

Focal Length & Compression

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In this lesson, we're going to dive into a concept related to photography, and that is focal length and compression. When exploring this topic, we're looking at how the look of your photograph can be drastically changed by both the focal length of the lens that you use and the distance between that lens and your subject.

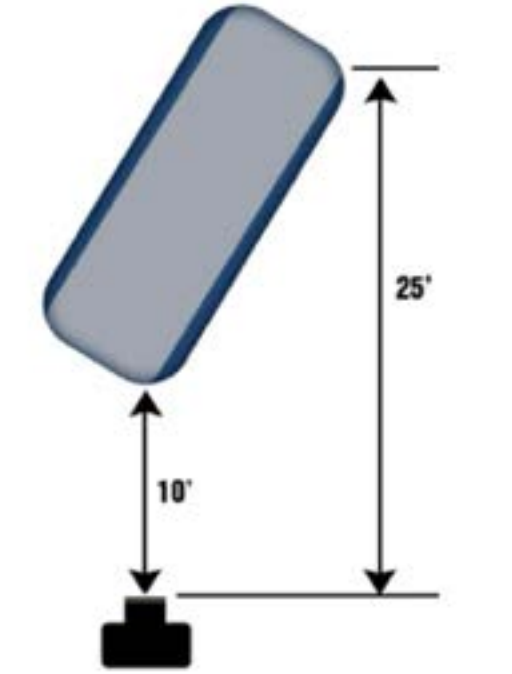
Look at the set of images below. Each image features the same subject, but the difference in the level of distortion varies greatly. In the image on the left, the front of the bus is much taller than the back. In the last image, the front and back of the bus are close to the same size.



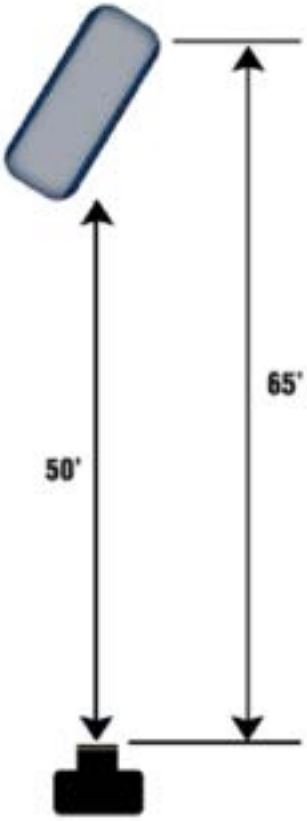
The images above all feature the same subject, but that subject looks different in each shot. That difference has to do with the focal length and how far the camera was from the subject. The image on the left was shot at 14 mm. The center image was shot at 44mm and the image on the right was shot at 50 mm.

Any time you shoot with a really wide angle lens, the distance between what's close to you and what's far away will be exaggerated. That is the case with the image on the left, which was shot at 14mm. The longer your focal length is, the distance between what's close to the lens and what's far from the lens will become less and less pronounced. The image on the right was shot at 50mm and you can see that there is less distortion at this focal length.

The difference in the images has much to do with where I was standing when I shot them. With the photos above, I included the entire bus in each shot. In order to do that, I had to position myself at different distances from the subject. When you shoot at a wide angle, you can be really close to the subject. When shooting with a longer focal length, you will need to back up in order to contain the entire subject in the frame.



Back of the bus is 2.5 times further away from the camera than the front of the bus



Back of the bus is 1.3 times further away from the camera than the front of the bus

Let's look at how your choice of lens and focal length can change the way an object looks. When it comes to perspective, the farther away something is from the camera, the smaller it looks. Therefore, if the front of the subject is really close to the camera and the back of the subject is really far from the camera, the front of the subject will look big, and the back of the subject will look small. We're going to use the photos of the bus to illustrate this.

In the diagram on the left, I was using the 14mm wide angle lens, and I was standing 10 feet from the front of the bus. Since the back of the bus was 25 feet away from me, there was 2.5x the distance between the front of the bus and the back of the bus. That's a lot! Alternatively, in the figure on the right, I was using the 50mm lens. In order to still fit the bus in the frame, I had to move back a lot... so that I was 50 feet away from the front of the bus. The back of the bus remains 15 feet farther than the front, so now the back is only 1.3x farther away than the

front. That's a much less drastic ratio than when we were using the wide angle, and it results in an image that looks much less distorted. It's this concept that makes it so you probably don't want to photograph a person close up with a wide angle lens. It will make their nose look huge and the rest of them look small!

