Spelunking Adventure II: Combining Cyclons

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Abstract

The set of 2D spline curves named 'cyclons' by Palmer [1] that are derived from polyhedra are used in combination to produce more strangely attractive curves for use in print and graphic animation.

Introduction: As reported at Bridges 2005, I used Rhinoceros software to construct a database of polyhedra within unit radius circumspheres. These are projected to the plane and exported to Corel Draw. Here the hard edged linear maps are 'converted' to a set of spline curves, '**cyclons**' that are useful in design applications. Some additive properties of these cyclons are explored here.

Four methods for combining cyclons:

1) **Spins**: Copies of a cyclon are circularly arrayed with rotation angle equal to S/n, where S is the cyclic group angle (e.g. 120 degrees or 2/3 pi) and n is prime so as to avoid duplication.

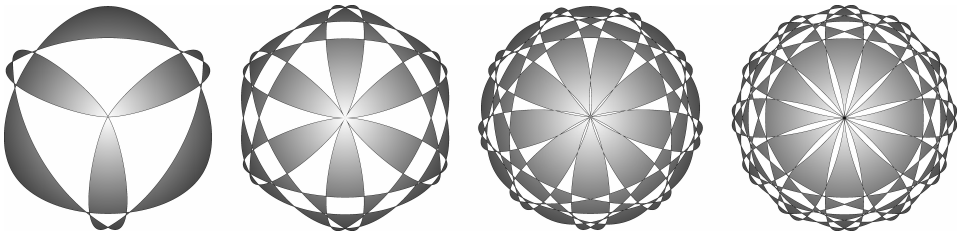

Figure 1: *Tetrahedral cyclon with Spins (n= 2, 3, 5)*

2) **Like with Similar**: Cyclons are combined with other members of their symmetry groups.

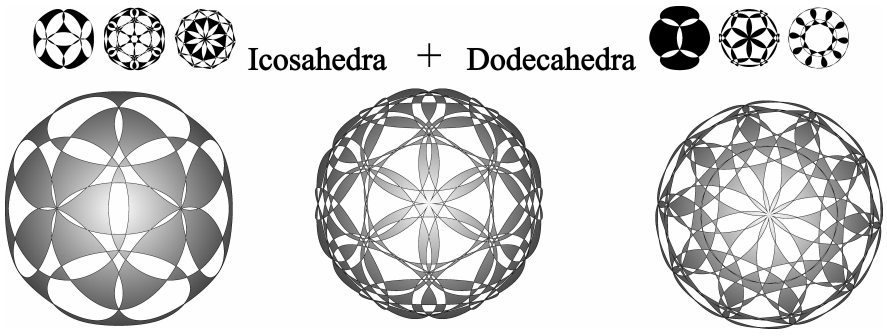

Figure 2: *Pas de Dual.*

3) **Scale**: Cyclons derived from polyhedra modeled with variable circumsphere radii are combined. In the example, radii for five related polyhedra were chosen such that their relative volumes are proportioned (1, 3, 4, 6, and 20).

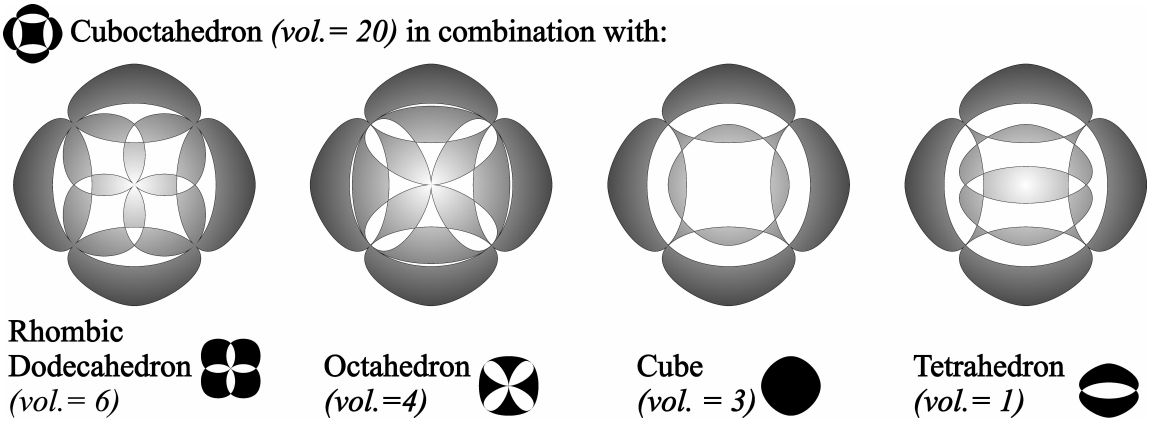

Figure 3: *Cyclons from pairs of polyhedra scaled to rational tetrahedral volumes [2].*

4) **Close Pack**: Space frame arrays of polyhedra are modeled in Rhinoceros and their cyclons are produced.

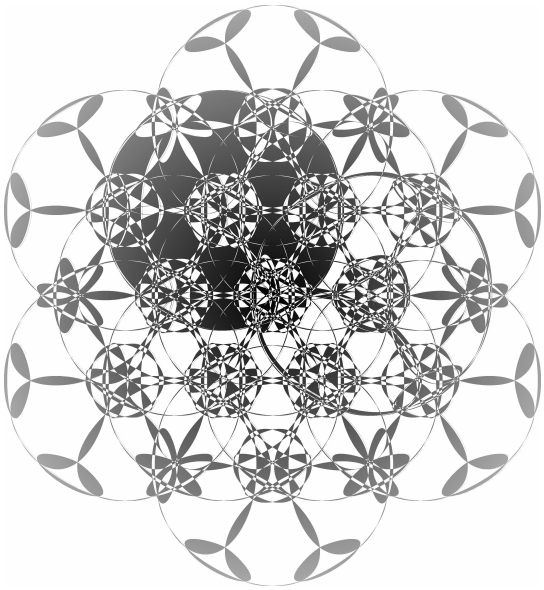

Figure 4: *Close Packed Truncated Cubes.*

Conclusion: These methods of cyclon combinatorics have provided an endless variety of pattern to pique the author's artistic and pedagogic curiosity and drive further spelunking of the 'spline mine'. "What would that look like?"

References

[1] C. L. Palmer, *Digitally Spelunking the Spline Mine,* Renaissance Banff, pp. 309-312. 2005.
[2] R. B. Fuller *Synergetics*, sec. 454.01, Macmillan Publishing 1975.