Photography from the Inside Out

Part Two – The Technicalities

by Jim Merrithew

Part one of this article (*Leader Magazine* – October, 2003), featured advice and tips on the basics of photographic composition. Now, the technical stuff begins! How do you use your camera settings, in tandem with the conditions and available lighting, to their best advantage and yours? Let's start with the basics.

Aperture

What is an aperture? Simply put, it's the size of the opening in your camera, located just behind the lens. On a sunny day, the light reflected off an image will be intense – so it doesn't take much to make a good picture. When it's cloudy or dark, the camera needs more light to create the image. In other words, the more light is needed, the wider the aperture.

Shutter speed

This is the amount of time the light is allowed to pass through the aperture. It's like a window shade: drawn over the back of the aperture to block out the light. When you click the shutter release, it opens for a period of time and then closes. The amount of time it is open is the actual shutter speed. Increasing the shutter speed is another way to get more light into the camera.

Now we'll see how these two basic aspects of a camera work together.

Shutter Speed/Aperture: Working together

Numbers on the shutter speed dial are expressed as a denominator of a fraction. The figure 4 represents 1/4 of a second, 15 is 1/15th of a second, 250 is 1/250th of a second.

As the numbers on the shutter speed dial get larger, the exposure time (length of time the film is exposed to light) becomes shorter. The shutter speeds are sequential; as the number increases, each exposure time is one half of the previous one. As the numbers get smaller, each exposure time is twice as long as the previous one.

Overexposed – too bright

For example, 1/250th is one-half the exposure time of 1/125th. One-eighth is twice the exposure time of 1/15th. The most common shutter speeds are: 1 second, one-half second, 1/4 second, 1/15th second, 1/30th second, 1/60th second, 1/125th second, 1/250th second, 1/500th second, 1/1000th second.

The aperture is a series of about 8 metal leaves inside the lens. As the aperture dial is rotated, the size of the lens opening increases or decreases. Increasing the lens opening allows more light to pass through the lens. Closing down the lens reduces the amount of light that will hit the film.

Most lenses have aperture settings of f/2, 2.8, 4, 5.6, 8, 11, 16, and 22. Each lens setting is called an f/stop. As the number increases, e.g. from f/2.8 to f/4, the size of the aperture decreases. Moving the aperture ring from f/2.8 to f/4 decreases the light hitting the film by one-half. Each full stop change in lens settings decreases the light exposure (the amount of light hitting the film) by one half. Opening the lens from f/4 to f/2.8 doubles the amount of light exposed to the film (i.e. opening up the aperture by one stop doubles the exposure).

Each type of film has been created and calibrated to be sensitive to a certain light level. The light sensitivity of a type of film is assigned a value called A.S.A. (or DIN). We use A.S.A. number as the guide to the speed of the film. The higher the number, the more light-sensitive the film is (i.e. 1000 A.S.A. film is very fast film, more light sensitive than A.S.A. 25, which is very slow film, less light-sensitive). Slower film is usually more fine-grained (i.e. it will hold more detail).

A slow film is A.S.A. 25. A medium film, good for most outdoor situations is A.S.A. 100 or 200. A faster film - A.S.A. 400, is good for gloomy days or bright indoor situations. A.S.A. 800 and 1600 films are good for indoors, concerts, plays, etc.

Note: If A.S.A. 800 and 1600 films are used outside, in bright sunlight, your camera may not have a fast enough shutter speed, or your lens may not close down enough to prevent the film from overexposing.

The best combo?

How do you decide which combination of shutter speeds and apertures to use? Would the photo turn out better or look more interesting if you used 1/500 f/5.6 or 1/125 f/11 or 1/30 f/22? Often, this decision depends on the subject. If you are photographing sports or action, you may choose 1/500th or 1/250th to freeze the action. If you need lots of depth of field, you might set the aperture at f/16 or f/22. When you make your decision based

Photo: Scouts Canada Archives

on the shutter speed, this is called shutter priority. When the aperture size is the determining factor, this is aperture priority. For a sunny day, with A.S.A. 100 film, an all-purpose setting is 1/250 f.8.

Note: When loading your camera, always verify that the camera's (film speed) A.S.A. dial is set to the film's A.S.A. speed. If this is not done, your whole roll of film will be overexposed or underexposed. Setting the A.S.A. at a speed slower than the film's correct A.S.A. results in overexposure. If the A.S.A. is set for a faster (higher) speed, the film will be underexposed.

Making exposures using the in-camera light meter

In-camera light meters read the light reflected from objects in the scene being photographed. The meter is calibrated to read subjects as if they are medium grey in tone. This can create problems because the world is not medium grey. If the subject is a dark tone, the meter reads this as midtone. As a result, if you believe the meter reading and use the aperture settings and shutter speeds indicated by the meter, the film will receive too much light.

Photo: Scouts Canada Archives

Underexposed – too dark

If the subject is white, or light toned, the light meter will deceive you into setting the camera for a midtone, and the film will receive too little light. To compensate, and to give the film the correct exposure for a darker subject, close the lens down, or use a faster shutter speed. This will adjust to give the film the right exposure. For a light subject, open up the aperture or use a slower shutter speed. Experience will teach you the amount of adjustment required for light meter readings of different subjects.

Different cameras have different types of in-camera light meters. An in-camera light meter gives a through-the-lens (TTL) light reading. This measures the light reflected from the subject.

Spot meters read the light values in a very narrow part of the subject. The "spot" is usually defined by a disk at the centre of the viewfinder.

