Journal for Geometry and Graphics
Volume 2 (1998), No. 2, 133–139

Geometric Prerequisites for the Creation and Aesthetization of Trademark Shapes in Graphic Design

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Abstract. In graphic design the creation of trademark shapes has gained specific importance. These identifying symbols for products or companies should integrate features like emotional imagery, logic-motivated originality, simplicity, structural clarity and ease of visual perception. This paper focusses on the geometric prerequisites for these compositions and presents examples of geometrically remarkable designs.

1 General Remarks

The increasing demand for graphic design includes also the creation of logotypes for companies and products. According to [9] these trademarks should integrate features such as an emotional imagery, logic-motivated originality, simplicity, structural clarity and ease of visual perception.

By experiments it has been proved that visual information gets a significantly higher rate of perception and reproduction when the shapes are regularly built [5]. Whatever the identifying icons are, figurative, attributive, symbolic or abstract, the geometric regularities are always a base for its composition structure.

Up to recent the graphic designers used the traditional method of creating the shapes of trademarks: They usually started producing a great amount of life-based drawings and sketches. Then step by step they graphically simplified the shape to an elementary level while emotionally they tried to preserve the characteristic patterns (Fig. 1). A modulus-based grid (square, n-angle, radial) was always considered as the most efficient means to harmonize a shape. The example in Fig. 2 shows “trademarks” stemming already from the Middle Ages [4].

Due to the impetuous expansion of computer technologies in all spheres of human activities, the traditional “hand-made” method of mark design has been replaced by methods based

