

Photoshop Session 1

This session will cover only “global” changes to images. That is, changes to the whole image and not just a part of it. Session 2 will get us into changing one part of an image without changing the whole thing.

This time we will concentrate on a few tools and only some of the items that appear in the window when you open Photoshop. The first challenge is to figure out how to get an image file loaded and the image visible on the screen. We use the File Browser to do this. Once the image is on the screen we can evaluate what needs to be done to the entire image to improve it in some way. Not every image needs to be changed by Photoshop.

Menu Items used for first lesson:

File

- Save As

Edit

- Transform

 - Rotate

 - Distort

 - Perspective

 - Skew

Image

- Image Size

- Reveal All

Layer

- Duplicate Layer

- New Adjustment Layer

 - Levels

 - Color Balance

 - Hue/Saturation

- Flatten Image

Filter

- Sharpen

 - Unsharp Mask

View

- Fit On Screen

- Actual Pixels

Layers

We will emphasize non-destructive image editing. That is, the image will be changed in such a way that you can always undo a correction or change the settings for a correction that has been made. The advantage of this of course is that as you make further modifications in an image you might want to go back and change a previous adjustment.

For this reason we will start using Layers immediately. If you load an image, say a .jpg, and make corrections without using layers, you modify the values for each pixel in the file. If you change your mind later and make a further change, you lose some of the original information because you have applied two corrections in succession. (It is the problem of so called rounding errors in mathematics. Repeated operations allow errors to accumulate). The reason to use a layer is simple. First of all, think of a layer as a large spread sheet. On the sheet there is a box for each pixel of the image. That box contains the information that tells Photoshop what to do to that pixel to bring about the correction. When you look at the image in Photoshop, those corrections are applied to the original values, BUT the original values are left unchanged. Each Layer contains another spreadsheet giving instructions on how to manipulate each pixel of the image after it has been manipulated by the previous layer's instructions. Some of the layers' instructions may be very simple, the same "formula" being applied to each pixel, such as for example, "Multiply the red value in each pixel by 0.8" to shift the color balance away from red. Others might possibly have a different instruction for each pixel in the image. The image that you see on the screen is the original image with all of the successive layer corrections applied to it.

Because the corrections done by a layer don't change the original value, you can always go back and adjust the corrections in any layer and not ever lose any information, nor ever modify the information in the original image. When you are done correcting an image you can save the image with all the layers still separate, as a PSD file. PSD files are BIG but if you think you might ever change your mind concerning any correction you have made, you can reload the PSD file and continue where you were when you saved the file. You can even delete a layer and it's corrections if you decide to do something different or if you think there might be a better way to correct the image. It is important not to save the file as a .jpg file again without renaming it, or you will overwrite your input file, assuming the original was a jpg.

Adjustment Layers

We will limit ourselves initially to just a few types of adjustments, those most commonly used, and discuss how to do them and what order is best.

In the upper right hand corner of the Photoshop work area is a histogram. The histogram is nothing more than a bar graph. The overall histogram shows how many pixels are at each of the 255 brightness levels in an image. At the left is black, brightness 0. At the right is White, brightness 255. In the middle is brightness 128, a medium gray.

If your image contains no blacks, the values at the left end of the histogram will be zero or very small. If it contains no whites, the values at the right end of the histogram will be zero or very small.

Usually a well exposed image will be lacking in blacks or whites, or both. Our first Adjustment tool is called Levels, and it will be used to improve the tonal range of an image. MOST images benefit from containing brightness (or Luminosity) values from 0 to 255. The image has good contrast when this situation exists. You may not want to include the darker tones in, say, a picture taken in a fog or haze. However, for now we will concentrate on stretching the tonal range of an image to fill the histogram or nearly so. There is no “standard” look to a histogram. The shape of the curve is very dependent on the subject.

The histogram can tell you if your image is overexposed. If there is a large value (called a spike) at the extreme right end of the histogram, some of the highlights are pure white or “blown out”. If there is a large value at the extreme left of the histogram, your image is underexposed and a lot of pixels are pure black.

