

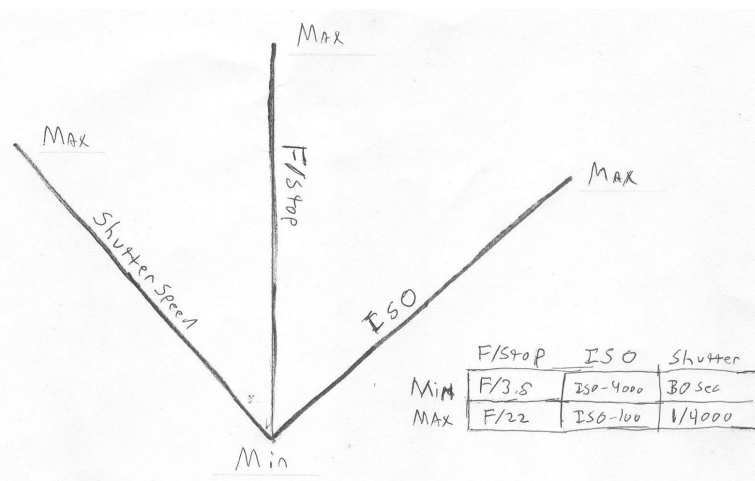
Understanding photography by a new way to look at your camera

Sometimes pursuing a random thought can lead to unexpected results; yet, I could ask myself why try what seems more like a mental exercise than a practical application. The idea was simple enough and I tested nine possible combinations of f/stop 3.5 to 22 and iso-4000 to 100 in even steps with the practical combinations and the more extremes ones included as well. The higher iso's are usually used at night in the dim light yet could be used in daylight as well so I did a visual comparison of those nine images and graphed out the shutter speed each required as a starting point. I then had to figure out what I was looking at and some patterns did emerge to work off of initially but a different set of ideas also developed in terms of cameras in general. I will go through each one of these separately to discuss them in detail.

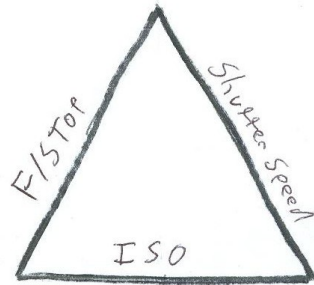
A few key concepts

The camera is capturing light and recording it on the sensor but the exposure is controlled by the combination of f/stop, iso, and shutter speed used. Using my camera as a model it goes in increments of $1/3^{\text{rd}}$ of a stop so I will start off with the basic unit of light which is to equal to $1/3^{\text{rd}}$ of a stop. For f/stop I have a total of 17 steps or units, for iso I have a total of 25 steps or units, and shutter speed a total of 52 steps or units but all three are “equal” when controlling the final exposure of the image.

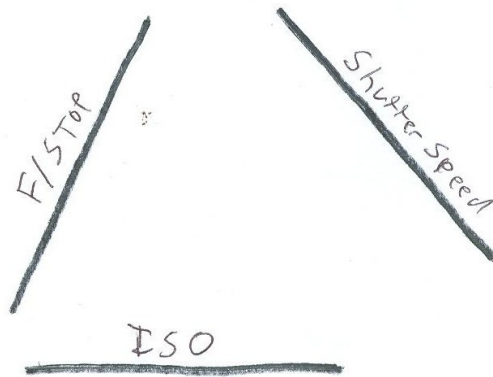
Because the settings used produce different optical effects within the final image I can imagine that a visual light space is actually produced along an “f/stop” axis, “iso” axis, and “shutter speed” axis where each point within that space would be a unique image including the scenes own quirks. Technically f/stop is controlling how much light is allowed in at anyone time but it is also creating a depth of field in the image by controlling the clarity from foreground to background. At f/3.5 you have a shallow effect and at f/22 the greatest degree of clarity. Shutter speed controls the duration of the exposure overall and in terms of effect the longer the exposure the more blurring that occurs and the faster the exposure the faster motion is captured. Finally iso technically mimics the old film speeds by adjusting the sensitivity to light and time to capture a complete image but the trade off at higher iso numbers is noise or gain. This noise isn't necessarily bad as the overall effect is a smoothing out and brighter areas results but can become more obvious given the right conditions.



