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The Online Photographer

Sunday, 21 June 2009

Depth-of-Field Hell

I might have lost my cool a bit in the the "P.S." to the "What's a 'Fast Lens'?" post below. I apologize for that.

My problem is that I've been sensitized. I was the editor of a technical photography magazine for six years. Depth-of-field (DoF) is a subject that is deeply beloved of wannabe photo-tech writers, and few things could create instantaneous dismay deep in my editor's heart like opening a submission and finding yet another beautifully prepared, extensive, arcane article on DoF. DoF is perhaps the ultimate hell of photo-tech—graspable enough so many people think they can understand it (or think they should!), complex enough so that very few really can. Whenever the subject really gets going, great reams of material are spewed forth "explaining" it, always—always—strewn with considerable content that happens not to be true. Assuming any given reader engages with said great mass of verbal matter, he comes out the other side usually no more enlightened, and possibly considerably more confused. Finally, add to those conditions the simple fact that a technical understanding of DoF is not required for the successful practice of photography, and you begin to appreciate the extent of my exasperation with the subject.

(By the way, the other day I finally figured out why "grammar police" types can seem to be so fussy and cross. It's because they keep correcting the World, and the World keeps making the same mistakes anyway. If you tell your child three times to hang up the wet towel in the bathroom and he doesn't, you're not that irritated. When you've told him 700 times and you still come into the bathroom and find the damp towel in a moldy pile on the counter, you might well be incensed. So do you see my point? No matter how many times I remind people that "loose" is the opposite of "tight" and "lose" is the opposite of "win," people are still going to misspell it—because it's different people all the time, and there are an inexhaustible supply of them. It's like having 40,000 children, each one of whom needs to be trained to hang up the towel. The first three people I correct, I'm perfectly calm. By the 700th, I'm about to "loose" my mind. Anyway, you see the problem: educate one photographer about DoF, or ten, or a hundred—at however great a cost of time and effort—and you still have numberless millions to go. It's Sisyphean.)

In any event, I've just added more material to the end of the original post. Ctein chimed in. It's now longer. And hopefully a bit more clear. But it's beginning to flirt with becoming yet another of those great masses of verbal matter on DoF with which the literature of photography, and now the internet, is littered.

End-around

Anyway, I figured I might try to do a quick, painless end-around on the subject, and try to tell you what actually matters about DoF. I'm going to ignore the technical explanation: because That Way Lie Dragons; Abandon Hope All Ye Who Enter there; etc. I'm doing that on purpose, so please don't write to fill me in.

1. By far—by far—the most important factor in how much DoF you'll get is your distance setting. The farther the distance between the lens and whatever it's focused on, the more you'll get in the DoF.
2. Next most important: the focal length of the lens relative to the size of the film/sensor. Again, on principle, let's forget all the tech-talk about what's "really" going on and the scientific explanations and all that. All you need to remember is that the longer the lens, the less apparent DoF there will be in your shots. And, big jumps matter, little ones not so much; there's not that much difference between an 85mm and a 100mm, or between a 24mm and a 20mm. Very roughly speaking, when there's a 2x or 1/2x difference in focal length, you're going to have noticeably different DoF characteristics to learn.
3. Last: aperture setting. When I was teaching, all my kids had to memorize the following phrase: "The higher the number the smaller the hole the greater the depth of field." Can you see differences? Of course. But again, it takes relatively bigger jumps to really matter all that much. The other two factors matter more.

Quick'n'dirty

Photography is a visual medium, so let's take a look at a couple of examples of point 1, above. I'm saying that your distance setting is the biggest determinant of DoF. Take a look at these two shots:

28mm lens on 24x36mm, $f/5.6$ Same camera, same lens, same focus distance setting, $f/2.8$

In both of the above examples, I've focused on the tree trunk in the middle of the frame. I was standing about thirty feet away from it. There are some differences in the two pictures, mainly because most lenses are at their crappiest wide open and this lens is a fairly crappy little lens, so the lower picture looks a little worse. And the much closer branch-tips in the upper right are a little crisper in the $f/5.6$ shot. But when your distance setting is 30 feet with a 28mm lens, the aperture isn't going to have very much effect on apparent DoF. No matter what the maximum aperture of the lens, you're going to have a hard time getting anything out of focus with this focal length lens at this distance setting.

