

Exposure, Part 4 – Bob Young

Many of you will be aware that I have been suffering (none too silently at times) with a knee injury as a result of stepping backwards into a hole about 600mm deep in July 2011.

Unfortunately, I re-injured the knee 2 months ago. The specialist's verdict was that a total knee replacement was the only option. That was done 6 weeks ago, but it will be some time before I can get back to bush walking and photography. For that reason, Rob Parker has assisted with the photography for portions of this article.

The Zone System

The Zone System was developed by Ansell Adams and Fred Archer in the early part of the 20th century. Although it was originally developed as a methodology to determine proper exposure and contrast in producing black and white prints, it is still relevant today as the basis for determining the correct exposure values when using manual exposure techniques.

Fundamental to the use of the zone system is an exposure meter which provides an exposure setting (aperture, shutter speed and ISO – the meter provides a set of values) which will render a single luminosity value as mid-grey in the finished print. These luminosity values are divided into a set of zones, each 1 stop apart, which are described in Table 1.

Table 1 – Description of Zones

Low values	Zone 0	Renders totally black with no detail or texture.
	Zone I	Effectively the darkest tone which will contain any detail.
	Zone II	Deep tonality with slight texture. Deep shadow in which some detail is required.
	Zone III	Average dark material where texture is displayed e.g. dark coloured brick fence. Black plumage.
Middle values	Zone IV	Dark foliage, stone and landscape shadows. Shadow areas in adult Caucasian skin portraits. Subject in shadow.
	Zone V	Mid grey as measured from grey card. Light grass or foliage in clear mid-day sunlight.
	Zone VI	Average Caucasian skin tone in sunlight. Shadows on snow in sunlit landscape.
High values	Zone VII	Very light skin. Snow with acute side lighting.
	Zone VIII	Lights with texture and delicate tonal values. White plumage.
	Zone IX	White with some detail and no texture.
	Zone X	Pure white, specular highlights and glare.

In practice one would take a meter reading, generally of a highlight area which is required to record some detail in the finished print (as opposed to a burnt-out highlight which would be rendered as pure white). Since the meter is producing an average reading for that single luminosity value, we know that if we select an aperture/shutter set from the dial that highlight area will be represented as zone 5 and will render as mid-grey in our finished black and white print.

In this example, the measured exposure value (EV) is 19, and this EV is set to zone V. If we selected an exposure set from the aperture and shutter speed options displayed (eg. 1/1000th second @ f22) and used it to photograph a light-coloured subject, we would get an under-exposed image, such as in the simulated image of the white duck (see below). Obtaining the correct exposure values for such a subject requires us to rotate the face of the meter so that we place the measured exposure value (EV 19) marker adjacent to the desired zone. In this case I would select zone 8 (see table above), which would result in an increase of 3 stops and produce an image equivalent to the image produced by Rob's Canon 350D using partial metering mode (see below).



Now I concede that there is probably only me and a couple of dinosaurs left who could be bothered carrying a separate handheld exposure meter, but the adaption of Ansell's zone system to your digital photography will assist when you have to handle tricky lighting situations.

Modern 'Prosumer' Digital Cameras

The original intention was that, in this part of this series on Exposure, we would look at the creative control which we could exercise through using the spot exposure mode and manually setting the aperture, shutter and ISO parameters. However, while I have no trouble doing this with my equipment, it became apparent that many of you will not be able to do so. This is not because I have better equipment: on the contrary, it is primarily because my equipment is now a couple of generations old and predominately I am still using lenses which were manufactured for use with film cameras.

Current digital cameras, particularly those in the 'prosumer' range, have automated the basic camera operations to a level where the creative control has been increasingly passed from the photographer to the camera's computer.

Earlier parts of this Exposure series discussed how camera manufacturers have provided options for fully automatic operation (AUTO mode); semi-automatic options, such as Aperture Priority (A or Av) and Shutter Priority (S or Tv), which allow the photographer to exercise control over depth of field and the illusion of movement; and a range of metering modes which take advantage of the camera's computer to analyse the image and determine

the 'appropriate' exposure settings. In approximately 90–95% of the time, these settings are appropriate. In the problem cases, my fall-back option is spot metering and manual exposure.

