Aperture and Depth of Field

When we exercise our ability to control what is in focus in our pictures, as well as what is not, we take a crucial step in directing the viewer's attention to what we want them to see. While lens focus is an import part of this, it is depth of field that determines how much of the picture is sharp.

What is depth of field?

Broadly, the term depth of field describes the distance in front of and behind a focus point that appears sharp in a photograph. When we focus on a tree in a field, it is rare that only that tree is in focus. You might find the grass between you and the tree is also sharp, and that the mountains in the distance have detail, too. However, with the right combination of lens and aperture it is possible to make sure that actually it is only the tree that appears focused, and all the other elements are blurred – or out of focus. When the photographer masters the skill of depth of field control, the options for what to show and what to hide are multiplied.

How to use depth of field

The purpose of depth of field control is not always to maximise it. Photographers spend far too long attempting to create complete front-to-back sharpness in their pictures at the expense of exploring the much more powerful effects of minimising depth of field. Even in landscapes where the depth of the subject might seem to encourage a desire to gain full focus from the foreground to the distance, selective focusing can be a more impressive creative tool. Using a very shallow depth of field can help direct the viewer to a single part of the scene by concentrating the focus of the lens there. It is a much more direct way of controlling the actions of the viewer and pointing out to them what you want them to see. When everything is sharp, you rely on their sense to see what is important.

Focused on the top of the steps, at f/11. The zone of focus is deep enough to keep everything from the handrail to the building sharp.

Controlling depth of field

There are three main elements that help us to control depth of field – aperture size, focal length and focus point. In the broadest of terms, a small aperture (such as f/22) will produce a greater depth of field than a wide aperture (such as f/2.8). In the same way, a wide-angle lens (such as 28mm) will produce a greater depth of field than a telephoto lens (e.g. 100mm). If you use a small aperture with a wide lens you increase depth of field, while a wide aperture with a long lens really restricts sharpness to a tiny area.

If you focus on a close subject you get less depth of field than when you focus on something more distant, which again can be brought to combine with aperture and focal length to widen or reduce overall depth of field.

A fourth element in this equation is the format of your film or sensor. Smaller formats, such as APS-C sensors, produce naturally more depth of field than larger formats. This is why most digital compact cameras turn out pictures that which have front-to-back sharpness, and why users of large-format plate cameras, such as Ansel Adams, have to use f/64 for their landscapes.

By shooting at f/2.8 on a medium telephoto lens, it has thrown the background out of focus, which concentrated attention on the subject

What is Depth of Focus?

Be careful not to confuse depth of field with depth of focus. Depth of focus is the distance span over which a lens can be moved forward and back without wholly losing focus on an object in front of it. Technically, it works out that the larger the depth of field of a lens, the shorter its depth of focus – and vice versa. The shorter the focal length of a lens on a given format, so the wider is its view angle, and the greater will be its depth of field and the smaller its depth of focus. A long focal length or telephoto lens, on the other hand, has a narrower field depth and a greater focus depth.

Effects of Aperture

The three photographs show how different elements are brought into the focus depending on the aperture setting.

F/2.8

With the lens used 'wide open' at f/2.8, only the lady in the foreground - my subject - is in focus.

F/5.6

With the focus locked on her, I can increase the zone of focus by stopping down to f/5/6 until the people in the middle ground are in focus, too.

F/22

At f/22, the depth of field is very wide and everything is in focus.

The images that follow were shot on an 85mm lens on an APS-C format DSLR. The difference in depth of field is more profound than the previous pictures.

F/2.8

F/5.6

F/22

Effects of Focal Length

Here I shot the wide, middle and tele settings of a 24-70mm lens, but moved backwards to keep my subject the same size in the frame. Notice how at the wide-angle setting of the lens the background appears sharper than it does at the tele end, even though the lens aperture remained the same, at f/5.6

Wide

Standard

Tele