Photoshop is what I'm covering briefly in this PDF and will cover two key concepts that presented themselves as I worked on a potential talk. The software is a powerful editor with many advanced features so I'm only sharing a starting point.

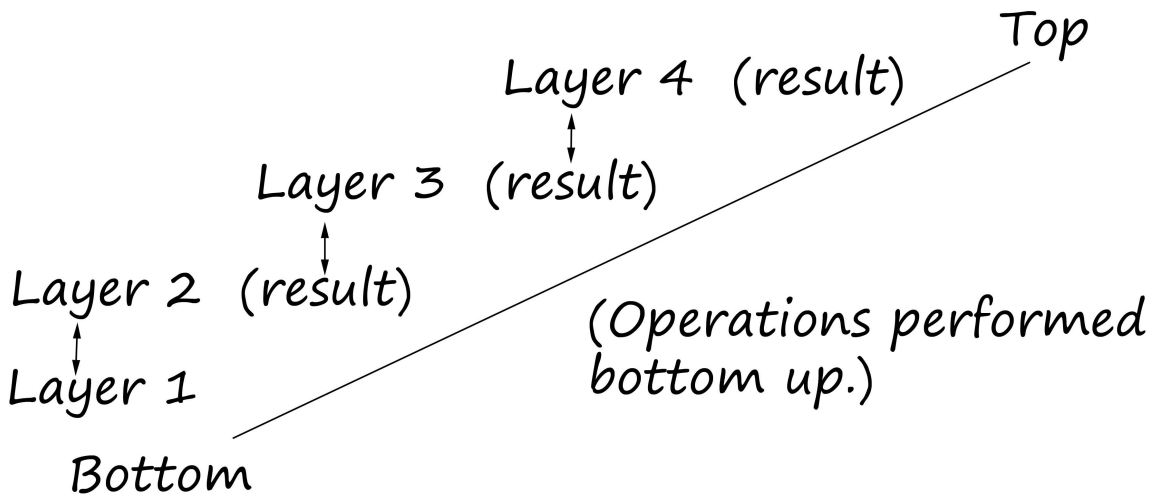
1) In talking about my ideas a phrase came about that worked well and turned into this concept. You are working with a visually oriented form of an ongoing mathematical equation. The math is hidden and your focus redirected but understanding some of this math is helpful.

2) You are starting out with the raw imagery and what you envision as the final result, the in between stages are in LiMBO until it matches your vision of the scene. LiMBO is also a good memory tool to understand the basic mechanism used in Photoshop. (L)ayers (i)nteract in a set order and are modified via (M)ask (optional) with the (B)lend mode and (O)pacity dictating what is performed.

The following images and descriptions will fill in more details and go over an example from start to finish. Hopeful this will create more answers than questions but questions usually lead to more questions and a few answers in between to make it worth while.

Layers

Layers are worked from the bottom up and the results of the previous layers combined with the top layer. Layers can be images, adjustment layers, blank layers to draw on, text, etc building up its complexity as you go. Layers are basic building blocks to be rearranged, deleted, or turned off as needed.



Masks

Why use a mask? Being able to selectively use portions of a layer enhances the options available to you. Areas in the mask that are white show up as is and areas in the mask that are black never show up. The shades of grey between black and white vary the opacity of the areas that show up. In the example the image itself was used as the mask over a white layer. Only the lighter areas come through. Invert that mask and the darker areas come through.

White layer below this result.

Grey scaled version of the image as a mask.

