Day 8: Nail the Focus

A Quick Review

First, let's review what we have already learned about focus:

- When setting up your camera, be sure to set your Autofocus point (use the center point).
- Generally, use the Stationary (AF-S or One Shot) focus mode.
- Remember that when you focus, you are setting your focus point on a distance or a plane (not a thing).
- Think of depth of field as the amount of leeway you get with your focus:
    - A large or wide depth of field gives you a lot of leeway, and keeps things sharp in front of and behind your focus point.
    - A shallow depth of field doesn't give you much leeway, and things get blurry very quickly as you move away from the point of focus.

Using Focus

Consider using back button focus. This is where you change your camera controls so that your camera sets the focus with a button on the back of your camera instead of when you press the shutter halfway. This separates the focus and shutter functions onto different controls, that way you focus when you want and only when you want. Otherwise the camera might try to reset the focus when you are taking a picture.

Use the "Focus then Recompose" method of focusing. This is where you set your focus where you want it without regard to your final composition. After that, you move the camera (without resetting the focus) to the final composition.

Where Do You Set Your Focus Point?

- When photographing people: Focus on the eyes. Every time! Focus on the near eye if you cannot see both.
- When photographing landscapes: Three guidelines are to (1) focus on the subject, (2) do not set the focus at infinity, (3) focus about 1/3 of the way into the picture.
- When photographing in low light or at night: Look for areas of contrast, but if that doesn't work use Manual focus.

Additional Commentary

Technology has made focusing really, really simple. The introduction of autofocus back in the 1980's followed by continuous improvements has made focusing much easier. At the same time, focusing is extremely important to our pictures. Things move fast and you need to be ready to move quickly. If you mess up the focus, there is nothing you can do about it; the picture is ruined. As a result, we need to spend a little time making sure you have a tight process and that you have mastered it. That way when things happen in the field, you will be ready to nail it.

The Basics of Focus

In the beginning, cameras had no lenses. Light came into the camera and onto the film. No focus was necessary. But then camera manufacturers started using lenses to direct the light. Lenses have a series of curved elements that shape the light as it passes through. In almost every way, using lenses is better. It channels the light much better and allows you to get different views. There is one drawback, however, and that is that we need to focus.

When you focus your camera, what you are doing is changing the distance between the lens elements and the camera's sensor to control where the light converges. When you set the light to converge on the plane of the image sensor, your image is *in focus*.

How do you do that? By turning the ring on the outside of your lens. That physically changes the positioning of the elements within the lens. You simply twist it back and forth until the picture is in focus.

At least, that is now it was done historically. Now there is a much better way. Starting in the 1980's, camera and lens manufacturer developed a system involving tiny motors in the lenses that allowed the camera to focus automatically. We call it "auto focus." The system works great and it is generally faster and more accurate than what you can do on your own. You simply press the shutter button down halfway (or enable back button focus, which we'll get to in a little bit) and the camera automatically focuses. It is basically magic.

Is that it? Is all we need to do to focus our cameras is press the autofocus (shutter button halfway down) and the camera does the rest? Well, sort of. You still need to tell the camera which part of the frame to focus on (or let the camera decide in auto mode). And you still need to figure out how to focus precisely where you want and then end up with the exact composition you want. That's what we'll do today so that you can take full advantage of your camera's focusing features.

The Set-Up

First, let's make sure your camera is set up exactly the way you want in order to take full advantage of the focusing features.

Focus modes

We already talked about this on Day 1 when we set up your camera. This is just telling the camera whether you want it to focus on one stationary point or if you want it to attempt to track a moving subject. Most of the time, a stationary point is the way to go, but occasionally you'll be photographing moving subjects to where you want to switch over for a bit. Refer back to Day 1 if you don't have this set already.

Enable Your Autofocus

Next you want to make sure to enable autofocus. This will not be a setting on the camera or in the camera's menu. Rather there will be a switch on the side of the lens that will say MF for manual focus or AF for autofocus. Just slide the switch over the AF and you are ready to take advantage of the magic of autofocus.

