

## Learnin' Adobe's Camera Raw

Our human eye displays a significant compressive nonlinearity!

As Reagan said in a remarkable Presidential debate, "There ya go *again...*"

Compressive nonlinearity; let's break it down. Compress-to press together. Nonlinear-study of systems governed by equations in which a small change in one variable can induce a large systematic change. Yep, that sure *is* physics.

### Why Is All That Gobbledy Gook SO Important?

Simple... your camera has a *linear* brain. You have a *nonlinear* brain. Adobe Camera Raw (ACR) is that vital link which translates 12-bit numbers your camera and its linear sensor records as a raw image into a visually pleasing image for your eye.

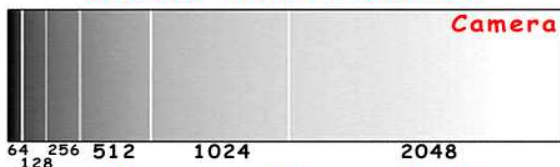
Visual compressive nonlinearity is built-in to your brain. Your senses function over an immense range of stimuli. You can go from subdued sunset lighting to bright evening sun without your eyeballs catching fire. Yet, you may have suddenly increased the stimulus reaching those eyeballs by a factor of 10,000 or so.

### How Does ACR 'See' Raw Data?

ACR has 2 different tools to show linear raw capture. A raw file is a record of data captured by your cameras linear digital sensor. The first tool is a histogram. A histogram is a bar graph of how much amount and color of light hit each pixel on your sensor. Much of that data clings toward the darker end of the histogram.

The second is a visual image of raw data. This visual image must create raw data in a highly technical, gamma-corrected space. In a visual image to please your eye, hopefully the data you captured spreads from one end of the histogram to the other. If so, it has a good dynamic range. If not, you've got to learn workarounds.

#### Linear Distribution



#### Gamma Corrected



### Camera vs high: Graphic Difference

Half the data a 12-bit raw file captures is between mid tones and highlights. See that 2048, it's the upper data? Half the remaining data is in mid tones. And so it goes until you get to darkest shadows.

That's not how your brain works! Your eye spreads data smoothly across a grayscale. It spreads tone into shadows and mid tones. It's even better at color.

## ***A Camera's Dynamic Range***

Dynamic range of a camera can be measured in terms of exposure values (EV). DSLR's generally have a range of five or six EV. Professional DSLR's may reach to eight or nine EV.

But is that enough range? Magic Hour scenes (that hour around sunrise or sunset) can have a range of 16 EV.

To solve this difficulty, you'll need to capture bracketed raw images. Most DSLR's have the ability to shoot continuously with a bracketed range; this range varies from three to nine shots depending on camera.

## ***Processing Bracketed Images with Adobe Camera Raw***

Adobe has re-designed software called Adobe Camera Raw (ACR).

ACR has three handy features:

- Gamma-corrected...
  - Image View.
  - Histogram.
- RGB Read-out.

After you've studied the vital link of how your digital camera captures data and displays a histogram, you'll really begin to like what ACR is doing for you with Bridge. Bridge is pre-processing and visualization software that comes with Photoshop CS3.



### ***ACR Tools: View, Histogram, Tabs***

When you take a picture with limited dynamic range and exposure, the linear sensor in your DSLR may clip data compared to what you're seeking to capture. In fact, you get extremes - highlights near white and shadows near black - which may be lost.

Bridge to the rescue...

**Camera Raw 4.3.1 - Nikon D70**

Let's say you take a three shot bracketed high dynamic range (HDR). Open Bridge - choose three images, right-click on those selected images, then choose Open In Camera Raw. All three open in ACR (left insert).

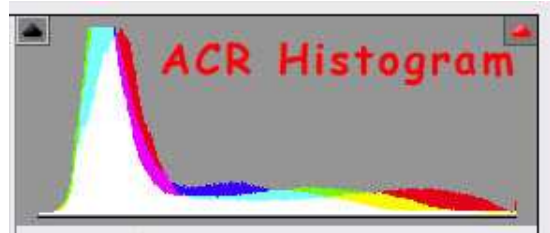
This insert shows three bracketed shots in the 0, -2, +2 bracketing order they were created. You can select any of these shots and see three additional pieces of information. You'll get Full View, Histogram, and Basic tab at default preset.

Play with this interface a while; it's going to become your digital imaging work space! BTW, the ACR version appears at the top of your window.

### ***Your Next Great Toy Is the Histogram***

It's going to turn out to be one of the most important tools in your digital imaging repair arsenal. It replicates changes you create during Tone Mapping, but does not change your file.

Colors have meaning; you can watch RGB channels or channel combinations where you have cyan, yellow, and magenta.



The two clipping marks are small arrows. If either arrow is *other* than black, it's telling you real data is clipped on what channel.

### ***Tone Mapping - Heavy Liftin'***



You're going to love this exciting feature!

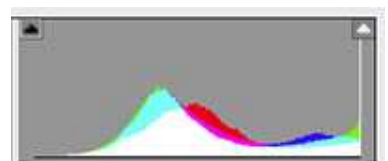
The Basic tab really has several functions:

- Fix clipped over exposed Highlights.
- Fix clipped under exposed Shadows.
- Set White Balance.
- Adjust Brightness and Contrast.
- Adjust Clarity and Vibrance.