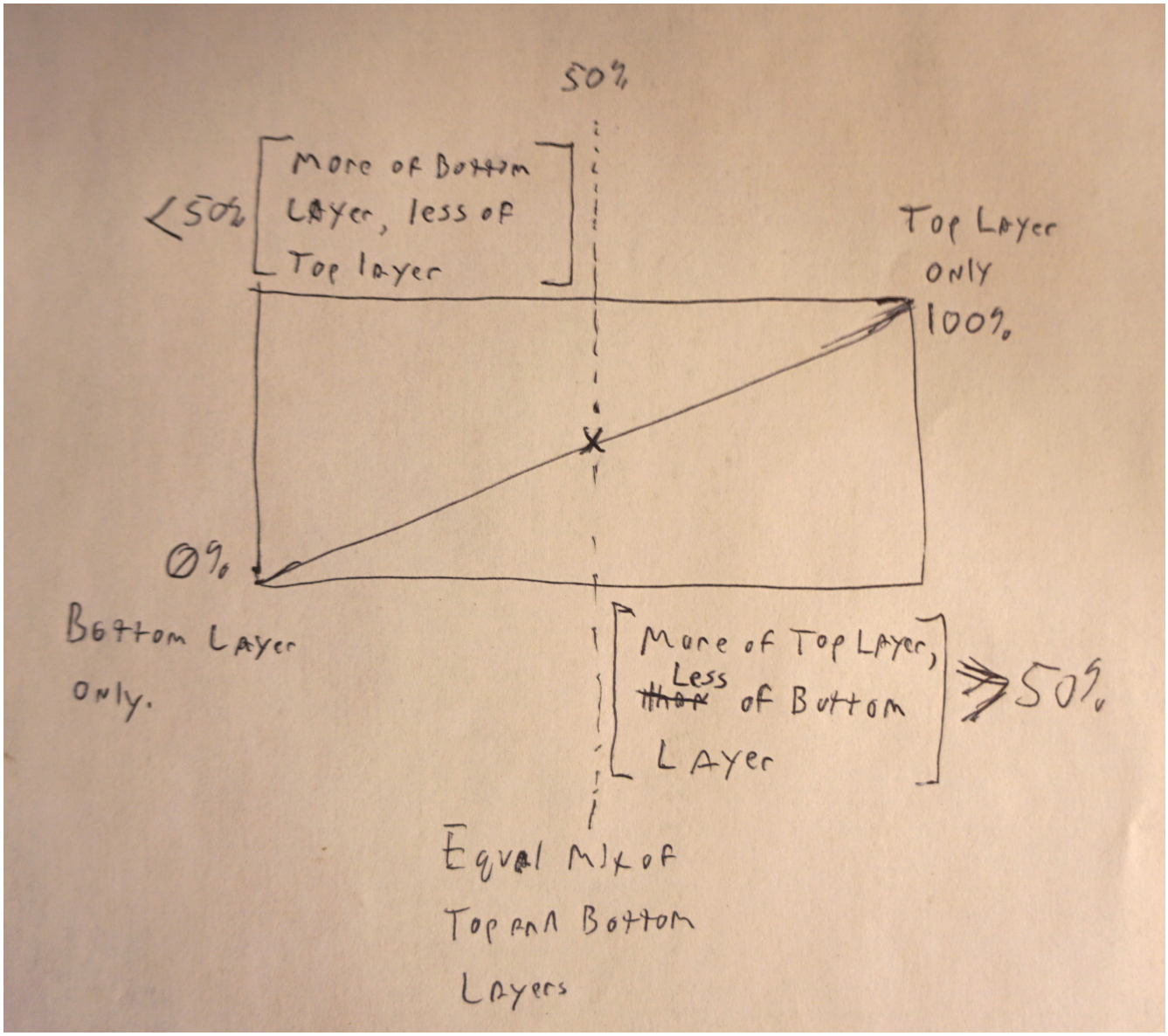
Blend modes

https://photoblogstop.com/photoshop/photoshop-blend-modes-explained

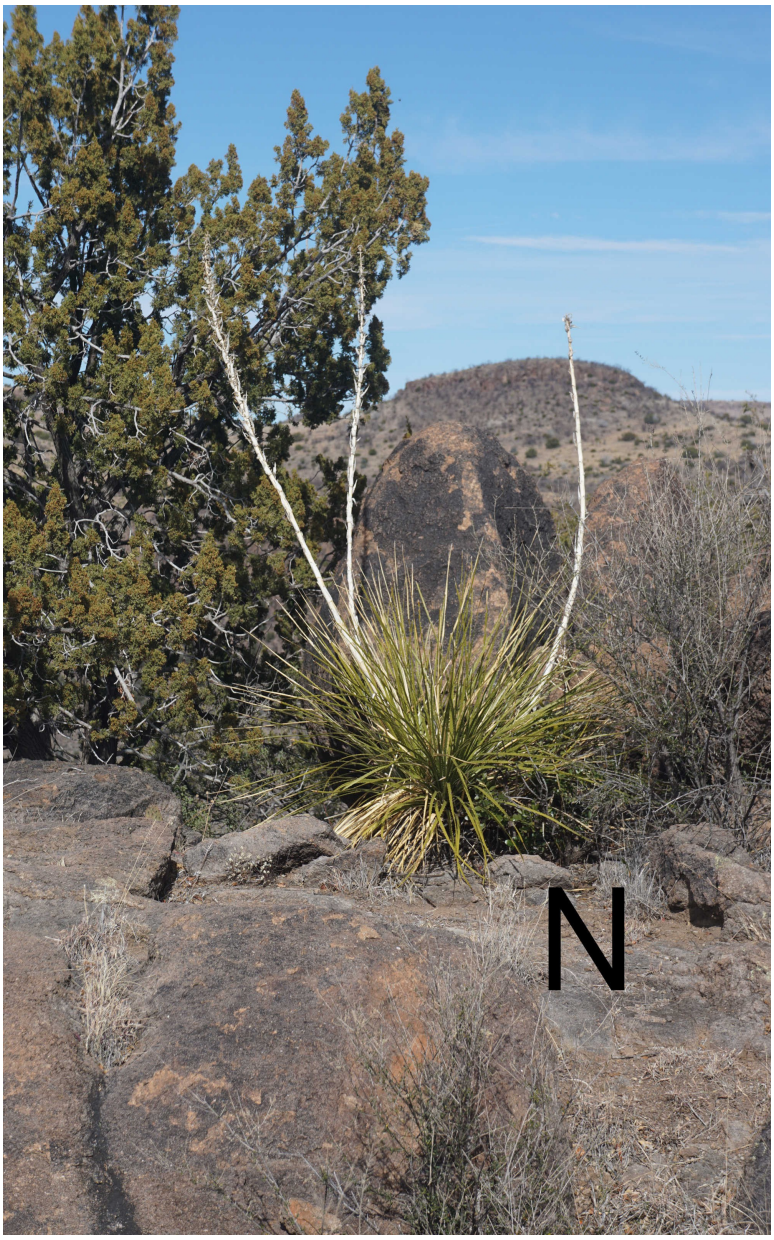
The above website explains blend modes far better than I could but even with some knowledge of how they work it is still a trial and error process and perhaps half the fun is the unexpected results to note for later use. In general each blend mode fits in one of several categories with a specific purpose. The categories are normal, darken, lighten, contrast, inversion, cancellation, and components. Most