

# Perfesser Kev's Automatic Flash Guide

## Effective and Ethical Use of Flash in Photojournalism

This is a guide in using the automatic exposure functions of a small electronic flash. It will discuss using flash as a fill light, and as a tool in better lighting a subject in very dark places or for portraiture. It will also briefly discuss my ethical concerns with these techniques.

### Equipment:

- *A camera* — One with the ability to connect a flash, either by the accessory hot shoe on top of the camera or by a small round sync plug somewhere on the camera or lens.
- *A flash* — Preferably the small hot-shoe-mounted type common since the 1970s. It should automatically set its exposure by either an Auto-Thyristor™ (that little eye on the front of the flash) or TTL (Through The Lens) automatic metering, or both.
- *A diffuser* — Some sort of built-in or separate accessory to soften and diffuse the output of the flash. This could be as simple as a white tissue attached by rubber band to the lens of the flash. It could be a white three- by five-inch note card attached so the flash bounces off the card surface and toward the subject. You could use the bottom of a translucent rubbing alcohol bottle stuck over the flash lens. You could also use one of the more expensive but higher-quality commercial versions of those things.

Whatever kind of diffuser you choose, you will get more efficient power from you flash if more than 75 percent of the light is directed at the subject. If using a white paper card off of which to bounce the flash, fold it to a 60-degree angle so it throws the light forward rather than up to the sky. Aim a diffuser cube or the bottom of a alcohol bottle *toward* the subject. Efficient use of power means greater output distance and faster recycle times for the flash.

- *A green gel* — When shooting under fluorescent lights we need to match the green color of the ambient light. At your local camera store or online, buy a "CC30 Green" plastic or gel filter large enough to cover the lens of the flash. It can be attached by Velcro™, rubber band or tape. These are not cheap, so find a method of attaching the filter that will prolong its life. It does *not* need to remain scratch free to be effective. It only needs to remain green and translucent.
- *A coiled sync cord* — This is an extension for the flash so it can be fully used off of the camera. It should be able to reach an arm's length and control the flash as completely as possible. The best ones will connect to both the camera's hot shoe and the flash's hot foot. The brand-name ones are expensive (more than \$100) but third-party brands can be found at reasonable prices.
- *Lithium batteries* — Your flash will probably take AA batteries. The more expensive lithium versions will last longer and recharge the flash faster. Alkaline batteries still work well, but as the power of the batteries drops, the flash will recharge its capacitor more slowly. That could cost you a picture.



A flash with sync cord and built-in diffuser card, left. A single-ply toilet paper diffuser, center. Two white paper cards, right, one folder over to throw 90% of the light forward, and one upright to throw about 50% of the light to a ceiling and 50% forward to the subject. The upright flash would be to bounce the flash but fill eye sockets and add sparkle to eyes.



Alcohol-bottle-bottom and manufacturer diffuser cubes set upright to fill a room with light, left, and aimed at subject, center. Lumiquest Pocket Bouncer™ prefabricated diffuser designed to throw 100% or light forward, at right.



A simple diffuser cut from 3/4 of the side of a rubbing alcohol bottle and wrapped around the lens of the flash, far right.

CC30 Green filters, right. At top is an elegant but very fragile version from the manufacturer. A diffuser can be attached over it. At bottom is one sandwiched between two pieces of transparent plastic, wrapped with packing tape and attached with flaps of Velcro™. A Lumiquest Pocket Bouncer™ can be attached to the Velcro on the outside of the flaps.

# How the flash works

Read the owner's manual to learn the mode of operation for your flash. All of them are different, so you may need to somewhat adjust what you read here to fit your equipment.

In order to get enough power from a simple set of AA batteries, an electronic flash uses a capacitor in its circuit. A capacitor stores energy from the batteries like a tank. It may store enough juice to send 500 volts to the flash tube, even though the batteries only amount to six volts of output. After your flash fires, the capacitor needs to be recharged as if the tank was drained. That's the source of the delay before the ready light reappears on the flash.

An advantage here to automatic flash exposure is that as the flash adjust its exposure it uses more or less of the charge in the capacitor. For example if the flash needs only one quarter of the juice in the capacitor to correctly expose the subject, you will be able to fire four shots before the capacitor must recharge. It takes one quarter the time to refill the tank. This makes reaction very quick and more economically uses those expensive and environmentally hazardous batteries.