Every time you grab your camera, you'll need to use this information to determine what lens to shoot with and what focal length to zoom to. If you'd like to exaggerate the distance between the front of the subject and the back of the subject, you will want to shoot with a wide angle lens and shoot with a short focal length. If, instead, you want to compress the space between what's close to the camera and what's far from the camera, then you would use a longer lens with a longer focal length. If you decide to do this, you will need to make sure that you can adequately back up enough to include the entire scene.

If you're shooting an object that has depth, like buildings or vehicles, it's important to know that wider angles will exaggerate any angles in the subject. As the focal length gets longer, the subject will have less and less of angle to it. Look at the images below. They all feature the same vehicles, but when shooting at a wide angle, those vehicles appear to be angling inward. As the focal length gets longer, you can see less and less of an angle.

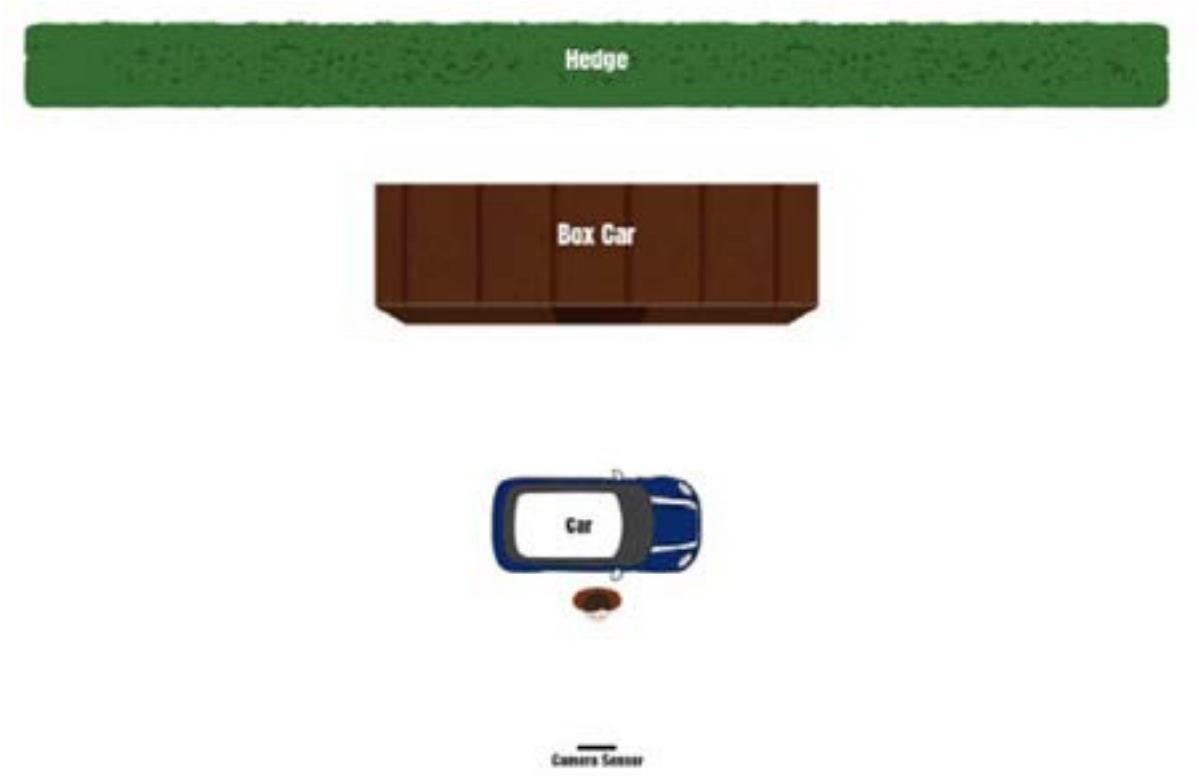




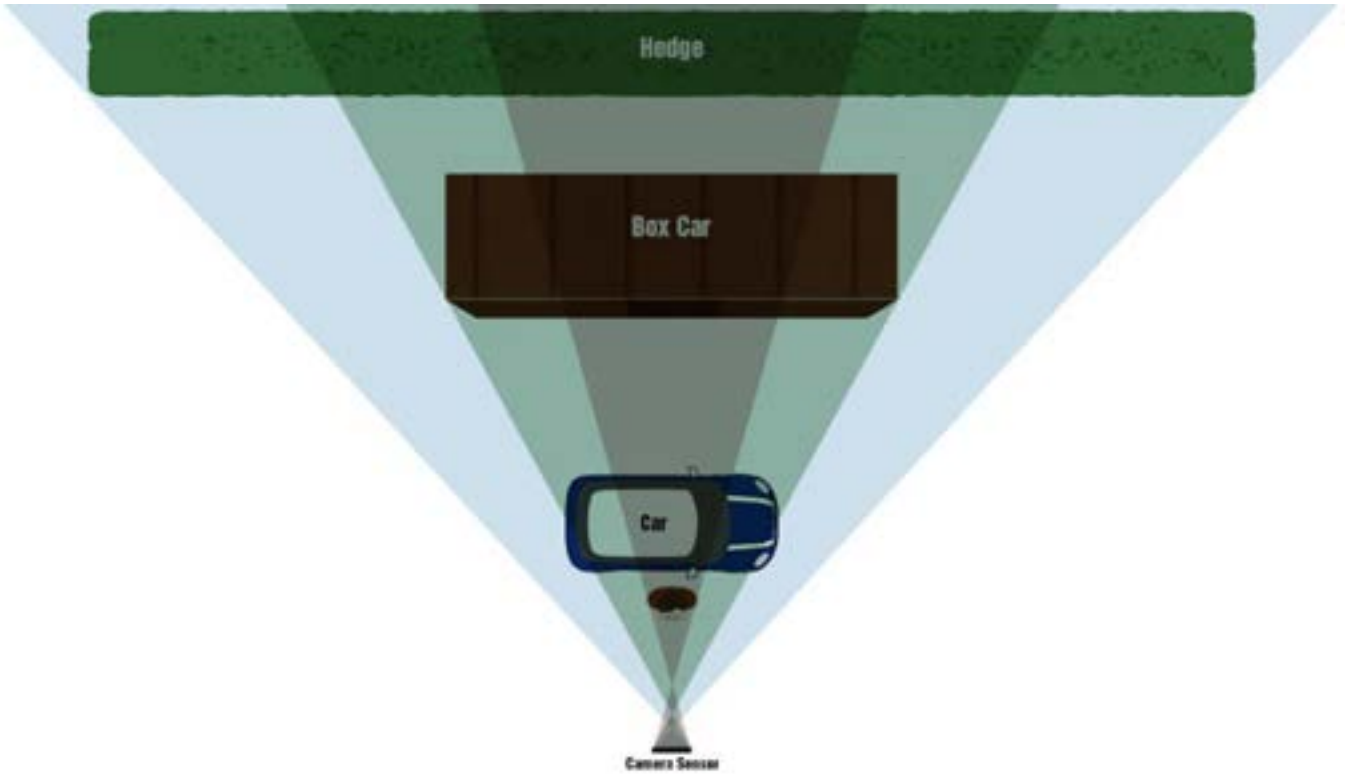




When choosing a lens for a particular subject, you're going to want to think about two things: 1. What millimeter lens will you need to appropriately fit your subject in the frame; and 2. How to you want your subject to be interacting with what's behind it. For example, how much of the background to you want to be able to see behind the subject?



We're going to use the scene/graphic above to demonstrate what lenses of different focal lengths do when you point them at a scene. In the image, we've got a hedge/shrubbery in the background, a train car in front of that, a car in front of that, and a person in front of the car. The little line at the bottom represents our camera's sensor. (Though it's obviously not to scale.)