Now look at the same two-aperture difference at a much closer distance setting, wider aperture first this time:



f/2.8



f/5.6

In this case, you can actually see a little difference in the blur, because you actually have some blur. In both of these, the focus was placed on the flower in the middle of the foreground, at the bottom of the frame. (I should have been a little more careful with exposure and framing. Sorry. Then again, if I made everything perfect, I'd never get anything done.) Now, obviously, there's some difference here. There should be: the aperture has been stopped down two stops. The flower is indeed a bit more "isolated" in the top, wide-open shot, and the blurry parts are indeed a bit blurrier. But just look back and forth between the house details at the top of the frame. There's some difference, all right....but it's not that much difference.

So in the top pair, you'd have a hard time opening up the aperture enough to introduce any blur; in the bottom shot, you'd have a hard time stopping down enough to eliminate all the blur. The point is that the top shot is pretty much going to have no blur, and the bottom shot is going to have some blur, with this camera and lens. And that's because of focus distance, mainly.

In any case, where DoF is concerned, don't sweat the small changes too much—whether this or that sensor is slightly larger or slightly smaller, whether this or that lens is $f/1.7$ or $f/2.4$, whether you're focused at 10 feet or 12 feet. When learning to manage sharpness and blur, it's the big swings that make more noticeable differences.

Hope this helps. But if it's just more verbiage added on to the great whacking pile of internet blather about DoF for you, well...at least you've got my sympathies!

Mike

[Send this post to a friend](#)

If you [need it](#), you need it.

[Featured Comment](#) by FS: "I am surprised that nobody has referred so far to this little gem: The Ins and Outs of Focus by H. M. Merklinger (Warning: PDF download):

<http://www.trenholm.org/hmmerk/TIAOOF.pdf>

"This is about infinity focus versus using DOF scales. The idea is to focus on infinity, and then stop down so that the actual opening of the aperture is about the same size as the smallest object to be resolved."

Mike replies: I was looking all over for a current source for Harold's book yesterday, and was stymied. I had no idea the entire book was a free PDF download. Thanks!

Harold's methods are a bit quirky, but his two books are a fine brief introduction to the understanding of focus and DoF.

Posted at 06:31 PM in [Photo-tech](#) | [Permalink](#)

Comments

I have seen a photo of a tattoo saying "Born to Loose" which I'm fairly sure wasn't meant to be quite so profoundly truthful.

Posted by: Paul Ewins | [Sunday, 21 June 2009 at 06:50 PM](#)

I one up your DOF discussion and raise you a discussion on the relationship between diffraction, aperture, sensor size, and resolution.

Now there's a topic that makes me want to grind my teeth with all the miss information I see being spouted. :-)

Posted by: [Jammy](#) | [Sunday, 21 June 2009 at 06:54 PM](#)

Once I started doing photography seriously as a hobby (before doing it professionally), I obsessed over DOF. I had to have shallow DOF. Then I started to realize that unless you are very good at focusing, or had a very good autofocus system, shallow DOF was a PITA. When you start using longer lenses, the difference in focus is so severe in a wide open shot, that most photos were throw-aways.

That being said, I have come to love the shallow DOF look for certain shots. One thing I do like about shallow DOF is that it can make a crappy lens seem sharp. Even if a lens is technically horrible wide open (bust out your focus charts or shoot brick walls). The 'contrast' between the in focus, compared to a nicely blurred out-of-focus can make the soft wide open shot look sharp. I use that technique when possible. I have noticed that my Canon 50mm 1.4 is no where near as sharp as my Pentax 50mm 1.4 when both are shot wide open. But, once to print a picture (yes some people do that other than just pixel peep) the difference is small with proper technique.

In other words, I agree with you PS from before, with just a slight (long winded) editorial added.

