

3D Photography Workflow

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Welcome to 3-D Photography

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The main goal of this class is for you to gain a **thoughtful understanding** of the differences between two dimensional and three dimensional imagery, and beyond that to produce art that's fun and interesting to you.

My hope is that during this semester you will be able **incorporate this style of imagery into projects and/or reports you produce for some of your other classes.**

3-D photography is also known as **stereo photography**, the "stereo" having nothing to do with sound. The word "stereo" means **two**. Stereo sound refers to two or more speakers making sound to replicate a live music experience. Stereo photography refers to two or (or more) images that work with your two eyes.

If you have two properly functioning eyes, they are two continuously running cameras coordinated by your brain, allowing for vastly richer visual experiences than you get in typical 2-D photography. 3-D photography has been around a long time. During the American Civil War fought in the mid 1800s, many photographs were shot in 3-D.

1) Close or cover one eye for 15-30 seconds. Look all around the room visually exploring the room as much as you can. With only one eye, you're seeing in 2-D, much like any ordinary photograph. After the 15-30 seconds, open both eyes and compare how much more information is available to you with both eyes open.

2) Curl one of your hands and put it approximately five to six inches in front of your face. Alternately open one eye and close the other, then switch one is open, then look with both eyes. Try to notice and appreciate how the right-eye-only picture is different from the left-eye-only picture, and how different these are compared to having both eyes open.

The primary tools you will use are cameras, computers and software (computer programs).

Any ordinary camera or camera-phone can be used to make 3-D images of still-life subjects. For live subjects, unless they're asleep or motionless, you'll need to shoot with two cameras and somehow be able to synchronize when they fire, or else use special two-lens 3-D cameras.

There is a computer program we'll be using called StereoPhoto Maker, specialized for 3-D photography. It works on PCs and Apple Macs that have a PC emulation mode. And you'll be using Photoshop.

StereoPhoto Maker is free. It was created by Masuji Suto of Japan, and is specifically designed to create and enjoy 3-D imagery. To get it type **StereoPhoto Maker** (capital letters don't matter) into Google or any search engine, and hit <enter>. At the top of your page you should see:

StereoPhoto Maker (English) stereo.jpn.org/eng/stphmkr/

Click on it, and it will take you to its web page. Near the top you'll see a download section. Clicking on the first link will let you load that program onto your computer. The most recent version when this was written was

StereoPhoto Maker Ver5.20 1457KByte 05/Feb/2017

Photoshop® is a complex and expensive image editing program, and you'll be using it in this class. There's a free program called **GIMP** and an inexpensive program called **Affinity Photo** that do much to most of what Photoshop does.

In this class we will be considering the differences between **2-D images**, traditional **3-D images**, and **photographic phantograms** (my personal specialty). Traditional 3-D images show depth. Phantograms go a step further and attempt to provide a realistic visual experience by imitating normal vision. For the past twelve years I've been producing thousand of these.

How to Shoot a 3-D *Cha-Cha* Shot

This only is intended for still life shots, but go ahead and try it on live subjects just to see why it's usually not a good idea.

Choose your subject and think about the backdrop. Backdrop is a critical part of the 3-D shot. Look for a shot that's cool to you. And look for interesting 3-dimensionality.

- 1) Lean on your left foot. Hold the camera as level as you can. Aim at the subject. Shoot.

- 2) Lean to your right foot, and in doing so, move the camera to your right. Continue to hold the camera as level as you can. Shoot.

Great work. You're on the way to a 3-D image.

Something to consider is *inter-ocular (I/O) distance*, the difference in distance the camera moves between the left eye and right eye shots. If you're shooting something far away, to get a 3-D effect you need a large inter-ocular distance, perhaps a foot or two, or maybe even more. For something close to you, you'd want to use a short inter-ocular distance. As a general rule, use approximately a 1:30 ratio of distance to the subject and how far right to move your camera for the second shot.

	Distance to Subject	Calculation	Feet	Inches
Example 1:	30 feet	30 feet / 30	1	12
Example 2:	12 feet	12 feet / 30	0.4	4.8
Example 3	8 feet	8 feet / 30	0.2667	3.2
Example 4	3 feet	3 feet / 30	0.1 feet	1.2

For most adults, the eyes are approximately 2.5 inches apart. Another way to say this is that our inter-ocular distance is approximately 2.5 inches. Measure yours in a mirror.


Workflow for Producing Cha-Cha Shots into Anaglyphs using StereoPhoto Maker


- 1)** Shoot “stereo pairs.” Each stereo pair consists of two shots, first a left-eye, then a right-eye shot.