Another staple of photography is the exposure triangle with its math behind it to balance the light between two of the three settings. In essence the math is simple enough based on leaving one of your settings alone while doubling another and halving the remaining one to keep the same light level of how the image was initially composed. Bracketing is achieved by altering only one setting to get your over and under exposed images in the set. As I look at the illustration of the exposure triangle it looks straight forward enough yet where would f/stop begin and end in relationship to iso for example?

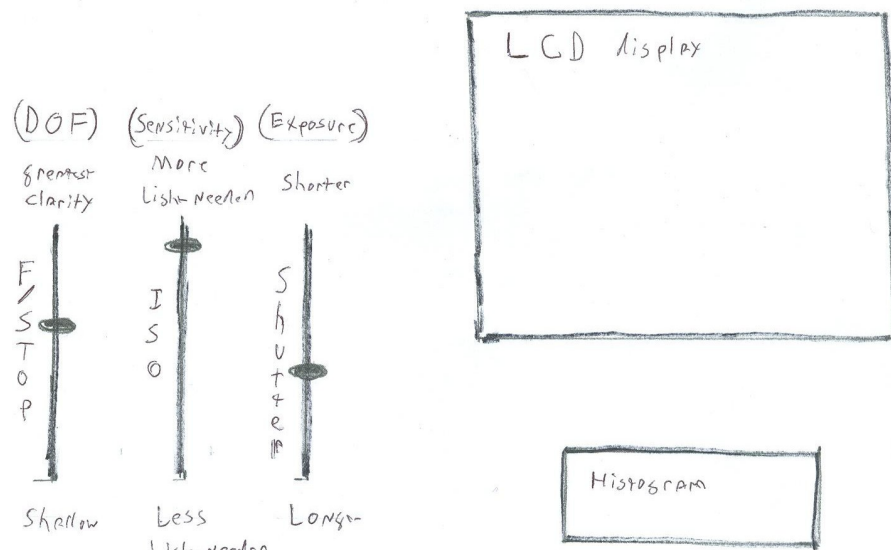


Having covered the basics of exposure how exactly are f/stop, iso, and shutter speed linked? A triangle implies a connection yet couldn't all three be separate settings acting like its own slider. Visually at least a starting point and stopping point is more obvious. Further is it the function that is more important than the effect or effect desired as it alters your final image?



Putting it all together

Imagine a control panel in effect “replacing” the camera in your minds eye. The image your working on is influenced by the lens used which sets the focal length and field of view (FOV), any external lights (like a flash), and external filters in addition to your exposure controls. The LCD screen will give some idea of your final image at least in terms of composition and having the histogram on helps with getting the overall exposure correct. A camera has a technical side and in and of itself the challenge to master it is a goal yet what visual effect does each part impart on your final image and can you control that aspect of the image more precisely. For example in controlling the overall exposure you can make one setting the key effect you adjust more precisely but the next setting is more locked in with the remaining setting out of your control.



