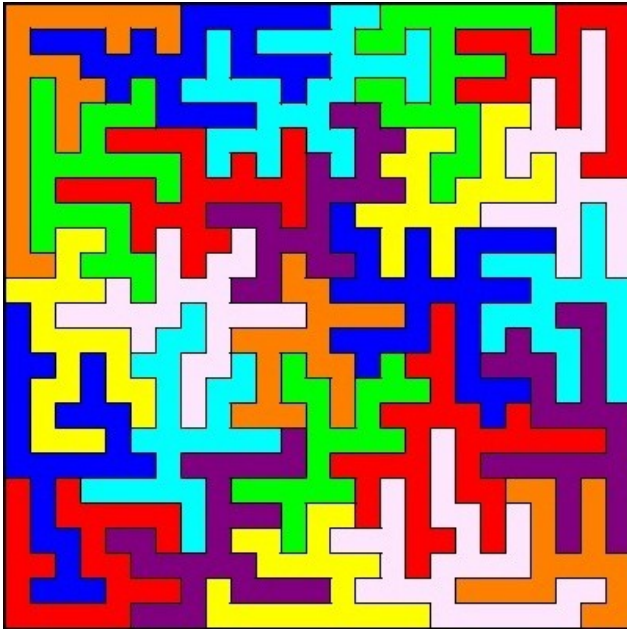


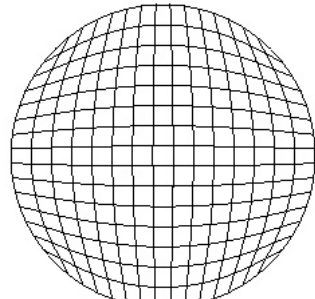
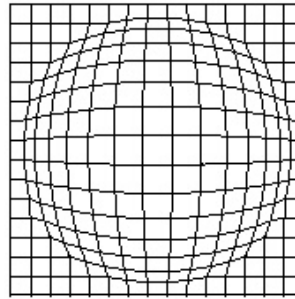
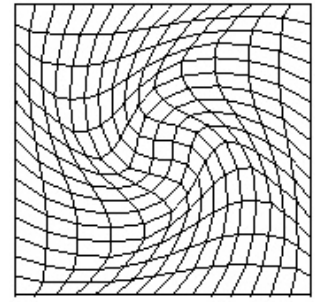
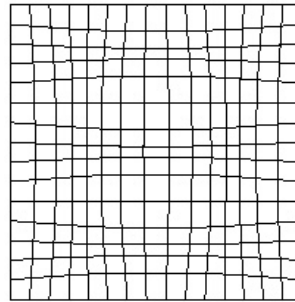
Warped-Grid Jig-Saw Puzzles

George Hart

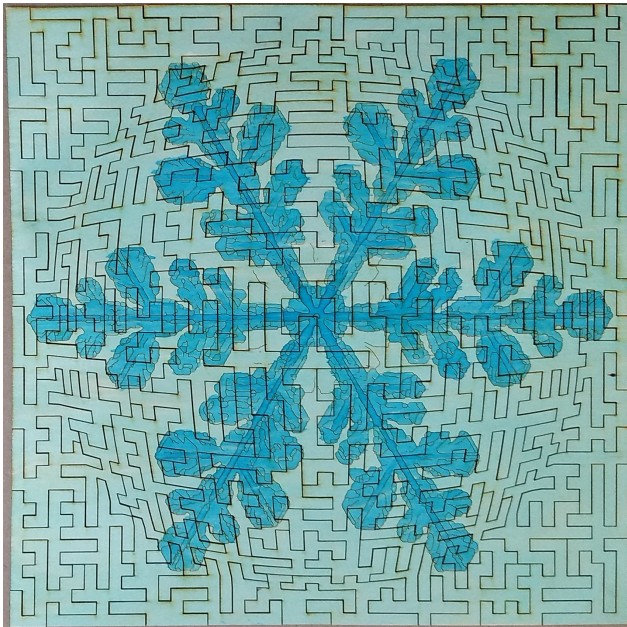
With a laser-cutter, it is easy to make one-of-a-kind jigsaw puzzles. The question then is what pattern of cuts to use. Here is a gallery of some experiments I have been making in which the cut pattern is based on a warped grid. A pseudorandom grid-based dissection of an underlying rectangular array is distorted to give engaging visual effects.



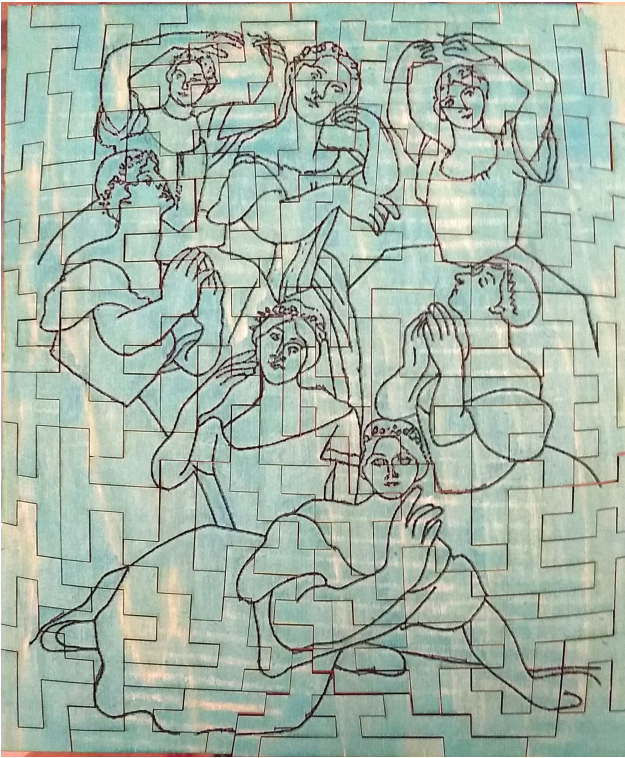
Example pseudorandomly generated 25-piece puzzle based on square grid, before warping the grid. Such designs can be warped in many ways.



Examples of warped 15×15 grids based on various easy-to-program transformations of the unit square: a) slight curve, b) swirl, c) bubble, and d) circle



100-piece laser-cut wood puzzles (with handpainted snowflake images) based on “bubble” warp, 11.75 inch square. Left example contains some 2×2 and larger blocks of cells, e.g., top-left corner, which I later decided should be avoided. Right example avoids any such blocks. (The “bubble” warp is inspired by op-art paintings by Victor Vasarely. The snowflake designs are based on photos by Kenneth Libbrecht.)



80-Piece puzzle with simpler part shapes, using a slight curve warping of the grid, 8×10 inches. (Etched image is Seven Ballerinas by Picasso.)



80-piece puzzle using swirl pattern. 8×10 printed photo was glued to wood before laser-cutting. (Image is Ocean Park #24 by Richard Diebenkorn.)



100-piece “tree rings” puzzle based on circular warping of grid. Laser-etched circles are scaled in geometric proportion.



100-piece puzzle using contraction transformation of grid. Image is hand-painted based on Ernst Haeckel drawing of Siphonophorae from Artforms in Nature.

This family of puzzles can be adapted to any desired level of complexity by choosing the resolution of the underlying grid. An infinite variety of warping transformations can be coded up using straightforward mathematical techniques to change the visual effect. Test-solvers report that these puzzles provide a fun solving experience. My G4G-14 exchange item is a small 25-piece puzzle with a bubble transformation. For more information, see: <http://georgehart.com/jigsaw>