blend modes apply the values in the top layer to the bottom but a few do reverse this order. Most blending modes apply one process to all the values in the layer but some actually apply one for dark values and another for lighter values.

Opacity

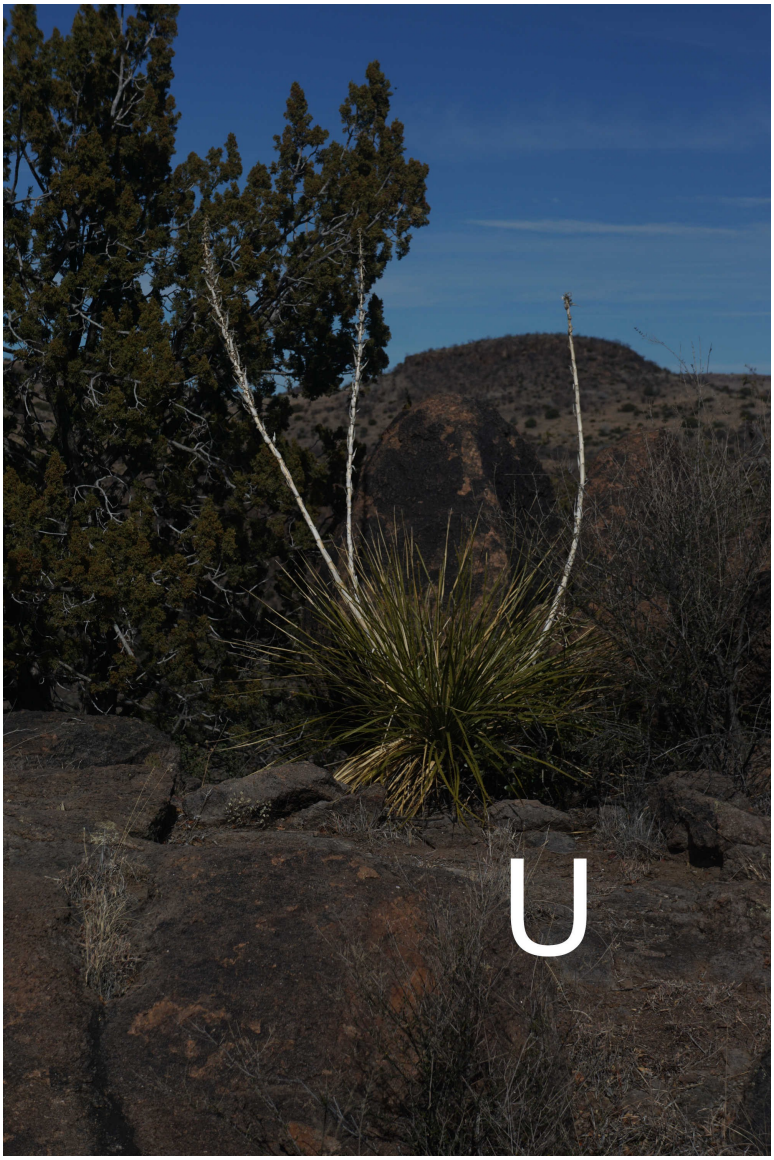
Opacity sets the degree of mixing between the top and bottom layers allowing finer control of the effect you see. In general blending modes applied at higher percentages will be more obvious and at lesser percentage more subtle. Sometime the smallest percentage are all you need.