Levels

We get the menu for adjustment layers and choose Levels. We get a box asking us if the name “Levels 1” is OK. Usually the default names are fine and I wish fervently that there would be some way to turn off the name window and save a mouse click every time you use the tool. OK so we say OK to the name and we get a window that looks like a copy of the Histogram that is already on the screen. However in this window we can do something about the histogram besides looking at it. Below the histogram diagram are three little triangles. Let’s say the brightest pixels in your image are only at value 210. You grab the right hand triangle with the mouse and drag it to the left to the 210 value and magically the histogram is stretched out so that the 210 value becomes 255 and all the other values are pulled up accordingly. At the left end of the diagram is a black triangle. Suppose the darkest value in the histogram is 46. You slide the black triangle up until it is at 46 (value appears in a little box on the diagram) and the bottom of the histogram is stretched so the darkest value is 0 or nearly so. In the process of spreading the brightness values sometimes there are some levels that go to zero so you have “slots” in the histogram. If there are too many of them, the image may show visible edges where one level changes to another. This is called “Banding” because you see intensity bands in the image. This indicates that you have stretched things too far! This is a good reason for shooting in Raw mode, but that’s another story for another time!

Now comes the real fun. Image look too dark? Grab the middle triangle and drag it to the left. The image becomes brighter in the mid tones but black and white don’t change a bit. Image too light? Drag the middle triangle to the right to darken the mid tones.

When you are happy with the tonal range and brightness of the image, click OK in the Levels box and it will close. On the lower right of the screen you will see a “pile” of layers. At the bottom is your original image, called the background layer. On top of that is the Levels adjustment layer. At the left of that icon is an eye. Want to see what the image looked like before your adjustments? Click on the eye and it will disappear. The layer will be shut off. Click again and the eye returns. Neat, Huh?

Hue/Saturation

Now let’s make another layer, a Hue Saturation layer. Go to the layers menu, move down to Adjustment Layer and over to Hue/Saturation. Click that and go through the layer naming process again, i.e. click OK. Now you will have a box with three sliders. Grab the Saturation

slider with the mouse and drag it all the way to the left. Voila! You have a black and white image. This is the simplest way to get one from a color image, though far from the best way. We'll cover that another time.

Now drag the slider all the way to the right. See the totally exaggerated colors! Might make an interesting poster. OK so we don't want black and white, and we don't want a poster. Just move the pointer to a more reasonable setting. If the original image was a bit drab, increase the saturation. If increasing the contrast in the Levels adjustment made the color too bright (it does sometimes) reduce the saturation. Note now you have a third layer in the pile. There are two other sliders in the Saturation adjustment window. One says LIGHTNESS. Don't use it. We've already looked at the better way to adjust the lightness of the image with the Levels controls. The third slider is a HUE adjustment. It rotates all the colors through the standard color circle. It very seldom does anything useful to an image unless you want to do something strange! When you are satisfied with your Saturation adjustments, click OK.

Color Balance

Now select the layer menu again and an adjustment layer. Select Color Balance. Same old window wanting to know if you want to give the layer a name. The default one is usually OK at least at this point in our exploration of Photoshop. This tool also has three sliders. There is one for each of the three "primary colors" and their opposites. One controls RED/CYAN, one BLUE/YELLOW and the third GREEN/MAGENTA. You can think of the second colors in the above as negative. That is, Cyan is minus RED. If the image is not red enough, you move that slider toward red. If it is too red you move the slider in the Cyan direction. Another way of looking at the secondary or negative colors is that each is a mix of two of the primary ones:

Cyan = minus Red = Blue plus Green
Magenta = minus Green = Red plus Blue
Yellow = minus Blue = Red plus Green

The primary colors are called additive colors. If you project light through three filters, Red, Blue and Green and overlap the images (and balance the intensities correctly) the place where all three overlap will be white. The places where two overlap will show cyan, magenta and yellow.

The secondary colors are the subtractive colors. They are used for inks (and in your printer) Cyan plus Magenta plus Yellow = Black. Printing inks are not perfect, so most printers use black too, four colors, Cyan, Magenta, Yellow and Black or CMYK for short. For photographic printing, because of the limitations of the printer the better ones all add light Magenta and light Cyan. These boast 6 color printing. The printer is limited in the minimum size dot that it can put on the paper, so the diluted colors are used when a very small dot is needed.