## Auto Flash

Exposure is controlled two ways. Older flash units and professional models from Nikon, Metz, Sunpack and Vivitar use what Vivitar called an "Auto-Thyristor™" circuit. This mode may also be called "Auto" (or "A" or "AA" depending on brand) on your unit.

A small eye on the front of the flash watches as the flash is discharged. When this sensor eye on the flash sees enough light bounce back from the subject it cuts off power to the flash tube.

The first advantage of this is that exposure adjusts for the distance to the subject. No longer do we need to recalculate exposure every time we move in relation to the subject. If you are closer to your subject, that sensor will simply cut off the flash sooner, leaving you with a relatively correct exposure. If farther, it will leave the flash on longer. When this was invented in the 1970s it revolutionized use of flash in photojournalism because exposure no longer need constant adjustment relative to subject distance.

I prefer this sort of circuit to TTL below. I can aim the sensor eye on the flash very specifically to the subject, and it always sees the subject flatly lit by the flash. This better limits factors that can cause exposure errors in TTL flashes. In use of flash, like the exposure in my camera, I am out to guarantee the result as much as possible. This means I cannot afford to depend on the circuitry of the flash or camera to understand my subject. I do not have the option of a reshoot, so I must be as accurate as possible from the start.

A disadvantage to Auto is that an older or less-expensive flash may have only a few apertures from which to choose. The original models of this type gave you a choice of two to four apertures that could be used to match the flash exposure. That limits flexibility. Newer and more expensive models from Nikon or Metz may give you a dozen apertures from which to choose, and even automatically set the flash's aperture setting to match where the lens is set.

To use this mode one sets the aperture on the camera to correspond with an aperture setting available on the flash. Both flash and camera must know they are working with f/5.6 for example. If set at f/5.6, the flash will expose accordingly. If then the camera is also set at f/5.6 the flash exposure would be correct. But one can also fool the system (see "Using the Flash" page 6).

## TTL Flash

TTL (for Through The Lens) works much the same way as above. But rather than using a sensor eye mounted on the flash itself, it uses the camera's internal light meter to determine when enough light bounces back from the subject for correct exposure.

An advantage to this is that the flash does not care what aperture you are using on the camera. It will simply adjust for how much light bounces back through the lens. Thus you can use any fraction of an aperture you like. No adjustment is necessary when using a filter on the camera lens.

The disadvantage is that the camera lens sees the subject in a complex way. If you are using the flash off the camera and deeply to the side of the subject's face the camera's meter sees both the bright side and dark side of the face. It may overexpose the flash trying to average the two halves. The Auto mode above would only see the bright side of the face and would more easily know the correct exposure.

Another disadvantage is the complexity of the camera's metering system. Factors such as the pattern the meter is using may change the exposure. A spot meter would only give you correct exposure for the small area the spot is seeing, for example. "Pattern" or "Matrix" metering may include irrelevant areas of the frame in the exposure calculation and once again give you an incorrect exposure.

You can limit these factors by using a TTL-only flash (such as those made by Canon and others) physically mounted on the camera so the light is striking the subject flatly, and by remaining strictly aware of what your meter is seeing within the frame. But if you have the Auto mode above you will be able to more accurately control how the light from your flash is seen within a complex subject and better control it. In good circumstance TTL is quite accurate. I just find it less predictable and more difficult to control.

TTL is also troublesome with digital cameras. The internal meter watches the light that reflects off the film during exposure to control the flash. Digital image sensors reflect in less predictable ways than film. This complicates all the other issues. I find Auto much better with a digital camera because the image sensor is not part of the system.

As a photojournalist you must meter accurately on the first try. You carefully aim your narrowly focused meter (spot or center-weighted) at a specific, middle-toned target in the key light of the scene. You can also aim the sensor eye on an Auto-Thyristor-type flash very specifically at the key area of your subject.

## Ranges

That capacitor mentioned above has limits. It can store only so much electricity, and therefore the range of the flash relative to aperture is limited. At full power, a flash with a guide number of 110 (measured in feet at ISO 100) would only be able to reach 40 feet at f/2.8. The Auto or TTL circuitry can cut off power to the tube only so quickly. It may only be able to work so close to the subject at f/2.8. At ISO 100 for f/2.8 it must be used no closer than three feet away.

