



## Working Notes

### Section Two - Color, Light, Technology

These notes are written to complement the material presented in the Nikon School of Photography Section Two seminar rather than as stand-alone text. While the notes will follow the main flow of the seminar, there will be additional material, both in the notes and presented by the instructors.

#### Useful Web Sites

[www.nikonusa.com](http://www.nikonusa.com) - Learn and Explore, and Service and Support

<http://capturenx.com/en/index.html> - tutorials on Nikon Capture NX 2.

[http://www.nikondigitutor.com/index\\_eng.html](http://www.nikondigitutor.com/index_eng.html) - explanations of camera features.

#### Goals for the Day

As instructors we hope to not just show you new tools and techniques, but also help you gain an understanding of how to apply them to your photography to create better, more powerful images.

As students your goal should be to take your photography to a new level through more creative techniques, better understanding of the technology, pushing yourself artistically beyond your comfort zone and learning to become faster and more efficient both with the camera and the computer.

#### Format for the Day:

The program is broken down into four sections. They are:

**Light and the Image**  
**Taking More Control**  
**Flash and Color Management**  
**Edit and Beyond**

Within those four sections we'll cover many topics, but the basics are:

**Light and the Image** - We'll begin by discussing the four primary qualities of light and how we, as photographers, can use them. Then we'll start talking about how RAW format and bit depth affect us, and from there get into In-camera image processing settings. And we'll finish by examining the impact that software has on our images, whether we want it to or not.

**Taking More Control** - Once we understand the qualities of light, then we can start taking an active role in working with it. Filters play a role here too, so we'll cover them. Then we start a discussion of flash, first explaining the different flash modes and how to use them. Finally, we'll cover how to make the most of one light (flash).

**Flash and Color Management** - Now we'll start working on how to use multiple flash units, with a live demo, using from one to several flash units. Then we'll cover the application of gels, or filters, with flash. The end of this section goes over an introduction to color management and the basics of D-SLR video.

**Edit and Beyond** - If you ever worked in a darkroom, you know that the capture of the image is just the first step in the creative process of photography. One of the great gifts of digital photography is the ability for everyone to take that original capture further using a computer and software. In addition to editing, we'll cover some output choices, and finish the section discussing several other directions you can take with your photography.

## **Section 1 – Light and the Image**

Photographers are always told to “look for the light,” or “shoot in the golden hours.” Photography and light go together. Without light, there is no photography. And being aware of light - looking for it - is a great way to search for photos. Light has certain special qualities, though, and understanding what they are, how they work and how to play to their strengths will pay off in better pictures.

The four key qualities of light (and they often overlap) are:

**Range**  
**Direction**  
**Size**  
**Color**

**Range** - This is important for us in terms of both exposure and aesthetics. Bright light can create shadows and highlights so far apart in exposure that the camera can't capture it all. This difference is called “range of light,” or “dynamic range,” and it is what we often have to deal with on sunny days, where contrast can be a real problem. Different times of day have different ranges of light, from wide (bright) to narrow (flat) to almost non-existent (fog). Each presents certain advantages and disadvantages to us as photographers. Our first challenge is to understand that range, and then how to work with it.

The range of light we have usually dictates how we expose a scene. And in choosing that exposure, we tend to value highlights more than shadows. That's because of how we experience the world visually, and our desire to create pictures that mimic that experience. In doing so, we usually expose to protect the highlights, and let shadows we don't care about go to black. Exposure, then, for photographers, is quite often a balancing act, trying to save highlight detail without losing too much shadow information.

Today's digital SLRs offer a histogram readout, which is a graphic representation of the exposure of the captured image. The brightest whites are represented at the far right and the darkest blacks at the far left. In the middle are the midtones. The height of the graphs simply indicate how many pixels there are of that particular tone (density), and tend to be less important to photographers. What's most important to us, then, is what's happening at the sides. That's where we can lose important information (either highlight or shadow detail). A properly exposed image in light that doesn't have much contrast would show a graph that started before the left edge and stopped before the right, with all the data contained between the left and right walls. If the range of light is too great (or a poor exposure has been made), then the graph will be “clipped,” meaning it hits one or both of those walls before reaching the edge. In that case the information beyond wasn't recorded, either in the

highlights (right side) or shadows (left side). Learning to read and understand the histogram is one big step toward having a better understanding of how to properly expose your images.

When the range of light is too great for the camera to handle, we have various tools we can use, from filters to flash to editing, as well as some in-camera options like Active D-Lighting.

And there are also times that we're simply unable to expose for all of the important areas in a scene. One solution for that is graduated neutral density filters. They darken one edge of the scene (top, bottom, side – wherever you choose) to reduce the light coming in from there, and thus the exposure for that area.

There are two other solutions commonly used when photographing the sun or moon. The sun, shining brightly in the sky, will overwhelm everything else in the scene. If you're able to block it with something (tree, clouds, person) or wait for it to get near the horizon, you've reduced that drastic range and now can make a good exposure. The same is true of the moon. A full moon at night will force you to expose for it, leaving everything else black, or expose for the rest of the scene and have the moon a white hole in the sky. Shooting it at dawn or dusk, though, when there's some available light around you, reduces that range into a workable exposure.

**Direction** - This is the quality of light that gets talked about the most. Front light (that coming from behind the camera) tends to be flat. It results in lots of information, but no feeling of depth, volume or mood. Backlight is the opposite, where you're going to have no information in the subject (a silhouette), or if you expose for that, no detail in the background (overexposed). Sidelight is often considered most pleasing. That's because the shadows add a feeling of depth, bring out texture and make the image look less two-dimensional.

**Size** - The size of your light source is important, both in its distance from the subject and their relative sizes. A cloudy sky, or the period before sunrise or after sunset, gives you a very large, soft light source – the entire sky. Once the sun is out, you now have a much smaller light source that gives an edge to the light and more definition to the scene. With harsh overhead light you can use diffusion, putting something between the subject and the light source, to soften the light, or add flash to fill in shadows.

**Color** - All light has Color. It may look white to us, thanks to our visual system correcting for it, but all light sources have color. From different times of day (morning, mid-day, evening) to artificial lights, it's simply a question of what we do with that color. Do we remove it, accentuate it, or change it? All are possible once we understand how to control the white balance settings on our digital cameras.

Those settings let us capture light naturally, without color, or with color that didn't exist in the actual scene. By default, digital cameras are set to "Auto" white balance. That means they make an educated guess as to what color the light is, and correct for that. For many people, that's fine. For a serious photographer, though, the ability to change white balance settings is an incredibly powerful tool. You have two choices – to either capture the color as it is, or to change it, perhaps radically. You can think of this as capturing color that's technically accurate, or creatively interesting.

The first step in going beyond auto white balance is to tell the camera what light you're working in. If you know, why not tell it? The primary choices are Daylight, Flash, Incandescent and Fluorescent. There are multiple versions of Daylight (Sunlight, Cloudy, Shady) and with some cameras multiple Fluorescent settings. Daylight and Flash are very close, and can often be used interchangeably. Cloudy and Shady are warmer variations of Daylight, and some people use them to produce a warmer, more yellow tone to their images.

The most powerful of the choices you can make in-camera is the White Balance Preset. By using the camera to take a white balance reading off of a “neutral target” (best is a gray card, though a white sheet of paper can work), you can get neutral color processing of your images in almost any type of light. That means whites will look white, skin tones will look natural and the overall color will be good. This is a great tool to use in any mixed-light (various light sources in the scene) or artificial light situation. Different models of Nikon cameras can vary slightly in how this is done, so check your manual for the details.

The one time to avoid either Auto White Balance or Preset White Balance is if you’re working in light that has color and you want that color to show. A good example would be while shooting in warm, early-evening light. In that case the Daylight white balance setting would do a good job of showing the warmth of that light, where a White Balance Preset would actually remove it, neutralizing that warmth.

Lastly, you can set the Kelvin temperature manually on some of the cameras. To use that properly you usually need either a well-calibrated color temperature meter or careful testing with editing software. However, you can also simply use the feedback from the LCD on the back of the camera to guide you, as long as you're not trying to be extremely accurate.

### NEF (Raw) Format

All digital SLRs allow you to shoot in RAW format. With Nikon cameras that’s called NEF (Nikon Electronic Format). The NEF file gives you the best possible quality out of the camera, and the advantages are most noticeable in the editing stage. You can do much more to a NEF by starting with that RAW data, but it also means larger files and a more complicated workflow.

### Bit Depth

There are many advantages to shooting in NEF (RAW) format, but one of the biggest has to do with bit depth. Color images made with digital cameras capture three channels: Red, Green and Blue. In a JPEG or TIFF image, each of those channels has the ability to record up to 256 variations of that color, which is called “8-bit color.” That gives you a palette of 16.7 million colors to work with. Most digital cameras, when shooting RAW, capture 12-bits of information, offering over 4000 steps per channel and a palette of 64 billion colors. It’s important to understand that this is no larger (wider) in range of data than that of 8-bit, but contains much finer steps of differentiation. When you edit image data, you are, by necessity, throwing away data. When you lose data you risk posterization, or banding, because of the loss of tonal information. Starting with 12-bits of information instead of 8-bits means you can do much heavier image manipulation before creating problems. That’s one of the great advantages to shooting the NEF (RAW) format.

Newer Nikon cameras offer the additional benefit of 14-bit when shooting NEF. You then have over 16,000 possible tones per channel, with a color palette of over 4 *trillion* colors. The main advantage to 14-bit is its ability to record more data in shadow tones than the 8 or 12-bit. And that gives you more information to start with when processing the data to create your final image.

The other consideration when choosing NEF is whether to have compression applied and if so, how much. Nikon offers choices of uncompressed, lossless compressed and compressed. “Lossless compressed” means they’re able to shrink the file size somewhat without losing any quality, and is a popular choice. File size is important not just because of the space it will take on the card, but also for the amount of space it will occupy in the buffer. Larger files means the buffer will fill more quickly, which can be a problem for action shooters.

When choosing NEF options (12-bit, 14-bit, compressed, uncompressed) you have to balance file choice with the type of photography you do. For best possible quality, you'd pick 14-bit NEF. For best quality that maximizes frame rate and buffer size, you'd often choose some version of 12-bit. *Note - When considering frames-per-second, be aware that other settings, such as AF and battery type (when using a battery pack) can affect that rate as well.*

The second main advantage to a NEF file is that the processing settings you chose when shooting your photos are only a starting point. White balance, contrast, saturation and sharpening are among the key adjustments that can be changed later, with no damage to the image. That's because a NEF (RAW) file is just data from the sensor that has not yet been turned into an image. The camera records the settings you started with, and first shows the image to you that way (on the back of the camera). However, you can change those settings at any point later, using software that's capable of rendering RAW data (like Nikon ViewNX 2 or Nikon Capture NX 2).

### Picture Control

This menu gives you six choices: Standard, Neutral, Vivid, Monochrome, Portrait and Landscape (some earlier cameras only had four, although you can download the other two for those at [www.capturenx.com](http://www.capturenx.com)). Choosing one of those, you can further tweak its settings. For most people, Standard or Vivid will likely be what they select. When you move from Neutral to Standard to Vivid, the main change is an increase in contrast and saturation.

Once you've chosen a Picture Control Setting (or left the camera at Standard), you can then vary the amount of sharpening, contrast, brightness, saturation and hue. It's important to keep in mind that all of these settings, if you've chosen to shoot in the NEF (RAW) format, can be changed later using Nikon's Capture NX 2 or even the free Nikon ViewNX 2 software. If you're shooting JPEG, however, what you choose in the camera is what you're going to get in your image. Therefore, these settings are most important to JPEG shooters.