Posted by: [Mike Hess](#) | [Sunday, 21 June 2009 at 07:06 PM](#)

Ok Mike, this post actually twisted my arm into reading ALL of the others, even though I agree with you completely.

I thought "this" was about the image.

About a hundred years ago (well ok, 40 years ago) I read my "Amateur Photographer's Handbook" (Aaron Sussman if my memory still works) there were a number of memorable statements: 1. Always get the sharpest possible negative you can given the circumstances, you can always kick the enlarger later if you want to show "motion".

2. THERE IS ONLY ONE CRITICAL PLANE OF FOCUS, EVERYTHING ELSE IN DEPTH OF FIELD IS A COMPROMISE RELEGATED TO "USABLE" FOCUS.

You stated this clearly about 2/3 of the way down. Oh ya, about that diffraction stuff. I don't worry about it much and I am very cavalier about my use of ridiculously small apertures when I find them useful to maximize "usable" focus. I do have to admit I miss those way cool colored lines that helped with that hyper-focal stuff. Now I have to think and these days one more item to think about is a challenge.

I will say that I stopped worrying about correcting grammar/spelling on the NET and decided that if I convinced myself that it all just people from "away" that were making valiant attempts at English. It was much easier than thinking that Jay Leno's Jay-walking contestants really are the standard these days.

Can we really blame/thank Jack Kerouac for enabling writers to abuse the written word?

Have some fun will ya?

dale

Posted by: Dale | [Sunday, 21 June 2009 at 07:20 PM](#)

Thank you for another clear explanation of how the world turns. This will be a nice post to point people to when they have questions.

I have one small question / piece of input that may very well be the internet drivel that makes your fingers tremble when you eat cereal, but please regard it as a self-check with constructive purposes.

What I make of the endless "small sensor, too much DoF" complaints, which ultimately results in "slow-or-not-fast-enough lens for a 4/3 sensor" ramblings, is simply as follows.

The amateur photographer sees pictures of scenes with buttery bokeh where the main subject is at about 10 feet into the picture, something that was done with a "fast lens" on a 35mm sensor, for example. They go to their APS-C or 4/3 or even their mini-sensor pocket cam and find that, at the same distance-to-subject and the same aperture, the DoF becomes larger than they want. They want distance-to-subject to be the same, so you way: go closer. But the point is, they want the same perspective as well. So the factor that appears to need change for the internet masses, is aperture.

Translate this to the 17/2.8 issue (perhaps a reference to Pulp Fiction would be in place here by calling it "the Pen Situation"), and you get the following. The masses want the bokeh of a 35mm sensor/film camera, but the sensor is smaller so the DoF appears larger than wished for. Going closer to the

subject does not solve the issue, because they want to have a perspective that resembles what the big boys use. So they want a bigger hole in their lens to compensate for the small sensor to "throw the background out of focus". And BAM! there you have low 'n' dirty internet-weaned amateur photography logic. Or not?

Wow, upon reading back I am starting to feel like a kid with a wet towel. Your blog is greatly appreciated.

Posted by: georgec | [Sunday, 21 June 2009 at 07:31 PM](#)

This post seems to be made entirely of frustration.

Posted by: Kosma | [Sunday, 21 June 2009 at 07:37 PM](#)

Thank you. I may write the essence of this on a wallet card -- it's the best, clearest explanation I've ever encountered, and explains every one of the situations I posed in my post yesterday. I don't think I need to know more details. My DOF *problems* were purely experiential [is that a word?] as opposed to theoretical, and this explains them, or at least tells me where my problems lie.

Uh, but...if I'm trying to take a photo of a Canaanite seal (diameter of a dime, thickness of an M&M) from a few inches, would I be better off using the Nikon 60mm Micro Nikkor (shorter focal length), as opposed to the 105mm Micro Nikkor (from twice as far away)? Or wouldn't it make any difference in this particular case, since I'm trying to hold the image size constant (filling the frame as much as possible) while focus length and distance cancel each other out? Both lenses are f2.8, not that it matters, since I would be shooting at about f11.

And now for the final important question. In the picture of the two trees, why is the sky deep blue in the holes in the leaves on the bottom tree, but on the edges of the frame, and in the top picture, it's light blue? I have a feeling it has to do with the effective aperture of the tree-holes, but I'm not sure.