ISSN 1433-8157/\$ 2.50

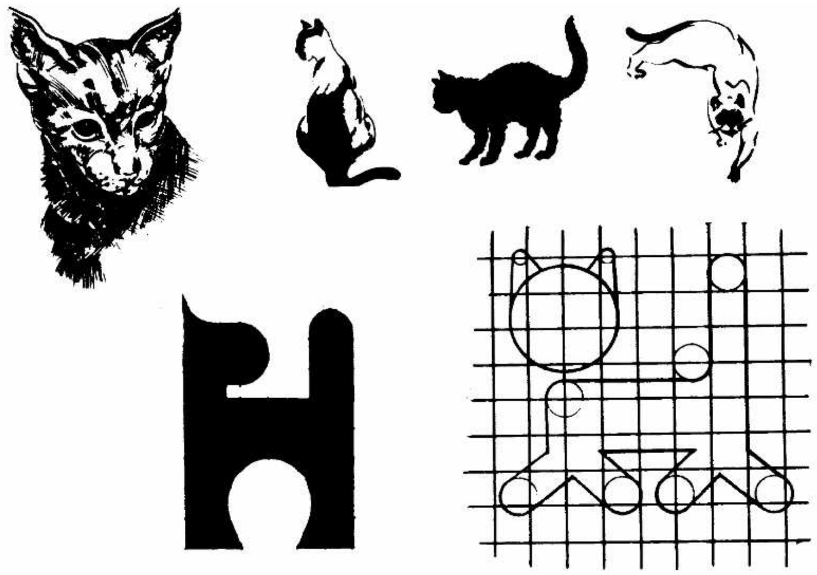

Figure 1: Traditional method of creating trademarks

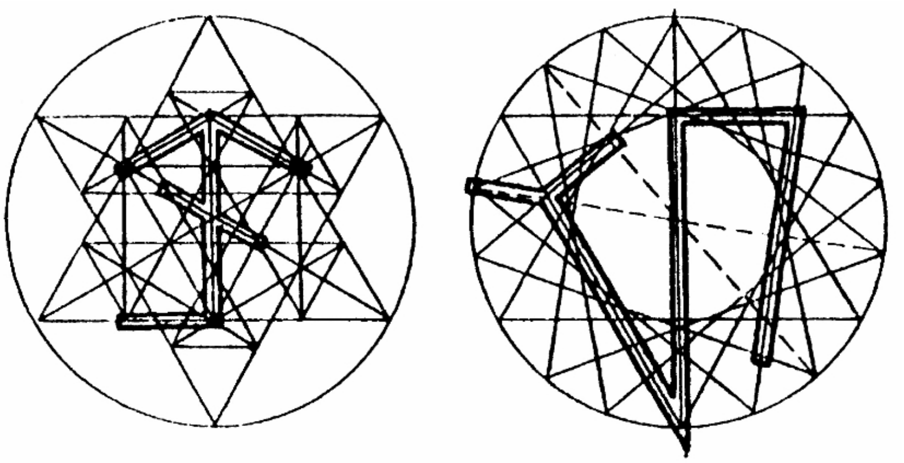

Figure 2: A historical design from the Middle Ages

on powerful design software developed for the means of visual information. Beside elementary shapes this software offers a storehouse of complicated geometric moduls like ellipses, hyperbolas, parabolas, spiral- and cycloid curves etc. [3], [8].

The critical point in the process of seeking for trademarks is the understanding that variations of curves carry out a specific harmony, which combined with graphically artistic means results in logotypes of high aesthetics [4], [2], [6].

2 Geometric Prerequisites

Let us consider some of the geometric prerequisites for the creation and aesthetization of trademark shapes. It is known from the experience in visual information that spiral-type curves are the base for numerous "dynamic" marks [9], [2].

The graphic analysis of the mentioned marks reveals that there are many unimportant "mistakes" included since these curves have been modelled "manually" by intuition. How-