Most photographers leave Sharpening at the normal setting, occasionally moving it up a bit (more sharpening in-camera). Some pros even turn sharpening off, adding a step in their workflow for post-capture sharpening.

Knowing that contrast is easy to add to an image in software, but can be hard to reduce once captured, photographers sometimes choose to use a lower contrast setting or the Neutral Picture Control.

One advantage to the newer Picture Control settings is that you can save the settings from one camera and load it into another (Nikon, of course). This gives you the ability to shoot several different model Nikon cameras and yet have them all process their images the same way.

### Optimize Image

Older Nikon cameras manage image processing settings from the Optimize Image menu. The same choices exist as above in the Picture Control settings, except that Brightness is missing. Those cameras also offer Color Modes of I (or Ia), II and III (or IIIa). Mode I's color processing is biased for skin tones, good if you do a lot of portrait work. Mode II is considered the most neutral, and often only available if you've also chosen the Adobe RGB color working space. Mode III is biased towards colors found in nature. Mode Ia and IIIa are found in the more entry-level Nikon D-SLRs and are for skin and nature, but with a bit more boost in color. Also, Modes I and III are in the sRGB color space.

## Note on Processing Settings

It's worth mentioning one more time that many of these settings (either in Picture Control or Optimize Image) are the same ones that can be changed later, if the image has been captured in NEF (RAW) format. However, even if you're shooting in NEF format, it makes sense to set these properly *before* shooting because that can save you time afterwards. Remember, when shooting RAW it's most important to get the focus right, and exposure at least close. The rest can be worked with later, if need be. The point of having processing settings is that you can build a "look" you like based on the kind of photography you do, whether people, landscape, close-up or something else. Nikon's software lets you change those settings to create the same look you'd have gotten if you set them that way in-camera. That's one of the advantages of using the camera manufacturer's RAW software. Nikon ViewNX 2 also gives you some ability to make changes to a NEF file, such as White Balance, Exposure Compensation, Picture Control, cropping and others through the "Quick Adjustment" tab. Nikon Capture NX 2 gives you even more control over changing that NEF data with the "Quick Fix" and "Camera and Lens Corrections" tabs. Both Nikon software packages allow you to do batch processing (applying the same adjustments to multiple files at once).

Using the Nikon software, some of the most dramatic changes can be made by adjusting White Balance. Since raw data is just that - raw - you can set the color temperature processing anywhere from about 2,500 to 10,000 Kelvin. You can also choose a different Picture Control preset, and then go in and further adjust sharpening, contrast, brightness, saturation and hue. Plus, the Quick Fix window gives you a Levels and Curves tool where you can adjust white, black and mid-point as well as build a multi-point curve.

## RAW Editing Software

Each camera manufacturer designs the processing of their camera's image data in a way they think best suits their users. If you want to see the image processed the way Nikon thinks it should be, you can either shoot JPEG (and get the in-camera processing) or shoot NEF and use Nikon's software (ViewNX 2 or Capture NX 2) to render that data. Other companies have also created software that can decode, or render, RAW image information. But they're going to do it in their own fashion, not the same way the manufacturer (in this case, Nikon) would. That can lead to some confusion when viewing your photos later, since they can look different based on what software you're viewing them with. Let's look at some of the popular packages and see what happens.

### Nikon ViewNX 2

Being Nikon's software, this free image browser can view any JPEG or TIFF (they're universal formats), but the only RAW files it can view are Nikon NEFs. However, there are a few advantages to this. First, when looking at a NEF, you'll see the image the same way that the camera would have processed it if done in-camera as a JPEG. That's because Nikon uses the camera settings as a starting point for viewing the image, and the same processing algorithms. Since it's a NEF, you can always change that later, but starting out, a NEF and JPEG of the same image will look exactly the same in Nikon software. ViewNX 2 also lets you make many "global" changes (to all the pixels in an image) to NEF files. Plus, any changes made to a NEF in Nikon View NX2 or Nikon's more powerful editing package, Capture NX 2, will be visible when viewing that file later in ViewNX 2 (or Capture NX2). Lastly, if you want to convert Nikon NEF files to any size or quality of JPEG or TIFF, there's a "Convert" button at the upper right that will process one or hundreds of NEFs however you want them.

### Capture NX 2

Nikon's flagship editing software can open any JPEG, TIFF or NEF (but not other RAW formats) and give you full and complete control over how you adjust the image after that. And, of course, it can later read any and all changes you make to a file within it. If you've chosen to save those changes out as a NEF file, then you can even

go back and change any of the original adjustments at a later time.

### Adobe Lightroom

As third-party editing software, Lightroom is updated regularly to allow it to open most digital camera RAW files. However, since Adobe's not a camera manufacturer, they have to create their own recipes for how an image should be processed. Therefore RAW files from most manufacturers will look different when opened in Lightroom than in the manufacturer's software. After making changes to an image, though, you won't be able to save those changes back into the original RAW format. You'll need to export them as JPEG, TIFF, PSD or DNG files. Since Adobe renders the RAW data in their own fashion, they can't "see" any changes that other software might make to RAW files (like View NX2 or Capture NX2)

### Adobe Camera Raw

A plug-in that's part of Photoshop, ACR uses the same processing engine (depending on the version) that Lightroom does. It can open most of the same RAW files, but again will give a different rendering of those files than the manufacturer's software does. And again, ACR won't "see" changes made to a NEF file in Capture NX2. As in Lightroom, those changes are saved into an XMP file or a catalog.

### Photoshop (CS6 and earlier)

The current version of Photoshop, through the ACR plug-in (above) is able to open most digital cameras' RAW files. If you use Photoshop for editing, then you want to learn how to work in Layers so your edits are non-destructive, and then save the images as either PSD or Layered TIFF files to keep those edits intact.

### Photo Mechanic

Widely considered one of the best (most powerful) commercial image browsers, Photo Mechanic is used to download, add metadata and organize images by many professional photographers. One of its strengths is that it gets its preview from the embedded JPEG that exists inside most RAW files. Nikon NEF files, and most other RAW files, have a highly-compressed JPEG embedded inside them to provide fast previews. If software, like Photo Mechanic, knows to look for that, then you'll see a properly rendered view of the NEF (RAW) file even if you've made edits to it in Capture NX2 or View NX2. And Photo Mechanic can read most image file formats, from RAW to JPEG, TIFF, PSD, DNG, etc.

### Adobe Bridge

Adobe's browser, a standalone app that's bundled with Photoshop, called Bridge, can read most common file formats, including RAW files. However, once again, it will read those RAW files with Adobe's interpretation of the data, and ignore any changes that have been made post-capture, such as edits with Capture NX2 or any other RAW editing program.

### Adobe Elements

Even Adobe's intro-level editing package, Elements, can read most RAW format files, if it's got a recent version of Adobe Camera Raw installed (Elements uses a simplified version of ACR to do this). However, earlier versions of Elements won't read newer camera RAW files because support for those versions was stopped before those cameras were released (and that's true of older versions of Photoshop and Lightroom as well). And, like the other Adobe products, it won't "see" changes that have been made to NEF files by other programs, like View NX2 or Capture NX2.

Apple iPhoto and Aperture – Again third-party editing software, they can open most RAW file formats, but do so in a different way than the manufacturer, or other programs, would. And any changes made to RAW files with them is viewable only in them, not with other programs like those from Adobe.

#### Summary on viewing and using RAW files

It's important to remember that we're still in the early days of digital photography. On the software side, particularly, there will continue to be constant changes, and compatibility will be an issue for some time. If you're a big fan of one program or feature (like Nikon Capture NX2's Control Points), then it's easiest to stay with that maker's software, or at least software that's compatible with it. And even if you shoot primarily RAW format, you'll still need to regularly convert images to JPEG for everything from email to web galleries to having prints made. For a Nikon NEF shooter, that's a strong reason to have View NX2 on your computer, as it does conversions from NEF to JPEG quickly and easily.

Many photographers like to use a combination of editing packages for various reasons. If you do, then you'll want to approach that in a systematic way to get the best from each package. For instance, you may choose to use Capture NX2 as your primary editor, but also want to use Photoshop for other tasks (see examples of this in the editing section near the end). To do this, start with the NEF in Capture NX2, make changes and save those back into the NEF file. Then save that file out as a TIFF or JPEG (which makes those changes permanent in that format) and open the resulting TIFF or JPEG into Photoshop to finish your work. Or, just use the "Open with" command in Nikon Capture to open a TIFF of the file into Photoshop (or whatever program you set "Open with" to work with in the preferences of Capture). If you simply opened the NEF into Photoshop, you'd get the original, unedited version, since Photoshop can't read the Instruction Set from either View or Capture.

#### NEF plus JPEG

Most D-SLR cameras now offer the ability to record both a NEF (RAW) file and a JPEG (processed) each time you press the shutter button. There are several good reasons for choosing this. It's one way to get started with NEF (RAW) files, as you also have the JPEG you're used to having. It's also a good backup, for when you'd rather shoot JPEG but want the safety net of the RAW file in case you make a mistake. And if you like shooting RAW files but often need JPEGs, then setting the camera to record a NEF (RAW) plus JPEG (perhaps lower resolution and higher compression) can save you time later. Eventually, if you become comfortable working with RAW files, then there won't be much need to have the camera create JPEGs as well. If you have a RAW file, you can always generate a JPEG from it.

#### Cards and Readers

Not all cards are the same, which is obvious from the prices. The best manufacturers speed rate their cards, which indicates better quality memory and controllers being used. The speed rating lets you know how fast the card can move images from the camera's buffer to the card itself. This can be an important issue if you shoot rapid sequences of images. In SanDisk's case, their cards are grouped into different levels based on speed and toughness. The top-of-the-line cards are the fastest, and also rated for extreme temperatures and conditions. Most newer cards now take advantage of something called UDMA (Extreme and Extreme Pro series in SanDisk's case), which can dramatically improve download speed (to the computer).

Not all cameras can take advantage of the highest speed cards, and often the card manufacturers publish lists of what cameras can achieve what speeds. However, if you plan to buy a new camera in the future, it will probably be able to take advantage of today's fastest cards. So it might make sense to simply buy the fastest card you can afford at this time, knowing that your future camera(s) will likely be able to do that.



Card readers play an important role in download speed. Some are fast, some are slow. Be sure that at the very least you're using a USB 2.0 or FireWire reader, and if FireWire, then FireWire 800 readers are faster. New USB 3.0 readers will leave the rest in the dust, as long as your computer has a USB 3.0 port.

Occasionally Nikon offers firmware updates for some of their cameras. This can fix problems that weren't known when the camera was released, add new features, and/or allow newer memory cards to be used in older cameras. You can find the current firmware for your camera at [www.Support.NikonUSA.com](http://www.Support.NikonUSA.com).

### Recovery Software

There may be times when you're unable to get the images off your card. Some causes for that are the directory of the card getting corrupted, you've shot a card full, formatted a card accidentally or the battery died while shooting. In those cases you'll want card recovery software. There are a number of programs that will usually recover those images. SanDisk sells RescuePro, and it also comes bundled free with their Extreme and Extreme Pro cards (as a coupon for download). There are about a half-dozen programs in this category, and they all sell for \$30 to \$40.

## **Section 2 – Taking More Control**

We make lots of decisions when shooting pictures. When something catches your eye and you decide to photograph it, two of the more important ones are the position you choose and the lens. Most people shoot from eye level because it's what they're used to. If we want to go beyond the average, then we have to get away from eye level all the time. Always make a conscious decision about where you're going to shoot from. Can you get higher? Lower? Or closer? In photography, it's almost always true that the closer you get to your subject, the better your picture.

