

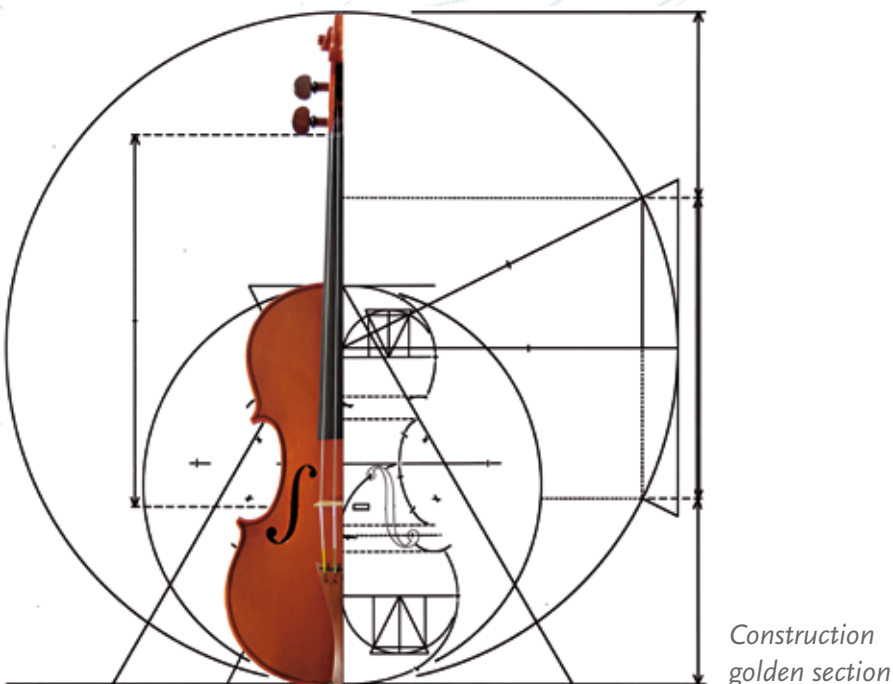
The golden section in violin making


Excerpt from the lecture: The golden section – by Wolfgang Schiele

At the beginning there was the color red. It is the first color that was ever named by mankind. In some languages the word “colored” is identical with the word “red” as in Spanish “colorado” for example. God as the light figure is the origin of the color. Red means blood as well as fire; blood is the vital force and in many cultures it is supposed to be the place where the soul is situated. In Hebrew, the words blood and red come from the same source: red is called “dm” and blood is called “dom”. To dye or paint something red means the revival of life. The most used color in the varnish of ancient Italian stringed instruments was red as well, which underlines the symbolical reverence of God.

- x To music lovers and connoisseurs alike the question arises how, in the early baroque era, the “perfect” shape of the violin could have developed. Perfect, on the one hand, because it survived unchanged all efforts at improvement during 19th and 20th centuries; perfect, on the other hand, up to the present day as by craftman’s skills highly esteemed work of art as well as musical instruments with exceptional qualities have been created. Following, the two basic requirements will be described, which in their amalgamation were responsible for the creation of work of art in architecture, painting as well as instrument making.

Searching to (re-)construct the shape of the violin, I have deduced an ideal design from instruments by the violinmakers Nicolo Amati, Andrea Guarneri and Antonius Stradivarius from around 1650–1670. Starting with the overall length of the instrument, all its measurements are in specific proportional relation to each another.





The Cremonese ell, which was the existing measure since the 11th century in this North Italian region, is used as basic measure. It is still visible carved in stone on the clock tower of Cremona. For the design, the geometric elements that come into use are the circle, the equilateral triangle, the hexagon and a square in a semi-circle that demonstrates the Golden Section on the diameter in a very special way. These elementary elements of geometry have been known for 5,000 years. They became the basis and part of a Greek philosophy regarding the view on harmony and cosmos. Harmony in their view was not only a valuable, nice and useful quality but also an objectively well founded one. By the consolidation of the Pythagorean science of numbers, there was in addition the discovery of the reciprocal equivalent of intervals and numbers. In the Middle Ages, these geometric elements represented symbolic meanings: the circle stands for the heavenly or divine unity; the equilateral triangle represents the Trinity on different levels, e.g. father, mother and son; the triple nature of the universe; heaven, earth and man; Man as body, soul and spirit. The symbolic meaning of the square is the earth as opposed to the skies for the circle. The hexagon, the double triangle, the Star of David, indicates that every true analogy has to be applied inverted, as above so beneath; it is the unification of opposites as male and female, positive and negative. In Christian symbolism it means: perfection, completion, the six days of Creation.

During the renaissance era, there were many studies of and theories about proportions of humans. It was the time when people considered the human being to be God's image, the godlike perfect. Consequently, architecture aimed at developing a clear and harmonious relationship between all parts of a building and to base them on both human dimensions, as divine proportions, and on the ideal proportions derived from the Golden Section.

Because humans appear to be "designed" based on the golden section, and also because nature makes extensive use of the same ratio, it seems conclusive that humans too find exactly this ratio of proportions harmonious, even simply from an optical standpoint. For instance, all pentagonal five-leafed flowers, as well as hexagonal honeycombs or snowflakes are directly related to the golden section. Consequently, buildings, pictures and sculptures based on these laws, whether consciously or unconsciously, are found to be balanced.