Spot metering allows the photographer to read a very small area of the image (1° field of view compared with about 45° with a 'normal' lense) and to get a predictable result – the exposure settings required to render the subject as a mid-grey on a grey scale, or Zone 5 when using the Zone system. In this (simulated) image of Rob's white duck, the white plumage on the breast is metered and a reading



Simulated image using spot metering without adjustment

is obtained which renders the duck as a 'grey' duck. The photographer must then manually calculate the necessary adjustment; in this case, I used 3 stops (corresponding to the difference between Zones 5 and 8, above). Metering on such a small area allows the photographer to eliminate surrounding areas which could impact on the evaluation of the overall image, eg. a very dark background would have almost certainly resulted in the white plumage being largely over exposed. In this example an adjustment of +3 stops would have rendered an image similar to the image below obtained when using partial metering mode.

Rob could not set his Canon 350D up for spot metering; this feature appears to be only available on the Canon 'professional' models. Instead there is a "partial metering" mode which limits the sampling area to a circle of approximately 9% of the viewfinder area in the centre of the image. Rather than providing an exposure setting which should render as 'mid grey' (as expected from my spot metering mode), it appears that some algorithm has been applied internally which has resulted in an image which is only about ½ stop underexposed.



Partial Metering mode

This raises the question as to whether the loss of spot metering is really a big deal. The partial metering mode removes most of the background tones which could have been causing erroneous exposure settings, and the result of the 'evaluative' algorithm is acceptable - certainly it would appear that the slight under- or over-exposure can readily be corrected with Photoshop or similar editing packages.

Overcoming Exposure Problems

Birds in flight:

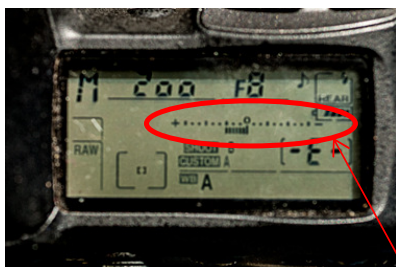
When photographing birds in flight, particularly overhead, the relatively small size of the bird means that the potential for the exposure to be adversely effected by the large expanse of sky is very high. Also, unless you are able to hand hold a 500mm lense without 'wobbling', you may not be metering on the bird at all. In Rob's image of this red kite, you can see that the centre of the image is barely touching the edge of the kite. The 'automatic' exposure would be severely influenced by the background sky.



The second problem is that the part of the bird which we are photographing (the underside) is in shadow. The sun is above the bird and therefore illuminating the back of the bird.

Assuming that you are able to hand-hold your camera without the wobbles, and your lense is long enough so that only the bird is included in the exposure area (spot or partial metering), you could use your camera's exposure compensation feature to automatically apply an additional 1 stop to the exposure to compensate for the fact that the bird is being backlit. (Exposure compensation will be discussed shortly).

A more reliable method is to use the manual exposure mode.



The image above shows the electronic analog exposure display as it appears in the control panel. In this instance the bars to the left of the '0' mark indicate that the current setting of f8 @ 1/200th second would result in a 1 stop over exposure – which would compensate for the bird being backlit as discussed in the previous paragraph. [A similar analog display is shown along the bottom edge of the viewfinder display.]

M: Manual

In manual exposure mode, you control both shutter speed and aperture. Shutter speed can be set to values between 30 s and 1/4,000 s, or the shutter can be held open indefinitely for a long time-exposure (**bulb**). Aperture can be set to values between the minimum and maximum values for the lens. Using the electronic analog exposure display in the viewfinder, you can adjust exposure according to shooting conditions and the task at hand.

To take photographs in manual exposure mode:

- 1 Rotate the function dial to **M**.
- 2 Rotate the main command dial to choose a shutter speed, and the sub-command dial to set aperture. Check exposure in the electronic analog exposure display (see opposite), and continue to adjust shutter speed and aperture until the desired exposure is achieved.
- 3 Frame a photograph and shoot. If shutter speed is set to **bulb**, the shutter will remain open while the shutter-release button is held down.

