nevertheless admits of some aesthetic quality.
- Beauty:
 - Subjective Aesthetic Appreciation
 - Objective Aesthetic Quality

Judgments: Aesthetic and Ethical

- **Kant**: The universally accepted.
- **Soloveitchik** - absolutes, be they scientific, ethical, or aesthetic, are found in the transcendent, rooted in God Himself.
- **Berkovitz** - "The supreme principle of the law to which man is subject is theonomous, its ultimate source of authority is the will of God; the interpretation of the law and its application to the innumerable and forever-changing life situations is autonomous."

Written Torah / Oral Torah

"The concluding blessing [recited upon reading from the Torah in the synagogue, is composed of two phrases]: the first, '...that gave us the Torah of truth' corresponds to the written Torah, and the second, 'and set everlasting life in our midst' corresponds to the oral Torah" (Shulhan Aruch, OH 139:10).

Objective/Universal Beauty

- **Pythagoras** argued that mathematics quantified the beautiful.
- **Kant** stated that, Nature is beautiful because it looks like Art; and Art can only be called beautiful if we are conscious of it as Art while yet it looks like Nature."
- "The history of art shows that in the long search for an elusive canon or 'perfect' proportion, one that would somehow automatically confer aesthetically pleasing qualities on all works of art, the Golden ratio has proven to be the most enduring" ("The Golden Ratio," Mario Livio).

Phi – The Golden Ratio

$\phi = 1.61803\dots$

$$\frac{a+b}{a} = \frac{a}{b}$$

Math, Science & Judaism

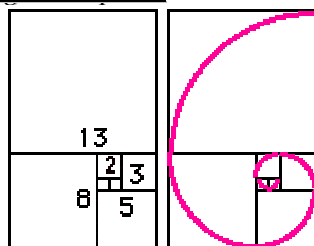
- **Vilna Gaon** to the translator of Euclid's work to Hebrew: To the degree that a man is lacking in the wisdom of mathematics he will lack one hundredfold in the wisdom of the Torah.
- **Maharal of Prague:** ... a man ought to study everything that will enable him to understand the essential nature of the world. One is obligated to do so, for everything is God's work. One should understand it all and through it recognize one's Creator."

Fibonacci & Phi

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987

1/1	= 1.000000
2/1	= 2.000000
3/2	= 1.500000
5/3	= 1.666667
8/5	= 1.600000
13/8	= 1.625000
21/13	= 1.615385
34/21	= 1.619048
55/34	= 1.617647
89/55	= 1.618182
144/89	= 1.617978
233/144	= 1.618056
377/233	= 1.618026
610/377	= 1.618037
987/610	= 1.618033

Squares, Rectangles & Spirals



Phi in Nature



Phi in Phyllotaxis



The Golden Angle: $1/\phi \approx 0.618$ turn; or $360^\circ \times 1/\phi \approx 222.5^\circ$ or $360^\circ - 222.5^\circ = \underline{137.5^\circ}$

Phi in Art & Architecture



Ancient Architecture?



The "Golden Ratio" in Jerusalem

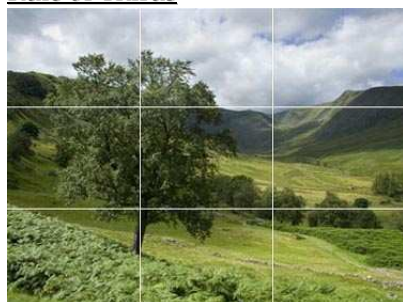


The Divine Proportion

Luca Pacioli – *De Divina Proportione* written in Milan in 1496–98, published in Venice in 1509)

“Without mathematics there is no art.”

Rule of Thirds



Beautiful Thirds

Rav said: ... the way to beautify (*noyei*) the tekhelet is one-third braid (*gdil*) and two-thirds fringe (*anaf*).

Approximation: *Produced in the Rough*

- Ancient units of measure: fingerbreadth, handbreadth, etc.
 - Measuring tzitzit done by wrapping the strands around one's finger or hand.
 - Length verified by double wrapping *anaf* to the *gdil*
 - Approximation to phi other than 1.5 would require far more intricacy.
- What is the measurement of a *hulya*? We learned in a Braita that Rabbi says, “so that you can wind once, then again, and a third time.” We learned in a Braita, One who minimizes should not have less than seven, and one who maximizes should not exceed thirteen. (Men. 39a).

- The nature of tying tzitzit is such that requiring a more exact approximation than 1.5 would border on the absurd.

Approximation: Viewed in the Rough

- Hazon Ish: How could the Rabbis require an exact ratio?
- His brother-in-law answered in his book, "Measurements in the Torah", that in fact Rav's ratio is not meant to be met exactly but rather in approximation to the naked eye – for beauty is beheld by the naked eye.

Proportion

Roman architect **Marcus Vitruvius Pollo** (31 B.C.E. – 14 C.E.)

De architectura libri decem:

'A magnificent temple cannot be constructed properly, unless it is built in an orderly manner with regard to symmetry and **proportion of its parts**, as is the case with a well-built man....'



Halacha Demands Beauty?

- Rav Soloveitchik's three gestures of man: **Intellectual, Ethical, Aesthetic**.

Dangerous Allure

- "What caused man's fall is his giving preference to the sensuous, delightful, and pleasing over the true, at both the intellectual and ethical levels" (Soloveitchik).
- "And the woman saw that the tree was good for food and a delight to the eyes..." (Gen. 3:6).
- "One who walks by the way and breaks off his study and says, 'How beautiful is this tree...' makes his life forfeit" (Avot 3:7).

Halacha Demands Beauty!

- "One who sees beautiful trees, ..., says, 'Blessed are you God, Master of the Universe, Whose world is such'" (Shulhan Aruch, O.H. 225:10).
- "When the aesthete begins to wonder whether everything which is apprehended as beauty and as pleasant expresses indeed genuine beauty, when he thinks that the aesthetic act can be critically examined and its worth objectively ascertained, in a manner similar to our critical attitude toward cognitive and ethical gestures, then beauty is redeemed" (Soloveitchik).

Three Gestures – Three Divine Addresses

- "God not only addresses Himself to man through the **logos**, by emanating wisdom and knowledge to the finite mind; not only through
- the **ethos**, revealing to natural man, driven by insensate desires and impulses, a great order of absolute values and ideals – but also through
- **aesthesis** – the immediate sensible apprehension of reality which is beautiful and grandiose" (Soloveitchik).

Apprehend v. Comprehend

"Only through coming in contact with the beautiful and exalted may one *apprehend* God instead of *comprehend* Him ..." (Soloveitchik).

Merits

- R. Huna explained "one who is punctilious in the observance of the mitzvah of tzitzit merits a beautiful Talit" (Shabbat 23b).
- R. Shimon Bar Yohai explained, "one who is punctilious in the observance of the mitzvah of tzitzit merits seeing the Divine presence" (Men. 43b).