Posted by: John Camp | [Sunday, 21 June 2009 at 08:13 PM](#)

Mike, great summation of the practical aspects of DoF. I shoot most of my shots at f/8 and for normal landscape shots, it's plenty of DoF. Using the same lens and at f/8, I can still get nice shallow DoF when shooting from a few inches away, and I'm not working with a tiny slice of in-focus area.

Posted by: David | [Sunday, 21 June 2009 at 08:33 PM](#)

Mike,

This is a crystal clear, practical demonstration. I get the sense that the entry itself is akin to writing "The comments on this entry are closed", but I'm going to try and make a comment or two anyway :-p.

The issue I was getting at with the E-P1 and 17mm lens is that a lot of folks will plan to use it mostly for photography of people. The people I photograph don't tend to be as far as that tree or as close as those flowers. Thus I most often use a "35mm equivalent" lens to photograph people at the sort of distances where I might expect to create more blur than you've shown in the first (tree) example and less than you've shown in the second (flower). I am guessing that most others who use a 35mm lens to photograph people have this in common with me.

If you can agree with what I've said about distance, then we come to the second most important determinant of DOF, focal length. 17mm is a short focal length compared to what many of us are accustomed with regards to a "35mm equivalent" lens.

The long and the short of it (bad Amin) is that the majority of people photographs made with the Olympus 17mm lens are going to have nearly everything in sharp focus. To ye olde photo dawgs, that probably sounds like a great thing. To that great majority of today's photographers who use "point and shoot" [sic] cameras and are wondering how to get "that look" they've seen before, it's not so great. As usual, I'm somewhere in between.

Amin

Posted by: Amin | [Sunday, 21 June 2009 at 09:23 PM](#)

Maybe a dumb question...but:

Do you get less depth of field when you go up in formats because the lenses are longer or because the film size is bigger?

Like there are lots possibilities for shallow depth of field with a 300mm lens on 8x10, but it's less apparent on 4x5 with a 150mm. Is this simply because the required focal length for 'normal' is longer?

Posted by: Mark Sperry | [Sunday, 21 June 2009 at 10:25 PM](#)

"Do you get less depth of field when you go up in formats because the lenses are longer or because the film size is bigger?"

Because the lenses are longer. The format actually makes no difference, except that it changes the angle of view of the lens/film or lens/sensor pair.

Mike

Posted by: Mike Johnston | [Sunday, 21 June 2009 at 10:33 PM](#)

"And now for the final important question. In the picture of the two trees, why is the sky deep blue in the holes in the leaves on the bottom tree, but on the edges of the frame, and in the top picture, it's light blue?"

I don't know! Fascinating, isn't it? I need to look into that....

Mike

Posted by: Mike Johnston | [Sunday, 21 June 2009 at 10:34 PM](#)

Ask yourself thish: are you taking a photo of the subject or the lens?

And if that doesn't make any sense you should taste this Alsatian riesling I'm tippling.

Happy Patriarch's Day!

Posted by: Robert Howell | [Sunday, 21 June 2009 at 11:20 PM](#)

<http://luminous-landscape.com/tutorials/dof2.shtml>

Posted by: Steve | [Sunday, 21 June 2009 at 11:22 PM](#)

Sorry to bumble into this glass shop like a buffalo with dermatitis but isn't this (fun) discussion a bit too much?

Long, narrow lens: shallow DOF

Short, wide lens: broad DOF

Teeny tiny sensor with either of the above: broader DOF

Photograph of buffalo from close: nose in focus, tail not so much, very nervous photographer.

Photograph of buffalo from comfy high ridge above the plains: nose and tail in focus but buffalo seems rather small.

Dave

Posted by: Dave Fultz | [Sunday, 21 June 2009 at 11:54 PM](#)

It's at moments like this that I'm glad my understanding of photography comes from a mixture of lessons from my dad when I was a kid, self-education, and lots of trial and error, and not from some formal education. Less BS that way, I believe. Either something works and is helpful, or it doesn't and isn't.

