

Outdoor Lighting With Flash

There are four basic roles a source performs in portraiture:

Key Light: Creates the highlight pattern on the face

Fill Light: Illuminates the shadows not hit by the key light

Background Light: Controls contrast between subject and background to create the illusion of depth

Backlight Accent (aka hair light): Creates separation between subject and background defining its overall shape and reveals detail in areas other than the face.

The ambient light outdoors usually performs 2-3 of them at all times. Its always illuminating the background and providing some fill from light bouncing off the sky wrapping around the subject's face. The direct rays of the sun can either be used directly or diffused with a scrim as key light, or as back-rim light. Direct sun as a key light doesn't work well for the simple reason it makes the subject squint, so its more often used as backlight unless the photographer has a phalanx of assistants to hold sail-like scrims to diffuse it.

Exposure Control Outdoors

Outdoors when flash is used there are two exposures to control. The ambient light which is not affected by camera /subject distance and the flash exposure which changes with the distance of subject and flash.

Flash duration is so short it is not affected by camera shutter speed, which allows the background ambient exposure to be controlled with the camera shutter /aperture / ISO speed, while the flash lit foreground exposure is controlled via flash power.

The ability to control background and foreground lighting independently offers many creative possibilities, but there are some technical limitations the photographer must be aware of and work around.

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X-sync limit

A DSLR camera has a focal plane shutter consisting of two moving curtains. When the shutter is pressed the first curtain opens exposing the sensor, then a second curtain closes to end the exposure. It takes the curtains about 1/400th sec. to cross the sensor. The flash can't be triggered until the first curtain is completely open, and the second curtain can't start closing while the flash is firing. That physical limit inherent in the design of the shutter limits shutter speed with conventional flash to 1/200 or 1/250th for most cameras and 1/500th for pro-level cameras.

Indoors the shutter limit, called "x-sync speed" is never encountered because the ambient light levels are low. But outdoors on a sunny day, shooting at ISO 100, a camera with an x-sync limit of 1/250th sec. will require an f/stop of about f/11 to obtain correctly exposed highlights.

Shooting at f/11 present to problems, one technical and the other creative. The technical problem with regard to flash is that it takes a lot of flash power to get past the small aperture. The creative problem is that f/11 creates a relatively large zone that is in focus, which for portraiture can result is unwanted detail in the background.

Camera manufacturers discovered a way to get around the x-sync limit with their hot shoe flashes by creating a mode which pulses the flash rapidly, turning it into a continuous source. (See <http://super.nova.org/DPR/Canon/HighSpeedFP.pdf> for a tutorial on high speed flash). But here we will assume a conventional "one-pop-per-exposure" flash is being used.

Control the Ambient Exposure First

Common sense should tell you that if you start with an ambient exposure which is blowing the highlights, adding flash on top of the ambient will blow them even more. A problem conceptually with learning flash is that most ambient only photos taken outdoors have blown highlights and photographers have come to accept that as "normal".

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The dilemma of the photographic process, both color film and digital, is that the recording medium can't record the full range of detail of an outdoor scene. An outdoor scene typically has a range of brightness of 10-12 stops. Some, such as cross-lit scenes of snow or sand may have a range of 15 stops. Digital camera can record a range of about 7 stops with detail.

So faced with an ambient only lighting situations of 10 stops the exposure can be set to preserve highlight detail, which will make midtones such as faces in shadow look too dark and cause shadow detail to be lost, or set so the faces are exposed normally (i.e., as seen by eye) and letting less important parts of the photo such as the sky or small highlights get blown out without any detail.

Photographers who use ambient light only will usually do the latter, keying the exposure to the most important thing in the photo - the face in a portrait - so it looks normal. That works in most cases because the human visual system only focuses on what is in the center 2-degrees of our vision, twice the width of a thumb held at arms length, and mentally tunes out the rest.

Adding flash to the ambient lighting allows a photographer to overcome the technical limitation of the short range sensor by changing the contrast of the scene to fit the range of the sensor. But that can only be done when the camera is aimed into the shadow side of the ambient lighting. That is an important concept to grasp because it explains why some flash strategies are effective and natural looking and others are ineffective and artificial looking. The cause and effect is related to how the flash changes the contrast of the lighting. Shooting into the shadows of the ambient light allows the flash to lift the areas it hits without affecting the exposure of the sunlit parts.

