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FROM THE GOLDEN RECTANGLE TO LAAN’S BOX AND MORE

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The concepts “Golden Mean”, “Golden Rectangle”, “Golden Spiral” gave rise to many generalizations. For example Hans van der Laan and Lambert Rosenbusch, both being architects, searched 3D-analogues of the Golden Mean to apply them as proportion modules in their architectural design. This paper aims at proposing unifying geometric principles to treat such generalizations: Characteristic equations for general mean values can be formulated as geometric closure conditions. Mean values as mathematical concepts are dimensionless just being (irrational) numbers. One-dimensional visualizations of such mean values are e.g. proportions of two segments on a line, but they can also be visualized by geometric objects of any dimension. By applying these principles it becomes possible to construct what can be called “golden helical bi-arc spirals” in space as a 3D- analogue to the classical “Golden Spiral”. Furthermore these principles allow to visualize Spinadel’s Metallic Means, van der Laan’s and Rosenbusch’s cubic means and further generalizations by (nested sets of) rectangles and boxes in a unified way. The following figures show examples of such visualizations.

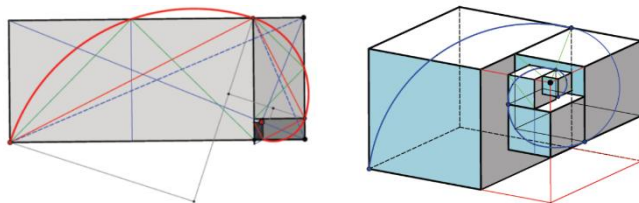


Fig. 1: “Silver Spiral” of quarter-circular biarcs to a nested set of Silver Rectangles (left), Spiral arrangement of cubes with side lengths $1, a, a^2, a^3, \dots$ and GC^1 -biarc spiral; a with “closure condition” $1 = a + a^2$, i.e. $a = \phi = 0.618 \dots$, (right)

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