Once you've found the best position, the next question is what lens to use. Again, our goal is to try to go beyond the average. Wide-angles are great for the amount of a scene they can capture. But the viewer can get lost in that large scene. That's why wide-angle lenses are the most difficult lenses to master. They see so much that it's easy to create an image that's difficult to understand. The best rule of thumb with a wide-angle is to try to have both foreground and background subjects. Think of it as working with 'layers' of information. The foreground object, if you're close enough to it (or it's large enough) easily becomes the dominant part of the photo. The background can then play the role of supporting it, through added information ("oh, this is in the mountains") or with beauty ("great sky!"). So any time you grab that wide-angle, always think, "foreground, background."

The other wide-angle technique that few people employ is using that lens to create intimacy. Getting close to your subject can add a whole different feel to a wide-angle shot.

Telephoto lenses, on the other hand, limit the amount of information you show. The magnification they provide, combined with less depth of field, makes it easy to give the viewer only what you want them to see. This is one reason people think telephotos compress a scene, because of that limited information. However, if you shoot the same scene with a telephoto and a wide-angle lens, then crop in to the wide-angle to see the telephoto framing, you'll see it's no different in perspective than the wide-angle shot. Finally, a good exercise to do every time you're out shooting is to move closer and closer to whatever first caught your eye. A telephoto lets you take that to extremes, which can often mean more interesting photos.

Position and lens choice are just two of the decisions photographers make while trying to create pictures that are unique, unusual, or show the world around them in a new and interesting way. Another choice is made in managing exposure, choosing to stop or blur action, taking advantage of depth of field to control focus or even change image processing options in the camera. And since photography is about creative control, then photographers need to start thinking about how they can extend that control to the light they're working in.

Once you begin consciously thinking about light, you'll realize there are times you can take action to change it. If light is too harsh, that's because it's a small light source. With what you know now about quality of light and size of light, you'll realize that if you diffuse the light, you'll change it to soft light. That's the role of diffusion panels. Placing one between your subject and the sun will change a small light source to a large one, resulting in softer light. This is why a diffusion panel is considered a "light modifier."

One of the most common light modifiers used by photographers is a reflector. The job of a reflector, not surprisingly, is to reflect light where you want it. Most of the ones you can buy are round and collapse into a smaller ring. However, a sheet of white cloth, or even aluminum foil wrapped around a piece of cardboard can be used as a reflector.

Whatever reflector you use, it can serve three jobs: adding light, softening light or removing light. To add light, reflectors are best when it's sunny. You simply use the reflector to shine light onto your subject. You'll find reflectors with different surfaces, from white to gold, silver or a mix of colors. The more reflective the surface, the more light it reflects. What makes reflectors great is their ability to provide a constant, fairly strong (as long as the sun's out) light source for very little bulk, weight or cost. You'd also be surprised how far they can reflect light. Your subject can be lit in the shade by a reflector dozens of feet away in the sun.

### Filters

With film, there were many effects that could be achieved by adding filters to the front of the lens. Being able to do much of that today in software has lessened the number of filters we might use. There are two types, though, that many photographers still consider essential: polarizers and graduated neutral density filters.

The two main uses of polarizing filters are to darken the sky or reduce/remove reflections from a scene. A polarizer does both of those things by doing the same thing – only allowing light of a specific angle to pass through the filter. To get that effect on the sky, it's most effective if the sun is to the left or right of the scene. With the sun behind or in front, there's little if any effect to be had. Be cautious when using them with extreme wide-angles, though, as the effect can be heavier at one side than the other. Also, with wide-angles, be sure the filter is designed for that type of lens (often referred to as a "slim" filter), to avoid vignetting (darkening at the edges).

Neutral Density filters reduce the amount of light coming through the lens without changing the color (thus the "neutral" title). Their primary use is to allow photographers to shoot at lower shutter speeds than otherwise possible. This is one way to do long exposures during daylight and have extreme blur (shooting a waterfall or crashing waves is a classic use). Graduated neutral density filters start dark at one edge and either gradually go clear or do that at a mid-point in the filter. Their use is to help manage the range of light, for example when a sky is much brighter than the area underneath it. Some graduated filters also have color in one half, to force a different look on the sky.

### Adding Light - Flash

Reflectors are one way to add light to a scene, but they're limited by the need for a bright light source and lack of

fine control. There's another tool we have that can be used to do that too - the flash. It's important to understand the basics of flash to make sense of how the different flash modes operate.

All cameras have a maximum "sync" speed while being used with flash. That simply means the fastest shutter speed that can be used where the entire area of the sensor (or film) is exposed to light at the same moment. In today's Nikon cameras, that's usually 1/200 or 1/250 second. Shutter mechanisms are designed with two curtains. The front curtain is the first to open, exposing the sensor, and the second (or "rear") curtain follows it to close and finish the exposure. At speeds above maximum "sync" speed, the second curtain starts to follow the first curtain before it's finished crossing the sensor. That means that at no point in time is the entire sensor exposed to light at the same moment. A flash fired above sync would thus expose only a part of the frame, leaving a black strip where the second curtain was in the way.

There are three flash modes, and they involve the shutter speed and when the flash fires. They are:

**Front-curtain sync** – This is the standard mode, and if you haven't changed your flash sync setting, this is how it's going to work. The flash will fire as soon as the sensor is fully exposed, and if using Automatic, Program or Aperture Priority, the automatic exposure system won't allow the shutter to fire below 1/60 second (to help you avoid blur). The maximum shutter speed is whatever your camera's sync speed is (usually 1/200 or 1/250).

**Slow sync** – Again, the flash will fire as soon as the sensor's fully exposed, but when using Automatic, Program or Aperture, the shutter speed can go as low as the metering system wants it to. Again, maximum shutter speed is whatever your camera's sync speed is (usually 1/200 or 1/250).

**Rear-curtain sync** – In this mode, the flash fires at the last possible instant in the exposure, just before the second curtain, ("rear" curtain) starts to cover the sensor. And that also means it can work with slow shutter speeds. But the maximum shutter speed is still whatever your camera's sync speed is (usually 1/200 or 1/250).

Most photographers choose to use either Slow sync or Rear-curtain sync for how it captures action. In Slow sync, if there's action, the flash can "freeze" the moment, but then the action continues, and at a slow exposure, blur can appear to come out of the subject, in the direction the subject's moving. Rear-curtain sync, on the other hand, by firing at the end of the exposure, shows blur behind the subject, a more natural look.

What makes this work is the fact that the flash is firing anywhere from around 1/1000 second duration at full power to as fast as about 1/40,000 at minimum power (based on the model of flash used). So if there's not much ambient light, and a fast shutter speed is used, the shortness of the flash duration can freeze action well beyond what the shutter speed might. This is how photos are made that show a hummingbird's wings stopped in mid-air, or water droplets in mid-splash.

### Using Flash

Once you understand and start using off-camera flash, a whole new world of photography opens up. Since you now control the light source, you can make photos that simply weren't possible before. Having and using that portable sun makes all the difference in the world.

Since flash is a light source, all the qualities of light apply to it just like they do to other light sources. And just like other sources, the size of the flash, in relation to the subject, has a tremendous effect on the final picture. The big difference with flash is that we control both the size of the light source and the distance to the subject. The

further the flash from the subject, the smaller it becomes as a source. The closer, the larger it is. This is especially true when you start using light modifiers, like umbrellas and soft boxes.

One quality of all light sources is that the closer they are, the more intense they are. That's true of a flash just as it's true of the sun. The difference is distance. The sun is so far away that the intensity of its light on earth is the same, one-foot in front of you, as it is 50 miles away. With most other light sources that's not true, so you have to take into consideration how far the light is from the subject. As that distance changes, so will the exposure. The duration of the flash is almost always shorter than the shutter speed being used. Because of that, shutter speed becomes most important in regards to the available light. Shutter speed becomes your main control for adjusting the exposure of that available light. The aperture becomes the most important exposure variable for the subject. This is why many pros put their cameras into Manual exposure mode when working with flash. They set the aperture for the flash, then adjust the shutter speed to make the background appear the way they want it. It's much harder to do that in an Auto exposure mode.

**Inverse Square Law** - This comes from physics, and states that the quantity of light is inversely proportional to the square of the distance from the source. What it means for us is that the closer your light source is to your subject, the faster it falls off (gets dimmer) behind your subject. This is why the quantity of light on a sunny day is the same whether two feet or two-thousand feet from you (because the sun's so far away), but there's a big difference between standing two feet or ten feet from a desk lamp. Where this affects photographers the most is when using artificial lights (in our case flash). The further they are from the subject, the larger the area around your subject that will be similar in exposure. The closer the light source to the subject, the faster that exposure falls off behind them. That's why bouncing a light off a ceiling helps not only to soften the light but even the exposure out over a larger area.

There's a lot you can do with just one flash, even on camera. Direct flash is when the flash is on the camera and pointed directly at the subject (duh!). While it can result in a good exposure, the resulting light is not very interesting because of its flat nature. Plus it can throw strong shadows behind the subject. This is true whether you're using a built-in flash or an accessory mounted on the camera. With some accessory flashes, however, you don't have to point the flash at the subject. And that's what makes them so much more versatile.

One great advantage to most accessory flashes (not the pop-up type) is that they can be pointed in different directions. When we talked about direction of light, we discussed how flat and un-interesting light is when it comes from the same direction as the camera (direct). However, if we can angle the flash head to bounce the light off the ceiling or a nearby wall, we've now changed where the light is coming from. Plus, we changed the size of it, from a small light source (the flash) to a large light source (the ceiling or wall). This makes it softer and helps spread it out to cover a larger area. You just need a ceiling that's not too high (the light has to get up to it and back down with enough power), and a ceiling that's not black or a color that will add an unpleasant cast to your photos.

The most common use of direct flash (in good photos) is "fill" flash. The goal here is to add some light into the heavy shadows created by hard light (i.e. the sun overhead). It's often most effective when turned down in power, as the goal is to have a natural-looking picture. If it looks flashed, then too much flash was used. Only another photographer should be able to tell when fill flash has been used properly.

The best light from a flash, though, comes when you get the flash away from the camera. When you do that, you change the angle of the light, making it more natural and interesting. In the next section we'll get into wireless

flash with the Nikon Creative Lighting System, but there's another simple way to get the flash off the camera - use a cord. Nikon makes two TTL cords, meaning the flash maintains communications with the camera, the SC-28 and SC-29. One of those cords will let you move the flash away from the camera, yet still have complete TTL exposure control. And that can be done with any of Nikon's D-SLRs, from the entry-level to the top of the line.

### **Section 3 – Flash and Color Management**

Once you understand how to use flash, you've opened up a wide range of new creative opportunities to explore. No longer are you limited by the light that already exists - you're now able to create your own, and put it where you want it. As with the other aspects of advanced photography, once you understand how speedlights work, you can take control of them. And that starts with i-TTL.

Nikon's cameras and speedlights use a form of through-the-lens flash metering called i-TTL (Intelligent Through the Lens metering). It takes much of the guesswork out of working with flash, and combined with other components of Nikon's Creative Lighting System makes doing off-camera flash fairly easy.

To take advantage of Nikon's wireless flash control you need a trigger, and a flash that can receive the signal. Any of Nikon's digital SLR's that have Commander mode with their pop-up flash can work as a trigger for an SB-R200, SB-600, SB-700, SB-800, SB-900 or SB-910 Speedlight. You can also use the SB-700, SB-800, SB-900, SB-910 or SU-800 as a wireless trigger for other Nikon Speedlights when paired with a Nikon digital SLR. Using any of these combinations allows you to get the flash away from the camera, to be used as a main light or backlight, and you can use many units at the same time. Once you start using these you'll understand why Nikon calls it the "Creative Lighting System."

