

Guide to Art Photography in Museums, May 13, 2012

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About the Author

I am an amateur art photographer who has photographed extensively in art museums since 1974. The first version of this guide was written for film cameras and published in CAA Newsletter in 1985. In April 2012, I rewrote this guide for digital cameras. A month later, I added sections on prime lenses and shooting in RAW.

SUMMARY

Good hand-held photos of artworks in museums and churches require three things: good equipment (a full-frame camera and a good lens), photographic experience, and basic skill in Photoshop. Without all of these, it is difficult to get high-quality results.

For the huge advantage of a full-frame camera, see the link below which compares an ISO photo taken with a Canon 7D camera (one level below a full frame DSLR) with an ISO 8,000 photo of the same painting taken with the Canon 5D Mark III (a full-frame camera developed in 2012).

<http://members.webs.com/MembersB/editAppPage.jsp?app=photos&pageID=157455060&token=null#photos/photo?photoid=154055209>

EQUIPMENT

(For more on equipment, see my “Guide to Digital Cameras” under the Misc Info page on my web site: <http://www.socialhistoryofart.com/miscinfo.htm>)

A Full-Frame Camera is Necessary by Allowing ISOs of 16,000+

The most important camera feature for museum photography is a large sensor capable of shooting at the high ISOs needed for low lighting without “noise” (grainy images) or blurriness due to handshake. Most small point and shoot cameras have tiny sensors which can only shoot at ISO 200 or 400 in low light without significant noise. This makes them useless for art museums.¹ The same is true for mid-size cameras like the Canon G12 which can only go up to ISO 800 in low light.

To shoot at higher ISOs, you must get a camera with a much larger sensor. And that means a DSLR. I cannot recommend the new micro four thirds cameras because their smaller sensors only reach ISO 1,200 – 1,600 without noise. For good low-light results at ISO 1,600 – 2,000, try a mid-price, crop-factor DSLR such as the Canon Rebel T3i, Canon 7D, Nikon D5100, or Nikon D300. These camera bodies cost between \$700- 2,000 and are cheaper, smaller, and lighter than full-frame DSLRS. Cannon’s new DIGIC 5 processor – for now available only in full-frame and tiny point and shoot

cameras - also reduces noise levels and should add another 500-1,000 to the top ISO limit for low-light shooting. It will appear in a cheaper DSLR by late 2012.

Even with these incremental improvements in high ISO / low noise, none of these crop-factor DSLRs can handle most dark paintings in art museums, especially those hung in low light. I say this based on five years of shooting thousands of paintings annually using Canon DSLRs including the Canon 7D. (I even kept my 15 megapixel Canon 7D set at 8 MP the whole time because this greatly reduced noise at higher ISOs between 1,600 and 2,500.)

Nor can these DSLRs handle sculpture where you need even high higher ISOs and higher aperture settings to allow depth of focus. With all of these crop-factor DSLRS, one is often unable to shoot at all, or forced to use higher, noisy ISOs. And much of the time, I was shooting at the very limits of my camera settings with the aperture wide open at f2.8 (not an ideal setting – see below) and the shutter speed set at 1/80 or 1/100 where blur from handshake remained common. Even using a Canon 7D for two years, I had to take 3-5 shots of every picture in the hope that one might be sharp. Most of these images had some noise problems. Many were blurred. And in many cases, there wasn't enough light even to try to photograph.

The solution is as simple as it is expensive. Invest in a good, full-frame DSLR such as the Nikon D800 or Canon 5D Mark III. Their larger sensors allow shooting at ISO 20,000+ with no noise. The Nikon D800 is considerably cheaper for now and has even lower-noise levels allowing shots at ISO 30,000. If you turn down its 36 megapixel setting to something equivalent to the 23 MP setting of Canon's 5D Mark III, you will get even lower noise.