Well, so much for color theory. Now with the sliders in the Color Balance tool you can fix the color balance of your image. Suppose you took a shot on an overcast day but you would like to make it look more like a sunny day. Increase the Yellow by dragging the appropriate slider. Try a value of 20. Now increase the Red by about half as much. At this point I might say to "season to taste" with regard to color balance. When you have what you like, click OK and notice that you now have four layers showing. You can turn any one or all of them off by clicking on the Eye image. Sometimes a later change makes it necessary to change an earlier setting. Just click on the icon and the adjustment window opens again for you to readjust things. You might notice that there are three boxes or buttons in the window that indicate Shadow, mid tones or

Highlights. Normally the mid-tones box is selected. If you want to change a color tinge in the highlights only, you can select highlights, same for shadows. My observation is that the corrections are not very well limited to highlights or shadows if you make those selections, but they do have some effect.

Saving your image

Now your image looks like what you want. What do we do next? Save it of course, but we do NOT save it back to the original file name. It is advisable if you have the space on your hard drive or have a CD burner, to save the image as it is now with all the separate layers. Click Save As. From the file type choices select PSD. And click Save. It's done. You can of course save it in a different folder because Save As gives you the opportunity to select a different path for the file.

Now if you ever want to change your interpretation of the image you can load the PSD file and you will be right back where you left off.

Printing your Image

Ok so now what? Let's make a 5 by 7 print. Over on the left is the tool bar. Click on the icon that looks like a pair of carpenter's squares. Now at the top of the screen three boxes open. In the leftmost one labeled Width, type 7 and move over to the second with your mouse. It is labeled Height. Type in 5. Move to the third box and type in the dots per inch for the image. For a small print like this, most cameras produce enough resolution so that you can use 300 for that value. Now put the cursor in the upper left hand corner of your image and drag down and to the right. You will see an outline of the area to be kept when it is cropped. The rectangle maintains the proportions of 5 to 7. If you make it longer it automatically becomes wider. Of course the image won't fit that frame. If you have an SLR the image will fit 5 by 7.5. If you have a point and shoot with a 3 to 4 image ratio, it will fit 5 by 6.67 inches. You can crop to an odd size or you can crop away some of your image to fit the format of the paper. After you drag the lower right hand corner down you can release the mouse button. Now you can drag the whole crop area in any direction, being careful not to drag an edge past the edge of the image. You don't have to use the whole width or height of the image. You can crop a fraction of the image. You can drag the corners of the crop area until you are happy with the image. Now RIGHT click inside the image and left click on CROP and the job will be done.

I must emphasize that you have not only cropped your image but you have resized it. You can crop an image without resizing it. I frequently do that just to get a nice composition from my initial image. Select the cropping tool again. In the so called options bar you will see your 5 by 7 by 300 DPI that we have just set up. Click on the CLEAR button and those dimensions will all go away. Now you have a free form crop tool. You can crop the image any way you like, square, long narrow or whatever. The resolution will not change when you crop in this manner.

Resizing seems to be the bane of any discussion about digital images. It is not, or should not be so mysterious. Suppose you have a 1 megapixel camera that takes a square image, 1000 by 1000 pixels (1000 times 1000 = 1,000,000 or one megapixel). Now you want to make a 6 2/3 inch square print. How many pixels per inch would you get if you didn't resize the image? $1000/6.67$

= 150 pixels per inch, but if you print at that resolution the resulting print will show stairsteps in diagonal lines. So, we let Photoshop add pixels.

Since Photoshop has no information from which to add pixels, it “interpolates”. In our present case we need to double the number of pixels in each direction, i.e. make a 2000 by 2000 image. That means that Photoshop will generate a new pixel half way between each pair of pixels. The simplest way would be to average the values. Left pixel has a value of 100, right pixel has a value of 150, add a pixel between with a luminosity of 125 etc. Photoshop uses a better calculation than just the average for conditions where the numbers don’t come out as even as in this example.

Ok so we resize our image to 2000 by 2000 and print it 6.67 inches square and have 300 pixels per inch on the print. Just what we wanted. The complication is that if you make a number of different sized prints, you need to resize the image for each one to get optimum print quality. Obviously resizing can degrade the image so you don’t want to resize the same image serially but always start with the PSD file you saved away.

