

(That's "Stereogram Maker Pro" in case you don't have your red-green glasses handy.)

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About the Program

Stereogram Maker Pro is a little program that will generate random-element stereograms from any grayscale picture. All you have to do is provide the grayscale picture (just about any will do, so long as it doesn't contain a lot of very thin lines) and in the blink of an eye (more or less) you will have a lovely stereogram. Just put on your handy red-green glasses (red goes on the right, please) and wondrous shapes will pop right out of the screen at you! If you like the program, or think it is even somewhat cool, please let me know – my address is listed below.

Some people may have to look at these images for a few minutes before anything pops out, but once it does, it won't go away and it'll be much easier to see the next time. It helps if you stand directly in front of the screen and are about arm's length away. If you don't have red-green glasses, colored cellophane or just about anything that is colored and transparent will do.

About Depth Perception & Stereograms

We perceive depth, in part, because each of our eyes views the world from a slightly different perspective. This slight difference between the image striking the flat, two-dimensional surface of each retina is used by our visual system to construct a three-dimensional perception of the world. This difference between the two eyes' images is called **binocular disparity**. With stereograms, a slightly different image is presented to each eye, thus creating binocular disparity and fooling the visual system into perceiving depth where none exists.

On the computer, stereograms can be created by using two colors to draw the image and then viewing the image with special glasses. The images, called **anaglyphs**, are made up of red and green portions, and the glasses contain a red filter in one eye and a green filter in the other. The red filter blocks out the green portion of the image and the green filter blocks out the red portion of the image. In this way, each eye sees only one part of the image and each of the two parts is slightly different, producing a binocular disparity and the perception of depth.

Random-element stereograms are a special type of stereogram made up of two grids of randomly-placed elements, which are usually small dots. For most dots, there is a red dot in one image that exactly corresponds to a green dot in the other image; the remaining dots are slightly different in the two images. In one of the images these dots are shifted over a few dot diameters relative to the positions of the

corresponding dots in the other image. This shift in location of some of the dots creates a disparity between the images of these dots seen by the two eyes. When viewed with the red-

green glasses, this group of dots appears to “float” in depth above the rest of the background dot pattern. The more the dots are shifted, the greater the disparity and the “higher” above the background the image appears to float. This type of pattern is especially interesting to vision scientists because when viewed with either eye alone, only a random pattern of dots is seen. The “form” is created by the visual system (i.e., the brain), which performs the complex calculations necessary to match up corresponding dots viewed by each eye and create the perception of a form where no form exists.

(The preceding description was adapted from the following source: Baro, J.A., Lehmkuhle, S. & Sesma, M.A. (1991). InSight 2 – InColor [computer program]. Santa Barbara, CA: Intellimation.)

How To Use the Program

| File | |
|-------------------|----|
| Open Mask... | ⌘O |
| Save Composite... | ⌘S |
| <hr/> | |
| Quit | ⌘Q |

Open Mask... Opens a mask image, saved in PICT format, to be used in creating the random-element stereogram. If the image is not grayscale, it will be converted by the program. Maximum image size is 640 x 480 pixels.

Save... This menu changes, depending on what is currently being displayed. You can save whatever is currently displayed into a PICT file. (Note: The “Save Mask...” option is always dimmed, since you can’t modify the mask image.)

Quit Self-explanatory.

| Image | |
|----------------------|----|
| Set Parameters... | ⌘P |
| Set Colors... | |
| <hr/> | |
| Show Mask | |
| Show Composite | |
| <hr/> | |
| Generate New Dots | |
| Generate Sequence... | |

Set Parameters... Displays a dialog box (see below) in which you can set two parameters, dot size and dot density.

Set Colors... Displays a dialog box in which you can set the two dot colors. Click on either the **Red-Green** or **Red-Blue** buttons to select a preset color table, or click on the left or right color patch to select your own colors. The color patch in the middle shows what the combination of the two colors will look like. Click the **Save Colors** button to make the current color settings the default.