Shooting into the Shadows

Flash can only reduce contrast of the ambient lighting if does not overlap the ambient lighting. A common situation illustrates this. Put a person in direct sun with it hitting their face and the angle of the sun will usually cause the brow to shade the eyes. When the exposure is set to keep the

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highlights from clipping the camera can record detail in the eye. If flash fill is added in that situation it will lift the shadows and highlights equally, blowing the highlights as it opens the shadows. Shortening the shutter speed (up to the x-sync limit) would get the highlights back down below clipping, but it will also cut the amount of sky fill that was illuminating the eyes. If more flash is added to open the eyes again, the highlights get blown again. What happens in that situation is flash replaces the ambient light, but doesn't reduce the contrast range of the ambient light because the flash affects highlights and shadows equally.

Photography has many technical dilemmas like that where the solution is either to change the orientation of the subject to the light, or completely overpower the ambient light with flash. Overpowering direct sun requires a great deal of power and also results in backgrounds which are underexposed and darker than normal. That look is currently in vogue, but from a practical standpoint the simpler solution to the dilemma is to put the sun at the back of the subject and keep off the front of the subject the flash(es) will illuminate entirely.

Sunny 16 / Shady 5.6

There is a rule of thumb for outdoor exposure which says that correct exposure in direct sun will be obtained if the camera is set to f/16 at a shutter speed equal to 1/ISO speed. So at ISO 100 and f/16 the shutter speed needed for a correctly exposed sunlit subject would be 1/100th sec. Because the sun is constant that rule of thumb is pretty accurate wherever the sun shines. Equally constant is the fact the shaded side of the face will always have three stops less light.

Natural light has two components: direct light from the sun and reflected light from the sky from the opposite direction. When a subject is placed with their back to the sun exposure must be set to prevent the sunlit parts from blowing out, with the flash then used to raise the - 3 stop shady side up to a level which is slightly darker.

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Perception vs Meter Readings

When setting lights for a photo the goals should be based on the perception the lighting creates compared to how the same scene would be seen in person. When we look at a backlit subject in person you'd normally expect the shaded side to be a bit darker than the sunlit parts. So when adding flash to the front the goal should be a good perceptual match, not an exact match of intensities in the scene of making the meter readings the same on the back lit by the sun and the front lit by the flash.

The perception of the ideal balance for the frontal flash will vary greatly, depending on the relative sizes of the foreground subject and background in the photo and the tone of the background. The amount of fill used for a shot of a subject on a sunny beach would look grossly overfilled if the same amount was used against a dark background. In the same way if the subject is very large in the photo with very little background perception of the photo will be based on how the face looks, but in a wider shot the exposure of the background will influence the perception of the lighting of the subject.

Finding the right balance is a creative judgement call the photographer must train their eye to make. Back in the days before digital it took a great deal of experimentation and experience (or lots of Polaroid test shots) to make those judgements. Today you simply need to look at the playback to see how whether or not balance of flash to ambient is natural, matching what is perceived by eye.

Situational Awareness of the Ambient Light

It is the direction of light that defines shape. Things look shapeless in flat lighting because there are no shadows. It's actually the shadows which provide most the clues in a photo the brain uses to match the pattern of contrast with the memory of a real 3D object.

In most photographic situations light comes from more than one direction. Outdoors the dominant direction is dictated by where the sun is in the sky, but there is also soft light from the sky wrapping around the

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subject. Indoors the dominant direction comes from the lighting fixtures, but there is also varying degrees of wrap around fill created by reflection off ceiling and walls.

Before adding flash to a scene it's important to have situational awareness of the ambient light. What is its dominant direction? What if any natural fill is there? What is its color temperature? Does the color temperature of the indirect fill match the direct light? Are there any external factors such as foliage affecting the color of the light?

When you train yourself to run down that pre-flight check list before shooting you will notice things which will inform your lighting strategy. Very quickly those things will become ingrained in your intuitive situational awareness.

You will notice that even when a subject is standing in open shade the eye sockets will be shaded because the light illuminating the face, while coming from the fill reflecting from the sky is hitting the face from such a steep angle that the brow is shading it, just as it does when a face is in direct light. Direction of the light is just as critical in open shade as it is in direct sun. As with a face in direct sun adding flash will not solve that problem because it will hit both the highlights and shadows equally.