- 2)** Move your images from your cellphone through the computer to your thumb drive.

- 3)** Rename the images. For any stereo pair, use the same name followed by -L or _L for the left eye image, and -R or _R for the right eye image.

- 4)** Using StereoPhoto Maker (SPM), and from the menu on the top select File and then to Open Left/Right Images. It will first ask you for the left-eye image, so select that. If the image’s file name ends with L, and there’s a file of otherwise the same name that ends with R, SPM will guess that’s the right eye image you want, and ask you to confirm. If it doesn’t find a file named that way, find and choose the right eye image of the stereo pair.

- 5)** SPM will load the two images and place them side-by-side. Because these shots were hand-held, most likely there will be some issues to be corrected to turn the stereo pair into a good 3-D image. From the menu at the top, click on the Auto-Align icon (). SPM will compare the pixels in the two shots, correcting for size differences, camera tilt and other issues, and create a new stereo pair from them. At this point you might want to save this new image. Give it a name like the name of the original images, but instead of -L or -R, end it with “LR” or “side-side”.

- 6)** Turn your side-by-side image into an Anaglyph image by clicking on the Anaglyph button (). A single anaglyph image will take the place of the side-by-side stereo pair. There are some good anaglyph options you might experiment with. Colors such as red, orange, pink, light blue, and some tints of green aren’t very good when viewed with anaglyph (red-cyan) glasses. The anaglyph options include “color” (default), “half-color”, “dubois”, and others. Have a look at them to see what best suits the colors in your shot. Then save your anaglyph image using a similar file name, followed by the letter “A” for anaglyph, or the word anaglyph itself. Other adjustments such as cropping or brightness-contrast can be done later.

- 7)** You can crop your image by using the Free Cropping tool () from the menu at the top. Define your cropping area by clicking at one corner and dragging to the opposite corner where you want it cropped, and then clicking on it.

StereoPhoto Maker doesn’t have tools for adjusting brightness or contrast levels like Photoshop, so you’ll need to use other software to improve your image in those ways.

Workflow for Producing Phantograms using Photoshop®

Visually imitating reality and normal vision based on a **Window** and a **Point of View**

1) Shoot your Stereo Pair


You need a subject and a rectangular background for your image. A sheet of paper, a rectangular tabletop, a patio tile, almost any rectangle will do. If you're not sure of its width and length, measure it and write it down. This rectangle is your Window.

Place the subject of your shot onto the Window, all the way to the front edge. Position yourself looking down at it from back at an angle. Exactly what angle isn't important. Look for a shot you like, keeping one rule in mind: Visually your subject must fit entirely onto the Window from both a left and right eye view. Find your Point of View, which is actually two points of view, one for each eye.

Get ready for the left eye shot. Position your camera left of center, lined up so that the bottom line of your Window runs straight across and not at an angle. Shoot. Slide over right a little, maybe just an inch if you're close to the subject, maybe as much as a few inches if your set back far. Try to keep the bottom of the Window straight. Shoot.

Move the images into your computer. Rename them with the same name, but using "-OL" or "_OL" for the left eye image, and "-OR" or "_OR" for the right eye image, to signify these are the Original left and right images.

2) Process the Stereo Pair in Photoshop®

Open both images of your Stereo Pair in Photoshop®. Select one of the images (either left or right OK). Using the Crop Tool ( third from top) drag from one corner of your Window to the opposite corner. This should create a dotted box with corner and side nodes. In the area above the images you'll see some options including a checkbox for Perspective. This box must be checked, which will allow you to move the four corner nodes independently.

Drag the corner nodes to the four corners of your Window. For more precise placement, zoom in by holding down the CTRL button and hit the + button a few times. This will enlarge the image. Use the slide bars on the right and at the bottom to move up, down, left and right. When all four corners are lined up with the corners of your Window, hit the ENTER button. This will crop the image, but the height and width of the image will be unpredictable.

From the menu at the top of the page, choose Image and then Image Size. The Constrain Proportions checkbox must be unchecked. Enter the width and height of your Window. Set the Resolution to somewhere between 72 and 600, so that the pixel width of the resulting image is at perhaps 1200 to 3000 pixels wide. Hit OK, then CTRL 0 (zero), which will show you the whole image.

In doing this procedure, you've effectively removed / reversed out the "effects of perspective", more or less put the image back to it's real life look and proportions. Do the same process for the other image of your Stereo Pair.