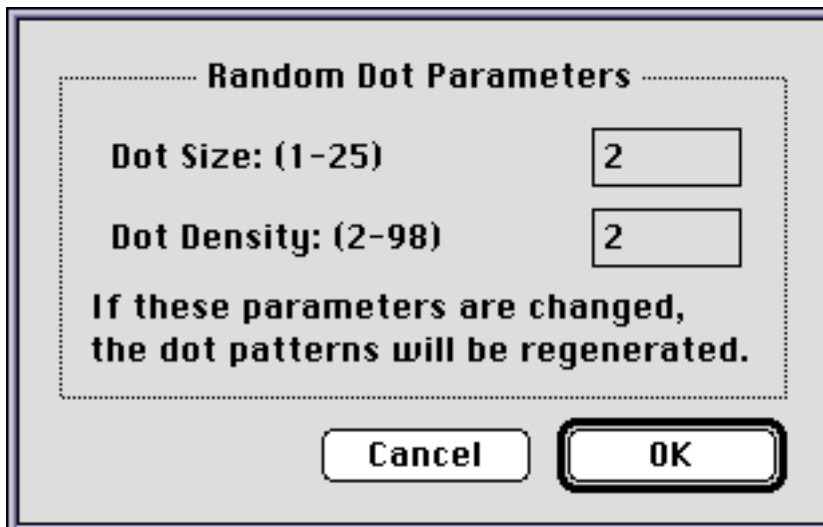
Show Mask Shows the mask image.

Show Composite Shows the stereogram.

Generate New Dots Generates a new, random sequence of dots. Please be patient, this may take a minute or two (the smaller the dot size, the longer it takes).

Generate Sequence... Generates and saves a series of stereograms, each one containing a different random pattern of dots. You will be prompted to enter the number of frames in the sequence (how many separate stereograms you want to create) and a name for the sequence. A period and a number indicating the stereogram's position in the sequence will be added to each of the stereogram file names (e.g., My Stereogram.1). The files are saved in PICT format. Please be patient, this may take a very long time, depending on how many frames you create and how big the dots are.

The reason for including the Sequence feature is so that you can create what are called **dynamic random-element stereograms**. This is essentially an animated sequence of stereograms in which the positions of the dots change from frame to frame, but their correlations remain the same. Even though all the dots appear to be moving around, the perception of depth is still very vivid. I recommend a little program called ConvertToMovie (free from Apple Computer, Inc.) for making QuickTime movies out of these sequences. This program will take any number of consecutively numbered PICT files and generate a QuickTime movie with them. It works well and the results are very cool.



Dot Parameter Dialog

Dot Size. How big each of the random-element dots is, in pixels. If you change this setting a new set of dot patterns will be generated, which may take a few minutes. The smaller the dots size, the longer it takes – because it has to generate more dots.

Dot Density. How close together the dots are. These numbers indicate a probability (sort of) – 2 indicates that, on the average, 1 in 2 positions on the grid contains a dot, 98 indicates that, on the average, 1 in 98 positions on the grid contains a dot. In other words, smaller numbers mean more dots. If you change this setting a new set of dot patterns will be generated, which may take a few minutes.

Where Can I Get Those Cool Glasses?

Good question. I haven't tried to buy any of them recently, but last time I did I got them from an optical supply company, Bernell Corporation (they sell equipment to optometrists). They can be reached at 1-800-348-2225. The catalog number of the kind I last bought is BC1181 (at least it was a few years ago). These are the red-**green** kind, and **not** the red-**blue** kind. I've heard that you can find the red-blue kind at comic book and hobby stores, but I've never tried.

System Requirements

You will need a color Macintosh, System 7.0 or later, and a color monitor. Be sure your monitor is set to at least 16 colors. Stereogram Maker Pro requires a memory partition of about 2000 K, which means you should have at least 8 MBytes of system memory (16 MBytes on a Power Mac).

Update History

1.0.1 – Fixed a bug in the Generate Sequence routine where a portion of a dialog gets saved in the pictures if the dialog window overlaps the image window.

1.0.2 – No longer requires a 640 x 480 screen, now works with those Apple 12-inch models that a few of you bought a couple of years ago.

2.0 – Stereogram Maker went Pro (I always wanted to create a program that has a “Pro” version). This version uses grayscale pictures to create images with multiple depth levels (previous versions accepted only black and white pictures and created images with only two depths). This version is also a fat binary. That means that if you have a Power Macintosh, it will run native on it (in other words, very fast).

2.1 – Added the **Set Colors...** option. Red-Green, Red-Blue, or a user-defineable color table can be used for display and saved as a default.

Legal Stuff

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This program, and all future versions of it, may not be included in or distributed by the University of Michigan Macintosh archive (mac.archive.umich.edu). If you would like to know the reason for this restriction, just send me E-Mail and I’d be happy to explain.

Stereogram Maker Pro was written in CodeWarrior Pascal (only because Symantec has abandoned Think Pascal, the best Mac programming environment ever), therefore portions of it are probably copyright ©1993-1995 by Metrowerks Inc. and its Licensors.

Disclaimer

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Please address correspondence to:

John A. Baro
NASA Classroom of the Future
Wheeling Jesuit College
Wheeling, WV 26003
Internet: JABARO@COTF.EDU
AppleLink: [JABARO.COTF](#)

Thank you.

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