Autofocus points

Next you need to tell the camera where you want it to focus. What I mean by that is that you can select a portion of the frame where you want the camera to set the focus point. You can let the camera do this automatically, but you are leaving things a bit to chance. Rather, I suggest you pick one discrete point or area where you want the camera to focus. And if you are picking a point or area to use, I would use the center point. Just set the camera to focus based on what is in the middle of the frame. Don't worry about what will happen when what you want to focus on isn't in the center of the picture - we'll talk about what to do about that in a bit.

Autofocus points is an area where cameras are becoming much more sophisticated in recent years. Now, rather than just a few points, you are likely to have many to choose from. Further, some cameras let you choose from groups of autofocus points (rather than just one point). If your camera allows this, it is a good idea as it gives you more leeway in setting the focus.

Back Button Focus

There is one other setting I want to address before we get into a process for setting the focus. This is a setting that I use and that I heartily recommend, but it is also one that some people aren't comfortable with. I will just tell you about it and then you can decide for yourself whether you want to use it. The subject is "back button focus."

As mentioned above, normally, you set the autofocus by pressing the shutter button halfway down. This works ok and most people are comfortable with it. However, it does have a couple of drawbacks:

1. The camera will attempt to reset the focus before every click of the shutter button,

2. You have to told the shutter button halfway down after you set the focus in order to keep the camera from re-focusing.

Therefore, your camera will likely have a feature letting you re-assign the focus function to a different button on the camera. As the name implies, you re-assign the function to a button on the *back* of your camera. This separates the focus from the taking of the picture and eliminates the two drawbacks stated above.

This is certainly a significant change for most people. You get used to pressing the shutter halfway down to set the focus, and then it feels weird to change it. But I promise that once you get used to back button focus, you will love it and never go back. Give it a try.

Focus then Recompose

Ok, now let's get into the actual act of focusing. For the most part, this is simple and needs no explanation. But, as you've seen above, I recommend that you set your autofocus points in the center. So, you may be thinking to yourself, "*But what about when I don't want to focus on what is in the center of the picture?*"

That is a good question, as it is true that usually your final composition will not have the focus point right smack dab in the middle of the picture. Typically, you will want to focus on your subject and, as you'll see when we get into composition, it is generally not even a very good idea to put the subject in the center of the picture.

There is a simple process that photographers use to set the focus and then compose the picture. I'm breaking it down into four steps here, but don't let the fact that there are multiple steps involved fool you into thinking this is complicated or it takes a long time. This is a fairly intuitive process you will do very quickly before each shot:

1) Center: First just aim the camera so it is centered on the thing you want to focus on. That will put your camera's center focus point on it. Don't worry about how you want your ultimate picture composed at this point. Even if you are in automatic mode, having your subject in the center will make it more likely that your camera chooses to focus there.

2) Set the Focus: Once your subject is centered in the frame, press the shutter button halfway down. Or, if you have set up back button focus, press the back button. When you do so, the camera should focus on your subject, and often will light up momentarily on your screen where it is focusing and give a little beep to let you know it has focused on something and is ready to

take the picture. If you are happy with where the camera focused, just move on to the next step. If not, keep moving the camera around a bit and pressing the button halfway.

3) Readjust: Once the camera does focus on the right subject, keep the button pressed halfway down while adjusting the camera to your exact composition. Keeping the button pressed halfway will keep your camera from refocusing on something else. If you have set the focus using back button focus, you don't need to worry about this. In any case, move the camera to set up the composition you want.

4) Shoot: When your picture is framed exactly the way you want it, press the shutter button all the way down to take your picture.

Using Depth of Field and Focus

Now you know how to set up and use the focus features on your camera. Before we get into real world examples of how you'll use these features, let's take a step back and review how the concept of focus works with something you've already learned about in this course: depth of field.

Here's how they work together: Focus is the point at which you make everything sharp. It is a plane some distance away from your camera at which everything will be sharp. So at that particular distance, everything will be tack sharp.

The question now is "*what else* in your frame will be sharp?" Or, "how fast do things move from this focus point where everything is sharp, to out of focus?" And that's where depth of field comes into play.