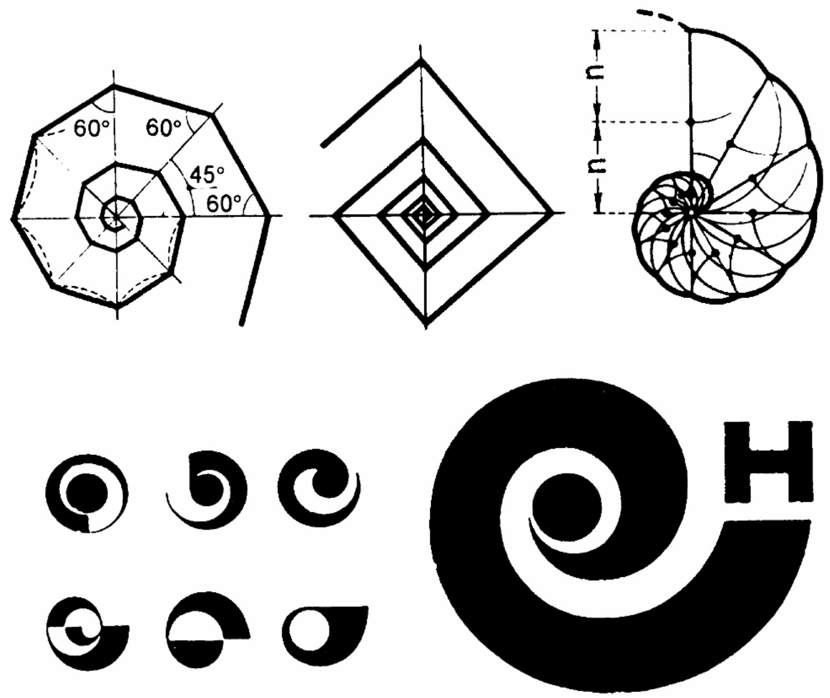

Figure 3: Shapes of spiral type

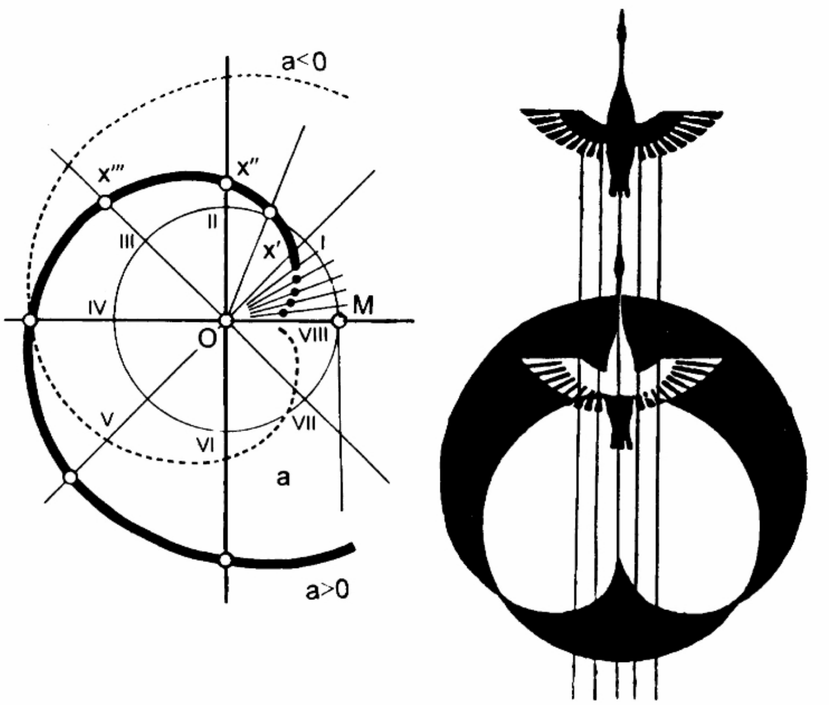

Figure 4: Parabolic spire $r^2 = a\varphi$ and its utilization

ever, when these trademarks are adjusted by mathematical templets of related spires on the computer (Fig. 3), then they obtain even more attractive plastic features and a significantly higher aesthetic rate. Fig. 4 shows a sample of a logotype based on a parabolic spire with the polar equation $r^2 = a\varphi$.

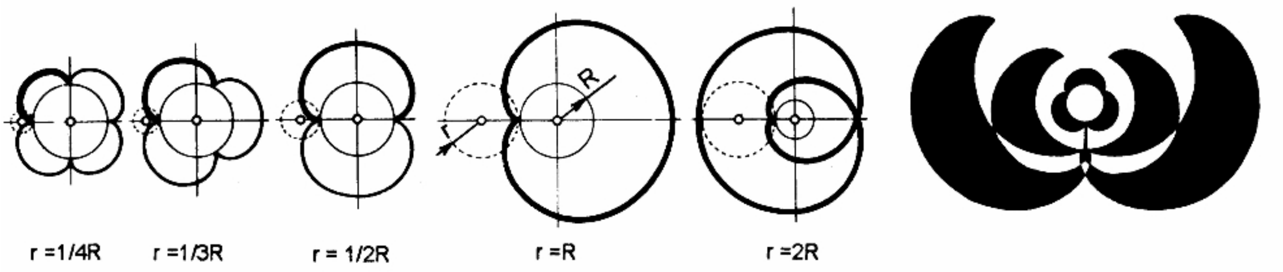

Figure 5: Epicycloidal curves