Using one of these two cameras, you can easily photograph all works of art, even light-sensitive works such as tapestries, watercolors, pastels, and illuminated manuscripts which are shown in very dim light. Shooting at ISO 20,000 or 25,000 also allows you to use the faster shutter speeds needed to eliminate blurring from handshake. (I now shoot all art at 1/300 sec or faster.) A full-frame DSLR also allows you to avoid the widest aperture settings which reduce image sharpness. (For example, if your lens goes down to f/2.8, you can shoot everything at f/3.2 or f/3.5.)

Full-frame cameras have a few disadvantages, especially their large size, weight, and price tag. They also require more expensive lenses as the cheaper lenses used on crop—factor DSLRs tend to have fuzzy edges. This is not a problem on crop-factor cameras because the smaller sensors used crop out the edges of every picture. It only becomes an issue with full-frame cameras which show a wider field and need better lenses to produce sharpness across the full image. For a good video explaining crop-factor vs. full-frame DSLRs, see the following link.

<http://www.youtube.com/watch?v=M4eiS5YNVA0>

In the next few years, Nikon and Canon will probably put larger sensors into smaller DSLRs allowing these cameras to work much better in art museums. For now, the only camera which delivers spectacular results is a new, full-frame camera. (Older models have older processors and should be avoided.)

Before rejecting a \$3,000 camera body as an extravagance, consider how much you spend on international art travel. If the biggest expense for art photography is the travel, hotel, and food, the price of a full-frame camera looks more reasonable (especially when a \$1,500 camera and lens yields mediocre results half the time).

Lenses

The lens is almost as important as the camera body so research any lens just as carefully. If you are focused on painting, you can get by with a single, all-around zoom lens with decent wide angle and some telephoto (28-70, 28-105, 28-135, etc). If possible, get a lens which goes down to f2.8 as these let in a lot more light than the smaller, lighter zoom lenses which start at f/4. . Architecture and gardens will require a wide angle lens. Architectural sculpture and close-ups of the tops of large paintings will require a stronger telephoto of 70-300 mm. In my experience, 200 mm is insufficient while 400mm is too heavy and expensive. A macro lens is the least needed lens unless your specialty is small medieval ivories, ceramics, medallions, and coins. If your zoom lens goes down to 18 mm, you may not need a macro.

Beware of the “kit” lenses bundled with many DSLRs, especially any DSLR which is not full-frame. These are often mediocre lenses, especially with Canon cameras such as the Rebel T3 series. The Nikon kit lens is quite good.

Carry a small lipstick-shaped lens brush and a lens cleaner kit and make sure your lenses are clean before shooting. I assume that you have covered every lens with a protective UV filter since day one.

Prime Lens or Zoom Lens

Professional photographers recommend using a prime lens for their sharper image quality and lower apertures (f/1.4, f/1.2) allowing shooting in low light. A prime lens has a fixed focal length and thus no zoom. This is great advice for those shooting art in a studio or in the museum’s photography department. But for normal museum photography, a prime lens doesn’t work most of the time as I learned the hard way. I followed the advice of a professional years ago and got a fast prime lens – the Canon 50 mm f/1.4. I knew this lens wouldn’t work with sculpture because it didn’t offer the higher aperture numbers needed for depth of focus. What I didn’t foresee was the way the lens made me stand 15-20 feet away from most paintings which meant I couldn’t shoot until the people in front cleared out. With a zoom lens, I could stand among the closer viewers and take my shot without waiting. In really crowded museums like the Louvre or Vatican, you can 10-15 minutes before the sea of people parts long enough to allow you to shoot. One could stand closer if one bought a prime lens with a lower mm. But then one couldn’t back off, when necessary, to eliminate the reflections commonly seen on the upper portions of larger paintings. The only way to get good results there is to stand back and zoom in. A low mm prime lens would also be unable to shoot details of paintings which are well above your head.

For these reasons, I recommend a good zoom lens with decent macro and telephoto such as 18-55, 24-70, or 24-105. The wide end allows you to get close for macro shots of details at head level and below while the telephoto end allows you to back off to reduce reflections and capture details at the tops of larger paintings. The range of aperture in most zoom lenses also makes it easy to shoot sculpture. With an all-around zoom lens staying on your camera, less dust will get inside.