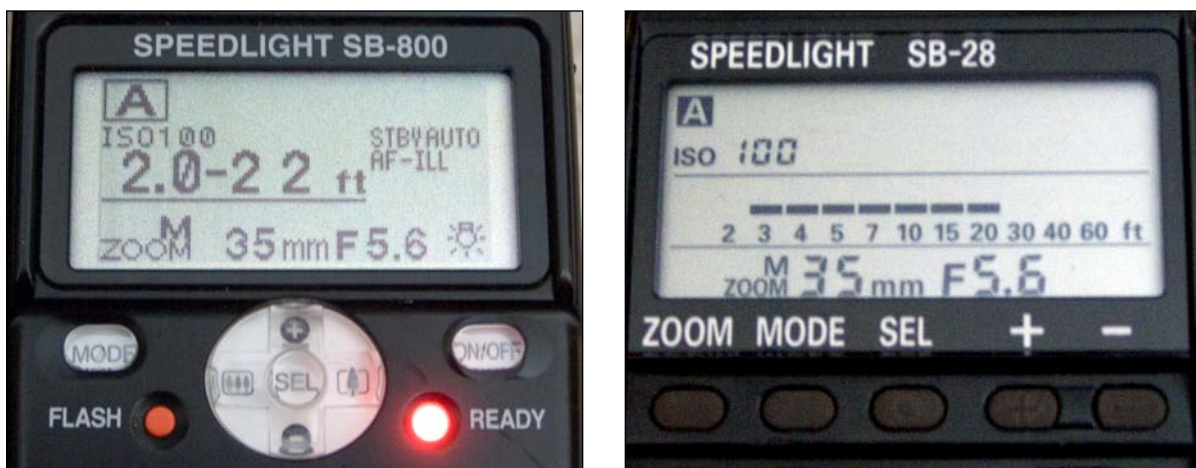
Anything inside that minimum distance would be overexposed. To get closer I would need a smaller aperture. It would then be easier for the flash circuitry to cut off power in time, but it wouldn't reach as far. For example at f/22 the same flash has a range of a few inches but can only reach to 4 feet in distance before the capacitor is empty.

Your flash should display the available range for each aperture. Consult your instruction manual to learn how it will show you that range. On newer models it is probably shown on the LCD panel on the back of the flash. Older or less-expensive models may have a painted scale on the back or side of the flash.

Note that the flash range info will only be accurate if the flash is aimed directly at the subject and has no diffusers nor filters over its lens. Once you bounce or add a diffuser the numbers become irrelevant. Many flashes will not show the range scale on the LCD screen when the flash is set to bounce. But be generally aware of the range so you can choose an aperture that will provide the result you wish.

With diffusion or bounce the flash must put out more light to correctly expose the subject. Light will be widely spread and absorbed by a ceiling on a bounce, or absorbed by a diffuser. This greatly reduces the range of the flash.

When bouncing or diffusing, use a wider aperture by at least two stops to stay within the range the capacitor can provide.



Note the range displays on the two flashes above, set at ISO 100, with the flash's lens zoomed to cover a 35mm lens. Both are on the Auto (A) mode to use the sensor on the front of the flash. Both are set to expose correctly for f/5.6. The flash on the left can cover 2 to 22 feet. The one at right can cover approximately 3 to 20 feet. These ranges would disappear if the flash is set to bounce, and be less accurate with a diffuser or filter over the flash lens.

At right are the range markings (color bands) from two venerable, accurate and inexpensive Vivitar models, the 283, left, and 285, right. Each color corresponds with one of four available aperture settings. The width of the color bands denotes the range on a scale in feet within each band.



# Using the Flash

## **Fill Flash**

The objective of fill flash is to add a touch of light to the shadow areas of an image. For example if your subject is wearing a hat with a brim at noon on a sunny day, the face might be in a very dark shadow while the background is fully lit by the sun. That shadow may be three stops darker than the surrounding light. The range of detail a typical image may show is only two stops of over or under exposure. Fill flash can add enough light to a shadow to bring that detail within the visible range of the image.

Fill flash is an absolute necessity with slide film. To avoid losing all detail in shadows and to bring the facts in the image within the reproduction range of a press, we needed to use fill flash. Slide film is very unforgiving of high-contrast light. The fill flash technique was invented to remedy situations like that involving the hat above or other situations where important details hid in shadows. Using B/W or color negative films, or even digital cameras, a photographer can dodge or burn in a wet or digital darkroom to salvage that detail. But...