Centre-weighted meters take light reading from the central area of the viewfinder. This is sometimes defined by a circle or rectangle in the centre of the viewfinder frame. This area is 12 - 20% of the frame. Some centre-weighted meters read an oval shaped area of the viewfinder. This area may be 20 - 50% of image area. (The area is not defined in the viewfinder).

Average meters read the whole area of the viewfinder. Some average meters are centre-weighted. These read the whole frame, but give more emphasis to the central portion of the frame.

Some average centre-weighted meters take their readings from the bottom 2/3 of the image area. This is to avoid having light from the sky influence the light meter reading. A reading from a light coloured or bright sky might cause the ground to be underexposed.

Some cameras have in-camera meters, which may be set to either spot, centre-weighted, or average. This gives the photographer some options. In various situations, it is useful to take spot meter readings from areas of highlights and shadows or dark tones; then decide what the average meter might be. Verify this by setting the meter's mode to average and take another reading.

Lenses – windows to the world

Camera lenses range from wide angle to medium (normal) to short telephoto to long telephoto.

For the average person a 28 mm or 35 mm are a good all-purpose wide-angle. If wider views are desired, a 20 mm or 24 mm is a good lens. If you can afford two wide angles, 24 mm and 35 mm are a nice combination providing flexibility.

A normal (medium) lens may fall in the 45 to 60 mm range. A short telephoto may range from 75 mm to 150 mm. A medium telephoto is 180 to 250 mm. A long telephoto is 300 to 800 mm.

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Just right!

Send Your Best Shots!

Send your Scouting shots to the Leader Magazine's Annual Photo Contest.

Email digital photos to:
leader@scouts.ca

Mail photos to:
Leader Photo Contest,
1345 Baseline Road,
Ottawa, ON, K2C 0A7.

Photos must be accompanied by parental photo release signed for each individual in photograph. Download the form at www.scouts.ca.

Each photo must be clearly marked (with permanent marker) with the photographer's name and address. This information should be included in the email with digital submissions. Contest deadline: January 31, 2004 (entries must be postmarked by this date).

Most camera users, if they wanted a variety of lenses, would enjoy the 28 to 35 mm, 50 to 60 mm and 85 to 135 mm lenses.

Zoom In!

In recent years the quality of zoom lenses has improved dramatically. Due to the fact that a zoom is a lens with a variable focal length, they are more complicated to design and manufacture. A zoom can replace three or more fixed focal length lenses. Therefore, a good zoom can be expensive.

A zoom will weigh more than a single focal length lens, but one zoom may weigh less than three fixed focal length lenses. A good utilitarian lens is a 35 to 75 mm or 35 to 85 mm. This gives a range from a slight wide angle to a short telephoto. A second choice could be an 80 to 200 mm zoom.

Maximum Aperture

In addition to being identified by their focal lengths, lenses are also defined by their maximum lens opening (aperture). The maximum aperture for a good wide-angle lens may be f/2, f/2.8, or f/3.5. A normal lens (45 to 60 mm) may have a maximum aperture of f/1.4, f/20 or f/2.8.

A short telephoto could be an f/1.8, f/20 or f/2.8. A medium telephoto's maximum aperture may be f/2.8, f/3.5 and f/4.

Long telephotos' speeds range from f/4.0, f/4.5 to f/5.6.

Lenses with large maximum apertures are referred to as "fast" lenses (usually more expensive than slow lenses). If the maximum aperture is not large (relatively), the lens is "slow". Zooms tend to be a bit slower than fixed lenses. Some zoom lenses will have a variable maximum aperture, depending on the focal length at which the zoom is set. For instance, a zoom set at 35 mm may have a maximum aperture of f/3.5. When the zoom is set at 75 mm, the maximum aperture may be f/4.5.

You're now ready to aim, point and shoot the very best images you can. Remember – every picture is a winner if it carries a special memory of Scouting years.

– Jim Merrithew is a professional freelance photographer. He has been the official photographer for visits of Pope John Paul II and President Nelson Mandela.

GO DIGITAL!

A digital camera samples the light that bounces off the subject, breaking the light pattern down into a series of pixel values that can be saved in memory. That's all there is to it!

How a digital camera works:

- Point the camera and adjust the zoom.
- Camera focuses and automatically takes a reading of the available light.
- Camera sets the aperture and shutter speed for correct exposure.
- Press the shutter release!
- The charge coupled device (CCD), or image sensor, is reset and exposed to light – it builds up an electrical charge and closes the shutter.
- Analog-to-digital converter (ADC) measures the charge, creating a digital signal representing the values of the charge at each pixel.
- Next, a processor compiles data from all the pixels to create natural-looking colour.
- Information is stored in memory (ie.Flash memory card).
- Check out the picture in the LCD screen – gives you immediate results.
- Transfer (download) images to a computer or printer, or transfer to e-mail messages.
- The more pixels your camera has, the more detail it can capture. A camera with 640 x 480 pixels is great for emailing images or posting them to web sites. A 1216 x 912 pixel camera is better for printing images.
- Flash memory device stores images, connects to drive or reader from your computer (inexpensive to buy). Different types of memory devices are not interchangeable.

Terms you may have heard... and what they mean

- **Overexposure -** Film was given too much light. Picture washes out, detail is lost in the highlights (bright areas of picture).
- **Underexposure -** Not enough light given to film. This decreases detail, especially in dark areas, which may go black. The highlights look muddy, dark.
- **Depth of field** is the zone of the picture, which is in focus (front to back).
- **Shallow depth of field** has only a tiny area (plane) in focus. The item in focus will stand out from the soft, out-of-focus background.
- **Deep depth of field** means that items in the foreground, middle ground or background will be in focus. This is good for landscape and scenics.