One of the things I really appreciate about your posts is that there is an admirable lack of arcana and techie ****-waving. Photography is a medium;

cameras and lenses are machines used to transform light into photographs. Some do it better/differently/with less/more user error than others, but that's what it all boils down to in the end, whether you're talking pinhole camera or the latest techno-whizbang. Your ability to balance camera geekery with friendly explanations of basic principles is unfortunately rare.

I've never really understood the need to turn it all into a big competition for coolness points or some sort of mysterious Photographer Street Cred. Just go out and take the pictures, you know?

Posted by: [Rana](#) | [Monday, 22 June 2009 at 12:42 AM](#)

Dear Steve,

That Luminous Landscape page is completely wrong. I've explained to Michael it's wrong, and he understands it's wrong. I don't know why it's stayed up... but it's wrong.

Depth of field is not dependent only on on-film magnification and independent of focal length. At low image magnifications (e.g., outdoor photography) focal length is a DOMINANT determinant of DoF.

Plain and simple, the text on that page is false. The photos on the page don't even support the premise.

No, this is not arguable. It is incontrovertibly provable, both by correct experiment and by calculation.

Ignore the page. Delete its URL from your bookmarks. Expunge it from your memory.

Do not refer other people to it.

pax / Ctein

Posted by: ctein | [Monday, 22 June 2009 at 01:01 AM](#)

In the OLD days lenses used to have little marks showing the depth of field for a given aperture. Made it all a lot easier.

Rex

Posted by: Rex Kersley | [Monday, 22 June 2009 at 01:03 AM](#)

In this case, you can actually see a little difference in the blur, because you actually have some blur.

Next time I'd like to see the Oly 17/2.8 vs a 35/2.8 on FX. Can you do it?

Posted by: [Johnny R](#) | [Monday, 22 June 2009 at 01:33 AM](#)

"Next time I'd like to see the Oly 17/2.8 vs a 35/2.8 on FX. Can you do it?"

Not yet, but if/when I get an E-P1 to fiddle around with, I'll be happy to.

Mike

Posted by: Mike Johnston | [Monday, 22 June 2009 at 01:38 AM](#)

Dear Mike,

I have found that building up a collection of columns have been very helpful in dealing with my 'tech police' irritations.

When I find a topic being consistently misaddressed, I realize it's good fodder for a column.

There, I can lay down "Da Woid!"

When the same misconception resurfaces, I just have to write "Dear X, I believe this column addresses what you said. Please read it, and afterwards we can discuss it further, should you wish."

It's great for my sanity and blood pressure!

pax / Ctein

Posted by: ctein | [Monday, 22 June 2009 at 01:44 AM](#)

Preaching to the converted, Mike :)

I'm going to start bookmarking these for referring to others.

Posted by: Zach | [Monday, 22 June 2009 at 02:43 AM](#)

Thanks Mike! :)

Posted by: [Lucas](#) | [Monday, 22 June 2009 at 03:19 AM](#)

I learned photography using an SLR that closed the aperture when the exposure meter was activated -- what I saw was what I got. It's the "most missed feature" of my modern DSLR.

Posted by: Speed | [Monday, 22 June 2009 at 05:25 AM](#)

Thanks to georgec and Amin for laying out the DoF issue as it relates to sensor size and what people might want out of their new Olympus.

Isn't that what the interchangeable lenses are for? If you want to take portraits with nice bokeh, you shouldn't be using the 35mm equivalent lens, but instead slap on (with adpter) a portrait-length lens.

Posted by: hookstrapped | [Monday, 22 June 2009 at 05:28 AM](#)

I know where all this is coming from. The Autocorrect feature of Word and other text processing software is going to ruin languages and get grammar nerds a nice headache. Then, left alone in front of the web browser, there's no help as for correcting misspelled words.

And it is very, very irritating how this software tends to correct "centre" into "center".

About depth of field. I'm still not able to control the depth of field. Years after years of trying it, I remember I gave up just the moment I got a picture which was surprisingly out of focus, with the wrong depth of field, and with the wrong exposure; but then, it just works [and I actually am rather fond of it].