Many of Nikon's cameras offer an Auto FP High-Speed Sync option in the menus. This allows you to use shutter speeds above the maximum sync speed with compatible Nikon Speedlights (not the built-in flash). If you understand how the two shutter curtains work, and that when the shutter speed is set above sync speed there's actually a slit moving across the sensor, this wouldn't seem possible. Nikon achieves this by having the flash fire multiple bursts (like a stroboscope) so quickly that it appears to be one continuous light, and is then able to essentially "paint" the subject as the slit crosses the sensor. The downside to this is that because it's firing multiple bursts, it won't have as much power, or "reach," as a single burst. However, if the shutter speed is at or below maximum sync, the flash reverts to one single burst. This is a very effective way to use flash outdoors and take advantage of wide apertures to throw the background out of focus.

Some of Nikon's Speedlights come with a set of color correction filters (and Nikon sells filters as well). The reason these are included is that mixing light sources can lead to undesirable color casts. Most incandescent light sources will photograph warm (yellow or orange) with the camera set to the Flash or Daylight white balance settings. Fluorescent lights can often show a green cast. By matching the filter to the light source (orange for incandescent, green for fluorescent) and then setting the camera's white balance properly (to incandescent or fluorescent), you can minimize those color problems. Using Nikon's SB-910 (or SB-900 or SB-700) with its filters and special holder, the camera will actually know the filter is there and adjust accordingly (see your manual for details). There are also third-party filters that can be bought from both Lee and Rosco, and *expoimaging.com* sells sets that Velcro to the front of the Speedlight.

Once you get started with lighting, you'll find there are a lot of accessories that can make it much easier. At the

very least you'll need a light stand and bracket to mount the flash to the light stand (or use the foot that comes with the SB-600, SB-700, SB-800, SB-900 and SB-910 Speedlights). Eventually you'll probably want to add tools that change the character of the light, called light modifiers. These include soft boxes, grids, gobos, scrims and other gear. Some of the ones used in the live flash demo are from *Expolmaging.com* (like the gels, above, and grids), Lumiquest, Lightware, or Westcott. The gear used in the live lighting demo includes:

- SB-910/SB-700 Speedlights
- Lowepro ProRoller case
- Bogen 7' stands
- Photoflex flash bracket
- Photoflex 30 or 36" satin umbrella or White Lightning 51-inch parabolic umbrellas.
- Photoflex arm (for the backdrop)
- Gels and grids (Nikon and Expolmaging)

Please consider using rechargeable batteries for your flashes. Ni-MH (Nickel-metal hydride) are the best in that category right now. There are fast and slow chargers. Fast chargers burn out batteries faster, so set the charge for slow unless you're in a hurry.

### Color Management

The reason every photographer should care about color management is trust. You want to trust your monitor to show the photo as it was shot, so that any corrections or enhancements you make are improving the photo, not creating new problems. And you want to have trust that others are seeing your photos the way you meant for them to be seen, or at least close.

There are entire books, many hundreds of pages long, on color management. So please consider this an introduction to color management, not the final word on it.

Using good color management will help you achieve predictable and consistent color. Whether your goal is to have accurate color or pleasing color (the two are not always the same), good color management will help get you there.

There are three primary parts to color management:

- 1 – Monitor Profile
- 2 – Color Space
- 3 – Soft Proofing and Printer Profiles

### Monitor Profile

If you can't trust the monitor you're looking at, then how do you know if you're helping or hurting the image when editing it? That's why a good monitor profile is so important. To do that, you need a hardware-based system to calibrate and profile your monitor. X-Rite ([www.x-rite.com](http://www.x-rite.com)) makes a number of excellent packages. ColorMunki Smile, ColorMunki Display, ColorMunki Photo and i1 Display Pro are among their products. The less expensive use colorimeters, which read transmissive light (what monitors produce). The more expensive use spectrophotometers, which read reflective light, so they can also be used for printer profiling, scanner profiling, projector profiling and camera profiling as well as monitors.

You'll need target values to tell the color management package what you're trying to do with the monitor. Usually a white point of 6000K or 6500K, Gamma of 2.2 and Luminance of 90-120 (depending on the monitor) are good starting points. If you can't choose white point with your monitor, then simply choose "Native." The software will help guide you in this, and your experience will also help you realize which setting work best for you.

If you're still using an old CRT monitor, let it warm up for about at least a half-hour before profiling, so it can come to full operating temperature. LCD's, which nearly universal today, do need to warm up as well, just not as long (perhaps ten to twenty minutes).

Calibrating and Profiling are two steps, and both are necessary. Calibration guides you in setting the monitor to certain values (white point, gamma, luminance). After that, profiling reads how your monitor displays a range of colors and tones once properly calibrated. Once your monitor is calibrated and profiled, do not touch the brightness or contrast settings again until the next calibration.

Re-calibrate and profile on a regular basis. For a CRT monitor this means at least every four weeks (more often if you're critical of color, or you notice a shift). LCD's can go longer between calibration and profiling, although at least once a month is a good Idea.

A good working environment is important too. Keep room lights low and neutral ("daylight" bulbs if possible) and keep window light away from your work area. Use a neutral background for your computer's desktop.

### Color Space

Most digital SLRs today offer AdobeRGB or sRGB (and sRGB is the default). If your images are headed to the web or to a commercial photofinisher that does not utilize full color management, you may be better off leaving your camera at sRGB. AdobeRGB is a wider color space, and therefore better suited for people who plan to work on their images later, or want the most possible color from their images. If you're shooting RAW, you can choose the color space later if you like, when working on your image in Nikon Capture NX2 or another RAW editor.

Make sure that your image editing program's color settings are properly set for your workflow. If you're using a software package that has color management (such as Capture NX2 or Adobe Photoshop) you can choose a workspace of sRGB or Adobe RGB (these two are the most common, though there are others). In most cases you'll want to set it for whatever color space your camera is set for.

With Capture NX2, simply go to the Preferences, Color Management tab and set the Default ICC profile to what you prefer (AdobeRGB or sRGB).

With Photoshop the shortcut to get to its Color settings is Control-Shift-K, or Command-Shift-K for Mac.

If your editing space is different from what your output space needs to be, you'll want to Convert your image to that output space. Most of the world is not color managed, so if your image is headed to the web, a non-color-managed application or a non-color-managed photofinisher, your image probably needs to be in sRGB. If it's in something else (not the default sRGB), then you'll need to convert it to the appropriate profile before saving (Capture NX2 – Adjust – Color Profile, Convert, or with Photoshop, Edit – Convert to Profile). A good starting point in the Conversion Options is "Relative Colorimetric, Use Black Point" (and Dither

with Photoshop). Occasionally you may see a color shift during the conversion. If you find the shift objectionable, then try changing the Intent to Perceptual.

If you're printing using an inkjet printer you do not need to convert out of your working Color Space, as that will be done during the printing step for you.

It's important to remember that your image needs to be "tagged" properly so that Capture NX2, Photoshop, or other color-management savvy programs know with certainty what Color Space the image is in. You can accomplish this in Photoshop by being sure the "Color: ICC Profile" is checked in the Save As dialog when saving the image. With Capture NX2 the profile is automatically embedded in the saved file.

Remember that "Apply" or "Assign" does not change the file. It changes the way the file is interpreted by your software and therefore changes the way it looks. "Convert" DOES change the file, but in a way that tries to retain that same color look in a different color space. This is why "Convert" is so important - it attempts to keep the same "look" you've created, even when viewed in different color spaces.

### Soft Proofing and Printer Profiles

It's also important to have the color management settings correct when printing. If using Capture NX2 to print to a photo-quality inkjet printer, turn on Capture's "Soft Proof" option before doing that. After that, choose the correct printer/paper profile that you'll be using, with Relative Colorimetric and Blackpoint Compensation. That information should then be carried on to the Color Management tab in Capture's Print dialog.

Soft Proofing is an incredibly valuable tool for photographers. It forces the computer and software to simulate how the image will look once printed on the chosen paper. Once you see that, you can leave it turned on while making further adjustments to the image, to get it back to how you want it to look. Not taking advantage of Soft Proofing is throwing away time and money.

To Soft Proof in Photoshop, use the View- Proof Setup menu.

### sRGB and Adobe RGB workflows

#### sRGB

1. Leave the camera set to sRGB as the color space (or for older Nikon cameras Mode 1 for skin tones, or Mode III for colors found in nature).
2. Don't change the color space in software.
3. When sending an image off to be printed, don't change the color space settings (no conversion required). If printing at home, let the printer manage the color (which is what it will want to do anyway).

#### Adobe RGB

1. Set the camera to Adobe RGB (or choose Mode II in older Nikon cameras).
2. Use color management "smart" software (like Nikon Capture NX2 or Photoshop) set to read the color space properly (more complicated with Photoshop than NX2).
3. Convert to sRGB if going to web/email or to a printer that doesn't handle color management.
4. When printing, make sure to turn off printer color management, since you're already managing the color through software. Having the printer software try to help at this point will only create problems. And be sure to take advantage of soft proofing before printing.



## Video

While video is not the main purpose of Nikon School, since newer cameras all have this capability, here are some helpful tips that you'll find useful in shooting video with digital SLRs.

First, you need to understand the choices you have in the "Movie Settings" menu. The first of those is Movie Quality:

Resolution -

1920 X 1080 – Usually referred to as "1080," this is also called "Full HD."

1280 X 720 – Called "720," this is HDTV resolution.

640 X 424 – This is considered SDTV, or "Standard" TV resolution.

FPS – Frames per Second –

24 – often used in movies (shot on film), referred to as "cinematic."

30 – the standard for video.

60 – better for fast action, or when you know you'll want to run the scene in slow-motion. Using 60 fps usually means you can't shoot at 1080.

Normal/High – the amount of compression, "High Quality" has the least compression.

Then choose what Microphone setting you want.

Auto – means the level will change based on the volume around you.

High/Medium/Low – set based on how far or close you are to your subject.

Microphone off – if you don't want to record any sound.

Manual control - some Nikon cameras now let you set the volume manually, and give you a meter to help do that.

Manual movie settings – let you use Manual mode to set ISO and shutter speed.

To be successful with video, there are some additional things to keep in mind. In addition to paying attention to subject, light and background, you also need to remember the four S's:

**Stability**

**Sound**

**Story**

**Software**

**Stability** – with video, you can't count on a fast shutter speed to freeze the moment. You need steady shots, which means a good tripod, monopod, or very smooth technique.

**Sound** – makes or breaks video. Sometimes the sound is even more important than the visuals. Think about the sound, and don't be surprised to find yourself investing in more gear – microphones (like the Nikon ME-1, made specifically for this) and digital recorders – to get better quality.

**Story** – with still photos, you can go for one shot or multiple, and then put them together in a package later in any order you want. With video, though, you really need to think through the story you're telling beforehand, to make sure you plan for the shots you need.

**Software** – the software you’ve been using for your photography probably won’t handle video, and certainly won’t let you edit it with the tools you’ll want. So more than the monetary investment in new software, you’ll need to invest time in learning how to use it. However, Nikon's free View NX2 browser does have a basic movie editor built in to help you get started.

And video isn’t for everyone. If your love is for still photography - great - it’s a wonderful medium. However, video and audio let you tell stories and present visuals in a whole new way, and will be an additional creative outlet for some.