Reprinted from Nikon D100 user manual

On the Nikon, the manual exposure mode can be used with either the Matrix, Centre-weighted or Spot metering modes. On Rob's Canon, the manual exposure mode can be used with either the Evaluative, Partial or Centre-weighted metering modes

Understanding the concept that *an exposure reading taken in one place will be the same as a reading taken anywhere else so long as the lighting conditions are the same* will allow us to overcome the problem associated with hand-held wobbles. If we take a meter reading on a bird of the same species or general colouration which is only 5 meters away, that exposure reading will be correct for any similar bird in the same lighting conditions (e.g. backlit by open sunlight) even if this second bird is 50 meters away. *The subject-to-camera distance does not affect the exposure so long as the lighting condition remains constant.*

We can take this one step further and couple this axiom with the concepts of the zone system. If we take a reading of any part of the subject and relate that luminance area to its appropriate zone, then we can extrapolate the correct exposure by adjusting exposure according to the variation between zones. For example, if we take an exposure reading from a grey card, or from normal green grass or foliage which is in full sunlight, then we know the exposure value for all parts of the image which should fall into Zone V. So if our bird was illuminated by this same light (sitting on a fence in full sunlight), then it will be properly exposed.

But if our bird was in flight and between us and the sun, should we add 1 stop of exposure to compensate for the fact that the underside of the bird (which is what we are photographing) is in shadow? I expect that most of you will say that we should, but would the resulting image truly represent the colours as we see them, or have they been 'brightened' to represent the colours which we normally associate with that species?

Let us look at 2 images – sorry, it had to be the front fence, as no birds were co-operating!



Image 1

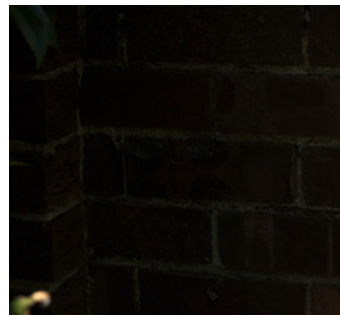


Image 2

Which image is correctly exposed?

Seen in isolation, Image 2 appears to be under-exposed. Yet both of these images were taken within seconds of each other, exposure is identical (f8 @ 1/800th ISO 400), and there is no change in the lighting conditions. If I put the 2 sections of the fence in context, is your answer still the same?



Image 3

I can only answer my earlier question with another question: “When we take a photo, what are we trying to achieve?”

Are we trying to depict the bird in its best possible manner, where the colours are as close to their natural colour as possible, and it is acceptable to make adjustments to compensate for poor or difficult lighting conditions? If so, shouldn't we also make a correction to the white balance? Unless you are using auto white balance (which I do not recommend), then just 'brightening' your shadows will still leave the colours too bluish. David Jenkins and Tom Oliver have produced a number of excellent articles on improving your images with Photoshop etc. If you are not familiar with the techniques, I recommend that you look back through the previous editions of our Newsletters.

Exposure Compensation



Difficult lighting situations often mean that we need to be able to compensate for the inability of the camera to correctly calculate the exposure. It is not uncommon to find that when we review the first few shots, it is noticeable that they are all under- or over-exposed by a similar amount.

We could correct such slight errors using our editing software and, depending on the package being used, this might be an acceptable approach. However, virtually all digital cameras, including point and shoot models, have an exposure compensation feature. In most models this feature is engaged by simply pressing a button with the +/- icon. While continuing to hold down the button, the amount of compensation is entered by turning the command wheel while monitoring the value as displayed on the control panel. Some models may require you to set the amount of compensation through a menu option.

Once set, the compensation will be applied to every image until it is changed or reset. As a general rule of thumb, images where the subject is lighter than the background will need a negative value, while images where the subject is darker will need a positive value. The Nikon D100 provides for a range of -5 to +5 stops in increments of either 1/2 or 1/3 of a stop.

On most cameras the exposure compensation function will operate with all exposure modes except for the manual (M) mode. When used in Shutter Priority (S or Tv), the compensation will be applied to the aperture value. For example, if a +1.0 stop value is applied in Shutter Priority mode where the original exposure was f8 @1/250th, the compensated value will be

f5.6 @1/250th. Similarly, when exposure compensation is used in conjunction with Aperture Priority (A or Av) the compensation will be applied to the shutter speed.

Conclusion:

We have decided not to include the remainder of the section on Spot Metering, as without images, it is very difficult to present. Unless there is sufficient interest for a further article on Spot Metering, this is the end of this series on Exposure. Please email the [editor](#) if you are interested in the spot metering article. It would be helpful if you included the make and model of your camera.

Many thanks to Rob for his assistance with the images.

Bob Young

www.rwyong.id.au