# Blur

**By James E. Beck**

As photographers, we are all aware of blur, sometimes using it to our advantage but more often suffering its unfavorable consequences. We couldn't do without using it as a tool to diminish a background thereby enhancing our subject. Some photographers are able to follow a moving subject with their camera, blurring the background to the same effect. More often though, blur is a nuisance to be chased out of any picture so judges can see the excellence of our work.

Did you know there are seven sources of blur we must contend with? Fortunately we usually only have to deal with a few of them in any one photo; the others can be ignored or managed. Before discussing each of them briefly it is important to understand when blur is acceptable and when it is a problem. Surprisingly, every photo has some blur even at the point of focus and even though we may be admiring them for being crystal clear. This is because we can't see all of the blur. Those of us with good vision can distinguish more blur than those with poor vision. Tests have shown that an average viewer can see 0.01 inches of blur in a photo from a distance of about one foot, or about 0.1 inches from ten feet, or about 1 mm from 1 meter, etc. This is a ratio of one part of blur in 1000 "parts" of distance. This is our average visual acuity and it can be used to determine the acceptable limit of blur in the parts of a photo that aren't supposed to be blurry.

One of the smallest blur sources is your camera lens; its contributions depend on the quality of the lens, the distance from the photo center, the size of the print and, perceptually, the photo content (i.e. how much texture). The latter two items affect most of the blur contributors.

One of the most obvious blur source is moving subject blur. If your subject is moving within the focus plane, besides the subject speed, the blur will increase with slower shutter speeds, shorter distances and longer focal lengths. If your subject is moving toward or away from you the factors are the same but the blur is much less.

Another obvious source of blur is camera movement. Mostly, angular camera movement is more common than movement in other directions. Once again, this is made worse with larger photos, longer focal lengths, shorter distances and slower shutter speeds. Fortunately vibration reduction hardware is built into some cameras or lenses reducing the blur by 2 to 4 stops. It is as if your shutter speed was shortened from 1/100 sec to 1/200 sec or 1/800 sec. from a blur standpoint. Of course, another great way to reduce movement blur is to use a flash.

Printing blur can be a major source of poor photos. Most experts recommend printing resolutions in the range of 240 pixels/inch to 300 pixels/inch for competitions, particularly for larger prints. Both the resolution and the printing process contribute to this blur. Monitors or projected images similarly have resolution blur and typical monitor

resolution is smaller, in the range to 72 pixels/inch to 98 pixels /inch. Of course final printed or projected image size is also a major factor.

Probably one of the largest blur sources occurs from limited depth of field. The published depth of field limits are set by blur amounts the average viewer can distinguish as described above. Mostly the blur gradually decreases from near and far depth of field distances to the focus point. If you look closely, you can usually see blur inside of the standard depth of field limits. The depth of field blur increases with shorter distances, larger apertures (smaller f-numbers) and longer focal lengths. Most digital cameras have significantly less depth of field blur than 35 mm due to the smaller sensors.

Diffraction blur is one of the least recognized blur sources and it is usually small compared to the other blurs. It is caused by small apertures and, as with most blurs, made worse by enlarged prints. Most SLR's have negligible diffraction blur at apertures smaller than f/16. But keep in mind that, while depth of field blur may decrease with larger f-numbers, diffraction blur will increase.

A last blur source is not really blur but can upset your photo in a similar way. It is "graininess" caused by noise at low light levels. The main contributor here is a high sensor speed (ISO) value, and is often noticeable in dark areas with ISO's greater than around 500.

Mostly, there are no good rules of thumb to apply to digital cameras for reducing blur as there were with 35mm cameras. Using Photoshop-type sharpening techniques are usually recommended as a last step after making any other Photoshop adjustments to your prints. They locate edges in your photo and increase the contrast at them thereby reducing apparent blur introduced by some Photoshop processes.

Mostly, we can master blur through experience and by trial and error. But, it's a good idea to understand the various blurs so you can analyze and improve your photos.

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