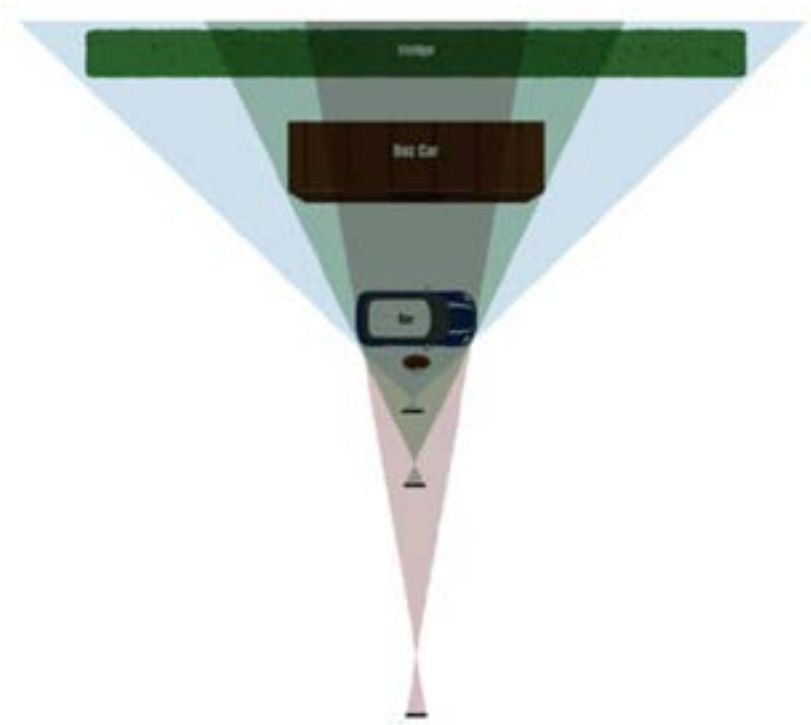


In the figure above, you can see the areas covered when shooting with a wide angle lens (the blue area), a medium focal length lens (the green area) and a long/telephoto lens (The red area in the middle). The diagram shows the areas covered when the camera stays in the same spot. If we're going to say that the person is the subject of the photo, you'll notice that when shooting with the wide lens, you'd have to move forward in order to get the person to really fill the frame, whereas with the telephoto/long lens, the person fills the frame perfectly. Now look at how the different lenses affect how much of the background is being shown. With the wide lens, the entire hedge will be visible in the frame. With the medium lens, you'll see much less of the background. The train car will still be visible though. With the long lens, you will see very little of the background, with only part of the box car in the frame.

In the figure on the previous page, we looked at how much of a scene is covered when we stand in the same place and change the focal length of the lens we're shooting with.

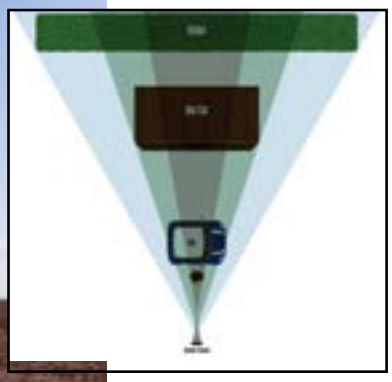
But when I'm actually out shooting, I don't stand in front of my subject and ask myself what focal length I need to get it in the frame. Instead, I ask myself how I would like my subject to interact with the background. Do I want to include a huge amount of background where it looks like everything is far away? If so I'll use a wide angle lens and move forward to get my subject the correct size in the frame. Do I want to include very little background, or bring the background closer to the subject in my frame? Then I'll use a long lens and move the camera back in order to still fit my subject in the frame.

The next set of diagrams will demonstrate this concept. In the graphic at right, we still have the wide, medium and long lenses. This time, however, we decided that the subject was the car, and we're going to use all three focal lengths to fill the frame with that car. To do this, we'd have to actually move the camera, and you can see how close to the car the camera would have to be with the three different focal lengths. Notice how much of the background is included in the frame as we change lenses.



Now, let's look at real world example. Below are two photos of the exact same subject at Cadillac Ranch. The top photo was shot with a wide angle lens from a point close to the gate. The second photo was shot with a long lens after having moved away from the gate in order to still fit it in the frame. Notice how the wide angle lens makes the cars look really far away and the long lens brings them in to appear closer.