Although zoom lenses with lower f stop numbers such as f2.8 allow you to work in much lower light, they are large, heavy, and expensive. The longer the zoom, the bigger (wider) and heavier the lens has to be to still handle such low apertures. The weight and size problem worsens with zooms possessing 200mm+ telephoto. To my mind, the Canon EF 70-200 mm, f/2.8 L IS II lens is too big and heavy to lug around Europe. I use the Canon EF 70-300 mm f/4.5-5.6 IS USM, a cheaper version of their top quality, comparable lens –the Canon EF 70-300mm f/4-5.6 L IS..

Lenses which start at f3.5 or f/4 are lighter, smaller, and cheaper because they have a lot less glass. If you have a full frame camera, you can work with a “slow” lens which starts at f/4. But if you have a smaller DSLR, you will need a lens which starts at f/2.8 to get decent results. Until I graduated to a full-frame camera in April 2012, most of my Canon DSLR shots from 2006-11 were taken with a high quality, Canon 17-55 mm f/2.8 IS lens which cost \$1,000. (This should not be confused with the mediocre Canon 18-55mm, f3.5 kit lens.). This is still the lens I recommend for any Canon non-full frame DSLR and it offers great flexibility for portraits, flowers, and landscapes.

Here are links to good review sites for Nikon and Canon lenses.

http://www.cameralabs.com/lenses/lens_buyers_guide/Nikon_Nikkor_lenses/Which_general-purpose_lens/Which_Nikkor_Nikon_general-purpose_lens.shtml

<http://www.the-digital-picture.com/Reviews/>

Other equipment

Tripods are generally outlawed in art museums. So leave them home unless you are shooting architecture, gardens, or art in churches. Even then, a tripod is rarely needed if you invest in a good full-frame camera.

A black cloth is essential for masking out light reflected in art, especially art with dark surfaces, or in plexiglass cases. For this reason, you should always wear black or dark clothing when shooting art. Good camera stores like B&H sell black backdrop cloth or visit your local Jo-Ann Fabric and get some lightweight black cloth as wide as you can stretch your arms and ca. 5 feet tall. The bigger the cloth, the more reflection you can block off. Ask a tall museum visitor to hold the cloth behind you if you need two hands to steady the camera. Even if the whole painting is too big for your black cloth to mask, you can use the cloth to get great close-ups. A black cloth also works wonders behind small sculptures if you can find someone to hold it for you.

RAW VS JPEG

JPEG compresses and processes every photo inside your camera, sacrificing some detail while providing an image which is ready to view and email (after it gets sized down in Photoshop). Most DSLRS allow shooting in RAW mode which preserves more visual information but requires processing the image afterwards in Photoshop or some other program before it can be viewed, projected, or printed. Processing in RAW is not difficult if you have already learned basics Photoshop for jpegs. Indeed, processing RAW images is easier and more user-friendly as the main things you will improve are lighting and color. In any case, post-processing is needed for almost all art images. So you will need to learn basic Photoshop before any of your art photos will look good. All of the art photos posted on the Art Galleries on my web site have been improved considerably with Photoshopped. If you can bother with basic Photoshop, you might as well spend another hour and learn basic RAW processing.

The other disadvantage to RAW is that each image will be substantially larger on your memory card and computer. You may need higher capacity cards and a larger hard drive at home.

The advantage to shooting RAW is that you can make much more dramatic improvements to flawed photos than you can in Photoshop. RAW processing is far better in three areas: 1) fixing color, 2) recovering areas which are overexposed and blown out (all but impossible to fix with jpegs), and 3)

restoring detail to overly dark, murky shadows. When shooting in jpeg mode, some art works will always appear greenish or brown no matter what you do in Photoshop. With RAW images, all color problems can be easily corrected. The second video listed below shows a portrait taken in RAW with a garish orange lamp. In jpeg, this photo would have been ruined. In RAW, the photographer was able to restore skin tones.