Logotypes created on the base of epicycloidal curves are attractive due to their resiliency. It is known that shape and symmetry properties depend on the ratio of the diameters of the moving circle and the fixed one (Fig. 5).

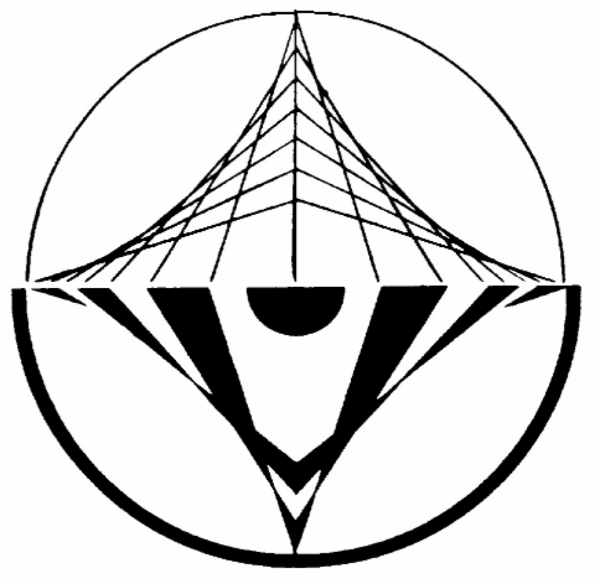

Figure 6: Astroid

Graphic images of "clean" mathematical curves offer an unexhaustible source for the creative improvisation in developing trademarks. So, the Figures 6 and 7 show logotypes based on the astroid and the prolonged astroid – free of any decorative adornment and additional elements. Among existing mark shapes such examples are rarely represented, although "genuine geometric" logotypes have a high index in terms of aesthetics [6].