The solution for shaded eye sockets for a face in direct sun is to get the face out of the direct sun. The solution for shaded eye sockets in indirect lighting is to raise the face up into the light so it reaches the eyes. Raising the face into the light requires the camera also to be raised to maintain a flattering above the nose view of the face. The most valuable "lighting" tool you can have on an outdoor shoot is a small step ladder.

Posing a person under a tree results in the ambient light having a green color cast from the foliage. You usually will not see it in person because your eyes will adapt to it. Many don't even notice it in the photos, but they will notice the skin tones look flat and gray. The root cause of the problem is that pink skin under green light looks gray. Adding flash to that situation makes it worse because then there is a mixture of color temps. If camera white balance is set to match the ambient light using a

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custom white balance off a gray card the flash lit parts will have an opposite magenta cast. If the color balance is set to the flash the ambient lit shadows will have a greenish cast. As with other photographic dilemmas the best strategy is to avoid the problem entirely by finding a location where there are trees in the background but the subject is not standing under them. The same situational awareness of color temperature effects is need if posing subjects next to painted or brick walls, brightly hued cars, etc.

Face and Clothing - What Contrasts the Most With the Background Will gets the Most Attention

As with indoors portraiture one of the primary goals outdoors is to make the face contrast strongly from the overall tone of the background and clothing. Since clothing is the biggest potential distraction from the face and bare arms and shoulder the next biggest, the tone and style of the clothing dictate what the most effective background will be. Light clothing and bare shoulders and arms will distract from the face on a dark background but will barely be noticed on a light one. Conversely a black dress or shirt on a light background will distract from the face on a light one.

Indoors you'd solve the problem of distracting clothing by changing the background to match and complement the tone of the clothing. Outdoors it is possible to find light and dark backgrounds at most locations. In the US the sun is always to the South as it tracks East to West so dark backgrounds can be found on the north side of trees or buildings and light ones on the south side where they are illuminated directly by the sun.

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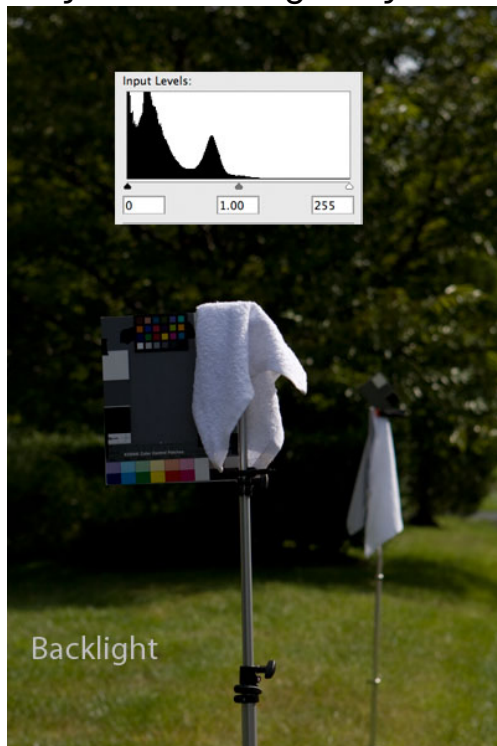
For a person wearing dark clothing an ideal location is one where the background is in its own shade but the subject is out in the direct sun, placed at their back as back-rim lighting. In that situation the sun supplies the background light, accent light, and most of the fill that is needed. All you need to do with flash is to raise the level of the fill a bit and add a key light over the fill to create the "mask" pattern of highlights on the face which defines its 3D shape in the mind of the viewer.



If a person is wearing light clothing the ideal location is one which is similar in tone so the clothing and background blend together.

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When a subject is placed with their back to the sun exposure in the camera must be set so the sun lit highlights are below clipping to retain detail. As mentioned previously when that is done in a digital camera is that the middle tones of the face will be rendered much darker than our eyes would see the same lighting. That's due in part because our eyes adapt their exposure to whatever part of the scene they are looking at and the brain, stitching those snippets of scene together makes us perceive the scene is more evenly exposed than it actually is. When a backlit scene is correctly exposed for the highlights the front of the subject will look grossly underexposed:



The underexposed foreground is a result of the camera only having a range of detail of 6-7 stops while a sunlit scene has a 10-12 stop range of lighting with the shady side about 3 stops below the sunlit side. There is lots of soft diffuse fill which completely wraps around the face of the subject, but its too dark for the camera's limit range to record it as our eyes perceive in person so it wind up not looking "normal" in the photo.

