Worksheet – Digital Imaging > Channel Mixer*

Due:

Objectives:

1. To understand how channel mixer works.
2. To learn how and when to use channel mixer to customize conversion of color photos to black-and-white.

Introduction:

With the traditional darkroom techniques, printing color negatives on black-and-white photo papers often results in images with low contrast, making the visual effect less striking than those are shot on black-and-white films.

With digital imaging technology, digital cameras are capable of capturing images in black-and-white directly. However, it is not uncommon that artists prefer shooting in color in digital or scanning color slides/transparencies to create black-and-white prints. Color images can then be converted to black-and-white (grayscale) with imaging editing programs such as Adobe Photoshop. For digital imaging, it is actually better to shoot in color even you are aiming for a black-and-white print. Why? You can find out more the technical rationales in the Art Module Chapter 2 The Art of Digital Imaging.

In this exercise, you will use and compare two different methods of converting color images to black-and-white images (actually, grayscale in digital imaging) – by changing the color mode to grayscale and by using the channel mixer tool.

Instructions:

Sample image to use in this exercise:
A sample image, called grayscale-this-pear.tif, can be downloaded from http://digitalmedia.wfu.edu/project/nsf-due-0127280/interactive/ and look under Channel Mixer. This image is a TIF file, originally created in Adobe Photoshop. It contains the color makeup that will help you easily see the difference of the grayscale images produced by the two different methods.

I. Conversion to Grayscale Mode Vs. Channel Mixer

1. Open the sample image grayscale-this-pear.tif in Adobe Photoshop or any image editing program that lets you convert color images to grayscale mode and has channel mixer tool.

2. Save it as grayscale-mode.tif.

3. Convert the image to grayscale mode: Choose Image > Mode > Grayscale.
   The color image is converted into a grayscale image.

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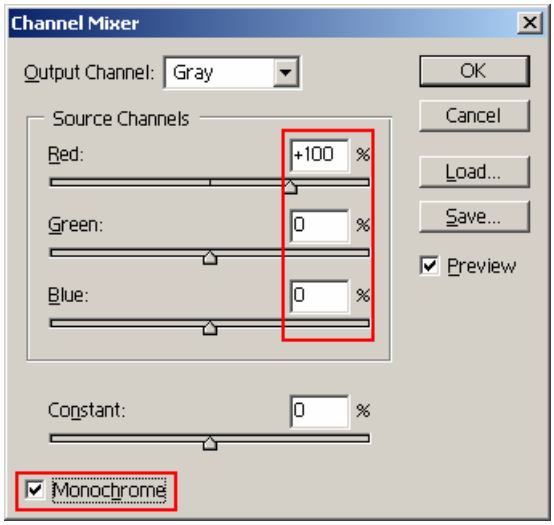
4. Open grayscale-this-pear.tif again. This time, you will use the Channel Mixer to convert the image to grayscale.

5. Before you open the Channel Mixer, open the Info window because you will need this in the next section. If the Info window is not open yet, choose Window > Info.

   Also arrange the grayscale-mode.tif and the grayscale-this-pear.tif side-by side so that you can view most, if not the whole, of both images.

6. Choose Image > Adjustments > Channel Mixer…

7. Check the Monochrome checkbox. (See the figure below.) Then, adjust the Red, Green, and Blue by using their sliders or entering a percentage for each channel so that the resulting monochrome pear image matches *approximately* the grayscale-mode.tif.
   Keep the Channel Mixer



Question: What are the percentage numbers for Red, Green, and Blue channels?
Note which channel is the highest.

Red:

Green:

Blue:

The average human eye is most sensitive to green/yellow light. Therefore, the grayscale mode conversion is giving more emphasis on the greens.

II. Calculation of Percentages for Red, Green, and Blue

To understand how the channel mixer works, let's try the followings.