The ability of RAW processing to recover overexposed, blown-out areas while brightening shadows involves what photographers call dynamic range. This is the full spectrum of lights and darks which the eye sees but no camera can capture using jpegs. Although full-frame cameras already have better dynamic range, they can only handle so much strong contrast. This is a particular problem when shooting high contrast paintings or areas of paintings by Caravaggio or Cole or stained glass windows by Tiffany where some sections are brilliantly lit. By shooting in RAW and processing the images later, you can achieve near perfect results. Landscape shots also benefit when shooting in RAW. In jpeg, blue sky often appears white and flat. Taken in RAW, the same shot can be fixed later to recover the sky's rich, three-dimensional color. See the breathtaking examples in the two videos shown below which illustrate Raw vs. Jpeg,

http://www.youtube.com/watch?feature=endscreen&v=mHMHYM_J7SY&NR=1

<http://www.youtube.com/watch?feature=fvwp&NR=1&v=E4X8BhlsxVk>

FLASH

Virtually no museums allow flash photography. Even if they did, flash doesn't work for paintings because it bounces back and ruins the shot. If you have a wireless flash (allowed by the better DSLRs), you could hold the flash to the side and get around that problem. Flash is more helpful for sculpture, especially if you can angle the flash at the ceiling or at a side wall to get an indirect light. This greatly heightens the three-dimensionality of the lighting rather than flattening it as does a flash pointing straight ahead. Learning how to turn down your flash is also very helpful, especially for portraits in dark interiors or at dusk.

PHOTO TIPS

Study your manual thoroughly and learn to change ISO (light sensitivity), White Balance (color temperature), Exposure Compensation (brightens or darkens a shot), Flash intensity (adjustable on all DSLRS and many good point and shoot cameras), aperture (depth of focus), shutter speed (at least 1/100 of a sec to eliminate hand shake), and timer. Type your own 1-2 page guide of the most useful menu options and slip a copy into your camera bag and email it to your smartphone. You can also download a pdf file for the whole manual from the manufacturer's web site and send that to your phone.

Recharge all batteries before going out to shoot. Always carry an extra charged battery and, if needed, the charger for use while you are having lunch.

Check all camera settings before shooting or you may still be on a setting which will wreck all of your shots (like tungsten WB when you are now outdoors). If something is inexplicably wrong with your shots, it's probably a simple matter of changing a setting.

If possible, visit museums on sunny days as this greatly increases the light available for shooting and allows faster shutter speeds (to eliminate blur) and greater depth of focus (for 3D objects). Weekdays are better as crowds will force you to wait until a clear view opens up.

Never shoot on AUTO. If you must use something like AUTO, use P instead as this is fully automatic with one big exception. It leaves manual control over all the important features you need to adjust to get good results such as ISO, White Balance, Exposure Compensation, and Flash Adjust.

Turn off your camera off between shots to quadruple the battery time. For the same reason, use the viewfinder, not the power-hungry LCD.

Exposure Compensation

Use Exposure Compensation (-+) to add or subtract light from a shot. Since it's easier to brighten darks later than it is to darken lights, subtract light to avoid over exposed highlights and washed out areas. Canon DSLRs often take better shots with the Exposure Compensation set down one or two notches. Exposure Compensation is one basic setting to learn immediately as you'll be changing it every three or four shots.

Every camera with manual controls has options for setting the internal light meter. For most art works, avoid spot metering whereby the camera selects a tiny central point in your shot and uses that to determine how much light is present. "Center-Weighted" or "Evaluative" settings for light metering are more reliable and take a broad sample. On the other hand, these settings will misread a dark painting in a large, gleaming gold frame as the bright gold throws the meter off. In that case just add more light using Exposure Compensation until you have the optimal lighting.

White Balance

White Balance is another setting to change frequently as you move from tungsten to daylight to fluorescent to mixed lighting, at times in the same galleries. (Small objects behind plexiglass are often lit with fluorescent.) Learn the WB icons so you can quickly change to the best setting.

My first shot is always a quick test shot for overall lighting (adjusted with Exposure Compensation) and color (adjusted with white balance). If mixed lighting prevents you from getting the right color, you can either use a white or grey card and set the color temperature manually (which is fast if you do it frequently) or try to fix the color later in Photoshop. The best way to get perfect color is to shoot in RAW and adjust later in Photoshop.