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So on the basic level what flash tries to do is to overcome the technical limit of the sensor to raise the shadows in the range in the photo which matches our expectation based on real life experience of what lighting in that situation looks like.



The Flash Becomes the Key Light, Not Fill

When flash is added to the front of a backlit head it creates a highlight pattern on the face on top of the sky fill. The areas the flash doesn't hit only get illuminated by the sky. Thus the flash is performing the same role the key light would indoors: creating the highlight "mask" which defines the shape of the face. Realizing that distinction, that the flash is the key light, is important because it will help you understand where a single flash used outdoors needs to be positioned relative to the face and when a second flash is needed.

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Direction of the Key Light Defines Shape

The reason many flash shots look fake isn't due to the level of illumination on the front of the subject but rather from the fact the flash is too low relative to the face. Our brains are accustomed to seeing faces illuminated by overhead light sources: the sun and sky outdoors and ceiling lighting fixtures indoors. So when adding a single flash to that ambient backlit subject you'll need to position it the same place you put the key light indoors.

Facial Angle dictates Most Flattering Lighting Pattern

In the simplest terms people are flattered in photos when the facial angle to the camera and the lighting pattern combine to make the face look slim and symmetrical. The angle and lighting pattern need to complement each other to do that.

The facial angle determines where the key light must be placed. It can be placed anywhere, but will produce the most flattering results when it illuminates both eyes and models the shape of the face naturally making the face look symmetrical and slim.

If the subject is full face to the camera you'll get a very flattering and complementary symmetrical lighting pattern on it by simply raising the flash above the camera, keeping the light aligned with their nose so the shadows fall down (i.e. butterfly pattern). What you wind up with is the highlights created by the flash illuminating the both eyes and the mouth with a minimum of distracting shadows. The most distracting shadow, the one from the nose, falls down and hides itself under the nose if the camera angle is high enough to hide the nostrils.

Outdoors a full face butterfly pattern can be executed effectively with one light. A single hot shoe flash raised on a bracket with a diffuser will suffice. Without any additional fill source the shadows will be quite dark due to the 8:1 difference between the sunlit highlights and sky lit shadows the flash doesn't hit, but there aren't many shadows and those on both sides of the face will tend to make the face look slimmer than a full face view in flat light.

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The Catch-22 of a full face pose is that it is only the most flattering angle for subjects like models who have naturally slim and symmetrical faces. If the face isn't slim or symmetrical that will be most obvious in the full face view with symmetrical lighting. Its possible to use short lighting with a full face view to compensate for asymmetry. Perceptually the brighter part of the face in a short lit face will look slightly larger than the shaded side so by putting the key light the narrower side of the face the two sides can be made to look more even.

An oblique facial angle with short lighting is also a good strategy for wide or asymmetrical faces look slim. Because the brain focuses on the highlighted parts of the face and tunes out the shadow side its tricked into thinking the face is slim and symmetrical. To pull of that optical illusion the photographer needs to first select the camera angle which makes the far side of the face appear in balance with the near side, then arrange the key light to the face so only the front of it is illuminated.

Adding a Second Flash

With a flash near the camera an oblique facial angle will result in the light hitting the broad side of the face. To highlight the front of the face the key light must be moved off axis around behind the face so it only hits the front of the face - the center of interest of a portrait.

Aiming the off camera light is actually rather simple, even when there are no modeling lights. By standing behind the light as its is moved, putting the stand between your eyes and the face of the subject, you will see where the light will hit. What you don't see from behind the light will be in the shadow of the key light.

The problem using only a single flash outdoors and moving it off axis is that the fill from the sky which illuminate the side of the face towards the camera will be about three-stops darker than the highlights created on face with the flash. That's a very harsh 8:1 lighting ratio.

What many seem to do in that situation with a single flash used off axis is overexpose the ambient to let the highlights clip, which also raises the

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sky fill by the same amount. The problem with that approach is that the blown highlights and nuclear halo in the hair can become undesirable distractions from the face - the desired center of interest.

The better strategy, from the technical standpoint, is to correctly expose the ambient lit highlights to keep them below clipping then augment the sky fill with a fill flash from the direction of the camera to keep it "neutral" and shadowless.