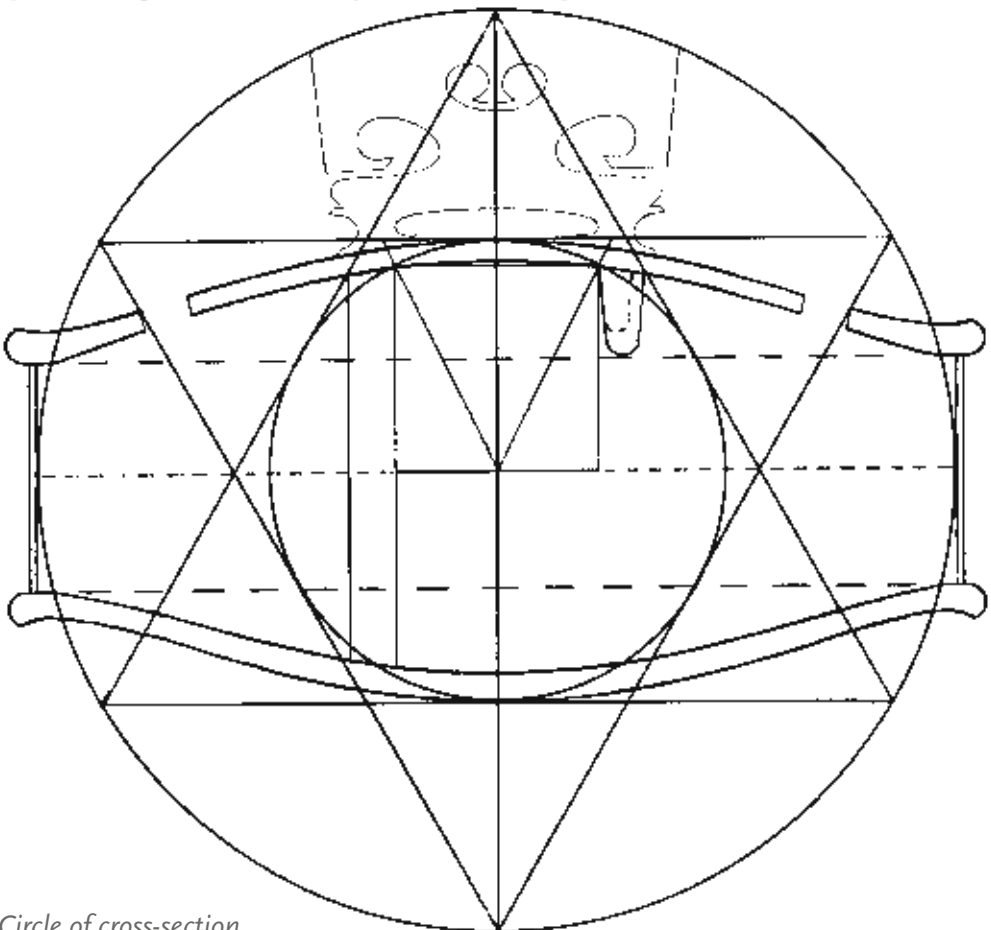
San Michele vecchio, Cremona, Romanik, 11th–12th centuries

In 1509, the mathematician and theologian Luca Pacioli introduced the term “divina proportione” for the first time as the title of a printed work, which he used to define the golden section. “Divina proportione” for him stood symbolically with its three parts for the holy trinity. Leonardo da Vinci (1452–1519) is said to have coined the term “sectio aurea” (golden section), others claim however that this term only originated in the 19th century.

During the reform of the Catholic Church in the 15th–17th centuries, geometry and religious development met. For the praise of God and for the celebration of ceremonies as encouragement for the attractiveness of the Christian Church, more and more music appeared in church during the renaissance. In the beginning, there was only vocal music and then the organ and stringed instruments were added, which subsequently led to a higher demand for instruments.

I find it highly exciting that, given this background, it is possible to completely reconstruct the shape of the violin solely by geometric means. Also the design and position of the f-hole as it is known from Stradivarius can be reconstructed; even the “third dimension” – the height of the ribs, back and top as well as the positions of the bassbar, soundpost and bridge – can be inferred. All these constructed dimensions correspond to the measurements we find on historical instruments. And the constructed positions of bassbar, soundpost and bridge correspond to those that are good positions by today’s experience of sound.

How could such common and approved knowledge of violin making vanish? The explanation lies in the general political development of the North Italian region. After two years of famine from 1628 to 1630, the plague and the taking over of Northern Italy by the Spanish during 16th and 17th centuries, with the end of the Spanish war of succession Cremona became Austrian in 1714. All this led to a deep economic depression from 1730 to 1750; only with the beginning of the 19th century the Industrial Revolution starting in England would eventually change the economic situation. Unfortunately, the end of the three great violin maker dynasties fell exactly within this period: Hieronymus II Amati died 1740, Antonio Stradivari 1737, Omobono Stradivari 1742, Francesco Stradivari 1743 and Guarneri del Gesù in 1744. Carlo Bergonzi, the last violinmaker who can be considered to have been same level as his predecessors died in 1747. As to why the work of his son Michel Angelo does not show the knowledge and the qualities of his fathers work we can only speculate.



Circle of cross-section

As far as I know, the relation between geometric elements, proportional ratios and the used color to the symbolic and religious meanings has never before been pointed out. The power of geometry makes it obvious that the shape of the violin cannot be improved as it has been tried many times over the past several hundreds of years.

So if one can take controlled use of all the sound-affecting components like the proportion and dimension of an instrument, the choice of wood, the form of the arching with corresponding thickness, the sizing of the wood and the varnish, then the result of contemporary instrument making is a very valuable one for a musician.

For further details please contact:

Wolfgang Schiele

Geigenbaumeister

Phone +49 (0)89 260 51 58

wolfgang@schiele-geigenbau.de