

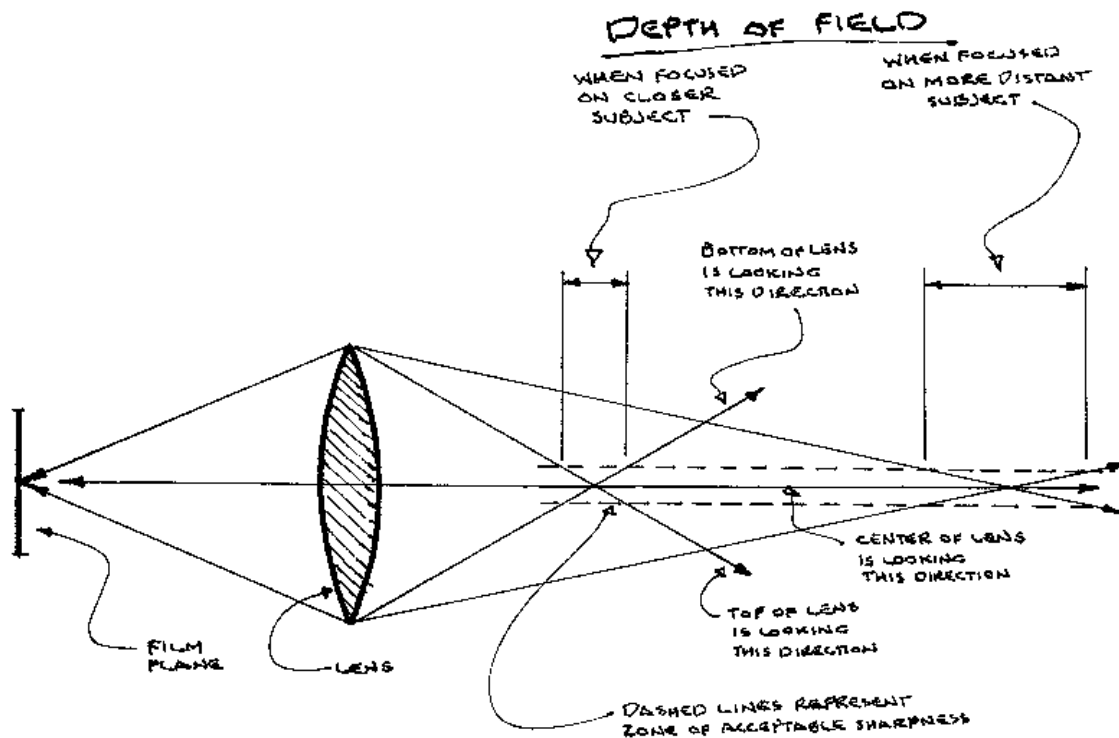
How does Depth of Field work?

To try to make practical sense of it, when wide open, your lens is seeing the subject from all points across the front of the lens; one edge of the lens is looking at the subject from a slightly different direction than the other edge, so what's in the background is different for one point than for another.... sort of like looking at something and closing one eye, then the other, and seeing how the background changes. It's the difference between the various angles of view that causes the blur in the background.

As you stop down, this difference gets smaller and smaller as the aperture constricts toward a small point in the center of the lens. This is why it's the **ABSOLUTE** aperture, the diameter of the opening, rather than the **RELATIVE** aperture or f/stop, that determines DOF... longer lenses having correspondingly shallower DOF for a given F/stop... and also why DOF is shallower at closer distances.

The sketch below attempts to illustrate this effect and why it happens. I've shown the difference between a nearer and a farther object, rather than between a larger and a smaller aperture, mainly because this gave me more room for notes on the sketch.... but the thing that determines the depth of field is the angle between the "highest" and "lowest" lines of sight through the lens, and I think you can see from the sketch how a smaller lens diameter would affect that.

Pinhole 'lenses' have essentially no diameter; therefore the "upper" and "lower" rays in the sketch do not exist, only the center ray, and so their Depth of Field is infinite.



... RAYS THRU ALL PORTS OF THE LENS CONVERGE
 AT THE FILM PLANE AND AT THE SUBJECT IN FOCUS...

This is not a technically perfect description; it does not, for instance, explain why depth of field is greater behind the subject than in front of it.... but I think dealing with that sort of detail would complicate it more than it's really worth. If you'd like to discuss that sort of thing, feel free to email me at rick.oleson@gmail.com.