

Mysteries of Photography #13: Why there is no such thing as depth of field but we think there is

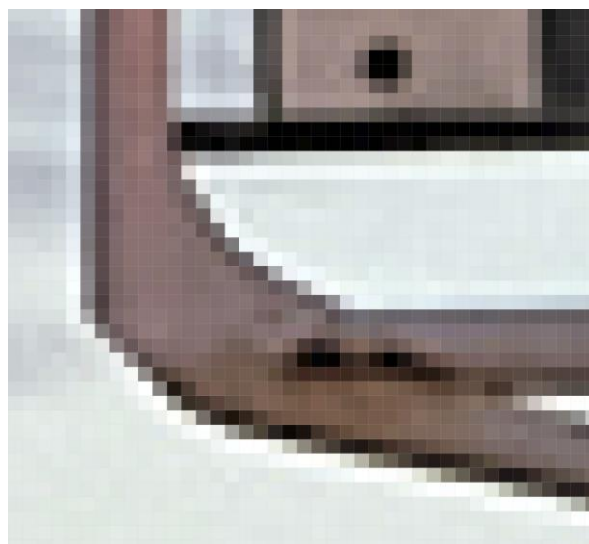
While every photographer knows that not everything in our photos can always appear tack sharp, we can all see that, if we focus on the correct spot, some of the objects in front and behind the point of focus are also appear sharp. This is what we call the depth of field and we all know that smaller apertures give progressively more depth of field.

So we all know that depth of field exists. We have all seen it in our images. So why am I claiming there is no such thing? Has dementia finally taken me?

The first image below may seem irrelevant to the argument. This is a nicely sharp image of the roadhouse at Oodnadatta at dusk. Prints well at A3 and above despite being only a 12Mp micro four thirds image.

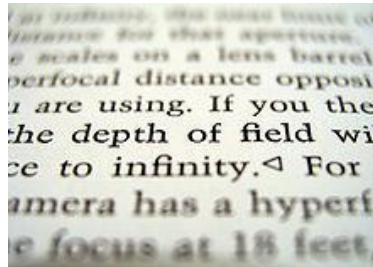


However, if we zoom right in to the bottom left of the sign in this image we see all sorts of pixelation effects that we probably couldn't see even close up to a large print of the image.



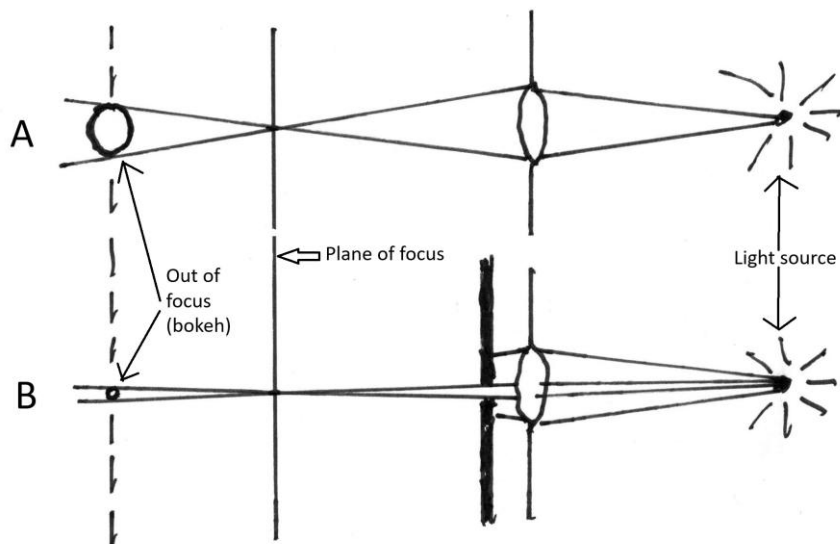
The point I am trying to make is that our visual discrimination is limited. Things that appear sharp to our eyes may not actually be what they seem if we look more closely.

Now back to depth of field. When we focus on something close to us, it is easy to see that objects are blurred in front of and behind the point of focus and early on all photographers learn techniques to manage the depth of field to get enough of our image in focus to keep club judges happy. So there is such a thing as depth of field, isn't there?



(Illustration from Wikipedia)

It's time now for a thought experiment. We have this tiny light source (to the right) and we have a lens in non-transparent mount. The lens focuses this to a point on the plane of focus.



In the top section (A), the only light going through the screen is through the full width of the lens. The light source is in sharp focus at our plane of focus. Behind it (and also in front of it), the light is spread out as a circle in the same shape as the lens opening. This is what we call bokeh.

Now what happens if we stop the lens right down (B). The cone of light going through the lens is much smaller and the out of focus circle is correspondingly smaller as well.

To put it in numeric terms, stopping down from $f/2$ to $f/16$ will reduce the diameter of the out of focus circle by a factor of eight and the area by a factor of 64.

Every image is made up of an almost infinite number of tiny points each too small for our eyes to discriminate that either emit or reflect light. When we use a lens to select a portion of the world around us we have only those objects in the exact plane of focus actually in focus. Anything behind or in front of this plane will not be in absolutely sharp focus but we can't see that until they are enough out of focus for our visual systems to register the loss of sharp edges.

So, in summary, rejoice in our limitations and enjoy the (apparent) depth of field in your images even if it isn't really there. And read this again if you don't understand the first time. It took me quite a while to get my head around this too so rest assured that you are not alone.

David Woodcock