Depth of field just refers to how fast or slow things move to out of focus. A shallow depth of field, which you will recall is primarily caused by using a wide open aperture (something like f/2.8 - 5.6), is where the falloff to out of focus is very quick. The thing at your focus point will still be sharp, but as you move away from that focus point things will rapidly start to look blurry. On the other hand, a deep depth of field, caused primarily by using a small aperture (something like f/16 - 22) is where the falloff to out of focus is very slow. As you move away from your focus point, things in your picture will still be sharp.

So, with that in our minds, we are ready to tackle some real-world examples of using focus controls.

Focus in the Real World: Photos of People

First, let's talk about using focus in the context of something you are going to do all the time: pictures of people. I have good news for you, and that is that this is going to be very simple. There really is only one rule. That rule is that when you are taking a portrait, or any shot of a person, focus on the eyes. That's all there is to it. There are virtually no exceptions to this rule.

But what about the situation where you cannot see both eyes, or where one eye is closer to the camera than the other. If you need to choose between focusing on one eye or the other, choose the near eye. Every time.

Going back to our process we have described throughout this lesson, what you will do is set the focus on the eyes (or near eye, if you have to choose). Assuming you have set up the camera to use the center autofocus points, center the camera on the eyes. Then, while holding the shutter button halfway down (if you haven't set up back button focus) move the camera to the composition you want. Take the picture. Done.

It is quite simple. Of course, you will need to execute in the field. You'll miss from time to time, and don't be hard on yourself when you do. Just make sure you aim for the eyes every time.

Focus in the Real World: Landscapes

You can get really hung up on where to focus in landscape shots. Often, you are photographing an entire scene in front of you and there is no defined point on which you should set your focus. So where should you set your focus?

Hyperfocal Distance

There is a complicated way to determine where to set the focus in landscape photos, and then there are some simple guidelines. We'll cover the complicated way first, but don't feel like you have to use it. The simple rules coming up will serve you just fine almost all the time.

The complicated way is by determining what is called the hyperfocal distance. This actually isn't as complicated as it sounds. It is a point at which you can set the focus and have everything behind that point all the way to the horizon line be sharp. In that way, you know how close you can set the focus and have the background sharp.

The hyperfocal distance depends on 3 variables: (1) the size of the aperture you set, (2) the focal length you are using, and (3) the sensor size of your camera. Obviously, the first two factors are things you will set in the field on a case by case basis, but the third is one you are stuck with depending on what camera you are using.

Hyperfocal distance is not something you are doing to want to calculate in the field. But the good news is that you don't have to. There are a variety of charts available and apps you can put on your phone. Here is a simple chart to get you going:

Micro Four-Thirds cameras						
Focal Length	16 mm	20 mm	24 mm	28 mm	35 mm	50 mm
Aperture f/5.6	10 ft	16 ft	23 ft	31 ft	48 ft	98 ft
f/8.0	7.0 ft	11 ft	16 ft	21 ft	34 ft	68 ft
f/11	5.1 ft	8.0 ft	12 ft	16 ft	24 ft	50 ft
f/16	3.5 ft	5.5 ft	7.9 ft	11 ft	17 ft	34 ft
f/22	2.5 ft	4.0 ft	5.7 ft	7.8 ft	12 ft	25 ft

APS-C cameras						
Focal Length	16 mm	20 mm	24 mm	28 mm	35 mm	50 mm
Aperture f/5.6	7.5 ft	12 ft	17 ft	23 ft	36 ft	73 ft
f/8	5.2 ft	8.2 ft	12 ft	16 ft	25 ft	51 ft
f/11	3.8 ft	6.0 ft	8.6 ft	12 ft	18 ft	37 ft
f/16	2.6 ft	4.1 ft	5.9 ft	8.0 ft	13 ft	26 ft
f/22	1.9 ft	3.0 ft	4.3 ft	5.8 ft	9.1 ft	19 ft

Full Frame cameras						
Focal Length	16 mm	20 mm	24 mm	28 mm	35 mm	50 mm
Aperture f/5.6	5.0 ft	7.8 ft	11 ft	15 ft	24 ft	48 ft
f/8	3.5 ft	5.5 ft	7.9 ft	11 ft	17 ft	34 ft
f/11	2.5 ft	4.0 ft	5.7 ft	7.8 ft	12 ft	25 ft
f/16	1.7 ft	2.7 ft	3.9 ft	5.4 ft	8.4 ft	17 ft
f/22	1.3 ft	2.0 ft	2.9 ft	3.9 ft	6.1 ft	12 ft

Don't get hung up on a precise measurement. Just use this as a general guide. After a while, you'll develop an innate sense of where you can/should focus to keep the background sharp.