As an example I have picked a bracketed set I took along the trail at the Fort Davis Historic Site on 01-12-2020.

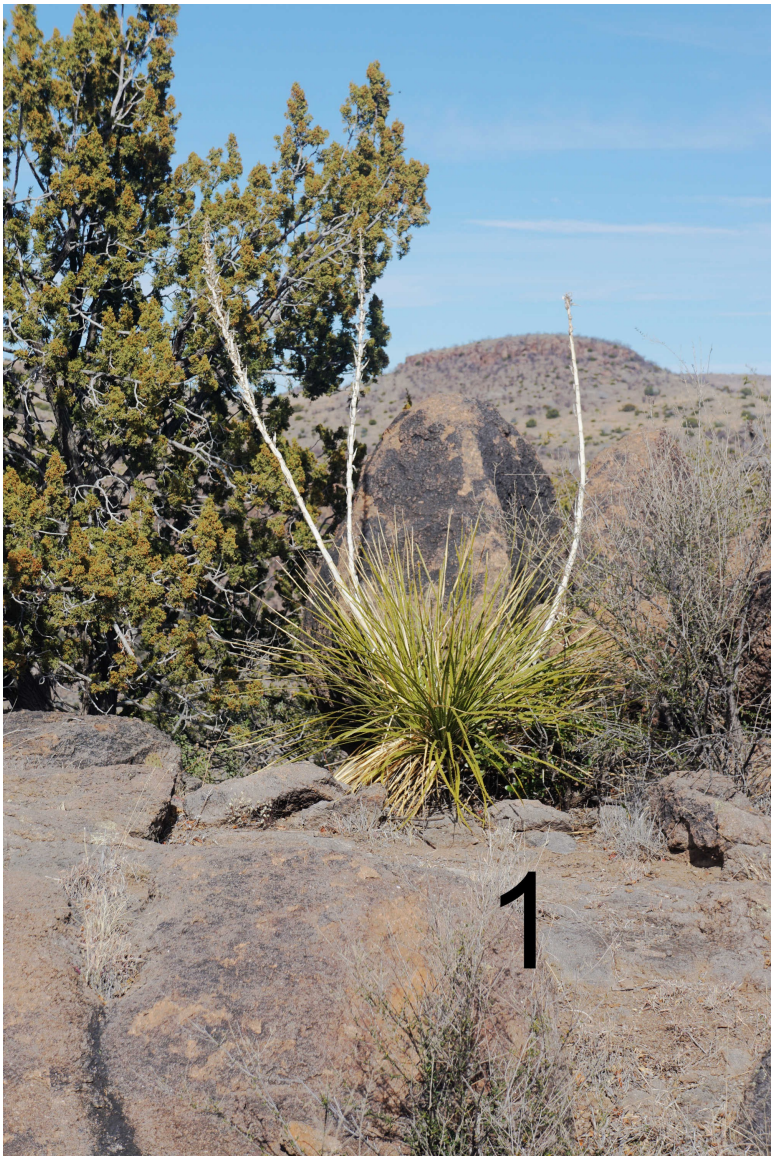


Neutral image - This is the initial image in my bracketed set I took. The underexposed and overexposed images in the set will help enhance details.