*An ethical note:*

*Modern digital systems have better ways to control the dynamic (visible) range of an image. When shooting RAW files on a digital camera, a photographer can use functions now found in most raw converters to squeeze the dynamic range of the image into what is visible on the page or screen. Adobe's Camera Raw converter has a slider for "Fill light" to open up detail in shadow areas. Lightzone has a similar system called "Relight" for example. Other raw converters have comparable functions.*

*Since these controls uniformly brighten all the shadows of an image I feel they are more ethically sound. If our objective is to make the image appear as it would to our eyes, this is easier and better. Fill flash, and even dodging and burning, are selective and affect only a small area of the image. They add something (light in the case of fill flash) that was not really there.*

The light from the flash should not be too bright. Though we are trying to lighten the shadows, fill flash aims to still leave them as shadows. If we make our flash too bright we create light situations that were not originally there.

Whenever we use a flash we are dealing with two separate exposures. We must be in control separately of the ambient exposure — for the natural light in the scene — and the flash exposure.

With fill flash the most important exposure is the ambient light in the background. Here we are simply popping a little extra light into a scene. So I first need to *correctly* expose for the ambient light, but underexpose the light from the flash.

The most ethical way to fill flash would make the light as unobtrusive as possible. It would model the qualities of the light that is already there. Follow these steps:

1. Mount the flash on the camera or hold it as close to the camera's perspective as possible. Shadows have no dimension since the light within them is directionless and diffuse. A flash held off of the camera will create dramatic light with dimension that doesn't match the shadow.

2. Use a diffuser. Shadow light is soft. Any of the diffusers mentioned above should work well for this. Direct flash has the wrong quality and will cause possibly inaccurate sparkles in the subject's eyes and crisp highlights and shadows that didn't exist. We must try to limit new shadows and highlights.
3. Meter for the ambient light and set the exposure manually to correctly expose for the sunlit areas. On a bright sunny day, using ISO 100, my exposure of the sunlit areas will be 1/125 second at f/16 (remember Sunny 16 calculations?). This will hold all the detail in the top of the hat and shoulders of the subject mentioned above. I will leave this exposure correct.
4. The flash, though, needs to be one to two stops dimmer than the surrounding areas. If left to its own devices, the flash will try to brighten the shadow to be just as bright as the background. The shadow is eliminated, and that's not our goal.

So we must fool the system. We must lie somehow to the flash so it does what we want it to do.

Aperture is the key half of the exposure to the flash. So long as our shutter is set to the sync speed or below (modern cameras usually sync no faster than 1/250 sec.) then the shutter speed doesn't matter to the flash. Aperture is where the ambient exposure and the flash exposure connect.

With that ambient exposure of 1/125 sec. at f/16, I could set my flash to f/16. This would create a "balanced exposure." The light from the flash would match the ambient light. All would be uniformly lit and not do what I want.

So to get my flash to put out less light I could:

- Use exposure compensation controls (best for newer film and digital cameras and for TTL).

Advanced amateur and professional cameras made since the 1970s have exposure compensation controls to fudge automatic exposure. Using manual exposure we probably always ignore this control. It's usually a knob or button marked with a "+/-" that will skew the exposure in 1/3-stop increments. You may find this control on the camera, on the flash, or both.

If my flash has its own exposure compensation control (the more modern and more expensive ones usually do) I could simply use it to tell the flash to under expose by a stop or two. I could set this control at -2 to tell the flash to put out two stops less light. This works for both Auto and TTL on newer units.

If a TTL flash does not have its own separate exposure compensation you could use the camera's exposure compensation control. But you **MUST** set the manual exposure on the camera before you change the exposure compensation or your metering will be off. Meter the scene first, set the exposure compensation to -2 and shoot the pictures. The flash's exposures will be adjusted by the camera's TTL meter. This will not work with Auto-Thyristor-type modes. So I could...

- Lie to the flash about what aperture I am using on the lens (Auto flash mode, not TTL).

Assuming my camera's exposure is set manually at 1/250 sec. at f/16, I could set the flash to expose for f/8. The flash sensor would think it only needs to put out enough light for f/8, rather than f/16. The light from the flash would be two stops dimmer, which I prefer for fill flash.

But many modern systems link the setting for aperture on the lens and the flash. I cannot lie this way with a Nikon camera using a Nikon flash, or a Canon camera using a Canon flash for example. Changing the aperture setting on either flash or camera changes both. So I could...

- Lie about the ISO I am using (only film cameras).