Remember this as well: the shorter the focal length (i.e., the more wide angle your lens is) the closer the hyperfocal distance. You will very often be using wide angle lenses in your landscape shots. Therefore, you can typically set the focus fairly close. That will allow you not to worry about hyperfocal distance as much. And so that you don't have to worry about it at all, I'll give you some additional simplification rules in the next section.

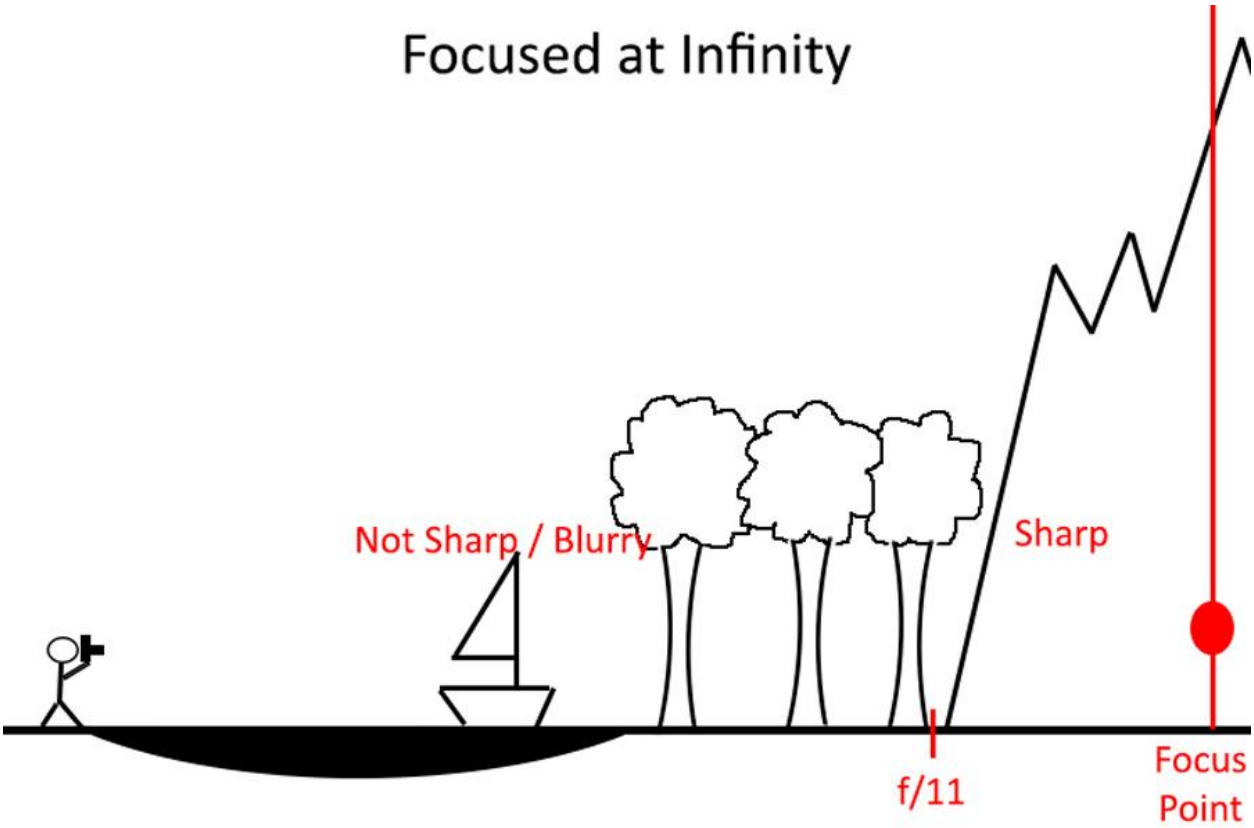
Some Simple Rules for Focus

You don't really need to go through the calculations involved with hyperfocal distance to determine where to set your focus in the context of landscape shooting. Rather, we can keep things really simple by following 3 simple rules. Here they are:

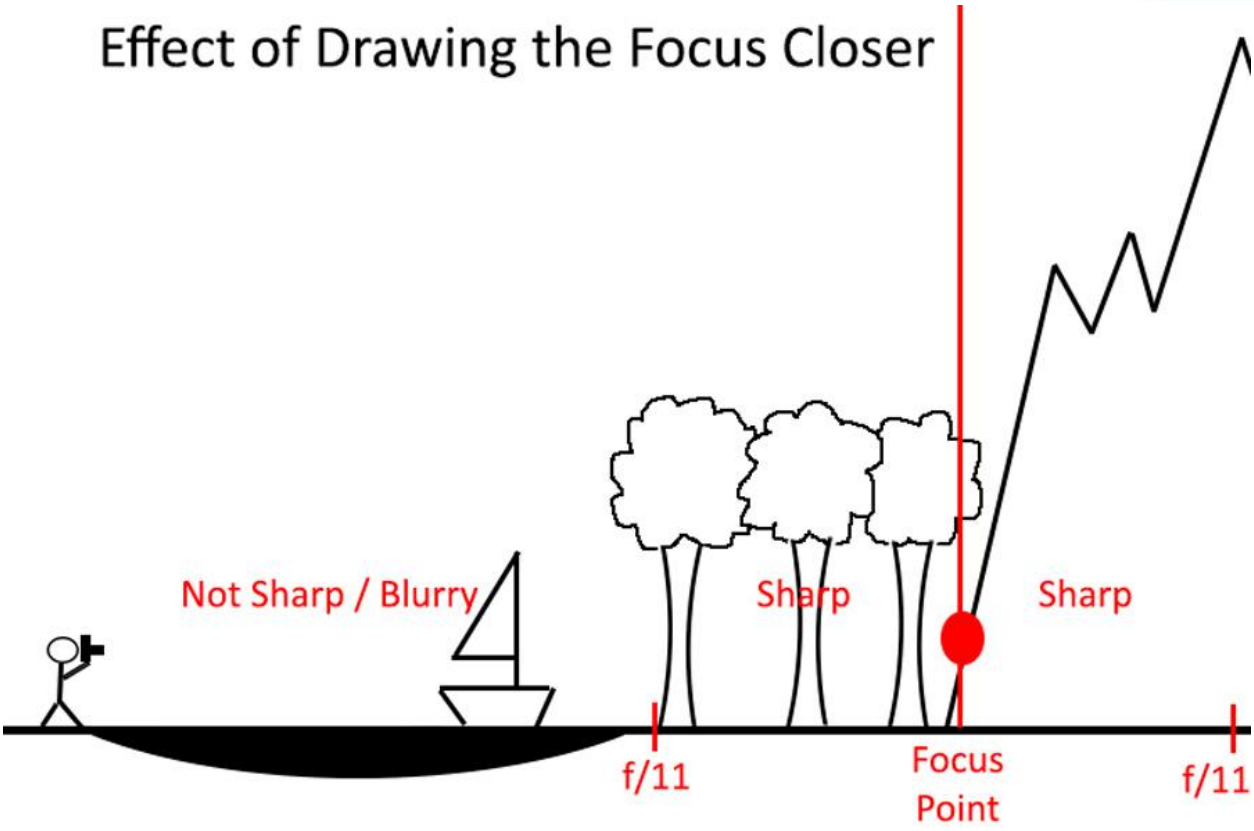
Rule 1: First of all, don't overlook the obvious. If there is a subject or a defined center of interest in your picture, set your focus on it.