## **Section 4 – Editing and Beyond**

With the advent of digital photography, every photographer who had a computer now had the equivalent of a darkroom. Everyone could take added control over their photos, and that's a good thing. No camera captures the world the same way human vision sees it. That alone is a strong reason to consider "touching" at least some of your photos. But there's also the added benefit of being able to take your photos further, to perhaps complete the creative vision you had when you first decided to take the picture. There are many reasons to work on an image in software, from simple enhancement to fixing exposure or color problems to removing dust spots. Trying to get the picture "just right" in camera is a great goal, but if you never use editing software, then you're not going as far with your pictures as you could. The trick is in making edits that look believable, avoiding heavy-handed manipulation. And that starts with how you shoot the picture.

As we discussed earlier, shooting RAW files lets you do more with your images later. The extra bit-depth and ability to change white balance and contrast, among other things, is incredibly valuable.

While accomplished photographers do everything they can to make the perfect picture with their camera, they don't stop there. They're also always thinking about what they might - or have to - do later. That means when shooting pictures you sometimes should be making decisions on things like exposure based on what you'll need to do later. A great example is when you have a dark subject against a bright background. You need to avoid overexposing the background, which will result in your subject being darker than you'd like. Which also means you'll need to plan on lightening up the subject later in software. If you just expose for the subject and overexpose the background, then that background detail will be gone for good. It's a case of balancing exposure to get the right information to make the picture you want, later.

When talking about exposure in digital photography, one common phrase is, "expose to the right." Technically, there's a good reason for that. Digital cameras capture far more information in highlights than they do in shadows. So the more information to capture to the right side of the histogram, the more information you'll have to work with. By exposing to push the histogram graph as far right as possible, without hitting that far right wall, you're capturing more useful data. However, the downside to this is that most of your photos will be too light (overexposed somewhat), needing to be adjusted later in software. This is one of those cases where the technically correct way adds extra work that most people probably won't want to do.

There are three categories of software we refer to in a digital workflow: Browsers, Editors and Catalog programs.

Browsers help you download, re-name, add metadata, sort, organize and launch your images into editors. They

should be fast and easy to use, and take no ownership of your images. In other words, you should be able to delete the browser from your computer and all of your images will remain unaffected. Nikon View NX2 and Photo Mechanic are two strong browsers, and other programs, such as Lightroom, Aperture, Adobe Bridge, Elements, Picasa, iPhoto and Windows Photo Gallery also have browser components.

Editors are for opening images and making not just global, but selective changes to color, tone, cropping, etc. These include Nikon Capture NX2, Adobe Photoshop, Apple Aperture, Adobe Lightroom, Adobe Photoshop Elements, Picasa and Apple iPhoto, to name some of the popular ones.

Catalog programs help you keep track of images. They do this by creating a database with thumbnail previews and the EXIF and metadata from those images. The classics in this type of program are Media Pro 1 and Extensis Portfolio, though programs such as Lightroom, Aperture, Picasa, Elements and iPhoto have some of that capability. You definitely need a catalog if you have a daily need to find images, or have a poorly designed workflow.

Speaking of workflow, there are four primary steps to most digital workflows. They are Download, Sort, Prep Master File and Prep for Output.

### Download

Browsers are tools for fast viewing and organization of images. Look for one that will help with the download process, including renaming and captioning during download. Be sure to rename your files, since the default name out of the camera tells you nothing about the photo itself. A good naming system uses the date the photo was shot as well as a simple name for the assignment/subject. For instance, a photo that was shot on August 4, 2013, on a trip to Chicago might be renamed "20130804\_Chicago\_001.jpg." Software that will do this renaming for you will automatically sequence the numbers up. Most good browsers, such as Nikon View NX2 and Photo Mechanic, offer this capability and more, and Adobe Bridge, Lightroom, ACDSee, Photoshop Elements and Aperture can also do this.

### Sort

It's been said that good photographers have large trash cans. What that means is that one aspect of being a good photographer is the ability to choose the best pictures and not show the rest. Here are a few suggestions to achieve that:

- Be ruthless in picking photos. Choose only the best to show, and immediately reject any that suffer from problems like focus, poor composition, lack of emotion, etc.
- You may have really liked that horse you just photographed, and worked it with all the tools you had. That's great, just what you should be doing. However, few people will want to see every one of those shots. Pick the single best one and show only that. Make them think you're so good that it only takes one photo for you to get it right!
- Avoid the cliché shots. That means if you're showing a photo of a kitty or a sunset, it better be an exceptional picture. There are millions of those. Look for the unusual or unique.
- Try to tell a story with your photos, especially if there's a natural story to tell. If you're showing photos of your vacation, they'll be more powerful if you combine different types of shots, using different angles and shapes, than to show a collection of all the cathedrals you visited. Show some of the people, their homes and streets, and surrounding countryside (or cityscape) at different times of day. And remember the rules above - make and show pictures that go beyond the ordinary.

- Finally, remember who you're trying to please. If you need to satisfy a client, then make sure you shoot what they want. If you're shooting photos for yourself, then make sure you shoot pictures you want. That's all that really matters.

### Preparing to Edit

When you first open an image, take a moment to figure out exactly what you want to accomplish. Have a plan. Then decide which tools will do that in the best way possible with the least amount of image degradation. You want to preserve as much image information as possible, and always be able to go back to the original file. When we used Photoshop our workflow was always to work on a copy (never the original) and do everything in Layers. The introduction of Nikon Capture NX (and now NX2) has changed that workflow.

Nikon Capture NX2 lets you work on JPEG, TIFF or NEF (RAW) files, and nearly all of its tools can be used on each of those file formats. There are only a few adjustments, in Camera Settings and Camera and Lens Correction that only work on NEF files. All of the other tools can be used with both JPEG and TIFF files.

One of the great advantages to Capture NX2 is how it keeps track of changes, through the Edit List, and makes those changes always available for re-working *as long as* the file is saved as a NEF. In other words, even a JPEG or TIFF file can be saved as a NEF from within Capture NX 2, and any adjustments done in NX2 are then saved with that NEF in a form that lets them be changed again and again in the future. This also means that file sizes, even with all of the changes, remain fairly small.

When working on an image with editing software, a good workflow would be to:

#### Crop

Fix/Enhance Tone globally

Fix/Enhance Color globally

Selective tone and color changes

Save file as a version, perhaps "Master" (Capture NX2), or layered TIFF or PSD with Photoshop.

Size for output method

Sharpen appropriately based on size

Soft proof if printing

### Preparing for Output

If you're going to share a picture, you want to make sure that not only does it look right (color management), but that it's also the correct size and sharpness. That means you need a clear understanding of both PPI and DPI, and how they differ. PPI stands for "Pixels Per Inch," and refers to image resolution. In other words, how many pixels an image has in a specific area. Every image has a certain number of pixels to start with. For instance, a 24-megapixel camera produces an image with twenty-four million pixels. If it's an SLR with a 3:2 aspect ratio, then those pixels will be distributed as 6000 pixels across and 4000 pixels deep. That's its resolution. PPI simply answers the question of how many pixels fit in a one-square inch area. For the 24MP camera that could be 300PPI or 72PPI and you'd still have 6000 pixels by 4000 pixels. What would change, though, is the area those pixels would cover. At 300 PPI, they would fill a space of approximately 20-inches by 13-inches. At 72 PPI those same pixels would fill a space of 72 by 48 inches. PPI is all about pixel density.

When printing you need fairly high resolution. Most people want somewhere between 200 and 360 PPI, although others go as low as 160 and see no difference in the final print. The important thing is having enough pixels to start with. If you want to print 30-inches by 20-inches at 300 PPI, then you'll probably have to resample your image up (add pixels). Remember that while most software will let you do this, it accomplishes that by adding pixels of similar tone and color/hue. It can't add detail. What this means is that the image will soften somewhat, and you'll need to add more sharpening during the output process to try to correct for the softening.

If preparing an image for screen, you should know that most monitors display anywhere from 80 to 120 PPI, meaning you need far fewer pixels to look good on screen. In that case pay attention to the pixel dimensions (how many wide by how many tall), since inches and PPI really have no meaning on a screen.

After setting the resolution for your needs, remember that when printing you'll lose some sharpness due to the slight spread of ink when it hits the paper. To recover from that softening effect, add a little sharpening in software. That's normally done with Unsharp Mask (USM). Try a low Radius, and moderate Amount, then use the Threshold slider to reduce the effect in smooth areas (like sky and skin). If you like using Capture NX2, then you may also want to try the High Pass sharpening method in it, which some prefer to the standard Unsharp Mask.

And don't forget to take advantage of soft proofing. With Soft Proofing you can simulate how the image will change once you move from a backlit RGB monitor to ink on paper. With glossy paper you'll usually see little change, but as you move to rougher-surface papers (i.e. matte, canvas), you'll lose more contrast and color. Once you've turned it on and seen how the image changes, you can then do more editing steps if needed to correct for what changed. In NX2 simply click the "Soft Proof" button at the bottom left of the image window, and then choose the paper profile you're going to print to. For rendering intent, start with "Relative Colorimetric" and "Use Black Point Compensation."

## **Editing Tips**

The first thing to ask yourself as you start working on images is, "Is there anything I need to do to all of the images, or some of them that can be done as a batch process?" If so, then that should be your first step.

Nikon View NX2 has a window at the lower left called "Quick Adjustment" that will let you apply one or several changes to either one or many photos. Simply select all the ones you want the change made to and then make it. If you like it, choose the "Save" button at the bottom of the window.

Capture NX2 also offers batch processing, in, not surprisingly, a more powerful fashion. To do that you first need to make changes to one image and save those changes using the small button that looks like two gears at the upper right of the Edit List. Clicking it, you can then choose "Save Adjustments" and in the following dialog select any or all of the changes you made, then save those with a name of your choosing. To apply that same set of changes to another image, just open the image and go back to the gears icon and choose "Load Adjustments", then choose the one you made. If you want to apply that adjustment to many images, then open the "Browser" window in NX2 and choose all the photos you want to change. Then, at the bottom of the browser window (lower left this time) you'll see that same gears icon. Click on it and choose "Load Adjustments" to start the batch process for those images. You'll see that this opens the "Processing Queue", which lets you not only apply that adjustment, but also choose a new destination for the processed images, change the name and even change file formats (for instance to JPEG or TIFF).

Most people using Capture NX2 on individual images will do the majority of their work using the options found in the Adjust menu or with Control Points. The Adjust menu is home to familiar tools like Levels and Curves, LCH, Color Balance, Contrast/Brightness, Saturation/Warmth and some unique tools like D-Lighting. They can be accessed directly from the Adjust menu, or from a New Step in the Edit List.

A good starting point for many pictures, especially if they're a bit flat or lacking in contrast, would be to use the Double Threshold feature of the Histogram. Turn that on, then pull the right slider (white) in until you see small white areas start to block up. Do the same with the black slider on the left. Then put a White Control Point in one of the small white areas and a Black Control Point in one of the small black areas. Now turn off Double Threshold. This will change the dynamic range for the image (generally adding some contrast) while also clearing some color casts that may exist in the highlights and shadows. In addition, if there's an objectionable color cast to the image (as opposed to one that's due to a natural condition like warm late-day light) use the Neutral Control Point to click a neutral area (an area that shouldn't have any color) to correct the color cast for the entire photo.