By the way. You can not even imagine how irritating is the spanglish mockery I come across with native english speakers. "El cheapo", "coholes" [which, incidentally, is misspelled big time] are too very often misplaced and misused.

Posted by: [Iñaki](#) | [Monday, 22 June 2009 at 05:31 AM](#)

nice post

Posted by: [hkki](#) | [Monday, 22 June 2009 at 05:37 AM](#)

Hye Dave:

No, it is not that simple.

In fact, the first element of the equation is ALWAYS the distance of the sensitive element to the subject [be it the sensor, be it the film].

That is the reason why an ultra wide angle [such as the Pentax DA 14 2.8, to put an example I've used], which can come very very close to the subject and isolate it.

Posted by: Iñaki | [Monday, 22 June 2009 at 05:45 AM](#)

can't comment on the DOF stuff but I hate the 'loose' - 'lose' substitution as much as you.

Add that to errors in 'there', 'their' and 'they're' and my favourite so far (from an ebay listing) of 'Paypal excepted' - the reverse of what was intended.

Posted by: Steve Smith | [Monday, 22 June 2009 at 05:57 AM](#)

Don't apologise, Mike! I now have the following verses printed out on my wall:

Mike's Letter to the Depthoffieldians, 14:2

And then came the theoreticians of the shared armchair and their picayune calculations of sensor size and diffraction and all else that's much talked of in numberless fora but wrong...

...And the users of large DoF shall inherit the Earth. I'm quoting this last bit from memory, so maybe it's not quite correct, but it was something like that.

Posted by: Miserere | [Monday, 22 June 2009 at 06:51 AM](#)

"And now for the final important question. In the picture of the two trees, why is the sky deep blue in the holes in the leaves on the bottom tree, but on the edges of the frame, and in the top picture, it's light blue?"

Isn't that just chromatic aberrations of the lens showing up at the light-dark transitions? The dreaded 'purple fringing' that everyone who isn't worrying about sharpness or DOF is worrying about. (the reason why you should only buy L/ED/ASPH/APO/EX/Limited/etc-glass*)

That would also explain why the effect is less on the stopped-down version (as stopping down minimizes all bad habits lenses might have, I'm always told)

*: Sarcasm Alert

Posted by: B.J.Scharp | [Monday, 22 June 2009 at 07:21 AM](#)

@John Camp: Maybe because the clouds, um, moved between the shots?

Posted by: [expiring_frog](#) | [Monday, 22 June 2009 at 07:44 AM](#)

I totally agree with your P.S., losing your cool or not. I always got the impression that the "I want to be able to limit my DOF" argument for going full-frame was bogus, simply a way to justify the extra expense over APS-C. It has been trotted out in so many now obviously false prophecies about the upcoming demise of APS-C and other smaller formats. There's nothing magical about the 35mm format in particular, but it is close to a sweet spot where you get the choice between subject isolation (difficult on compacts) and wide DOF (difficult on large format). I just don't buy that a difference of 1.5 or 1.6 or even 2 in the thin end of DOF is worth that extra price & size.

Posted by: [Lars Clausen](#) | [Monday, 22 June 2009 at 08:09 AM](#)

I don't understand what all the bouhaha is about DoF. It's so simple and easy to understand. Really, it's just common sense. OOPS! If sense were so common, more people would have it, huh?

Posted by: fiddlergene | [Monday, 22 June 2009 at 08:27 AM](#)

"I don't know! Fascinating, isn't it? I need to look into that...."

It's hard to tell for sure in the pictures, Mike, but maybe some clouds moved behind the tree? Either that, or you accidentally left your "show blue sky through trees" art filter on...

Posted by: David Bostedo | [Monday, 22 June 2009 at 08:37 AM](#)

«I might have lost my cool a bit...»

Thank god for that! I have always suspected that, in practice, DoF is just as you described here. But the usual internet forum discussions based on brutally technical articles that I have gone on to read (and understand btw, in the academic sense), have made me lust for lenses I can only dream of affording. You have killed my lust by reminding me, ONCE AGAIN, how one can throw a background out of focus while keeping the desired subject in apparent focus. No fast lens needed, thanks.

