The Art of Spirolaterals

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The web site includes a series of images which is part of a larger set investigating the formation of two-dimensional designs leading to three-dimensional architectural forms using basic mathematical concepts. While investigating fractals and space curves, a mathematical figure called a "spirolateral" was encountered. A spirolateral is based on a square spiral with increasing length of turns and the turns repeating themselves. The turns can be all in one direction or certain turns can go the opposite direction. Angles other than 90 degrees can be used. The most interesting of these are ones that close on themselves, not all do. Investigating a series of possible turning angles, number of turns, number of repeats, and trying all revered turns, I identified over 10,000 spirolaterals that closed. This web site displays over 300 such spirolateral designs. In addition to investigating spirolaterals composed of straight lines, a series was developed that curves them. These designs are based on spirolaterals that are curved by antiMercator, circular, and inversion transformations. Figure 1 displays the 460 spirolateral, 4 turns at 60 degrees. Figure 2 and 3 display the same spirolateral with the antiMercator and Circular transformations applied. This web site includes galleries displaying the great variety of spirolaterals, interactive JAVA routines to display a series of spirolaterals, as well as, developing your own design, a technical description of spirolaterals, and the data for all the displayed images. My overall interest is to investigate methods that can develop forms that are in one sense predictable, but have the strong element to generate the unexpected. Using custom software enables an approach that allows variations to be investigated in a repeatable way, this enabling me to fine tune an idea by repetition and experimentation. For the most recent version of this work, please check www.netcom.com/~bitart.
Figure 1: $4_{60}$ spirolateral

Figure 2: $4_{60}$ spirolateral with an antiMercator transformation

Figure 3: $4_{60}$ spirolateral with a Circular transformation