

Module 2 - Understanding Aperture

Aperture and shutter speed, and the effect they have on images, are by far the most important two elements of photography to understand. Once you have cracked this, everything else is relatively straightforward! But it can take years to drill it into your brain to the extent that it becomes second nature, so don't worry if it doesn't sink in after five minutes. I'll try to explain it in a way that is easy to grasp . . .

So, as a quick reminder, this is what each one is - remembering back to the 'door opening in a darkened room' analogy!

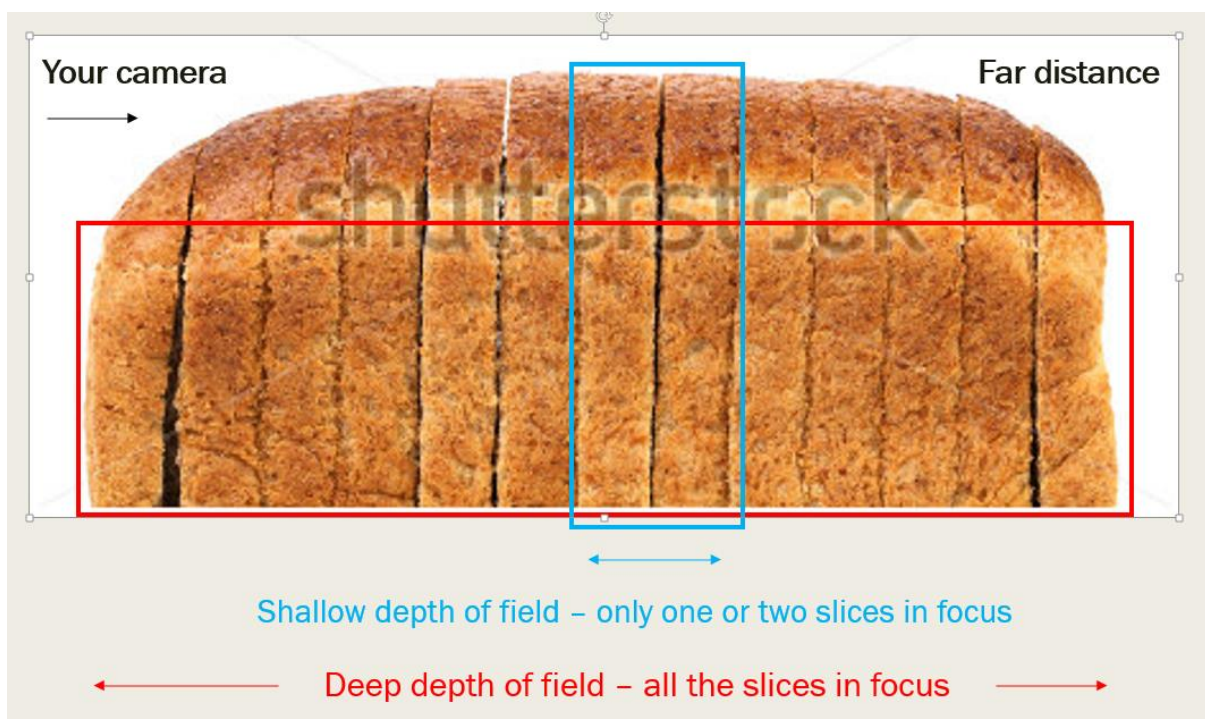
- a) Aperture – the size of the hole in the lens, made bigger or smaller using an iris, much like your eye adjusts the amount of light getting in by making your pupil a different size.
- b) Shutter speed - the amount of time the shutter stays open and exposes the sensor to light. The rest of the time, when the shutter is closed, this stops any light getting onto the sensor.

As I explained in the Exposure document, the main reason not to just keep both of these on an 'average' setting is for artistic effect. So, how you want the shot to look.

Aperture

Changing the size of the hole in the lens either increases or decreases the amount of light that gets onto the sensor in a given time – in effect we're making that door bigger or smaller. But it also does far more than that – it also controls what is known as 'depth of field'. This is a slightly confusing term, but basically your overall 'field' of view is the distance between your camera, and the furthest point you can see in front of you.

Think of this distance as being like a loaf of sliced bread. Each slice can be in focus or out of focus, depending on the effect you want. And you can choose to have just one slice in focus, some of them, or all of them.



To make the camera focus in the way you want it to, you have to change your aperture – the size of the hole in the lens. A big hole (wide aperture) will give you just one slice in focus, whereas a small hole (narrow aperture) will give you all the slices in focus, from where you are, to as far as you can see – within reason, as there are some technical limitations, but nothing that will worry us for now.

The way I was taught to remember this, and which has stuck in my mind, is that when you squint to see something more sharply, you are in effect making your eye smaller. So by making your aperture smaller, you can see all of the slices (the 'depth of the field') more sharply:

- Large hole/wide aperture – just one slice in focus, and hence with an out of focus background. This is known as a 'shallow depth of field', one slice of the loaf.
- Small hole/narrow aperture – all the slices in focus, front to back, like squinting. This is known as a 'wide' or 'large' or 'deep' or 'maximum' depth of field. It doesn't really have a fixed name in the same way, but you get the idea. Think of it as the whole loaf of sliced bread! Let's call it a 'deep' depth of field for now.

And in between these two is a medium aperture, which gives you some, but not all, of the slices in focus.

