

Gray Gradients

The gradients have tickmarks at white, 50% gray, and black. There are 512 lines in the gradients, plus some solid black and white on each end, so zooming the windows out to 50% won't hurt these experiments, but does make them harder to see. One image is in Lab, the other is in RGB.

These exercises assume that you have 24 or 32 bit color enabled (Millions); have a CRT (Cathode Ray Tube) based monitor (LCD or plasma won't do -- you can't calibrate them yet); have both images open and visible (preferably side by side) in Photoshop 5; and have calibrated your monitor (using Adobe Gamma or another calibration utility).

No matter how your monitor or RGB space is setup (assuming you haven't actually lied about your monitor), the Lab gradient should always look uniform: at the 50% mark the gray should look like it is halfway between white and black and it should look like the gray values are balanced on both sides.

Exercise 1

Open RGB Setup, move the dialog so you can see the two gradients, make sure Preview is turned on and Display Using Monitor Compensation is on. Select sRGB. Look at both gradients.

If your monitor and video card are good, then you won't see any banding in either gradient, the white and black points will look pretty close to the end tickmarks, and the entire gradient should look close to neutral gray (no color casts).

If your video card has an extreme gamma adjustment in its LUT, then you may see banding in both gradients -- in this case you probably should check the settings in your video card driver, and you may need to re-calibrate using Adobe Gamma or another monitor calibration utility.

If your monitor doesn't have its brightness or contrast controls set correctly, then you might see the black and white points somewhere away from the tickmarks -- I suggest you run Adobe Gamma or another monitor calibration utility and follow the directions.

If either gradient has an overall color cast, then you probably don't have a good profile for your monitor -- the problem is likely to be the white point or the phosphor set specified. Check with your monitor documentation or manufacturer for the correct information. If the color cast isn't too bad, then go ahead. (on the other hand, if the white area looks like peach, you probably won't be able to make great color judgements on that monitor).

Exercise 2

With RGB Setup still open and positioned so you can see both gradients, make sure Preview is turned on and Display Using Monitor Compensation is on. Select sRGB. Now change the gamma value to 1.0. Now change the gamma value to 3.0. Play with the gamma value in your RGB Setup and try to find a value that makes the RGB gradient look just about like the Lab gradient. At that value (or close to it) you have a uniform distribution of values, and a uniform coding of perceived lightness. Make note of this gamma value (it should be pretty close to 2.5)

Exercise 3

With RGB Setup still open and positioned so you can see both gradients, make sure Preview is turned on and Display Using Monitor Compensation is on. Select sRGB. Look at both gradients. They should look very similar at this point. Change the gamma to 2.45. The gradients should now look even more alike. Hit 'OK' to accept the new gamma value. Make sure the Info Palette is visible. Set the Info Palette left readout to show Lab values, and the right readout to show RGB values. Select the Gray Lab image. Move your cursor over the Gray Lab image and over the gradient next to one of the 50% tickmarks. Using precise cursors (in preferences/Display&Cursors) can help you position the cursor more accurately. The Info palette should say that the Lab value is 50% and the RGB color values are 127. This means that the middle value (out of 255) is being used for the middle gray. Select the Gray RGB image. Move your cursor over the Gray RGB image and over the gradient next to one of the 50% tickmarks. The Info palette should say that the Lab value is 50% and the RGB color values are 127. This also means that the middle value is being used for the middle gray, and that half the values will be used for light grays and half the values for dark grays...in theory. Look at the dark half of the gradients. On most monitors you'll see that the black point has moved upward slightly and that the 50% point seems to be a little dark. Open up RGB Setup Select sRGB -- this resets the gamma to 2.2 Now the RGB Gradient should look a little more balanced

Why is the gamma that matches the Lab values not showing a balanced gradient?
Because the gamma of your eyes depends on what you're looking at, how bright it is and how bright all the surrounding scenery is. A gamma of 2.2 comes closer to looking right when viewed on most CRTs under common viewing conditions. (in other words: it's an average)

Exercise 4

With RGB Setup still open and positioned so you can see both gradients, make sure Preview is turned on and Display Using Monitor Compensation is on. Select sRGB. Change the gamma to 1.0. Notice that at the 50% tickmark, the RGB gradient is now

much lighter than the Lab gradient at the same tickmark. Notice that there are very few dark grays in the RGB Gradient, the transition to black is very sudden. This is because at gamma 1.0, more bits are being used for lighter grays (highlights) than for darker grays (shadows). Hit 'OK' to accept the new gamma value. Make sure the Info Palette is visible. Set the Info Palette left readout to show Lab values, and the right readout to show RGB values. Select the Gray Lab image. Move your cursor over the Gray Lab image and over the gradient next to one of the 50% tickmarks. The Info palette should say that the Lab value is 50% and the RGB color values are 47. Look at the dark portion of the Lab gradient -- notice that there is some banding. This is because with gamma 1.0 you're trying to fit 128 visible grays into just 48 values (zero through 47)!! The other 208 values (48 through 255) are being used for light grays. Select the Gray RGB image. Move your cursor over the Gray RGB image and over the gradient next to one of the 50% tickmarks. The Info palette should say that the Lab value is 76% and the RGB color values are 127. This means that the halfway point in the RGB values is already over three quarters of the way up the value scale towards white!

This shows that a gamma 1.0 color space is not very good for storing images, because there will be lots of data in the highlights and almost none in the shadows. This also shows the way that gamma 1.0 spaces tend to show banding: when they are converted to display on monitors or they are printed