Posted by: beuler | [Monday, 22 June 2009 at 09:20 AM](#)

Nice article on an often over-wrought subject.

Just to enjoy the spring foliage--what is the name of the purple flower? I have been trying to figure it for some time, but alas, I am no gardener.

Alex

Posted by: Alex Vesey | [Monday, 22 June 2009 at 10:10 AM](#)

>John Camp wrote:

Uh, but...if I'm trying to take a photo of a Canaanite seal (diameter of a dime, thickness of an M&M) from a few inches, would I be better off using the Nikon 60mm Micro Nikkor (shorter focal length), as opposed to the 105mm Micro Nikkor (from twice as far away)? Or wouldn't it make any difference in this particular case, since I'm trying to hold the image size constant (filling the frame as much as possible) while focus length and distance cancel each other out?

It does not make any difference in this case. In practical terms, you can indeed explain this phenomenon as the greater focus distance canceling out the effect of the longer focal length.

Because I don't want to turn this into yet another arcane DOF discussion (I share Mike's opinion of them as a horrible scourge), I won't go too deeply into the "why" of this. But the fact that it is true is why I, personally, am slightly uncomfortable with telling people that longer focal length lenses have less DOF than shorter focal length lenses. In practice--i.e. in about 97% of real-world situations--it works that way. But when you must hold image magnification constant--i.e. you need the subject to be one particular size within the frame--changing focal lengths will not change DOF (although it can sometimes change, very subtly, the appearance of distant out-of-focus backgrounds).

Posted by: Eamon Hickey | [Monday, 22 June 2009 at 10:18 AM](#)

All this makes sense to me and have known this for a while, however I do have a question in regards to Zoom lenses mostly because I was told this statement which was contradictory to what I had thought. That is, a Zoom lens has a fixed DOF characteristic, you will have the same DOF at f5.6 @ 70mm 50 feet away as you would at f5.6 @ 200mm 50 feet away. True or False. If DOF is something you want to utilize to its best benefit is it better to use a number of fixed focal lengths over one zoom

Posted by: [Richard](#) | [Monday, 22 June 2009 at 10:56 AM](#)

Quite good explanation about the thick issues, which is what most people miss when they start delving into this.

I remember going crazy over landscape shots DOF on 6x9 film. One big thing about such formats is the dof distribution (what is sharp and what is REALLY sharp). But that's just overkill with today's equipment. Mainly what I got from all that is, even if the scales on the lens tell you it can be done otherwise, the centre of your focus range SHOULD be on what you want in focus.

Or go to f/32. But there's nothing like a photo of subjects at different distances were the obvious sharpest point falls right in the middle, just nowhere, a strip of sharper dirt on the floor.

Posted by: Max | [Monday, 22 June 2009 at 11:01 AM](#)

OK, as an unskilled amateur here is what I conclude from the article. The solution to this DoF problem is to carefully shoot a lot of pictures with each lens and study the results many times over.

Posted by: Charles Laird | [Monday, 22 June 2009 at 11:07 AM](#)

Nice explanation. Actually, since I started to shoot in 35mm format, I've run into more trouble due to the thinner DoF compared to DX than I expected. On a cropped sensor f/5.6 seemed like enough DoF for most scenes, but on full frame, even with wide angle lenses, I find 5.6 isn't enough.

Posted by: Eric Ford | [Monday, 22 June 2009 at 11:17 AM](#)

I've never been inspired to post on any of the photo sites or blogs until spending time on TOP. The whiplash experience of switching between aggravation and amusement is ample incentive to just close the browser. Mike's philosophy (and Rana's more specific comment above) help to maintain a 40+ year passion to "Just go out and take the pictures....", whether personal or professional.

Posted by: Bill Stickney | [Monday, 22 June 2009 at 12:15 PM](#)

For general photography with normal focal lengths I use a four point scale of DoF:

f/2.8 - not a lot

f/4 - some

f/8 - a lot

f/16 unlimited

Works pretty well.