Here are a couple of examples of the extremes:



1. Shallow depth of field



2. Deep depth of field

In image 1, I've used a very wide aperture (large hole) and so the camera has a 'shallow' depth of field, and just the elephant is in focus – with the foreground and background out of focus.

In image 2, I've used a narrow aperture (small hole) and so the camera has a much deeper depth of field, meaning the front of the table, the elephant, and the background are more in focus.

The other thing to mention is that you can see both shots are exposed exactly the same – neither one is darker or lighter than the other. So exactly the same amount of light got onto the sensor, even though I changed the size of the hole in the lens.

Going back to the Exposure document, the camera has compensated for me changing the size of the aperture by automatically changing the shutter speed to let in less or more light. In effect I made the door bigger in image 1 and smaller in image 2, and the camera decided how long it should stay open

for, in order to let exactly the same amount of light in. This is known as shooting in 'aperture priority' mode, and we'll cover more on that later.

As you can see, it's very easy to change the artistic effect of a shot simply by changing the aperture, and because we are on aperture priority (the A on that dial on the top of the camera – or Av on Canons) we control the size of the hole - and the camera automatically adjusts the shutter speed for us, in order to maintain the correct exposure.

You may also notice that on image 2, the lights have created a 'star-burst' effect. This is a by-product of having a narrow aperture (small hole) and can create some very nice intentional effects – for example in urban shots at night, with star-bursts on street lights.

Setting the aperture

This is where we really start to understand how you control your camera. If you look at the LCD screen of your camera, or in the viewfinder, we are now concentrating on the two numbers at the bottom of the screen. These show you the aperture and the shutter speed – but their exact position on the screen may vary depending on your camera, so check in the instruction manual if you're not sure which ones they are. The shutter speed is generally only visible when you half press the shutter button, then it stays for a while and goes again.

The next step then is to understand how aperture is measured – and unfortunately it is a rather confusing scale, but it's one that has been the same ever since photography was invented, so we just have to work with it! Aperture is measured in what are known as 'f stops' or 'f numbers'. The f actually stands for 'fraction' but unless you're a maths whizz (which I'm not) it just gets confusing to try to think of the numbers as fractions, so I generally just think of them as whole numbers – it doesn't change anything.

The average range of 'f stops' (or 'f numbers') on a standard lens is as follows:

f2.8
f3.5
f4
f4.5
f5
f5.6
f6.3
f7.1
f8
f9
f10
f11
f13
f14
f16
f18
f20
f22

Yours may be slightly different as the f numbers relate to the lens not the camera body – some don't go as low as f2.8 and some don't go quite as high as f22. You will have a control on your camera

which changes the aperture, and this is usually some kind of mechanical wheel on the right hand side – again, you may need to check in your instruction manual to see how to change this.

So, if you turn the wheel one way, the number should get lower, and if you turn it the other way, the number should get higher – which way is which depends on the exact camera. One other thing to mention here, if you press the shutter halfway down, to make the shutter speed appear, and then turn the wheel to change the aperture, you will see that the other number changes as well. This is the camera changing the shutter speed for you, to compensate for you making the aperture bigger and smaller.

The next thing to understand is how the f numbers relate to the size of the hole, and I'm afraid whoever came up with this system made it even more confusing at this point – because the smaller the number, the bigger the hole. This is the one thing that confuses people the most! So:

f2.8 – largest hole

f3.5

f4

f4.5

f5

f5.6

f6.3

f7.1

f8

f9

f10

f11

f13

f14

f16

f18

f20

f22 – smallest hole

The main reason for changing your aperture is to change your depth of field (how many slices of the loaf are in focus) – and in some ways this actually makes it easier:

f2.8 – small number, small depth of field (one slice of bread)

f3.5

f4

f4.5

f5

f5.6

f6.3

f7.1

f8

f9

f10

f11

f13

f14

f16

f18

f20

f22 – large number, large depth of field (the whole sliced loaf)

So, you can actually forget about the size of the hole altogether to an extent, and just remember it as follows:

- f2.8 (or f3.5 or f4 etc. if your lens doesn't go down that far) – shallow (or small) depth of field. Low number = one slice, or a lower number of slices.
- f22 (or f16 etc. if your lens doesn't go up that far) – deep (or large) depth of field. High number = high number of slices.

This is the part that usually takes ages to sink in, so please don't worry if it sounds confusing. The more you experiment with it, the easier it gets.

Going back to my examples for reference:



1. Shallow depth of field – **shot at f2.8**



2. Deep depth of field – **shot at f22**

Once you have tested this, you can apply the same settings when you are out and about with the camera, always remembering to keep the 'subject' – flower, fence post, child or whatever - in the focus square, and keeping the aperture on the smallest number (f2.8 or f3.5 etc.) if you want a blurry background.

Remember also that the closer you are to your subject, and the further away it is from the background, the more noticeable the blurry effect will be. If you try a shot and it doesn't seem to work, it's usually because the subject is too far away from the camera. You can test this by keeping the same settings and moving closer to the subject, or just zooming in a little – you will see the difference in how blurry the background is.

One last thing to mention. If you are out with your camera and you just want to take 'normal' shots, where you're not trying to get a particular depth of field effect - or everything is in the distance anyway then leave it on around f8 to f13. This is a good middle point and most shots in good light should come out fine – this central area is also usually where most lenses are at their absolute sharpest.