Adding a fill source over the camera allows the photographer to lift the 8:1 ambient sun-key / shadow-side ratio to whatever ratio the mood of the shot calls for. He has the option to use minimal fill to maintain the harsh moody look of the contrasty natural light, or open the shadows almost to the point of matching the key light to create a flattering soft look for women and children. With a fill source on the camera the photographer has more creative control over the mood and character of the lighting because the tone of the shadows can be manipulated.

Exposure

When flash is used effectively outdoors there is no need to blow any highlights for the sake of making the shadows and mid-tones lighter.

First set the shutter at the x-sync speed, then find whatever f/stop it takes to keep the sun hitting the back of the subject from clipping. The easiest way to do this is visually using the overexposure warning in the camera playback.

A very easy visual way to determine when that ideal point of exposure is reached is to have the subject hold a white towel next to their face in the test shots. Adjust the aperture until the sunlit parts of the towel are 1/3 stop below clipping in the playback.

When the ambient exposure is correct, turn on the flash and again using the white towel next to the face adjust flash power until the shaded, flash-lit parts are also about 1/3 stop below clipping in the overexposure warning.

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At that point the balance between the flash and ambient becomes a judgement call. Both the sunlit and flash lit parts of the towel - a proxy for the highlights on the subject - should both be below clipping, but perceptually the flash lit “shadow side” should be slightly darker for it to look “normal”.

The net result will be a photo in which there is detail in all tones of the subject in the foreground from brightest highlight to darkest shadow. If a bride and groom were photographed that way there would be detail in the bride’s dress and the groom’s black suit because the flash, complementing the natural light (instead of fighting it) altered the contrast range of the foreground to match the limited range of the camera.

Learning to use the sun as backlight, the simplest outdoor strategy, isn’t the only one, but its a good baseline for evaluating the effectiveness of everything else. By the time it is mastered you will hopefully learn enough about the cause and effect of mixing ambient and flash to figure out for yourself when other things you try work better or not.

Equipment Choices

Beginners tend to throw equipment and money at problems they don’t fully understand. As you develop situational awareness of the ambient lighting outdoors --which simply requires looking around and thinking about what you are seeing and what roles the ambient light is playing -- you will likely find ways to achieve desired results with less equipment.

On the most basic level making a photo effective is mostly a function of deciding what is most important then finding ways to make it contrast in tone, color, sharpness, size, etc. with everything else. Sometimes the best solution to make the face the contrasting center of attention is simply to change backgrounds to one which makes the clothing less distracting. Within the face you want the most attention focused on the eyes and mouth, not a brightly lit ear or a nose with a long dark shadow hanging off of it. A subject in backlight from the sun will usually have darker eye sockets because the fill from the sky is shaded by the brows making them wind up being darker than other parts of the face. If you

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want attention in a portrait on the eyes you need to make them the brightest area on the face so the first step before adding any flash would be to raise the face of the subject into the light and stand on a ladder to take the portrait from a flattering facial angle.

Most lighting equipment choices are a compromise between budget, quality and character of the light, and convenience. The choices are subjective and everyone needs to find their own balance point. Some might find it necessary to haul a 7 foot octobox and 50 lbs of sandbags needed to keep it from blowing away up a mountain to overpower the sun to get the lighting they desire while others might tackle the same task by using the ambient light to full advantage augmented with a pair of hot shoe flashes. Only you can decide what works best for you and how much you want to spend.

The best way to understand the cause and effect of combining ambient light and flash outdoors is to experiment, starting with direct flash then add progressively larger modifiers and noting how the character of the lighting changes.

The biggest difference outdoors vs indoors with the backlit scenario is how the wrap around fill supplied by the sky augments whatever flash you add. Where its necessary to use large diffusers on the lights indoors to create diffuse light, outdoors the subject is surrounded on all sides by God's own softbox, the sky. If you experiment using flash outdoors you will find that because the foundation of sky fill is very diffuse you can get very soft looking lighting with no modifiers at all.

If you experiment with progressively larger modifiers outdoors you will see the most significant visible effects are the specular character of the brightest highlights and the size and shape of the catchlights: direct flash is more likely to produce hot spots if skin is oily or damp, while more diffuse modified sources will produce more diffuse highlights. At some point you'll find a balance between all the gear you need to haul and the visible difference in the results it produces that meets you personal needs and standards.