Next step is to FLATTEN the image. Go to the Layers Menu and at the bottom is the item Flatten Image. Click on that and all the layers will be combined into one. This cannot be reversed!! You still have the PSD image that you just saved on your disk however. Now with the image flattened, select the Filter Menu and select Sharpen. Select “Unsharp Mask”. In the window that opens, set the Levels slider to 1. Set the Radius slider to 1.3. Check the preview box. Now put the little box that becomes the cursor at a point of interest in the image and click. The preview box shows that area of the print. Now move the Amount slider up all the way. You will see the effect of very much oversharpening. Back off until the preview box looks reasonable. The preiew box shows actual pixels and is a good way to decide whether the image is over sharpened or not. I’ve used values from 50 up to 250 with these settings. When you are happy with the results click OK. These values are just starting points. Increasing the Levels slider reduces the sharpening and eliminates adding noise to things like blue skies. Increasing the Radius increases the sharpening.

Now you have a file ready to make a 5 by 7 print. Time to save it in yet another form. Click Save As and choose TIF or TIFF file type. Now when I size and sharpen an image for a particular size print, I rename the file. You can use the original name assigned by the camera, but edit it to add “7_5” for a horizontal print or 5_7 for a vertical.

For example: IMG4567 7_5.TIF

Now save the file and you are ready to make a 5 by 7 print anytime you want one. If you want to make, say an 8 by 10, go back to the PDF file, and crop to 10 by 8 by 240 pixels per inch. Then flatten the image (you can flatten it first if you like), and go through the sharpening process with this newly scaled image. Save it with 10_8 or 8_10 added to the filename. For larger images I use 240 pixels per inch because we look at larger prints from farther away. 240 is a good value for the printer, and having a bit less resolution in the print does less damage to the image than increasing the image size too much by adding too many pixels.

Lastly we can do a couple of other things to a whole image, that is a Global change. Suppose you have a nice landscape but the horizon is crooked. I have plenty examples.

Get the file loaded and select “Fit image on screen” from the View menu. Now from the view menu select zoom out. Your image will have a gray area around it. In the Layer menu select Duplicate Layer and accept the default name “Background copy”. You won’t see any difference. Photoshop won’t let you rotate the original background image but you can do what you like with the copy. Go to the Edit Menu and select Transform. A sub menu gives you several choices. Choose Rotate, the one high up in the menu. Now when you put your cursor in the image you will see a curved line with an arrow at each end. Position the cursor near a corner of the image and move it in one direction or the other and the image will rotate. You can eyeball a level horizon or you can drag a guide line down from the ruler at the top of the window. When you have the image level hit ENTER on the keyboard and wait a moment until the frame goes away. Now it might look like the image still fills the area but it does not. Click on the Eye icon for the background layer and you will see that parts of the image are missing. Select the crop tool and click on the CLEAR button to the right of the Resolution box. This makes the crop free form as discussed previously. Carefully mark the biggest rectangle you can inside of the real image, excluding the corners that are empty and select CROP after a right click. now you have straightened your image.

Perspective Correction

Now suppose you have a building in your photo. You’ve pointed the camera up at it so perspective seems to make it get smaller at the top. This is particularly apparent in pictures of a building.

Select the Edit Menu, Transform, and Perspective. Now drag one of the top corners outward. The other will mirror the action. At some point the perspective will be such that the sides of the building are parallel and straight. ENTER again and the image will be corrected. Since you’ve made the top of the building wider, it might look a bit squat.

Edit Menu, Transform, Distort. Now drag the top of the image up until the building looks normal. You might first go to the Image menu and select “Reveal All” so you can see the keystoned image shape and also the top of the image as you drag it up. Now you will have to crop again to get back to a rectangular image.

There is one other useful transform correction, called SKEW. With it you can make a different perspective correction on each side of the image. You can pull the corner of the image by dragging it, and only that corner will move. With the PERSPECTIVE tool if you drag the upper right hand corner to the right, the left corner moves to the left by the same amount automatically.

REMEMBER that the Transform and Rotate functions only work on a COPY of the background image. Now you can save the image as a PDF or continue to make other corrections on it.

This ought to be more than enough for one session! Practice all of this on some of your images. Get comfortable with Layers and saving PDF and TIFF files. To summarize our use of files, we started with a .jpg file, the original image. We made corrections to the image using layers, and saved the file with the corrections as a .PSD file. Then we flattened the image, chose a print

size, cropped and resized the image to fit the print size, sharpened it and saved it with a tag to the filename indicating the size of the print for that TIF image file. That is it unless you have started with a RAW file, in which case you will not have the .JPG file, but a RAW instead.

Next time we'll look at changes to PARTS of an image rather than the whole image.