Underexposed image - The underexposed image at -2 exposure is darker but actually records the highlights in the scene.

Overexposed image - The overexposed image at +2 exposure is lighter and blown out but actually records the shadows in the scene.



[1] - Combining the 3 images in this bracketed set to produce its final result will illustrate one possible solution. My methods are not quite set in stone and the image itself dictates what happens. The starting point produces (grouping A) and is part of creating a mask later.

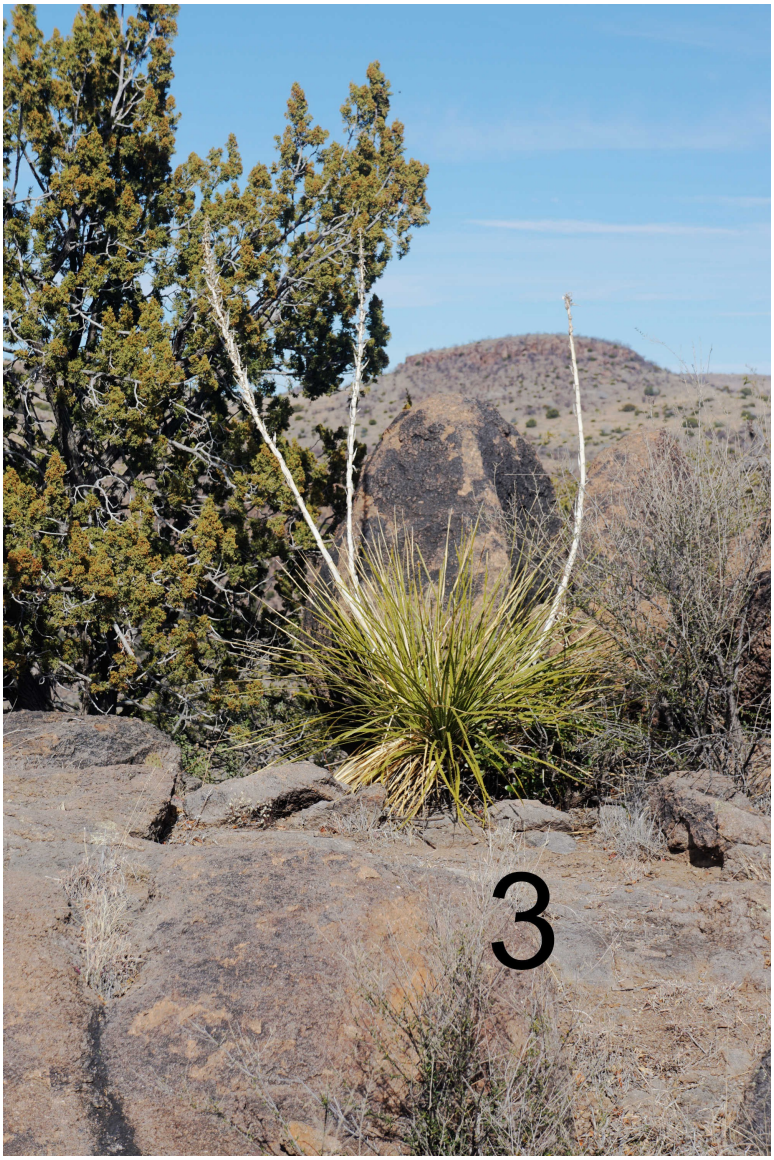
Layer 2 = O [mask=O inverted] overlay @ 100% (shadow details only)
Layer 1 = N normal @ 100%

Layer 1 is the base of the image so it is at normal - 100 and I used overlay in this because it is a contrasting blending mode.

[2] - I use a copy of grouping A as my base and apply U into the mix. What I found when linear light (another contrasting blending mode) was applied didn't work as is but brought out the highlights I needed so it became mask B.