External Influences

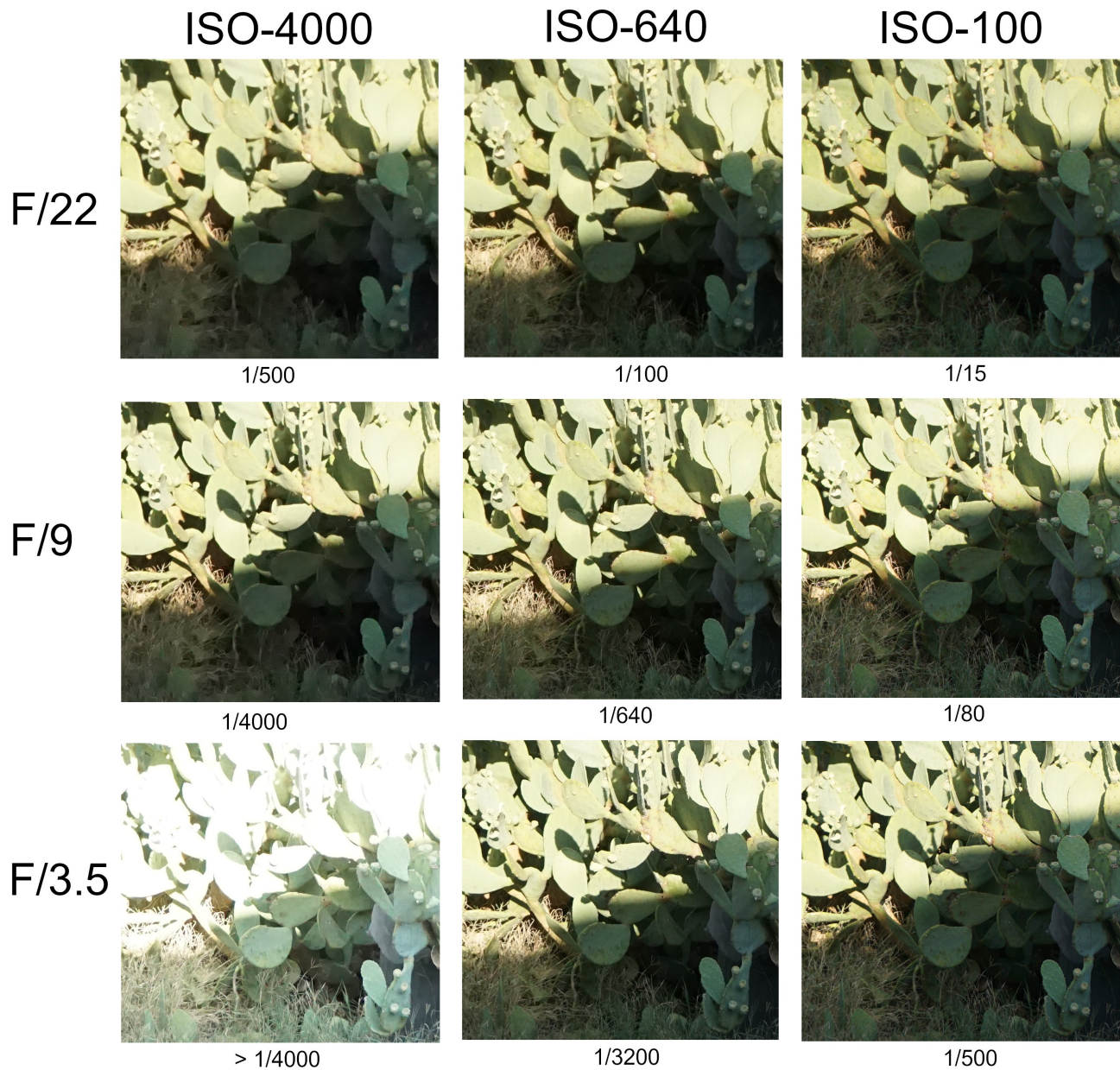
- Lens Used - Focal length / Field of View (FOV)
- External Lights (i.e. a flash)
- Any Filters on the Lens

You could say it is just a camera learn to use it and take a picture and be completely correct; however, what did I learn in this attempt to see photography in a different way. I have a pattern of how I do things and what I tend to repeat so breaking out of this pattern opens up new avenues and problems to solve. The study showed me that in daylight a higher iso and f/stop with greater depth of field can counter act each other and still look acceptable. A higher iso is used to gain the ability to shoot at a faster shutter speed so is not uncommon. Maybe the exposure triangle as it is represented make better sense as three individual sliders to you as well but until I wrote this piece I had not seen it that way either. Is just focusing on the effect on your image verses being too technical of some help as you see why you do certain steps for specific results. Multiple view points on a topic can yield interesting results.



The picture at the center of this quest taken at F/9.0, ISO-640, 1/640 around 7:30pm and at first glance doesn't look bad. The higher iso of 640 seems be counter balanced using F/9's better depth of field. In artistic terms maybe it is more fitting than a perfectly sharp image overall.

During my full moon walk on July 3rd through July 5th at the Monahans Sandhills State Park I took one picture at iso-800, f/9, 15 sec that seem less harsh than the others at f/3.5 while just taking pictures mindlessly. That one odd instance started me to think and wonder how the concept could be used. In some round about way along with the number of odd notes taken along the way this picture came to be.

