

Golomb Rep-Tiles and Fractals

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In 1964 *Solomon W. Golomb* suggested an unusual type of tile: nonperiodic rep-tiles. Unlike other kinds of tiling, rep-tiles are obtained by grouping individual tiles together to form larger replicas of themselves. One of the Golomb rep-tiles, namely Rep-4 (L-triomino) is shown in Figure.1(a,b) [1,2].

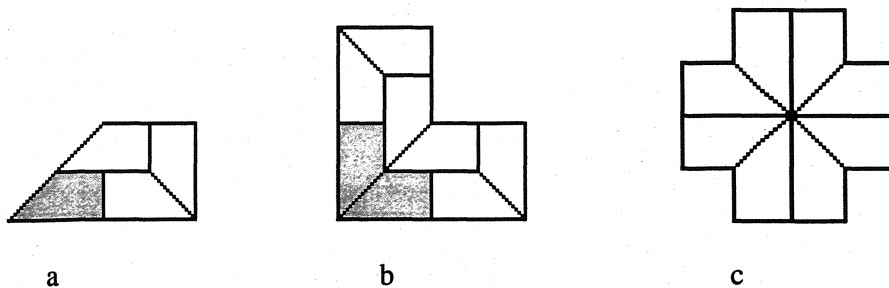


Figure 1 a

b

c

The multiple repetitive nature of the fragments, shown in Figure.1b, can be used to cover a plane completely, without leaving gaps or overlapping (Figure.2a). Through coloring the individual fragments shown in Figure.1c one can distinguish more clearly the organization of the system. As a result two kinds of mutually complementary and *cross-tree* like nonperiodic ornaments are obtained (Figure.2b). By careful examination of the final picture it is easy to see the fractal character of both kinds of *cross-tree*.

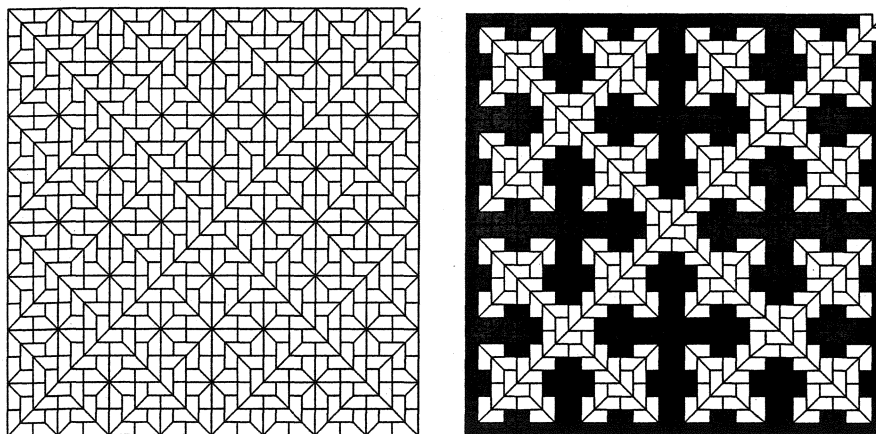


Figure 2

a

b

Figure.3 an expanded view of the image shown in Figure.2b.

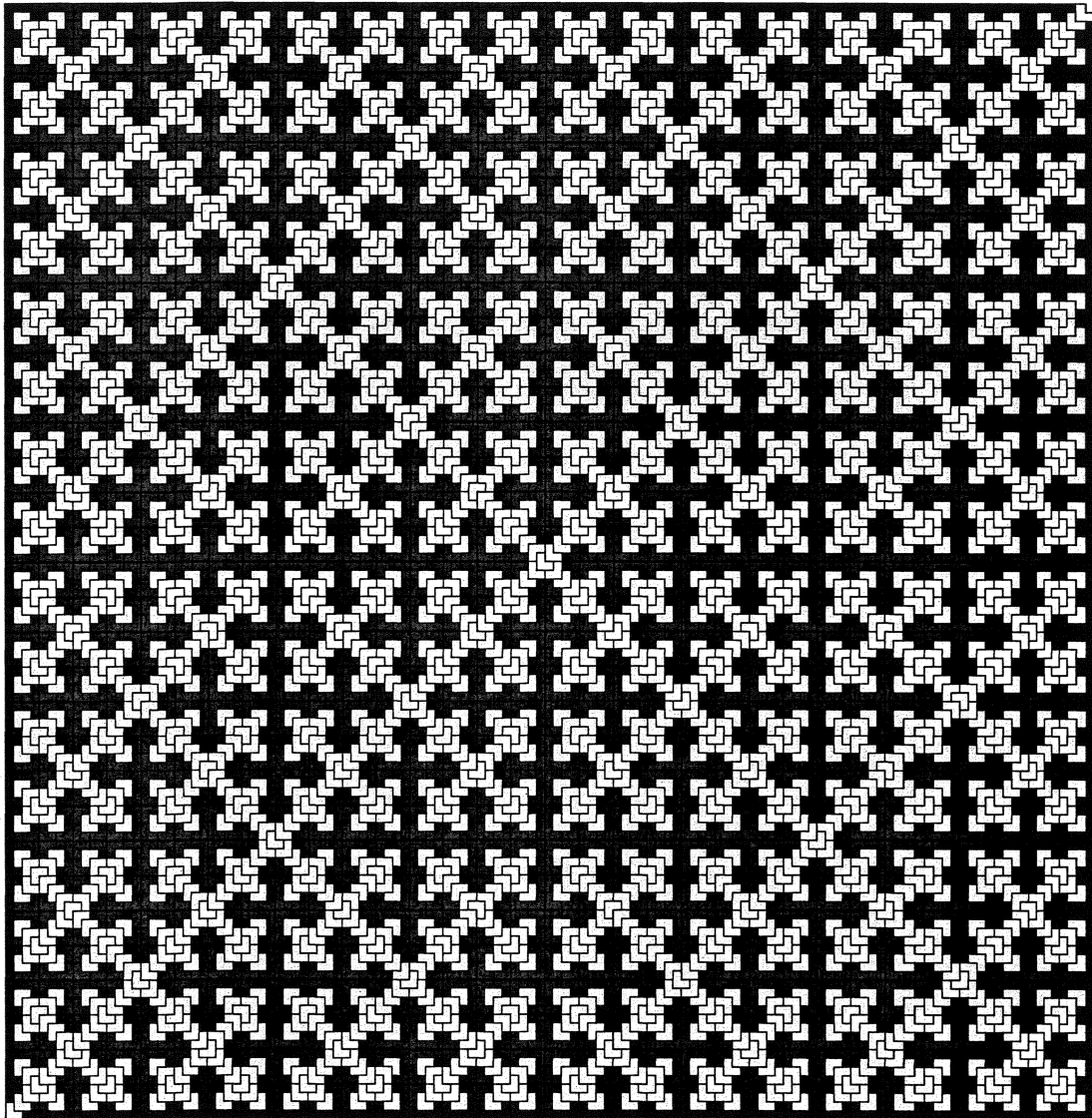


Figure 3

This ornament can have many applications, such as in decorating churches and cathedrals.

References

1. Golomb, Solomon W. "Replicating Figures in the Plane." *Mathematical Gazette* 48 (December 1964): 403-12.
2. Gardner, Martin. *The Unexpected Hanging and Other Mathematical Diversions*. Chicago: University of Chicago Press, 1991.