One of the progressive trends in the creation of logic-motivated mark shapes is the insertion of geometric elements in an integral composition. Examples can be seen in the Figures 8 and 9, where the prolonged epicycloid and the strophoid are "decorated" by additional pithy elements.

Among samples of such nature frequently the 90°-turned digit '8' can be found. For a design with the aid of a related geometric curve it is recommended to use BERNOULLI's lemniscate. This curve represents an outstanding case among CASSINI's curves. Among the various definitions of BERNOULLI's lemniscate we pick out the following: It is the geometric locus of points M (Fig. 10, left) for which the product $R_1 \cdot R_2$ of distances to two given points

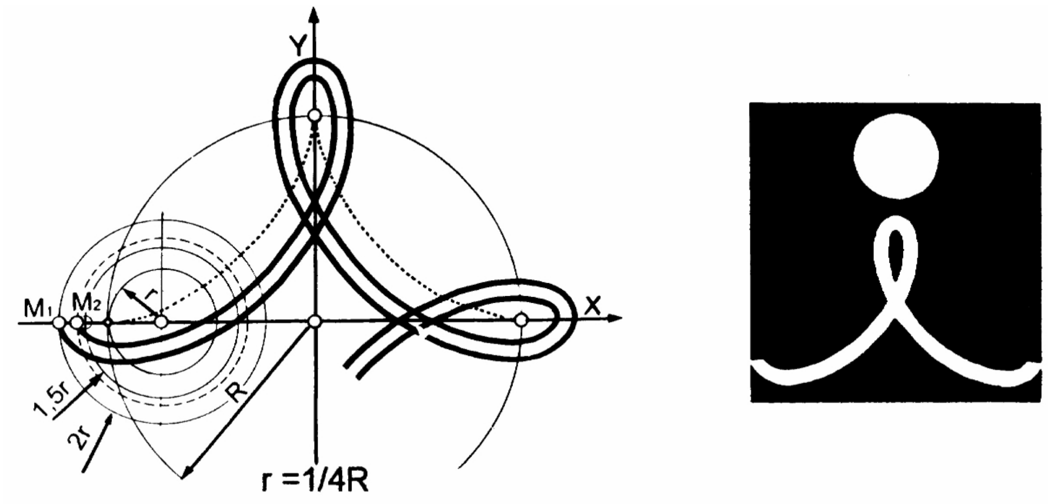

Figure 7: Prolonged astroid and its utilization

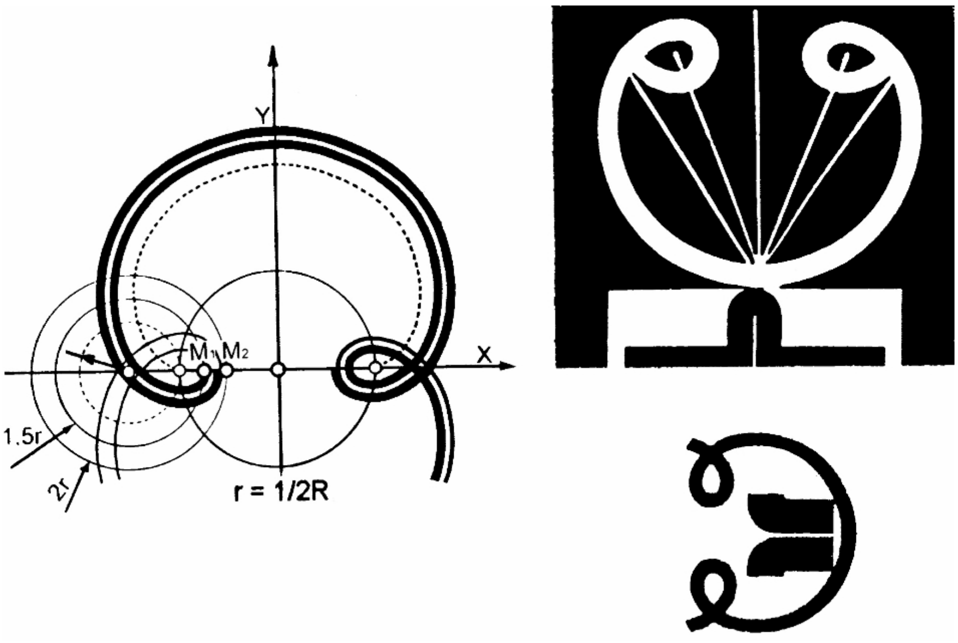

Figure 8: Prolonged epicycloid

F_1 and F_2 (focuses) is constant and equal to the squared half-focus distance c, i.e.

$$R_1 \cdot R_2 = c^2 = \frac{a^2}{2}$$

with the major semi-axis $a = c\sqrt{2}$. The equations of BERNOULLI's lemniscate in Cartesian coordinates (x, y) and in polar coordinates (r, φ) are

$$(x^2 + y^2)^2 = 2c^2(x^2 - y^2) \quad \text{and} \quad r^2 = 2c^2 \cos 2\varphi,$$

respectively. There are many methods for generating the lemniscate. A simple one is shown in Fig. 10 (left). On the right side of Fig. 10 trademarks are displayed which are built on the base of the lemniscate [1], [8].