Assuming I am using manual exposure I could set the ISO on the flash or the camera higher. Even though the film will be exposed at ISO 100, if I set the ISO to 400 the flash will think it needs two stops less light to correctly expose.

This can only work with film cameras or very simple older flashes though. With modern systems the ISO on camera and flash are linked. If we change that ISO on a digital camera the manually set ambient exposure would no longer be correct.

Some caveats:

- For fill flash to work well, the key subject needs to be the closest thing to the lens. If an extra object — a hand, shoulder, tree branch — is closer than the subject it will catch more of the flash's light. Those objects will be too bright. Eliminate foreground objects.

If you want to keep those foreground objects in the frame, use the sync cord and hold the flash out of the camera's view but beyond those objects. Be careful. This may cause the light to have new direction and dimension.

- The color of your flash must match the color of the ambient light. If using this technique under fluorescent lights, apply a green filter to the flash so the light sources will be the same color. Then correct all that green from the image in by setting your digital camera white balance, with a raw converter, with Photoshop, or in the darkroom. Under incandescent lights, candle or fire light use an "81B" orange filter.



- I find built-in fill flash modes (Nikon calls theirs "Matrix-balanced Fill Flash" still too heavy and quite unpredictable. Don't leave your exposure to chance. Use the flash in a way that will give YOU as much control as possible to guarantee the shot on the first try. Like all automatic modes, they may work 80 percent of the time. But losing one in five frames is professionally unacceptable.

*Fill Flash Examples*



## **Flash as the Main Light Source**

We can reverse that formula for other purposes. We can make the flash our main light source and use the ambient light to fill the shadows.

*Ethical note:*

*This is a technique I once used vigorously in journalism. I needed to photograph everything, even in darkest night, with slide film no faster than ISO 200. Flash was a necessity to stop action of any sort in a situation where the fastest shutter speed might be 1/2 second. This is still a valuable technique, but in terms of journalism it is heavy handed and unquestionably changes the dynamics of light in a scene. Fortunately I can use a digital camera at ISO 6400 with noise no worse than the grain of Kodachrome 200 slide film.*

*However, I feel that so long as the reader clearly and understands that the light has been changed by the photographer then the reader is not deceived. Ask yourself in every situation if the average insurance salesperson in Peoria would see what you did. Honor the reader's trust by being very clear with them. If you add light to a scene, have a good journalistic reason for it and make it understandable and VERY evident without having to read the fine print.*

I gained many advantages by using the flash as a main light source.:

- I could position the light at a more pleasing angle, giving dimension and drama to the light.
- I could hold the light at an angle that would avoid throwing unwanted light on objects in the foreground, like an arm, a piece of furniture or an element of the landscape. Attention was still focused on the subject.
- I could evenly light multiple subjects that were at different distances from the lens. If the flash is on camera it will light the close objects more. By holding the flash off camera I could position it at an equal distance to two or more people, evenly lighting them.
- The slow shutter speeds required to collect ambient light in a dark scene created the risk of blurry lights and objects that would smear across the image, wrecking even subjects frozen by flash. By underexposing those ambient objects I could limit the damage from motion blur.

## **In daylight**

I used this technique in two ways. In bright daylight I could subdue the surroundings by underexposing the ambient light.

1. First set your ambient exposure by metering on the background. You want to subdue not eliminate it, so adjust your exposure so the midtones in the background are a stop underexposed. As you make that change be aware that your shutter speed needs to remain slower than the camera's sync speed, and that your aperture should be within the output range for your flash. This can be a tricky balance.

For example, a common exposure for overcast light at ISO 100 would be 1/125 second at f/8. To underexpose you could raise the shutter speed to 1/250 second leaving your flash with a long range. If working close enough you could instead raise the aperture to f/11.

2. Next, set the flash to expose correctly for the chosen aperture. No exposure adjustments need to be made. Auto or a simple TTL mode will provide correct exposure. If the flash is being used off the camera, Auto may be more accurate.
3. You may now decide where to position the flash. If making a portrait you could hold the flash at arm's length, at an angle that might give Rembrandt light to the subject's face. Or you could position the flash to avoid casting unwanted light on a foreground object. You could also position that flash to evenly light subjects at different distances from the lens.

If the flash exposure were then correct, the subject would draw the reader's eye. In a very dark scene I could stop the action of the subject despite long exposures. By underexposing the ambient light I could reduce the bad effects of blurry elements.