(Yes, I know all the science, numbers, maths etc.)

Posted by: Martin Doonan | [Monday, 22 June 2009 at 12:19 PM](#)

Hyperfocal distance... (sorry i couldn't resist! i use to routinely shoot with a 24 mm f 2.8 lens (35 mm) lol!)

Posted by: John Taylor | [Monday, 22 June 2009 at 12:40 PM](#)

I think the obsession comes from this: gadget-oriented buyers purchase a dSLR because it's _clearly_ the better, serious, "pro" way to go. You don't even need to look at the marketing material -- you can tell from the price tag!

When they show their new gadget to their buddies with compact cameras, they want something amazing to tell about that their camera can do that the compact just can't. Noise and high ISO performance is a matter of degrees, and the ability to interchange lenses seems like a *downside* to the buddies. The compact has a better video mode, even, and you don't have to peer through that viewfinder. The scene modes probably aren't as good, and no face detection! But there's one thing: the big sensor allows a much narrower DOF than the compact, and so:

"Ah, but I really need the DSLR Look for my Art. You know, that really dreamy bokeh blur. That's why people spend the big bucks for these things. What you've got is good for snapshots, but this is what the pros use, because they need that control over depth of field."

Posted by: Matthew Miller | [Monday, 22 June 2009 at 01:38 PM](#)

"what is the name of the purple flower?"

Alex,

No clue. I bought 'em, planted 'em, and they're growing in front of my house. But ask me what they are with a gun to my head, and it'd be sayonara Mikey.

I used to work in a garden center, too.

Mike

Posted by: Mike Johnston | [Monday, 22 June 2009 at 01:44 PM](#)

"OK, as an unskilled amateur here is what I conclude from the article. The solution to this DoF problem is to carefully shoot a lot of pictures with each lens and study the results many times over."

That's exactly it. That's both how you learn your equipment and materials, and a pretty good description of how you become a better photographer. I used to settle down for bed at night with a stack of prints, and look through them, just for pleasure.

Mike

Posted by: Mike Johnston | [Monday, 22 June 2009 at 01:51 PM](#)

Ctein (or Mike) - I would love to see an article explaining what is wrong about the Luminous Landscape article referenced above. Even if it involved equations! Any pointers?

Posted by: David Bostedo | [Monday, 22 June 2009 at 01:53 PM](#)

Further up this comments column, I asked why, in Mike's two tree examples, the sky seen through holes in the bottom tree is a darker blue than the sky in the broader parts of the photo, or in the top photo. I have formulated a simple possibility (and no, the clouds didn't move.)

I think the answer is that in the majority of the sky showing, light is coming from all directions to hit the sensor, overloads it, and whites-out the sky. In the holes in the trees, light is coming from only a small part of the sky -- that directly visible as a hole, or, more accurately a tunnel -- and is surrounded by dark foliage which effectively acts as a *flag.*

The effect now seems to me to be visible in the top photo as well, but not nearly as strongly, which suggests to me that the phenomenon is time-related, rather than aperture related. That is, in the bottom photo, the shutter was not open as long (because the overall exposure is roughly the same, but the bottom photo was shot at f2.8 and the top at f5.6.) But because the leaves were effectively acting as an irises, of sorts, they normalized the amount of light coming through, so for those holes, it didn't matter too much what f-stop was used. The only thing that mattered was shutter speed, and the faster shutter speed reduced the light striking the sensor through the holes, thus allowing it to appear as blue rather than as a washed-out white.

That's my story, and I'm sticking to it.

I understood the entire DOF conversation until Eolake stuck his oar in. Since it seems that a very large number (and proportion) of photographs are taken with the idea of a constant size in the frame -- that is, the human face, singly or in groups, looking at the camera, shot from the waist up, with an inch or so of space above the head -- his point seems relevant. I just don't know what it means, except that, for me, I should probably shoot portraits and groups at 75mm or more (so noses don't spread out) and walk backwards until they fit in the frame. Does that solve the Eolake conjecture?

Posted by: John Camp | [Monday, 22 June 2009 at 03:00 PM](#)

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