Displace

Displace is a plugin filter module for Photoshop that displaces one image by another.

```
Displace...                    ┌─────────────┐
                               │     OK      │
   Horizontal Scale: [10]      └─────────────┘
                               ┌─────────────┐
   Vertical Scale:  [1U]       │   Cancel    │
                               └─────────────┘
Displacement map:
   ● Stretch to fit
   ○ Tile
```
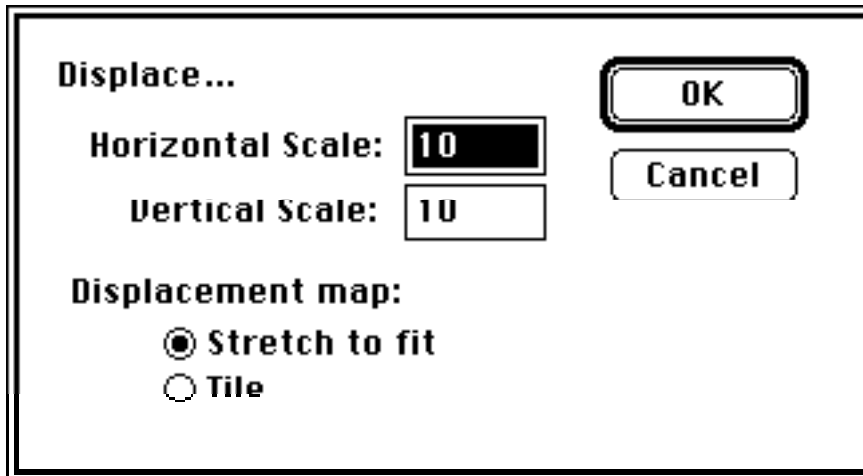
Displace reads a color value from the displacement map and uses it to control how far to displace the input image. A gray value of 128 is no displacement, 0 is maximum negative displacement, and 255 is maximum positive displacement.

When the displacement map is not the same size as the image being filtered (most of the time), you have a choice about how to make the map fit the image. It can be resized to fit the image, or it can be tiled (like filling with a pattern).

The scale controls are used to control the magnitude of the displacement. When the scale factors are at 100%, the maximum displacement is 128 pixels (remember that middle gray is zero displacement).

What is a displacement map?

A displacement map is any legal Photoshop file except a bitmap. If the map has more than one channel, horizontal displacement will be read from the first channel, and vertical displacement will be read from the second channel. If a one channel map is used, all of the displacement will be along a diagonal defined by the horizontal and vertical scale ratio. If, on the other hand, a two channel map is used, the displacement can be completely arbitrary, and any pixel can point to any other.

What can this be used for?

An example is in order here.

Let's say we want to make an image sag in the middle, like it was printed on a cloth that was held by the corners. Start by making a new grayscale image, 256 pixels wide by about 100 high (this dimention is not important, but small maps are better than big ones for memory reasons). Set the foreground color to black and the background color to white. Make a linear graduated fill from left to right. Using the Arbitrary map, filter the image with a curve that looks kinda like this:
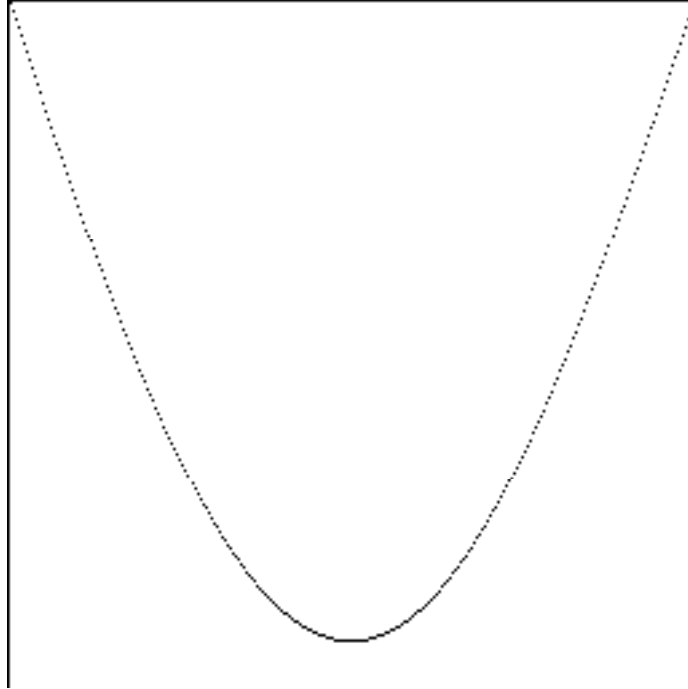
This is the shape of the distortion we're going to use. Save this image to disk.
Open the image you wish to distort, and call the displace filter. Set the horizontal scale to 0 and the vertical scale to about 50%. Set the method to "stretch to fit". When you hit "OK", you will be presented with a standard file dialog where you must select a displacement map. Select the map you just made. When the filter finishes, the image will have been distorted in a parabolic shape.

Memory requirements:
Displace requires enough memory to hold BOTH the entire image to be filtered, and the displacement map. If you try to filter an image bigger than the memory of your computer, or use a displacement map that is too big, Displace will fail with a "not enough memory" message.

About the examples:
Most of the example displacement maps require that the horizontal and verticel scale be set to 20%, and the "tile" method be used for the effect to work properly. How do they work? Most of these maps are divided into regions that are all displaced from the same pixel, giving them a uniform color for that cell.

Confused?
Well, okay, this is not an easy thing to understand. Experiment a little and perhaps you will gain insight into how it works. It is worth learning, because this filter can do some really amazing things.