1. With the Channel Mixer dialog box still open, move the mouse over a color in the grayscale-this-pear.tif; choose any color except the red, green, and blue square at the bottom of the image. Look up the RGB values of that color in the Info window. In the Info window you should see two sets of RGB values separated by a slash (/). The values on the left are the original color before the adjustment made by the channel mixer; the ones on the right of the slash are the new values with the adjustment made in the channel mixer. Note these old and new RGB values and answer the following questions.

Questions:

1. What are the new RGB values read from the Info window?

2. What are the old RGB values read from the Info window?
   Red:

   Green:

   Blue:

3. To see how the new RGB values come from, let's do some math with the old RGB values and the percentage values you set for the channels: multiply each of the old RGB values with the corresponding percentage set for its color channel in channel mixer. Then, add them up.

   For example, say the old RGB are:
   R = 252, G = 207, B = 203.
   And, the percentage values I set in the channel mixer are:
   Red = 16%, Green = 72%, Blue = 12%.

   Then,
   252 x 0.16 + 207 x 0.72 + 203 x 0.12
   = 40 + 149 + 24
   = 213
   And, this matches the new RGB values.

   Now, try the above with your sets of old RGB values and your channel mixer settings. Show the calculation below and see if it matches the new RGB values.

III. What does higher percentage of a source channel mean?

There are three square block below the pear: red, green, and blue.

1. With the Channel Mixer dialog box still open, set the Red source channel to 100% and the other two source channels to zero. Move the mouse over each of the red, green, and blue squares and note their old and new RGB values.

Questions:

1. What are the old RGB values of the square blocks?

	Red Square	Green Square	Blue Square
R:			
G:			
B:			

2. What are the new RGB values of the red square block? What does the color that this RGB values represent?

	Red Square	Green Square	Blue Square
R:			
G:			
B:			
Color:			

3. With the other two source channels set to zero, slide the red source channel slider back and forth. Describe how the increase and decrease of the percentage of red source channel affect the color for the three squares.

% of Red source channel	Red Square	Green Square	Blue Square
increase			
decrease			

2. Repeat the above step with Green source channel set to 100% and the other two channels to zero. Note the old and new RGB values of the red, green, and blue squares.

Questions:

1. What are the old RGB values of the square blocks?

	Red Square	Green Square	Blue Square
R:			
G:			
B:			

2. What are the new RGB values of the red square block? What does the color that this RGB values represent?

	Red Square	Green Square	Blue Square
R:			
G:			
B:			
Color:			

3. Repeat the above step with Blue source channel set to 100% and the other two channels to zero. Note the old and new RGB values of the red, green, and blue squares.

Questions:

1. What are the old RGB values of the square blocks?

	Red Square	Green Square	Blue Square
R:			
G:			
B:			

2. What are the new RGB values of the red square block? What does the color that this RGB values represent?

	Red Square	Green Square	Blue Square
R:			
G:			
B:			
Color:			

Questions:

1. Multiple-choice:
   As you see above, for a "reddish" color (color that has a high value in the red component), a higher percentage for the Red source channel in Channel Mixer, with the Monochrome on, will make this color become:
   A. lighter
   B. darker

IV. Challenge: Determining the Percentages for Red, Green, and Blue for the Pear Image

The original pear image makes use complementary colors placed side by side, for examples, the yellow-orange in the pear is placed next to the purple stripes in the background. The yellow/orange in the pear is also placed next to blue-green in the pear. When complementary colors are used side by side, each color can make the other seem more vibrant.

However, as you have seen in the Section I above, a simple conversion of

the pear image to grayscale with mode changes renders this particular image flat with less distinguishable strokes.

Channel Mixer gives you more control in the conversion process by setting percentages for each source channel.

Experiment with Channel Mixer to convert this pear image to a grayscale image so that it still preserves the original vibrant essence which now will be manifested as contrast in its grayscale version.

1. Record the percentage of each source channel that you decide.

   Red:

   Green:

   Blue:

2. Save this grayscale image as a TIF or PSD file and name it with your username. Turn in the image.
   (Save on a disk, CD, send in an email, or upload to a computer -- Ask your instructor to see what he/she prefers.)