

The Programs

The figures in the paper were computer-generated using LOGO, and the programs are included in this file.

It should be possible to write programs for use with other software (such as Mathematica) from the information in the paper, but it might help to refer to the LOGO programs. For example the exact values to use to draw spiral-headed arrows are not obvious because of the change of scale involved in recursion.

GRID generates the basic skeletons of figures 5 and 6. The top level command is **grid depth length**, so figure 5 was generated with the command **grid 2 400**.

ARROWS adds arrowheads to the skeleton generated by GRID, as in figure 7. It is based on GRID, so the top level command is the same.

CELTIC produces versions of the original Celtic design. Again it is an elaboration of GRID. There are constants throughout that have been hand-tuned to give a reasonably good image.

SPIRALS was used to generate figures 12 and 13. There are 4 parameters:

depth as in the other programs

length as in the other programs

f the relative length of the arrow shaft

turns the number of edges in the spiral

Figure 12 was generated by the command **grid 2 400 0.8 6**

NOSHAFT is like SPIRALS but the arrows have no shafts. It is particularly convenient for investigating what happens when different values are used for f.