Keep the ISO Low, if Possible

Always use the lowest ISO possible as this improves the shot by reducing or eliminating noise. In bright daylight, you can shoot at ISO 100-400 and still have fast shutter speeds and wide depth of focus if needed. The most commonly changed setting on your camera should be the ISO. So practice until you know the button by feel. ISO is light sensitivity. The less light you have the higher your ISO must go. But stay within the limit of your camera for high ISO / low noise as going higher will produce grainy shots. Noise is also a product of megapixel setting. Since 10 MP is all you really need to get good results, try setting the picture quality (i.e., megapixels) one notch down if your DSLT goes up to 15 or 20 MP and you find you need more light. (Remember to change it back to the highest MP setting after the shot.)

Misc. Tips

With paintings, I shoot on the AV mode (aperture priority) with the aperture set one or two f stops above the lowest setting to get the sharpest results. The lowest aperture on most lens reduces image sharpness. This suggestion is often impossible with anything but a full-frame camera because the low light in many museums forces you to shoot at the lowest aperture.

When shooting sculpture, remember to select a higher aperture number to provide depth of focus. The closer you are to a 3-D object, the greater depth of field you will need to handle even a few inches of depth. Shooting small Meissen figurines from eight inches away might require an aperture as high as f/8 or more. See my shot of a Tiffany pulpit only one inch deep, taken at f/4 which proved insufficient at close range.

<http://www.socialhistoryofart.com/apps/photos/photo?photoid=155681109>

If available light allows you to lower the ISO while keeping a shutter speed fast enough to avoid blur caused by hand shake, lower the ISO to get even better results. Check each shot afterwards and make sure to zoom in during PLAYBACK to check the focus of tiny cracks and brushstrokes. On most DSLRs, you can move rapidly in Playback from one image to the next while fully zoomed in. This allows you to take 2-3 shots of every image and quickly check to make sure one shot is perfect. Even with a full-frame camera, I take two of everything because I often find one image is slightly out of focus. With a crop-factor DSLR (non-full frame), I always took 3-5 shots of everything and was lucky if one of them was perfect. It takes a lot more time to review your images (zoomed in) before you leave each gallery but that's the only way to spot lousy shots and redo them while you can.

If the image is blurred, raise the ISO and the shutter speed will go up, eliminating most blur which is caused by handshake. If only part of a photo of a painting is in focus, your camera was probably not parallel to the painted surface. This is especially important when shooting very small works or extreme close-ups. If available lighting permits a higher f stop number, give yourself a little extra depth of focus when shooting details as the center of the section photographed will be a little closer than the edges.

All cameras have occasional trouble focusing on shiny or smooth surfaces (such as marble) so be prepared to revert to manual focus now and then. Or move your focus point to a crack in the sculpture or some area of contrast to help the camera autofocus properly. When using a tripod, consider manual focusing using Live View (with the LCD zoomed way in to check).

Shoot close to your art object, if possible, as this increases visible detail. If using a zoom lens and you don't have enough light to shoot (and your ISO is already as high as it can go without making too much noise), make sure you are zoomed out as this lets in a lot more light. If your zoom lens goes down below 24mm, be careful about using these low settings which introduce barrel vaulting (curving the sides of your rectangular painting). Most of this can be easily corrected in Photoshop but you can reduce or eliminate the problem beforehand by staying above 24 mm with your zoom.

Leave your camera on the maximum megapixel setting as this brings in more detail. You can always downsize the shots later for emailing, PowerPoint projecting, and web posting. I downsize to 1 MB for slide shows and normal viewing and to 150k for web posting. If your can't get a shot without increasing the ISO into the realm of noisy photos, switch to the next lowest megapixel setting (8 to 10 MP) as this significantly reduces noise levels. In the two years when I used a Canon 7D which went up to 15 MP, I did all of my art photos on the lower 8 MP setting. Almost all of the 1,600 photos posted on my web site's "Art Galleries" were taken at 8 or 10 MP. Now that my lighting problems have

disappeared with a full-frame camera, I shoot at the full quality setting of 23 MP with an occasional dark interior requiring me to lower the MP to 10.