### ***In Dark locations***

As mentioned above, the slow shutter speeds necessary to expose ISO 100 slide film in the dark could cause many problems. If a typical exposure in a poorly lit scene is 1/2 second at f/4, a sudden movement by the subject would cause a bad blur. A sudden movement by the photographer would be even worse.

Flash, with its extremely short burst of light, freezes almost any motion. By underexposing the ambient light by a stop or so, I could get a faster shutter speed, reduce the "ghosts" caused by moving subjects, and limit the damage I may cause by not holding the camera steady. Light sources in the scene streak across a photo when the camera moves during a long exposure. I dread that they would streak across an important subject's face.

1. Once again, set your ambient exposure by manually reading the light in the background. Make your reading on the midtones in the background, then adjust your exposure to under expose by one stop. The best plan here is to raise the shutter speed by a stop. You need all you can get, and so long as you are using a diffuser on the flash you should be good with f/4 or higher at ISO 100.

If the correct ambient exposure is something like 1/2 second at f/4, raise the speed to 1/4 second. You reduce the blur by half. Still, make sure that your aperture keeps you in the distance range for the flash.

2. Next, set the flash to expose correctly for the chosen aperture. No exposure adjustments need to be made. Auto or a simple TTL mode will provide correct exposure. If the flash is being used off the camera, Auto may be more accurate.
3. Again, you may now decide where to position the flash. If making a portrait you could hold the flash at arm's length, at an angle that might give Rembrandt or side light to the subject's face. Or you could position the flash to avoid casting unwanted light on a foreground object. You could also position that flash to evenly light subjects at different distances from the lens.
4. If working under incandescent, fluorescent or mercury vapor lights, consider the color. If all your light sources are made to be the same color you can easily correct whatever shift you might find.

Under fluorescent lights use a CC30 Green filter on the flash. For mercury vapor that CC30 Green will work, but better are CC40 or CC50 Green filters. For incandescent (if you choose to correct or replicate those) use an 81B filter on the flash.

Once all the light colors are the same you can correct out the color in various ways. If shooting with a digital camera you could correct the white balance either at the camera before shooting (required for in-camera JPEG or TIFF files) or with a RAW converter afterward. If shooting color negative film you can correct either when making traditional prints or when scanning the negative.

If shooting color slide film the correction must be made at the camera. For a CC30 Green filter you will need to correct with a CC30 Magenta on the lens of the camera. This filter only absorbs about 1/3 stop of light so it's not a great sacrifice. But if correcting the incandescent light you would need an 80B blue filter on the lens, This filter absorbs nearly two stops of light which compounds your problems in a dark place. Fortunately you could use tungsten-balanced slide film instead to correct for the orange of the incandescent lights and filter on the flash.

Again with the caveats:

- Using a flash off camera makes focusing difficult. Here is a situation where autofocus is very handy. With your right hand on the trigger and left hand holding the flash you can work with autofocus to keep even a moving portrait subject sharp.

When using manual focus cameras or lenses I first tuck the flash under my left arm. I focus on the subject, then return the flash to its position either to the left or right of the camera. To keep the subject sharp I sway or step back and forth to keep the subject in the sharp focus plane. If needed I again tuck the flash away to focus.

- Many modern cameras and flash units have a feature called "Rear Curtain Sync." This sets the flash to fire at the end of a long exposure rather than the beginning as it usually does. The idea is that if a subject is blurring its way through that long exposure, a flash fired will freeze it at the end of the motion rather than the beginning.

This is a function only useable when the photographer is in absolute control of the scene. In a live-action circumstance it is impossible to time the firing of the flash on the decisive moment. We always push the trigger when the decisive moment happens. The flash would go off late and the picture would be missed.

- Red-eye reduction and red-light focus aids are great distractions to subjects. Red eye (that devilish red glow from the pupils on bad flash photos) is caused by light from the flash bouncing off the retina of the subject's eyes. The pupils must be dilated, the subject must be looking close to the camera and the flash must be close to the lens of the camera. Thus with professional cameras and flashes it is very rare. I haven't had it happen to me in 25 years. So if your camera or flash fires a series of preflashes to reduce red eye, turn the function off.

Autofocus cameras may use a red light from the flash to aid the autofocus in a dark place. Use this judiciously as it can attract attention from those you hope to have ignore you. Sometimes, with dark lenses, it is necessary. But make your default mode of working to have it turned off rather than on. Use it only when necessary.

*Examples of Flash as Main Light*