What really sets Capture NX2 apart from other editing applications, though, is the U-Point interface. With the U-Point technology, making changes to a file is as easy as clicking the area you want to affect and then dragging a slider to make that change. While there are several different types of Control Points, the Color Control Points will get the most use. When you drop a Color Control Point onto an area, it takes into account color, texture, tone and detail among other things, and gives you a number of ways of changing that. To see what the Color Control Point is affecting, check the "Show Selection" box in the Edit List. Areas that show white are what will be most affected, darker areas less, black areas not at all. With that turned on you can fine-tune both the placement of the Point and the size of the area you want it to control. You can then adjust the tone, color, warmth, saturation and other variables. Capture NX2 also offers a number of other tools for making selections to let you further refine the area you want to adjust and the amount of that adjustment.

Whether using one of the adjustment tools or a Control Point, when you have it open you can use the Brush to selectively remove that effect, or even to selectively paint it in. There are other selection tools (gradient, lasso, marquee) to help you get just the look you want from your photos. And to take that look further along, Capture NX2 has complete color management built in.

Applying profiles, Converting profiles (covered in the Color Management section), Soft Proofing (mentioned earlier), Unsharp Mask – Capture NX2 has all of the high-end tools to help you make the most of printing your images. You can re-size from within the program as a New Step in the Edit List and then go back and change it anytime you like. Set your sharpening based on size, but feel free to go back at any time and re-work that sharpening step in the Edit List.

How far you choose to go with Capture NX2 is up to you. To help you on that trip, there's information for Nikon Capture NX2 available at [www.capturenx.com](http://www.capturenx.com). Also, well-known digital imaging author Ben Long has written a book, *Real World Capture NX2*. In addition there's an ebook available, by Jason Odell, called *The Photographers Guide to Capture NX2*.

A photographer friend once said, "It's not a picture until you can hold it in your hand." That may not be literally true, but the fact is that far too photographers bother making prints any more. And that's a problem. Paper can have an incredibly long life, if it's not lost or destroyed. Think ahead twenty or thirty years. Are you confident you'll still be able to read all your digital files? You can get great quality prints made today for very little money. Make it a habit to get prints done of your ten or fifteen favorite photos every year, and get a good archival box

(from an art supply store or online) to store them in. You'll thank me some day in the future.

## Backup

One of the great advantages of digital over film is the ability to have as many exact duplicate files as needed. There's no image degradation in copying a file from one folder or hard drive to another. In fact, for the first time in photography's history, it's possible for an original image to retain all of its original data intact, indefinitely, as long as the file is kept on current media and can be opened. The one downside is that images can be lost, just as film could be lost. That's why a good digital workflow is so important and a good backup strategy too. If your image only exists in one place, it's in danger. Cards can be lost, hard drives can crash. That's why every diligent photographer backs up their images as soon as possible. There are a number of ways to accomplish that, and some are very easy. Perhaps the best way to think about your options is to consider what works best for short-term image storage and what's best for long-term.

Short-term backup relies mainly on hard drives (and perhaps memory cards - CF and SD). Long-term uses hard drives too, but also brings in devices like personal servers, NAS (Network Attached Storage) and DVDs.

Hard drive – This is perhaps the easiest and least expensive option for most people. You can buy a terabyte hard drive for under \$100, and it's plug-and-play on any current computer operating system. In other words, plug it in, connect it to the computer (usually through a USB port), turn it on and the computer will “see” it. Then you can simply drag folders of images over to it and presto, now you have a second copy of your images. You can (and should for your best images) take this one step further, and copy those images to a hard drive that is then stored away from your home. Have a friend keep it, take it to your office or use a safe deposit box. Now your images are safe from fire, flood, burglary, etc. (unless you're unlucky enough to have tragedy strike those two locations simultaneously). If you're traveling with a computer, you can get very small, portable hard drives that are powered by the computer's USB port. That means you can backup your photos to a second device even when traveling. If you do that, always keep that hard drive and your computer in separate bags, in case one is lost or stolen.

USB stick or memory cards – High capacity USB sticks, like the SanDisk 64GB Ultra Backup, are even smaller, more portable ways to backup images on the road. Simply download your cards to the computer, then backup those files to the stick. Small and mostly plastic, you can keep it in your pocket while traveling, and even while going through airport security. Memory cards, too, can be good temporary backup devices. You can download the images to your computer, then just tuck the cards away someplace safe until you return home. Once you've successfully backed up the images from your computer, you can then re-format the cards and use them to shoot to again.

Servers – Servers, which are enclosures with multiple drives accessible across a network, used to be just for businesses. No more. There are many options in home servers today that can store not just your images, but your other important data, music and videos as well. And these servers can “serve” those music files and videos to other devices around the house.

NAS devices (Network Attached Storage) are similar to RAID arrays in that they can be accessed across a network, and often involve multiple drives as well. With any devices that communicate across a network, it's important to have a fast network. These days that means you want to have cable, routers and computers that support gigabit speeds.

RAID arrays – Redundant Array of Independent Disks, are a collection of hard drives in an enclosure that can be set up to combine the drives into one large drive (RAID 0), as a “mirrored” configuration (RAID 1, every write or delete action is performed to two drives simultaneously) or as a combination of the two strategies (often called RAID 5 or 6). These are also becoming more common and inexpensive, and give you fast access of very large amounts of data with redundancy, so a drive crashing will mean no immediate data loss.

Online backup – There are several services that allow you to backup your files online, as another method of protecting your most important files. Nikon offers such a service with Nikon Image Space. Anyone can sign up and get 2GB of free space. But if you own a Nikon camera, you can get 20GB for free just by registering. Other companies offer similar services, and capacities of up to 50GB and beyond are available. There are drawbacks to this as your only backup strategy. Speed of upload and download can be slow, and you have to trust that the company managing the site will stay in business. Using one of these services is a good idea, just make sure it's not the only place you have your most important photos stored.

### **But wait, there's more...**

Photography is such a wide-ranging art form that its possibilities are nearly limitless. Here are a few areas you may want to explore:

#### **Night Photography**

Most people don't try night photography because it seems too difficult, or complicated. And that's simply not true. As with all photography, it's a matter of figuring out the technical side, and then getting creative. Here are a few things you need to do, or understand, to be successful:

First, you'll need a tripod. While it doesn't have to be real expensive, you'll be happier if you buy a good one. A good tripod will last a long time and be a pleasure to use. More importantly, it will be sturdy and result in better pictures. For exposure, you'll be more successful with night photos if you shoot in Manual exposure mode, as the wide range from light to dark makes using an automatic mode nearly impossible. You want to avoid moving the camera when taking the picture (which would result in blur), so use a cable release (or infrared trigger) or the camera's self-timer to trip the shutter. It's doubtful the autofocus will work well in the dark, so turn it off and focus manually. Finally, when looking at your photos on the LCD in the dark, remember that it will look brighter than it really is. You'll probably need an exposure that looks a bit too bright on that LCD, and check the histogram too.

#### **Light Painting**

Light painting is just night photography where you're providing the main light. One great thing about it is you can do it anytime, anywhere, as long as you've got a room you can make dark. Like night photography, you'll need a tripod and want to shoot on Manual exposure. If it's dark enough, you can trip the shutter by pressing the shutter button, or use a release or self-timer. Again, you'll want to turn the AF off and manually focus. Now let's get to the fun part.

The trick in light painting is using a little light, not a lot. You want to paint light onto just some areas of the scene. If you light up everything, then you might as well use a flash. A good picture done with light painting will look as if multiple light sources were used, or just one but from an interesting angle. If you're working in a small area, like something you've created on a table at home, then a penlight can provide plenty of light. If working outside, painting large objects like trees, then you need something more powerful, like a handheld spotlight. Exposure is



all trial and error, but having the LCD makes that pretty easy.

### Bad Weather can make for Good (or Great) Pictures

One thing we always try for as photographers is to make pictures that are different. Which means if you can find something people don't often shoot, you've got a better chance at making an interesting picture. And most people don't like to go out in bad weather. So if you're willing to, then you may find some great photo opportunities. The trick, of course, is staying comfortable and protecting your gear.

If you're uncomfortable - cold, hot, wet, hungry - then you're probably not going to be as creative as you could be. So dress appropriately, from head to toe, and take care of yourself. And if you're struggling to keep your gear dry or functioning, then that will limit you too. Golf umbrellas are a great accessory for photographers. They give a lot of coverage and are built to withstand a fair amount of wind. If you shop around, you'll also find ones that are collapsible, so they don't have to be three-feet long all the time.

Plastic bags can be a photographer's best friend in bad weather. A kitchen trash bag and a couple of rubber bands can do a good job protecting a camera and lens from rain. And there are some great camera "raincoats" out there too, from a few dollars to over \$100.

In cold weather the two biggest concerns tend to be batteries and fingers. Batteries drain faster in the cold, so keep at least one spare inside your coat, so your body keeps it warm. And mittens, with thin gloves underneath, can keep your hands from going numb. Many photographers use the small chemical heat packs in their mittens, or pockets, to help keep their fingers functional.

Ice and snow can make for great pictures, but also treacherous footing. Boots are essential, and you can find "creepers" that easily attach to your boots to give you extra traction on slippery surfaces.

### HDR (High Dynamic Range) Imaging

This is an area that's gained great popularity the last few years thanks to better software. As we discussed earlier in the program, the range of light in many scenes exceeds what our cameras are capable of capturing in one exposure. In HDR photography you shoot the same scene several times, at different exposures, and then combine those photos later in software. Most simply, it's a way to extend the dynamic range of a picture. As with night photography and light painting, it's best done on a tripod, though most good software can assemble a hand-held series. It's best to shoot in Aperture Priority, so only shutter speed changes (otherwise the change in depth of field can cause problems). Most of today's cameras have an automatic exposure bracketing feature, so you can use that. You'll need a minimum of three shots, one at the "correct" exposure and two more, one over and one under-exposed. And finally, while it's possible to manually assemble the photos using layer-based software, it's much easier (and usually better quality) to use one of the HDR packages for that.

### Infrared

Infrared photography in the days of film was a very difficult and complicated process. Now, with digital cameras it's fairly simple. There are two ways to approach it. You can buy an "infrared" filter to put on your lens. This nearly opaque filter will allow only infrared light through, but your camera will be preventing much of that from being recorded thanks to the infrared blocking that's done with the low-pass filter. That means you'll need to shoot on a tripod, as the exposures, even in daylight, will be fairly long (measured in seconds). And, you need to focus and compose before putting the filter on. This is the least expensive way to try IR photography.

To shoot IR with a digital camera in a more natural way, that low-pass filter needs to be removed. There are several companies that can do this conversion, and *LifePixel.com* is one that several of the instructors have used. In that process the low-pass filter is removed and replaced with a filter that's sensitive to IR. With that new filter in place, the camera functions just like a "normal" camera and exposures are similar to what you'd have in regular situations. However, the camera's now recording only infrared light, so your photos will look different. And it can no longer be used for regular photography - it's an IR-only camera now.

There are advantages to shooting in RAW format with IR, but to get the best results, you need to start the RAW conversion process using your manufacturer's software. There's a pretty convincing explanation of this here: <http://www.lifepixel.com/tutorials/infrared-photoshop-videos>. Watch the "Infrared RAW file white balance issues & solutions" video.

Finally, thanks to the longer wavelength of IR light, focus can be somewhat off after an IR conversion. You can have a lens calibrated for this, but most people simply choose to shoot at smaller f/stops or even bracket their focus when shooting. And thanks to most landscape IR photography being done with wide-angle lenses, using smaller f/stops (f/8, 11?), this is rarely a problem.

#### Interval Timer/Time lapse

Many of Nikon's D-SLRs have an Interval Timer function built into the camera, in the Camera Setup menu. Using it you can have the camera shoot from 2-999 photos in series, at a designated interval. Most people use this feature to shoot a group of images and then turn them into a time-lapse movie. In most cases, if you're going to do this, there's no need to shoot RAW, or even best quality full-resolution JPEGs. You'll also likely use an automatic exposure mode, like Aperture Priority, and want to turn off VR and AF. While there are several programs on the market to assemble the resulting sequence into a video, Apple's QuickTime Pro (\$30), for both Mac and Windows, is a popular, easy-to-use choice.