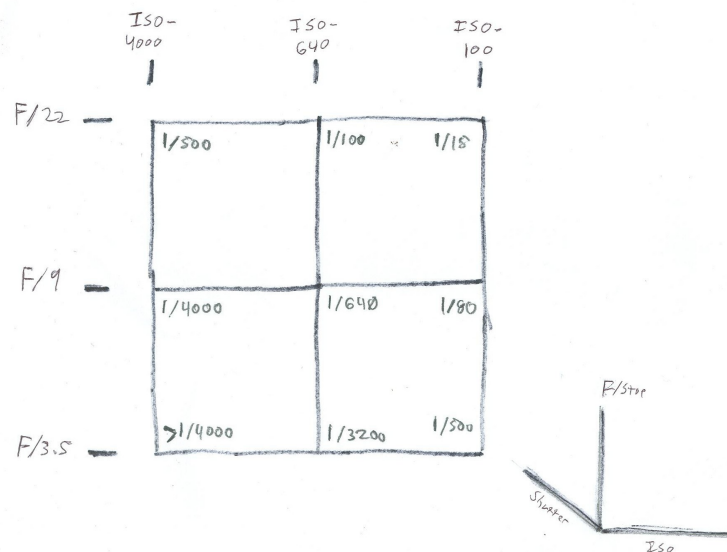


I cropped into an area with a good representation of contrast to show side-by-side all the images and the effects of the more unusual combinations are obvious in this case but remember most images stand alone and are judged on that basis. At f/22 and iso-100 there is blurring due to the slower speed of 1/15 and at f/3.5 and iso-4000 the sample is much brighter because a neutral density filter would be needed to reduce light enough to get same full histogram in the other images.

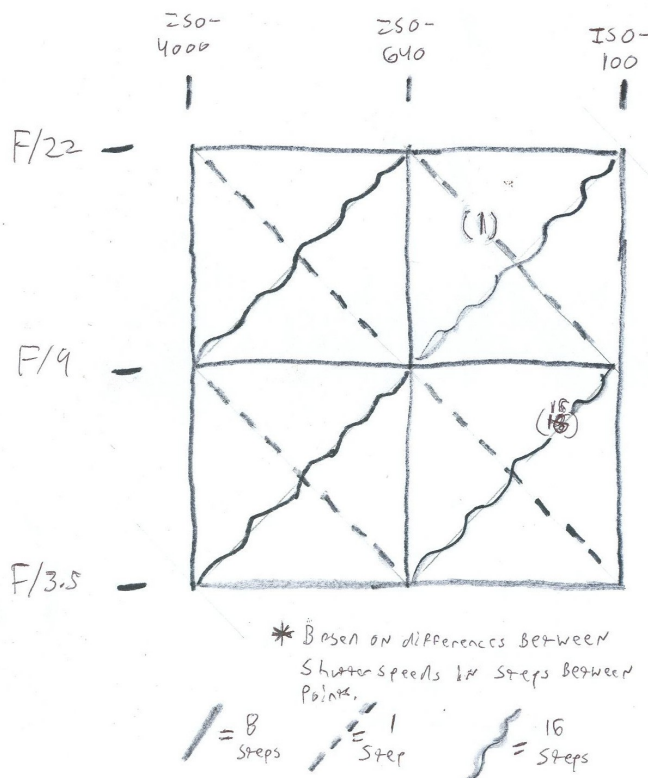
One pattern I noticed early on was that diagonally the same shutter speed appears for different combinations of f/stop and iso. Could be useful for future use.

- * (f/22, iso-4000) and (f/9, iso-640), and (f/3.5, iso-100) pair up
- * (f/22, iso-640) and (f/9, iso-100) pair up
- * (f/9, iso-4000) and (f/3.5, iso-640) pair up

The next set of illustrations will finish out the patterns I found in the set.



The distribution of the shutter speeds for each combination at the data points. As I already noted some pairs share the same shutter speeds.



Finally the relationship between each point as I comparing the differences between the shutter speeds. Depending on which setting you make darker or lighter you could moving to another point. What exactly this is useful for I'm not sure but this is the results.