Use Something to Steady Your Camera

Always try to improvise a tripod-like object to steady your camera. Placing your camera against the side of a column, door, chair, wall, etc. will eliminate hand shake and allow you to use much lower ISOs (for a clean, smooth shot) while allowing greater depth of focus if needed. If you can place your camera on something stable, set the ISO to 100 and use the 2 second timer. To shoot a ceiling, put your camera on the floor, set the ISO to 100, select a high aperture number, zoom out for the widest view, and use the 2 sec timer. If shooting at a local church, ask or a step ladder or bring one.

How to Handle Reflections in Paintings

If a painting has reflected light which cannot be blocked with a black cloth (or your dark coat), you might be able to shoot from a side angle without reflections and correct the perspective later with one Photoshop command. In that case, you must leave a little space on the far side of the art work as the correcting process enlarges that side as you fix the perspective. Without including some extra space, your painting will be cropped when you straighten it. For reflections at the top of a painting, stand back and zoom in or use a stronger telephoto.

Shooting Sculpture and Architecture

Needless to say, you must use a higher aperture when shooting anything three-dimensional or it won't be fully in focus. While f/5 might be fine for a group shot of friends standing three rows deep at a distance of twenty feet, you will need a higher aperture to capture a 7-inch statue at a distance of 8-12 inches. In general, the closer you are to a small 3D object, the more depth of focus needed.

Since 3D objects require a higher aperture number (i.e. a smaller opening letting in less light), you will need either more light or a higher ISO. A tripod or tripod substitute would help greatly. Placing your camera directly against the plexiglass is discouraged in most museums but it does help greatly when shooting small 3D objects. If plexi reflections are impossible to mask, use your flash, well turned down, with the camera at an oblique angle to avoid flash reflection. One nice thing about flash is that it makes plexi reflections go away.

With sculpture, it may or may not be helpful to set the camera on spot focusing. In this mode, the camera focuses on a tiny spot which is normally in the center but can be moved using your camera's buttons. Spot focusing used unknowingly is particularly bad for sculpture because you may end up focusing on the wrong part of the sculpture. It's even worse when shooting two friends standing side by side and the camera focuses on the center spot – the tree 50 yards behind your friends. To get the result you want, know how to change focusing options and know your current setting.

If your camera locks the focus after you push the shutter down halfway, you can always select your ideal focal point, depress the shutter halfway, and then recompose the shot before taking the picture. Many DSLRs have a setting placing a red dot on the focal spot which is only visible in the PLAYBACK mode so you can review your focus points and understand your mistakes better.

To get a better angle on a sculpture placed high up, put the camera on LIVE-VIEW mode so you can shoot using the LCD and hold the camera high over your head with a faster shutter speed to prevent blur. Or put the camera on a tripod, use the timer, and raise your camera even higher for the ideal shot.

This works best with cameras with a tilting LCD so you can aim properly. If your LCD doesn't tip back, get a spotter to stand behind you and tell you when the shot is framed.

Architecture is hard to shoot well and requires a separate, wide angle lens which goes down to 12 or 14mm. To reduce perspective distortion, shoot from a greater distance or find an elevated spot such as a 2nd or 3rd story window in a nearby building. Many architectural shots are spoiled by a washed out, bright sky so wait for a cloudy day or shoot at dawn or dusk (and change your White Balance to "shade" or everything will look cold and blue). Or shoot in RAW and recover the original blue sky. Dimmer, indirect light is generally preferable as it brings out the middle tones whereas direct sunlight often reduces everything to a harsh, flat pattern of light and dark.

Most cameras have a grid option visible through the viewfinder which helps compose architectural scenes, landscapes, and paintings.

ⁱ One exception is the Canon S100 which handles up to ISO 1600 without noise because of its larger sensor and new Digic 5 processor. Its tiny battery makes it impractical for extended shooting in museums.