In addition to Interval Timer, some new Nikon cameras offer a "Time lapse" feature in the menus too. This is similar to the Interval Timer in that you set how many photos are shot at what interval. But instead of finishing with a large group of still pictures, "Time lapse" automatically assembles the photos into a single video in the .Mov format. And the resolution and frame rate of the video is whatever you have set in the camera's "Movie settings" menu.

These are just a few of the fun things you can do that are outside the boundaries of "normal" photography. And this what makes photography such a satisfying lifelong hobby - there are always new directions to explore with it, new techniques to try.

We want to thank you for joining us today, and hope you have a lot of fun with your new knowledge.

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#### Software and Tools Used

We use a lot of different software packages throughout the day with Nikon School. All work on both Windows and Mac systems, unless noted below. While most have been listed above, the key ones we use and/or talk about are below:

## Color Management

ColorMunki Display, i1 Display Pro, ColorMunki Photo – [www.x-rite.com](http://www.x-rite.com)

Datacolor Spyder - [www.spyder.datacolor.com](http://www.spyder.datacolor.com)

## Light Modifiers

Photoflex – [www.photoflex.com](http://www.photoflex.com)

HonlPhoto - [www.HonlPhoto.com](http://www.HonlPhoto.com)

Lumiquest - [www.lumiquest.com](http://www.lumiquest.com)

Westcott - [www.fjwestcott.com](http://www.fjwestcott.com)

## Browsing and Editing software

Nikon ViewNX2 – [www.nikonusa.com](http://www.nikonusa.com)

Nikon Capture NX2– [www.nikonusa.com](http://www.nikonusa.com)

Photo Mechanic – [www.camerabits.com](http://www.camerabits.com)

HDR Expose – [UnifiedColor.com](http://UnifiedColor.com)

Photomatix – [HDRsoft.com](http://HDRsoft.com)

## Video editing software

Photoshop Premiere Elements and Adobe Premiere Pro – [www.adobe.com](http://www.adobe.com)

Final Cut Pro X – [www.Apple.com](http://www.Apple.com)

iPhoto – [www.Apple.com](http://www.Apple.com)

Windows Live Photo Gallery – [www.microsoft.com](http://www.microsoft.com)

## CF and SD cards

SanDisk – [www.sandisk.com](http://www.sandisk.com)

Lowepro camera bags, packs and rollers – [www.Lowepro.com](http://www.Lowepro.com)

## Image Recovery Software

SanDisk RescuePro – [www.SanDisk.com](http://www.SanDisk.com)

## Archiving Software

Media Pro 1 – [www.PhaseOne.com](http://www.PhaseOne.com)

Extensis Portfolio - [www.Extensis.com](http://www.Extensis.com)

## Slideshow creation software

ProShow Gold (Windows only) – [www.photodex.com](http://www.photodex.com)

Pictures to Exe (Windows Only) – [www.wnsoft.com](http://www.wnsoft.com)

iPhoto, iDVD (Mac only) – [www.apple.com](http://www.apple.com)

FotoMagico (Mac only) - [www.Boinx.com](http://www.Boinx.com)

## Books we Like

- *Real World Capture NX 2* (Long)

- *Speed of Light* (McNally)

- *The Hot Shoe Diaries* (McNally)
- *Real World Digital Photography* (Eismann, Duggan, Grey)
- *Complete Digital Photography* (Long)
- *Real World Photoshop*
- *From Still to Motion – D-SLR video tips*
- *Color Confidence* (Grey)
- *Photoshop for Photographers* (Evening)
- *Photoshop for Digital Photographers* (Kelby)
- *Photoshop Master Class* (Caponigro)
- *Real World Color Management* (Fraser, Murphy, Bunting)
- *Mastering Digital Printing* (Johnson)
- *The Complete Guide to Digital Photography* (Freeman)
- *Photoshop Masking and Compositing* (Eismann)

### Photography Trips

As mentioned earlier, a trip planned around photography is a great way to push yourself to shoot more pictures. However, it doesn't need to be a two-week adventure, or even go outside your hometown. Taking an hour to go explore an unfamiliar park or using your lunch break to walk the streets nearby can be visually rewarding. Get to know your area as well as possible. Invest in a local map book and use it to keep notes of interesting places that may be best visited at a different time of day or season. If you do choose to take part in a workshop, here's a link (at the bottom of the page) to some sponsored by Nikon, which means the teachers will be up-to-date on Nikon gear: <http://www.nikonusa.com/en/Learn-And-Explore/Nikon-School/index.page>.

## **Extra Material**

Due to time limits, there are topics we'd love to discuss but just can't fit into the day. While we may cover some of them during the Question and Answer session, they're listed here as well.

### Formatting cards

One of the best ways to avoid card problems is to get in the habit of regularly re-formatting your cards. The best way to do this is with your camera, using its built-in format function. This replaces the current directory on the card with a new, clean one, and can really help cut down on possible card errors. But remember, only format a card when you no longer care about any photos that are on it

Menus - It seems that every digital camera these days has hundreds of menus. Let's look at a few of the key ones:

**Active D-Lighting** - This option is an attempt to stretch the dynamic range of the camera. Every camera, whether film or digital, has a limited range of light that it can record. With today's digital cameras that tends to be around six stops of light. Anything beyond that will record as either black or white (under or overexposed). Active D-Lighting stretches that range a bit by underexposing the image (thus saving more highlight detail) and then adding extra processing to pull out detail in the shadows (that would have been lost due to the underexposure). Some Nikons offer set levels of D-Lighting, and the newer ones also offer "Auto." We've found Auto to be very effective, as it only turns on in contrasty situations, applying the amount it feels necessary. If you're comfortable managing dynamic range with traditional methods, you probably don't need this. If not, it can help.

Exposure Fine-Tuning - Over the years we've occasionally had people complain that they don't think their camera meters properly. "The images always come out too light," they might complain, or "too dark." Almost always, upon checking, there was nothing wrong with the meter. They simply preferred their images to be a different tonal range than most people. The Exposure Fine-Tuning menu was made with them in mind. Using it you can set the camera to consistently over- or under-expose by a set amount, without seeing that in the meter readouts. In other words, it changes what might be considered "0" for the meter.

High ISO Noise Reduction - With any digital camera, as you push the ISO higher, you'll start making digital noise more visible. This menu adds a processing step to the image to help reduce that noise. Some people like it, some don't. If you shoot a lot of high ISO images, then you might want to try it.

Instructor's Favorites - Five photographers teach the Nikon School of Photography, and here are a few of their favorite menu choices:

- AF Activation - Allows you to change AF "On" from the shutter button to the rear AF button only.
- Easy exposure compensation - Makes it easier (duh!) to use exposure compensation by removing the necessity of holding down the +/- button on top.
- White Balance Slots - Newer Nikon cameras, from the mid-range and higher, give you four Preset locations where you can store frequently used White Balance Presets.
- Format - This is the easiest, best way to help cards live a trouble-free life. Doing an in-camera format after safely downloading the images to your computer puts a new directory structure on the card, rather than simply adding more information to the existing one.
- Non-CPU lens data - If you have an older Nikon lens that doesn't have the CPU contacts to communicate with the camera, you lose the ability to meter. This menu lets you program the length and aperture of an old lens (or more than one) to again have Aperture Automatic metering. Cool!
- Virtual horizon - Turns the LCD display on the back of select Nikon digital SLRs into a level. Very neat.
- Live View - For low or high-angle shooting (camera on ground or held above the head), a great feature on the cameras that have it.
- Assign Function Button - Some of Nikon's cameras have a Function button on the front, and this menu lets you assign various options to it.
- File Number Sequencing - Can be set to force the camera to always reset the numbering to "0001" when you put in a new card, or keep numbering from where it left off.
- Custom Timers - you can change how long things like the meter or the rear LCD stay on.
- World Time - Lets you switch time zones rather than changing your camera's date/time stamp manually.
- Image Comment/Copyright - Allows you to add information to the EXIF data being written each time you press the shutter button.
- Auto Image Rotation - Uses the camera's orientation sensor to determine if the image is a vertical or horizontal, and passes that info along to smart browsers (like Nikon View NX2).
- Flash Sync Speed (Auto FP High Speed) - Some of Nikon's digital SLRs have this setting which forces the flash into "Focal Plane" action, which then lets you shoot above the normal high sync shutter speed. Only works with a Nikon accessory Speedlight, and very handy when using fill flash on a sunny day.
- Crop Mode - The D2X, D3X, D3, D3S, D700, D800, D4, D7100, and D600 all have this option, which lets you change the image capture area from full frame to less than that (more on that below).
- Battery Info - Since moving to Lithium-Ion batteries, battery life readouts have become much

more accurate. This will also tell you if the battery needs to be "calibrated."

## Upgrading

There are many good reasons to upgrade lenses and cameras. Here are some of the more important ones:

### Bodies

- Do you have a second body? Multiple bodies means less lens switching, fewer missed photo opportunities, and if one camera fails, you can still shoot pictures. This is a must if going on a special or unique trip where repair or replacement of a broken camera would be impossible.
- You may want to add a body with FX or DX capability. DX cameras have the built-in crop factor of the DX sensor, which can give telephotos a narrower angle of view (great for sports or wildlife photography). The Nikon D4, D3S, D3, D700 and D600 have FX sensors that excel in low light, making them great for anyone who regularly shoots in poor light. And the D800, D600, D3200, D5200, D7100 and D3X, with their high-resolution chips (24MP and above), have unbeatable resolution for huge prints or cropping.
- Higher-end cameras offer more functions and menus, tougher build, more weather-sealing and shutters with higher ratings (longer lives). Their autofocus systems commonly are faster and have more AF sensors.
- And sometimes it makes sense to buy one of the smaller, entry to mid-level cameras to take advantage of their lighter weight.

### Lenses

- Usually people want to add lenses to their kit to expand their focal length range, going longer (more telephoto) or wider. However, often times upgrading to a faster lens, one with a wider maximum aperture, is more beneficial. That means being able to shoot pictures in less light, or to use faster shutter speeds in poor light.
- More expensive lenses, especially paired with higher-end bodies, can result in faster autofocus.
- And, more expensive lenses benefit from higher-end designs and coatings, are often built tougher to withstand more use, and overall give better performance in the long run.

### Lens Choices

Nikon makes both a 10.5mm f/2.8 full-frame fisheye DX lens and a traditional 16mm f/2.8 full-frame fisheye (for film and FX bodies). These lenses give 180mm of coverage, making them a lot of fun to use, especially when close to a subject. Their use is broadened, though, when paired with Nikon's Capture NX2 software. Using it, you can click a button called "Fisheye Lens" to have the image "straightened" into a 130-degree view without the field curvature.

"Fast" is a term used to describe lenses that open wider than what would normally be found in a lens of that focal length. Most lenses tend to range from f/3.5 to f/5.6, but most fast lenses start at f/2.8 and go wider from there (f/1.4 anyone?). There are two big advantages to "fast" lenses. First, they let you shoot at a higher shutter speed in low light. If you can shoot at 1/60 second, f/4 at 1600 ISO, an f/2 lens would let you shoot in the same light, at the same ISO, at 1/250 second. The other advantage to a fast lens is that it has much less depth of field when used at that maximum aperture. That means the photographer has more control over how the background of the photo looks.