This image was shot with a wide angle lens, and the camera was close to the gate.





This image was shot with a long lens and the camera was moved back, away from the gate.





The image on the left was shot at 27mm and I was standing close to the letter C. You can see that the letters far from the camera look much smaller than the letters close to the camera. The image on the right was shot at 200mm and I moved back, away from the letter C. You can see that the letters close to the camera and the letters far from the camera are closer to the appearing the same size.





The image on the left was shot at 135mm. Notice how far the Treasure Island hotel looks in the distance. The image on the right was shot at 200mm and you can see that it compressed the scene more, making it look like the Treasure Island hotel is closer.



This image was shot with a wide focal length and it caused the trees in the distance to appear smaller than the trees in the foreground.



This image was shot with a long focal length and you can see that all of the “trees” look to be similar in size.





In the images above, focal length was used to intentionally make the background appear farther or closer. With the image on the left, the people in the background would have been a distraction so a wide angle was used in order to distance them from the subject. In the scene on the right, I wanted the subject to interact with the background so a long lens was used in order to compress the scene, making the building and the subject appear to be close together.



These concepts do not only apply to large scale scenes and landscapes. Here, we have a table-top scene and a long focal length (70mm) was used in order to minimize the amount of perspective in the individual objects.

Focal length issues Now let's look at some issues you may run into when changing the focal length of your lens and moving closer and farther from the subject when you're out shooting. Let's say that you want to make what's in the distance appear close to your subject[s], but by moving back and zooming the lens, you end up cutting out too much of the scene. You can get around this problem by shooting a panorama of the scene, using that zoomed focal length.



This panorama is made up of several individual frames. With this scene, I wanted the trees in the background to appear close to the animals. When I moved back and zoomed my lens, however, I ended up cutting out much of the scene. To get around this, I shot a panorama.

As you use longer and longer lenses, you're going to find that your aperture setting is much more important. With a wide angle lens, it fairly difficult to mess up the aperture setting, and that's because the "infinity point" is much closer to you.

If your lens has a focus scale, you will see a mark that has an infinity symbol on it. If you focus at that focal length or farther, everything beyond that point will be in focus. The infinity point on a wide angle lens is relatively close to you. Therefore, most of the scene will be in focus. With a long lens, the infinity point is much farther away. This makes it so that if you focus on an object close to you, it's easier to have any objects in the distance become out of focus. This is especially something to be careful of when shooting a panorama.

Panorama settings When shooting a panorama, you need to make sure that all of your camera settings stay the same across every frame in the scene. If your focal length changes from one shot to another, then you will have an uneven focal range after merging the panorama. To avoid this, I use the buttons on my camera to lock certain features. The AE-L (Auto-Exposure Lock) setting will lock the shutter speed, the aperture setting and the ISO and I always make sure this is turned on so that all of these elements remain consistent across all frames of the panorama.

I also make sure that my Focus Lock setting is turned on so that the focal range remains consistent. If you don't have a focus lock setting on your camera, you can instead set your lens to manual focus so that it doesn't change the focal point automatically.





The above panorama is made up of many images. When viewed small, it looks great. However, I failed to lock my focus point to make it consistent across all the frames so, at left, you can see that the focus point shifts and there is a line between areas in focus and out of focus.

Maintaining focus across near and far objects When using a longer focal length, it can become more challenging to keep both near and far objects in focus. As you zoom your lens more and more, it will be harder and harder to maintain a deep depth of field. As you increase the focal length, you will need to increase the aperture setting to a higher and higher number in order to keep everything in focus. This is also the case when you bring your subject closer and closer to the camera.

If you're using a higher aperture number to get more of the scene in focus, you will need to be aware of the specular highlights. These are the really bright areas where light is reflecting off something shiny, or the light you see when looking directly into the sun, etc. Really high aperture settings will cause the specular highlights to turn into starburst shapes. Sometimes this looks great and other times it can be distracting. It's just something to be aware of when choosing your aperture setting.



This image was shot using a high aperture setting (f22) and you can see how it turned the specular highlight of the headlight into a starburst shape.