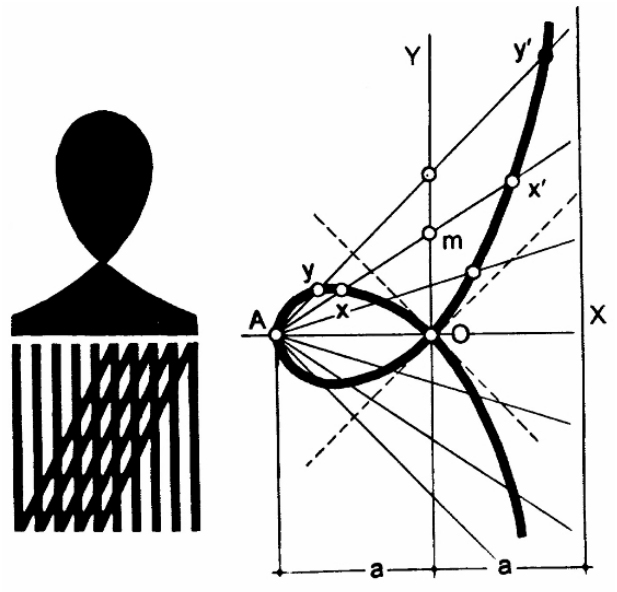

Figure 9: Strophoid

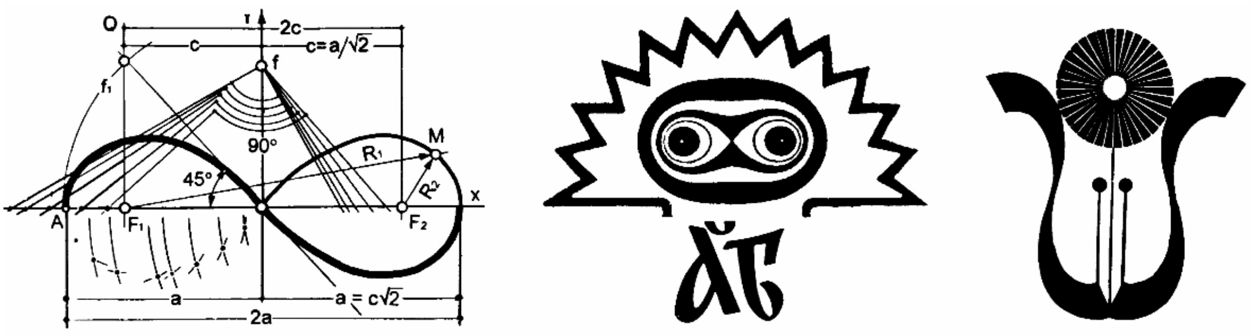

Figure 10: BERNOULLI's lemniscate

When trademark shapes are created, an associative-figurative thinking is needed in order to figure out and to express the characteristic properties of the object to be symbolized. This creative process demands also a skill for manipulating geometric structures [7]. A successful example can be seen in Fig. 11: An original trademark has been developed from a simple damped waveline by means of graphical expression.

The combination of elementary geometric elements like straight line segments, circular arcs, equilateral polygons (traditionally used in industrial graphics) with regular curves of second order gives practically an unlimited variety of trademark shapes.

3 Conclusion

Only a few examples have been selected in order to demonstrate the importance of geometric structures for creative graphic design. However, already these enable to foresee that these geometric prerequisites together with the possibilities of computer technology will lead to a more efficient development of attractive shapes for visual information.

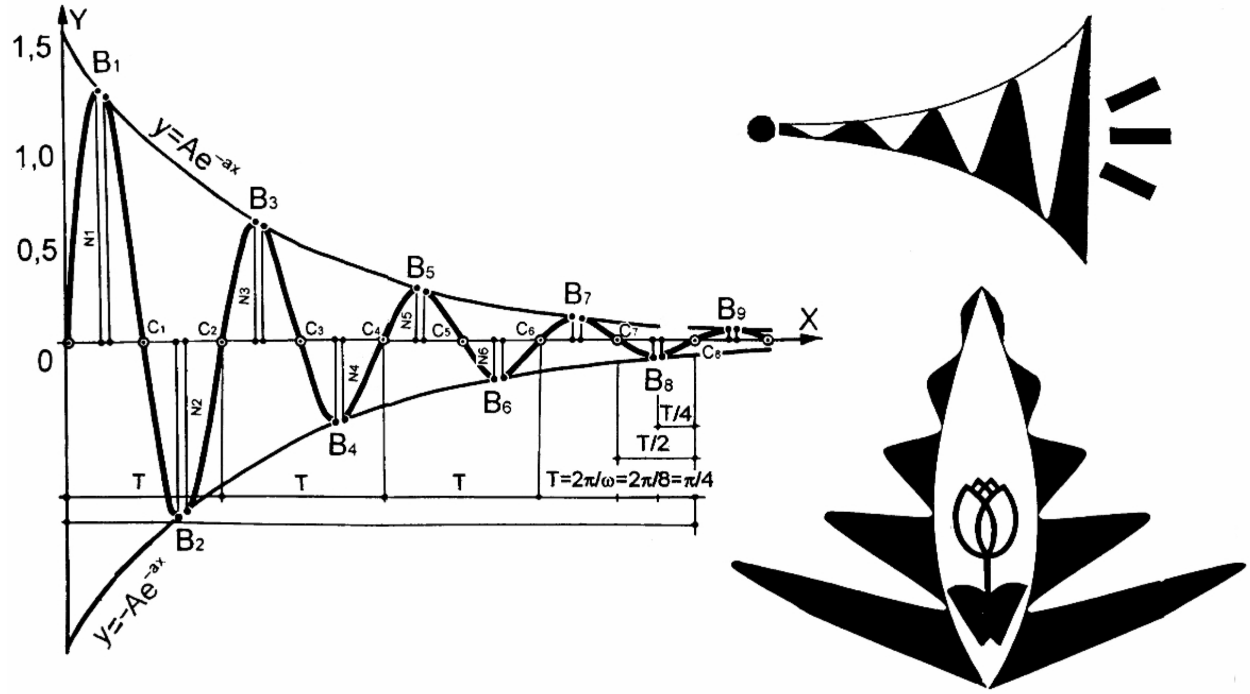

Figure 11: A damped waveline and its modification

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Received February 2, 1998; final form October 13, 1998