Wildlife photographers are usually familiar with teleconverters. These look like small lenses that mount between a telephoto lens and the camera body and extend the reach of the lens. In return for that extended reach, you lose some light. Nikon currently offers three teleconverters. A 1.4X, that, for instance, would make a 300mm a

420mm, losing one stop of light. A 1.7X, so a 300mm becomes a 510mm and loses 1.5 stops of light. And a 2X that makes that 300mm a 600mm, at the cost of two stops of light. If you're interested in a teleconverter, check first to make sure it will work with your lens. Nikon's teleconverters are designed for specific higher-end telephotos.

For close-ups, nothing beats a Micro (sometimes called Macro) lens. Nikon makes five, from 40mm to 200mm, and three of those are f/2.8. While most people think of them only as close-focus lenses, it's worth remembering that they all focus to infinity and are fairly fast (wide aperture), so they're very useful in low light too.

### Tripods

The best thing you can do when buying a tripod is to spend more money than you'd like. Tripods aren't sexy. However, properly cared for, a good one should last many, many years. A poor quality one, on the other hand, will make you leave it behind.

Tripods are all about support. If it's not steady, it's not worth using. And no matter how sturdy a tripod you have, the higher you make it, the less stable it becomes. Don't raise the center post unless you absolutely have to. Small, less-expensive tripods can do a good job if they're used low to the ground.

If you invest in a good tripod, you'll also likely be buying a good head to use on it. Spend some time researching the options. The Arca-Swiss style mount is very popular with serious photographers, and a number of companies specialize in heads and plates with that design.

### Bags

If you're going to carry more than one camera and lens, then you need a good bag that's both comfortable and functional. Shoulder bags, backpacks and waist belts are personal decisions photographers make. For travel, nothing beats a good backpack. If you're traveling very far, then you might want to consider one with wheels. If going by plane, check the airline's luggage allowances, number, weight and size, and plan accordingly. Lowepro has a very good selection of well-made bags. They make a bag for almost every use, from shoulder to waist to backpack to roller.

### Keeping the sensor clean

No matter how careful you are, you'll still sometimes get dust in the camera. That dust can settle on the low-pass filter covering the sensor and result in small defects in the image that look like smudges. If your Nikon camera offers a built-in cleaning routine ("Clean image sensor"), go into the Setup menu and set it to run at startup and shutdown (every time the camera's turned on or off). While that can help, there may still be times when dust appears on the sensor. Because that filter is delicate and easily damaged, Nikon recommends that any manual cleaning be done by Nikon-authorized service personnel. It is possible to try to clean the sensor yourself, but use extreme caution. Sometimes simply blowing off the sensor with a blower-bulb (not compressed air) can remove dust. To do that, you first need to use the "Lock mirror up for cleaning" option in the menus. Check your user manual for details.

### Printing

As great as it is to be able to show and share images on computers, there's still nothing quite like holding a print in your hand. The transition to digital photography means that anyone with a computer and a good photo printer has, essentially, a darkroom in their home. To make sure those prints live up to your expectations, there are a few things you need to know:

Inkjet is the most common type of high quality printing done at home these days. With inkjets, you need to understand the difference between dye-based inks and pigment inks. Dye-based have in the past given us the brightest colors and saturation, but at the cost of lifespan. Newer ink formulations used with certain papers can now create prints that, properly cared for, will last 20-to-50 years or more. Pigment inks have a longer life, some combinations estimated to last 200 years or beyond. For more on information print permanence, look at the independent site [www.wilhelm-research.com](http://www.wilhelm-research.com).

Paper choice is a critical component to a long lifespan as well as good print quality, so the easy answer is to use the manufacturer's paper and ink combinations. Their papers are what their printer, ink and drivers are designed for. Third party papers are an option, but do a little research on longevity and be prepared to spend some time getting the settings right for good-quality prints. Cheap papers will equal cheap (poor quality) prints. Regardless of the paper brand you settle on, be sure to consider some of the different surface types. Non-glossy papers with semi-gloss or matte surfaces have become very popular.

Art papers (such as Hahnemüle or Moab) can be an excellent choice for their unique surfaces, and their high quality means longevity shouldn't be an issue. However, check to see if they offer printer drivers for the printer you have. Otherwise expect to spend some time finding the right combination of settings to get good results. If you have a color management package that allows you to make custom printer profiles (such as those by X-Rite) you can create your own.

The software your computer uses to control printing is called the "print driver." Every good printer comes with drivers for that printer, and it controls everything from the speed to the amount of ink used to the shape of the ink droplet and how the ink is sprayed onto the paper. The speed at which a printer outputs images should be your last concern unless using the printer in a production environment. In fact, for the best quality prints you'll often want to slow that process down by turning off options like "High Speed". Perhaps most important is the conversion that the driver has to do to get good results transitioning from an RGB image on screen to essentially a CMYK image on paper. It's important to be sure that you have the latest driver (check your manufacturer's website) with the current crop of ICC profiles for the paper(s) you're using.

The ICC profile for a specific paper type could be called the recipe for that printer/ink/paper combination. As new papers are developed and released, new profiles are created for them. And as time passes, there are often updated profiles for existing papers. Using the latest profile is one of the keys to getting excellent results when printing. Remember, though, that each profile is for a specific printer/ink/paper combination. Using the wrong profile almost guarantees poor results.

When sending an image to the printer, the most important choice you make is telling the printer driver what specific type of paper you're using. That means you'd select something like "HP DJ 30/90/130 - Photo Satin", which means you're printing on HP's Satin paper on a Designjet 30 or 90 or 130. Without this information the printer will probably expect plain paper, and you'll be unhappy with the results (and will have wasted a sheet of photo paper).

If running color management, you have to be sure to turn off color management in the driver dialogs, because double-managing the color will mean poor results. Sometimes there's a button that says something like "No Color Management". In some printers you simply choose "Application Managed Colors" to tell the driver that you're managing the color from the application, not from the driver.



## Neutral Black and White

For best quality black and white prints from an inkjet printer, be sure to leave color inks turned on. The printers use a combination of color and black inks to produce grayscale output. If the default settings don't give you the neutrality you're looking for, you can try adjusting the ink settings in the printer dialog boxes.

## Panoramas

Some compact (point-and-shoot) cameras shoot and assemble these automatically for you, but they're easy to do manually too. The keys are having plenty of overlap between frames (to help the stitching software avoid problems), a set exposure (either Manual or use Exposure Lock), a set white balance so you don't get color shifts, and software to put them together. Remember, you can shoot vertical panoramas, and tiled shots as well.

## GPS

Being able to pinpoint exactly where and when a photo was taken can be very handy. Nikon makes the GPS-1 device that works with many of their SLRs, and automatically embeds GPS data into every photo taken. Using Nikon's View NX2 software (or many other programs as well) you can then pinpoint on a map exactly where the photo was taken.

## Perspective Control Lenses

If you have to tilt the camera back to photograph a vertical subject, then you're going to have a perspective problem - the subject will appear to be leaning away from you. Perspective Control (or PC) lenses can help avoid this by having the ability to tilt and shift, just like old view cameras. And in the last few years, they've become a popular way to create interesting pictures by adjusting them not to correct perspective, but to show only a small area of the scene in focus.

## Small cameras, big sensors

The best camera is often whatever camera you've got with you. Most people have cell phones with cameras now, but their quality leaves a lot to be desired. For not much more in the way of size, you could carry a Nikon 1 (J1, J2, J3, S1, V1 or V2) or COOLPIX compact camera. While not as versatile as an SLR, they can still make great pictures. You can also find underwater housings for some of them, and Nikon now has the AW-110, a ruggedized, shockproof, freezeproof and waterproof small camera.

## Edit and Output

Adobe Photoshop has been a powerful tool for photographers since the early days, and while it's not used as much as before, there are still a few things it can't be beat at. As mentioned earlier in the notes, if you want to work on a NEF that we've made changes to with View or NX2, you first need to save that file out as a TIFF or JPEG before bringing it into the other editor, such as Photoshop.

**Merging Images** - There are times where you'll want to combine two (or more) photos. If you have a RAW file, you can acquire it with different white balance and exposure options (among others). For instance, you can acquire and save one image as a TIFF with normal white balance, then a second time with a different white balance. Open both photos into Photoshop, then choose the Move tool (V) and hold down the shift key while dragging one photo on top of the other. The Shift key forces the image to align to the first one. Now choose the Eraser tool and white or black as the foreground tool to paint the color from the one layer onto the other.

To combine two different photos, you first need to create a selection in one photo. Open the second image and select all (Control-A) and Copy (Control-C). Go back to the first image and choose Edit – Paste Into. The first selection will be pasted into the second selection.

A better (and faster) choice for merging multiple images to create a High Dynamic Range image (HDR) through software such as “HDR Expose” or “Photomatix.” Designed just for this, these programs tend to do a better job than Photoshop.

Cosmetic Surgery – Whether you’re trying to smooth out wrinkle lines, help Uncle Ted shed a few pounds or just trying to clean up a photo with some dust, Photoshop has tools to help you do that. Capture NX2 now has the Auto Retouch Brush which works well, but Photoshop offers a larger variety of these types of tools. The Clone tool is the oldest of the bunch in Photoshop, and samples pixels from one area and puts them in another. It’s good for cleaning dust out of the sky.

There are better tools for working on skin problems like blemishes, wrinkles and scars than the clone tool. The first step should be to make a copy of the Background Layer (Control-J) so that all of your fixes are taking place on a Layer, not the original image. Introduced in Adobe Photoshop CS2, the Spot Healing Brush tries to automatically figure out where to sample from. While it normally works well, it sometimes picks an area too close to where the fix is being made, and so is noticeable. If that happens, try the regular Healing Brush instead. Use these options -- Mode: Normal, Source: Sampled and Aligned. Now choose a brush slightly larger than the size of the blemish you’re fixing, then hold down the Alt key (Option, Mac) and sample a clean spot away from the blemish. Remember that what’s being taken from the area you’re sampling is the texture, not the color. Now click and brush over the blemish. For wrinkles or scars, the Patch tool is sometimes better. Set its options for Source, then make a selection of the wrinkle or scar. Once you have the selection, drag it to a cleaner area nearby, and see how that works. The problem with these fixes is that you can end up with a face that’s almost too smooth. Use the Layers palette Opacity slider to back off the effect so the person looks normal, but with softened wrinkles and blemishes. For slimming (or having a bit of fun) try the Liquify tool (Filter – Liquify). “Forward Warp” can be used to remove a spare tire or slim down a neck or cheeks.

Borders and Text - An added touch for a special photo is to add a framing line to it and a title, or credit. It’s easily done, again using layers in Photoshop or Elements. To create a white edge, first select the image (Control-A, or Command-A). Then choose Edit – Stroke and set for 6 pixels, color white, Inside. Now create a New Layer (Layer – New – Layer) and go to Image – Canvas Size and check Relative and change the Width and Height boxes to 2-inches each. Make the Canvas Extension Color black, and click OK. Now your photo will have a white edge around it, with a black border. Another way of doing this would be to first create a Duplicate Background Layer (“Layer – Duplicate Layer...”), then go to Image - Canvas Size, then make sure “Relative” is checked and add a set amount in the Width and Height boxes. Then set the “Canvas extension color” to whatever you want the border to be. Using this technique allows you to add multiple borders and does so without cropping in slightly on the edges of your image.

For a final step, choose the Type tool and type in a title, a credit (your name) or both. Control – Return to accept the type, then use the Move tool (or hit the V key to make it active) and put the type where you want it. Of course, there are many variations on this, where you can use different colors or add more combinations of frames, borders and type.