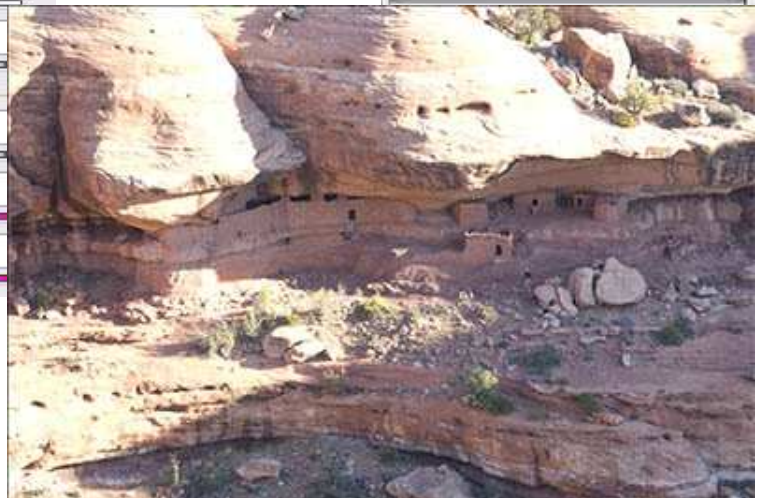
It's almost like Spiderman, on steroids...

If we select the 3<sup>rd</sup> HDR image for our ACR preview, it's the +2 EV.

Our highlight is clipped: we show



the image view and its histogram. AAArrggghh...

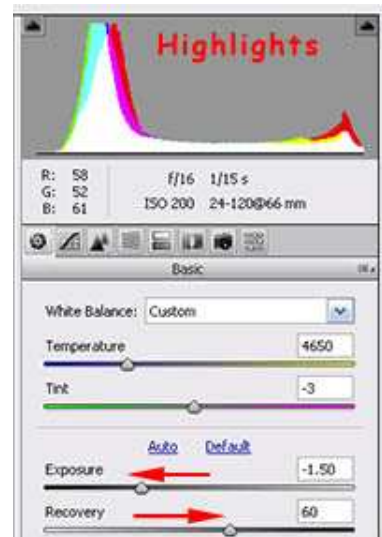


### Can We Fix It?

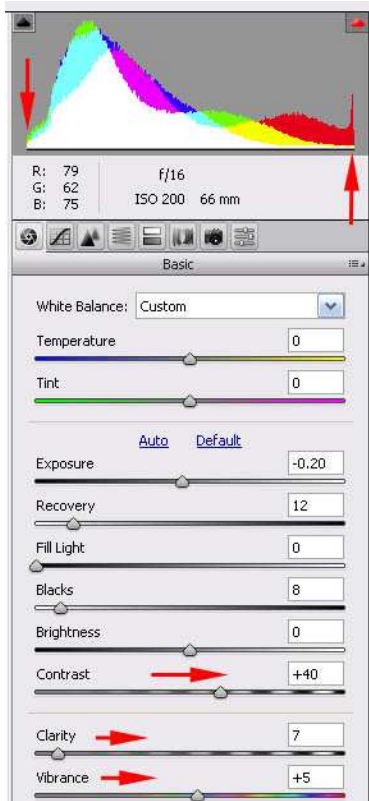
Yes, we simply move the Exposure slider to -1.5. Then we move the Recovery slider to 60. You're using a combination of what your histogram shows and what you see in the view to make a 'best' choice.

Now, open the -2 image, play with blacks and fill light sliders, and fix your own underexposed image while viewing histogram corrections again.

When you're done, fix all three images to the same white balance, then save images as DNG files.



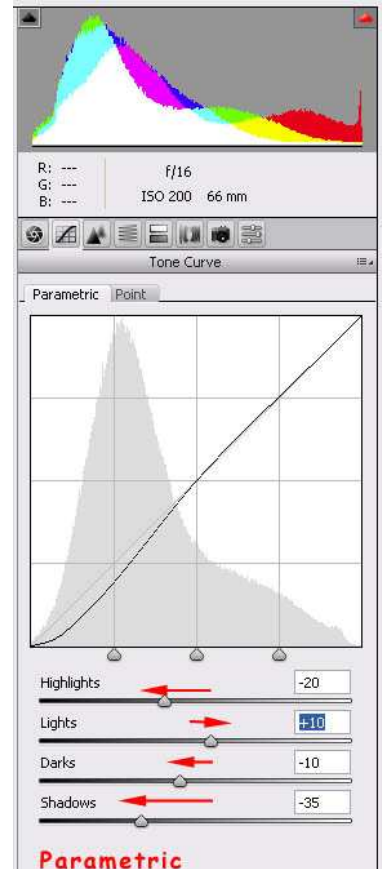
### Fine-Tuning Your Tone Mapped HDR



Notice we've pushed our histogram in both Shadows and Highlights. But we can do some fine tuning as well.

We've increased Contrast while lowering Brightness. Then, we increased Clarity and Vibrance about the same amount.

We loaded a tif file to capture this histogram; although we did repair white balance, the tif file, from Photomatix, doesn't carry white balance forward into ACR.



But we don't stop there...

Let's hand-tailor our Tone Curves. We can do this Parametrically or we can do this point-by-point using Curves.

In parametric toning, ACR makes choices as to the histogram range that you can affect by moving the sliders. In Point toning, you choose and set all the points.

The image was taken as morning sunlight filled an Anasazi canyon. To enhance the contrast, we decided to move Highlights, Darks and Shadows into a stronger contrast state.

The composite HDR image below was taken with a Nikon D70 with a 70-30 mm 5.6 consumer lens. This camera and lens is prone to noise. And These images have been through lots of mastication.

Nevertheless, this tutorial shows how you can quickly and efficiently use Bridge, ACR, and CS3 to create a low noise, award-winning, rather marketable product.

*Voilà...*



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