Workflow for Producing Phantograms using Photoshop®

(continued)


Now is a good time to save the two “perspective reversed” images. From the menu at the top, select File, then Save As. I’d recommend you name these files to include the letter “P” before the “L” or “R”. Doing so is for your benefit later, to signify they’re Processed or Perspective reversed images (they should end “PL” and “PR”), instead of ending “OL” or “OR” to signify Original left and right.

3) Combine your Stereo Pair into an Anaglyph image

There are a number of ways to do this in Photoshop®, but for this guide I’ll only mention one. You’ll need to use the Channels window, so if it’s not already showing, select from the menu at the top Window and then Channels.

All colors on a computer are derived from some combination of Red, Green and Blue (RGB) light. To make a “color anaglyph” image from your Stereo Pair, you’ll be combining the red channel of the left eye image with the green and blue channels of the right eye image. Doing so will allow your combined image to work with red-cyan 3-D glasses using a blocking technique. The goal of this blocking technique is for your left eye to get only the left eye image, and your right eye only to get the right eye image. Anaglyph images are by their nature imperfect, but workable.



Click anywhere on the right eye image of your processed Stereo Pair. In the channels window, click on the word Red. The Red box will be highlighted and the RGB, Green and Blue boxes will not be. On the left side of the channel window is an “eyeball” selection. Choose RGB there. Effectively you’re saying you want to work only on the Red channel, but see all.

Then click anywhere on the left eye image and do the same, select to work in Red, but see all (RGB). Once you’ve done this in both images, choose from the menu at the top Select and then All. A dotted line should surround the left eye image. Using the Move tool ( top), click anywhere on the left eye image and drag it to the right eye image and let go. Since you’re selected to work in the Red channel, only the red channel will be moved. Drag that red channel from the left eye image around a little, see what it does, and position it on the right eye image so the dotted line is centered and visible both up and down and left and right. If you’ve done everything right so that both images are the same size, you can hold the Shift key down while dragging it, and it will position itself perfectly (Copy and Paste will also work). Congratulations, you’ve created a “color anaglyph” phantogram. Save this image, removing the “L” or “R” designations.

Depending on the colors of your subject and backdrop, other styles of anaglyph might be better, and there are other options available to you in **StereoPhoto Maker**, so that might be a better program for doing this.

4) Improve the quality of your image

In the channels window click on RGB, so you’ll be working with all colors now. From the window at the top select Image, then Adjustments, then Levels. Play with the settings to get your best image, or alternatively, you can select Image, then Adjustments, then Auto Levels, and Photoshop® will adjust the image as it thinks is best.

You can crop your image by using the cropping tool () or the Rectangular Marquee tool (), followed by choosing Image from the menu at the top and then Crop.


Workflow for Producing Phantograms using StereoPhoto Maker



1) Shoot your Stereo Pair


The same directions as those for producing phantograms with Photoshop apply (page 5)

2) Process the Stereo Pair in Photoshop

Open Left/Right images of your Stereo Pair in StereoPhoto Maker. The process will be to define the four corners on both the left and right eye images. In doing so you can start on any corner, and can proceed either in clock-wise or counter-clock-wise direction.

From the menu at the top hit the down arrow portion of the Real Size or Zoom (), and choose 200%. Click anywhere on the image screen, a hand icon will appear. Drag on it so one of the corners of your Window is showing in both left and right images. Hold the ALT key on your keyboard and hit the F key. Horizontal and vertical lines will appear. Position them on the corner of either the left or right eye image and click, then do the same on the other image. It doesn't matter if you do the left or right image first. Click again to get the hand icon, and drag to the next corner (either clock-wise or counter-clock-wise OK). Again, hold the ALT key and hit the F key. Click on the corners of your Window. Drag the image to the next corner, repeat the steps of ALT F, clicking on the corners, and do the same on the fourth corner. Once you've done all four corners, a new window will open. Toward the bottom, check Rectangle, then in the Aspect Ratio box, enter the width and length of your Window. Click on Apply, then OK.

From the menu at the top click on Fit () and the adjusted Stereo Pair will appear. If you want an anaglyph phantogram, then click on the Anaglyph symbol () and choose which style of anaglyph you want. Depending on the color of your subject and backdrop compare color, half-color, Dubois, Suto, or SPM, and see what looks best with your anaglyph glasses.

You can crop your image by using the Free Cropping tool () from the menu at the top. Define your cropping area by clicking at one corner and dragging to the opposite corner where you want it cropped, and then clicking on it.

StereoPhoto Maker doesn't have tools for adjusting brightness or contrast levels like Photoshop®, so you'll need to use other software to improve your image in those ways.