Layer 3 = U linear light @ 100%
-- grouping A --
Layer 2 = O [mask=O inverted] overlay @ 100% (shadow details only)
Layer 1 = N normal @ 100%

This is a new image I copy from later.

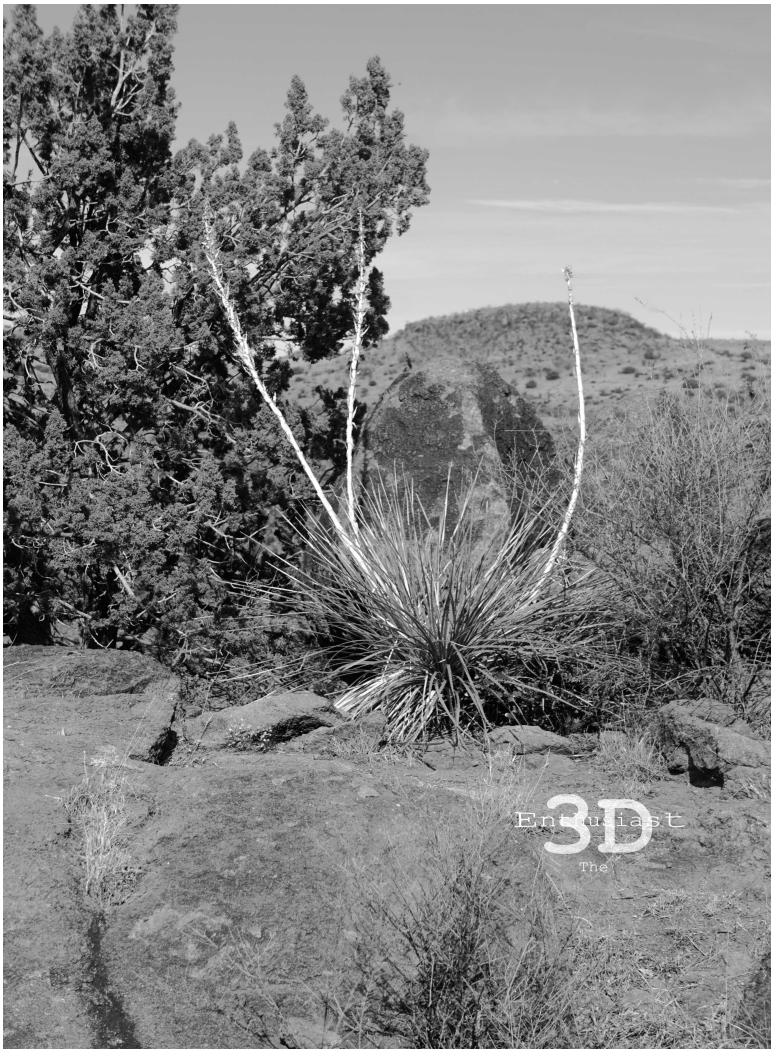


[3] - Part of the process is to restore some detail lost as well as add more in so I use a solid black layer.

Layer 3 = O [mask=O inverted] multiply @ 50% (less extreme blending and more equal mixing)
Layer 2 = O [mask=O inverted] overlay @ 100% (shadow details only)
Layer 1 = N normal @ 100%

[4] - My highlights need to be added back in now but I will use mask B from the 2nd step since it worked better than [mask=U] which I normally would use.

Layer 4 = U [mask=mask B] addition @ 100% (addition is a blend mode in Gimp)
Layer 3 = black [mask=O inverted] multiply - 50 (less extreme blending and more equal mixing)
Layer 2 = O [mask=O inverted] overlay @ 100% (shadow details only)
Layer 1 = N normal @ 100%



[5] - Coversion of this colored image to black and white is just as varied in technique but I use a simple approach.

(image copy - inverted) color @ 50%
(image) normal @ 100%

I may have to desaturate it if some color persist but it works well for me.

In Summary:

A reduction of a complex system doesn't always translate but hopefully this made some sense. The example I used isn't my "straight" forward version but illustrates what can be done at this level. The key to learning anything new is to put the time in and just play with it, the unintended discoveries are usually the best things about getting lost in the processing of pictures manually like this.