

HDR

High Dynamic Range A Presentation to the Cary Photographic Artists Organization

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Agenda

- What HDR Is and Is Not
- Example
- Terminology
- HDR Methods
- More Terminology
- Equipment Needed
- Your Needs
- Field Techniques
- Digital Darkroom techniques (layers, HDR software)

HDR

What HDR Is and Is Not

I am sure you have heard of HD in relation to televisions and DVDs.

HD, or high definition, is about getting a higher resolution picture, thus improving image sharpness.

HDR, or high dynamic range, is not about image sharpness. It is about image detail. It is about getting detail in the light and dark areas where you used to get blown out whites and flat blacks.

Example

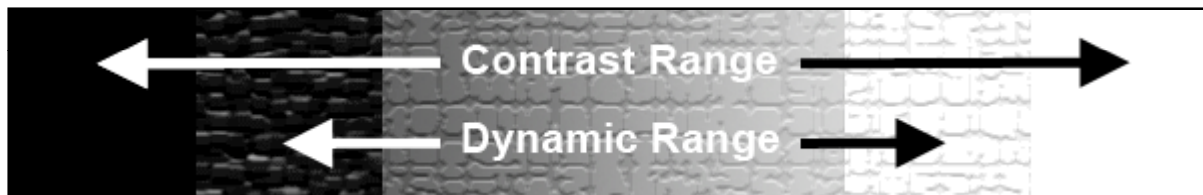


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Terminology

Contrast: Difference between darkest and lightest areas in an image.

Dynamic range: Amount of detail you can capture from the deepest blacks to the brightest whites.



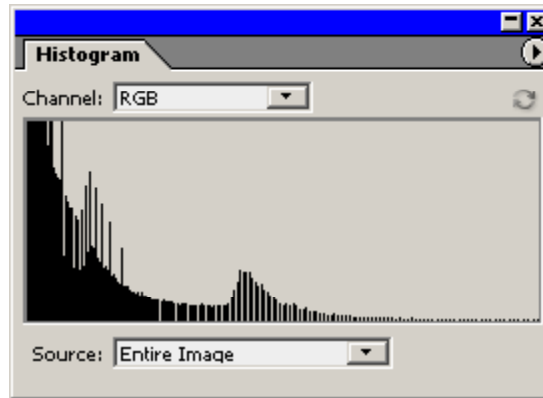
Brightness: Refers to how bright or dark something is. Brightness can be used to describe a single pixel or an entire image.

Stop of light: A halving or doubling of light.

Histogram

Pop Quiz

Using the histogram below, describe the image's contrast range, dynamic range and overall brightness.



What is HDR?

HDR is ...

the use of one or more techniques to increase the dynamic range of an image. It consists of lowering the brightness of whites and increasing the brightness of blacks so you can see detail in both areas. The result is an image richer in detail, but lower in contrast.

HDR Methods

Two HDR Methods

Layers: Use layers (and layer masks if available) to combine images. Any image editing software that supports layers can be used.

High Bit: Use special software to combine multiple images into a single 32 bit image and then use tone mapping to create the HDR image.

The high bit technique is what people assume when discussing HDR.

Terminology

Tone: How we measure brightness.



An 8 bit image can have at most 256 tones.

A 16 bit image can have at most 65,536 tones.

A 32 bit image can have over 4 billion. More than the human eye can perceive and more than a computer monitor can display.

In order to create a high dynamic range image we can see, we must compress millions/billions of tones into the 8 or 16 bit range. This conversion is called tone mapping.

Tone Mapping: The mapping of 32-bit tones to 8 or 16 bit tones.

Field Equipment Needed

- A film or digital camera. If using a film camera, you do not need special film. Use the film, color or black and white, that you typically use. For print film users, please note that print film naturally has a broader dynamic range than slide film. If using a digital camera, shoot Raw or Raw + JPEG. The Raw files should be used to create the HDR image.
- A tripod. If you hand hold the camera, it will be very difficult to get the multiple images to align properly when combining them into a single image.
- A cooperative subject. Objects that are moving will not be in the same position in each of the photographs.

Darkroom Equipment Needed

Digital cameras and the Raw format have not made HDR possible. The digital darkroom has.

- If you use film, you will need access to a film or drum scanner. Scanning prints on a flat bed scanner will give poorer quality results.
- Layers Method – Image editing software that supports layers and, optionally, layer masks.
- Hit Bit Method – Software that can process multiple images into a single high bit HDR image. This can be Photoshop's Merge to HDR feature or third party software.
- Patience. More often than we wish, the software will create an image with visible defects that will have to be fixed.

Your Needs

HDR, by definition, is creating an image that is impossible for your camera to capture. Therefore, you and your equipment cannot be in auto mode. To master HDR, you will need to ...

- Understand exposure.
- How to meter for exposure.
- How to set exposure on your camera.
- Become comfortable with computer and image editing software.

How To: Layers Technique

1. Find an appropriate subject. One with simple edges.
2. Using a tripod, take two or three images. One exposed for the shadow areas, one for the highlights and another for everything in-between. Order is not material.
3. When scanning, or Raw processing, try not to bring out the details. You were suppose to do that in the field.
4. Combine the photos into a single, multi-layer image. Use a layer mask or eraser to remove the unwanted parts of the top layer.



The more photographs you take, the more computer work you will have to do.

How To: High Bit Technique

Field Techniques

Take multiple photographs of the same scene. The first photograph is exposed to render detail in the shadows. Then each succeeding photograph has its exposure decreased by increasing shutter speed by 1 stop of light. You take as many photographs as needed until the last photograph has captured detail in the highlights. These photographs represent the full range of detail in the scene. You then combine the photographs in your computer into a single image. This results in a single photograph that has a broader dynamic range than any of the individual photographs.



How To: High Bit Technique

Pop Quiz

Exposure can also be changed by adjusting the lens' aperture. For high bit HDR, why not change lens aperture instead of shutter speed?

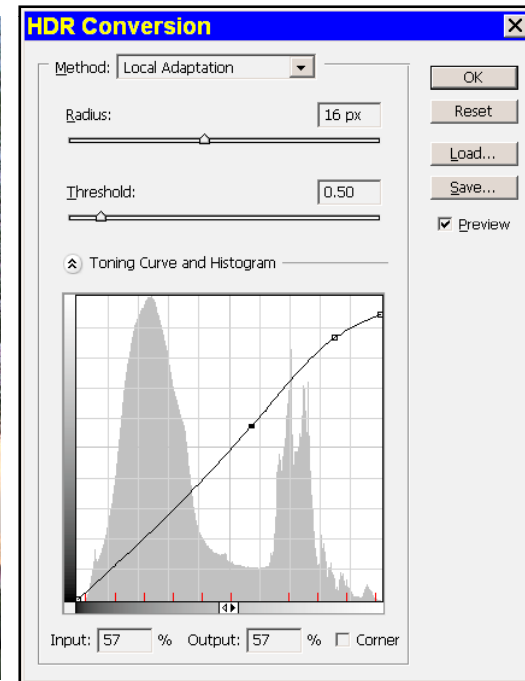
For digital cameras, why not change ISO and leave shutter speed and *f*-stop alone?

On your camera, how many clicks does it take to change your shutter speed one full stop of light?

How To: High Bit Technique

Computer Techniques

1. Use HDR software to combine the photographs into a single high bit image. In Photoshop, this is Merge to HDR. The result is usually not very pretty.
2. Convert the image from step 1 to a 8 or 16 bit image while adjusting the dynamic range. In Photoshop, this is Image > Mode > 16 bit and use the Local Adaptation method.



End

Q&A

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