Rule 2: Don't set your focus at infinity. Even when everything in your picture is very far away from you, draw the focus a little closer than infinity by focusing on some part of the picture that is closer to you. Why do you do that? To put depth of field to work for you. Remember that depth of field works both ways (in front of and behind the focus point). If you focus at infinity, you are wasting half your depth of field (the part behind the point of focus). But if you set the focus a bit closer, you essentially use depth of field to double up the amount of your picture that is sharp.

The following graphics should help you understand it better. The graphics assume you are using an aperture of f/11 and the marking on the chart below showing f/11 is the limits of sharpness. First, here is how it works when you set your focus at infinity:



Notice that you are focused at something very far away, so depth of field only works in one direction. It will help keep some parts of the frame in front of the focus point sharp, but that is it. Now let's take a look at what happens when we draw our focus point closer:



Notice that now depth of field is working in two directions. Since you didn't focus at infinity, there is a part of the picture beyond the focus point. Now the deep depth of field you created by using a relatively small aperture of f/11 is working in two directions. You have effectively doubled the amount of the picture that is sharp.

Rule 3: Focus 1/3 of the way into the picture when you have foreground elements you want sharp. You'll hear this handy rule of thumb in landscape photography: set your focus 1/3 of the way into the frame. Generally, that corresponds with a line 1/3 of the way from the bottom of your frame. This one rule will generally keep your foregrounds sharp and still keep your backgrounds acceptable sharp. You'll find this corresponds pretty well to the hyperfocal distance as well.

Example of focusing about 1/3 of the way into the frame. It gives a sense that you can walk into the picture. Even with the close focus, because of the relatively small aperture I used (f/16) along with the wide angle lens (17 mm), everything is acceptably sharp throughout the picture.

These three simple rules will help you set the focus correctly in the vast majority of your landscape shots. And you don't even have to think about hyperfocal distances or anything complicated like that.

Focus in the Real World: Night and Low Light

There is one more context in which I want to talk about focus, and that is when you are in an extremely low light or night time setting. In that case, it is often so dark that your camera has difficulty focusing. Autofocus needs light to work. Often it is relying on contrast. There are some ways to help your cause though.

As I mentioned, often cameras focus using contrast detection. If you have your focus point set at something very dark or black, there is no contrast. Aim for something bright so the camera has something to work with. Street lights and well-lit portions of your picture work well for this. But don't stop there - aim your focus for the edges of that bright area. That way not only are you

using the brightness to your advantage, but you are also using an area of contrast to help the contrast detection in your camera.

If you don't have a bright spot or area you can use, all is not lost. Break out a flashlight and shine it where you want to set your focus. The brightness will give your camera something to use to set the focus. When you are done, turn the flashlight off and take the picture.

If neither of these techniques work for you, you will have to use the manual focus on your lens. Switch to "MF" on your lens and then set the focus manually. If you can see well enough to set the focus, go ahead and do it. Otherwise you will have to guesstimate. That' not ideal, but take solace in the fact that this is the digital age and shooting is essentially free. You get a do-over.

When shooting in low light environments, it can help to use the Live View on your camera. Sometimes it will be too dark to show anything, but if you can use it you can also zoom in and get very precise with your focus. Remember too that if you are shooting with a DSLR this will flip the mirror out of the way and avoid any vibrations to potentially increase sharpness.

Day 8 Assignment
The Flower Shot

Description:

Put your focusing skills to work by photographing a flower. If you have one outside your home, use it. Otherwise pick one up from a local florist or garden shop. Use a macro lens or extension tubes if you have them (but if you don't that is ok too).

Keys to Success:

- Get as close as you can to the flower so it fills the entire frame.
- Use a large aperture and create a shallow depth of field.
- Focus on the center of the flower: be sure the focus is precise.
- Try using back button focus.
- Practice the "focus then recompose" method by setting your exposure and then moving your camera to get the composition you want.
- Beware the slightly moving flower! It will throw off your focus and ruin the picture.

Upon Completion of this Assignment:

People love pictures of flowers, so hopefully you got a good one. In any case, you've now seen the challenges that can go into precise focus. You should have a good grasp on that process, which you can put to good effect in your other photography.