lighting on location

essential skills

~ Change the character and mood of subject matter using lighting.
~ Develop an awareness of overall subject contrast and how this is translated by the capture medium.
~ Develop skills in controlling introduced lighting on location.
~ Research a range of fill and flash lighting techniques.
~ Produce photographic images demonstrating how lighting techniques control communication.
Introduction

The lighting in a particular location at any given time may not be conducive to the effect the photographer wishes to capture and the mood they wish to communicate. In these instances the photographer has to introduce additional lighting to modify or manipulate the ambient light present. In some instances the ambient light becomes secondary to the introduced light, or plays little or no part in the overall illumination of the subject. The following conditions may lead a photographer towards selecting additional lighting:

- The lighting may be too dull and the resulting slow shutter speeds would cause either camera shake or subject blur.
- Color temperature of artificial lights causing undesired color casts.
- The available light is leading to an unsuitable brightness range for the image sensor, e.g. the contrast is too high for the latitude of the capture medium and would lead to either overexposed highlights or underexposed shadows.
- The direction of the primary light source is giving unsuitable modelling for the subject, e.g. overhead lighting creating unsuitable shadows on a model’s face.

Activity 1

Select two images created on location where you feel the photographer has used additional lighting to the ambient light present.
Discuss why you think the lighting has been changed to suit the communication.
Fill

In high and extreme contrast scenes where the subject brightness range exceeds the latitude of the imaging sensor, it is possible for the photographer to lower the overall lighting ratio by supplying additional fill light. The two most popular techniques include using reflectors to bounce the harsh light source back towards the shadows or by the use of on-camera flash at reduced power output. Before the photographer jumps to the conclusion that all subjects illuminated by direct sunlight require fill, the photographer must first assess each scene for its actual brightness range. There can be no formula for assessing the degree of fill required when the subject is illuminated by direct sunlight. Formulas do not allow for random factors which are present in some situations but not in others. Photographers must, by experience, learn to judge a scene by its true tonal values and lighting intensity.

The photograph above was taken in Morocco in harsh sunlight. The photographer could be mistaken for presuming this is a typical scene which would require fill light. If the scene is read carefully, however, the photographer would realize that the shadows are not as dark as one would presume. Meter readings taken in the shadows and highlights would reveal that the shadows are being filled by reflected light from the brightly painted walls.
Reflectors

Fill light can occur naturally by light bouncing off reflective surfaces within the scene. It can also be introduced by reflectors strategically placed by the photographer. This technique is often used to soften the harsh shadows cast on models in harsh sunlight.

The primary considerations for selecting a reflector are surface quality and size.

Surface quality

Reflectors can be matt white, silver or gold depending on the characteristics and color of light required. A matt white surface provides diffused fill light whilst shiny surfaces, such as silver or gold, provide harsher and brighter fill light. Choosing a gold reflector will increase the warmth of the fill light and remove the blue cast present in shadows created by sunlight.

Size

Large areas to be filled require large reflectors. The popular range of reflectors available for photographers are collapsible and can be transported to the location in a carrying bag. A reflector requires a photographer’s assistant to position the reflector for maximum effect. Beyond a certain size (the assistant’s ability to hold onto the reflector on a windy day) reflectors are often not practical on location.

Activity 2

1. Select two examples where fill light has been used to soften the shadows created by a harsh direct light source. Comment on the likely source of the fill light used in each image.

2. Create an image by experimenting with different reflectors to obtain different qualities of fill light. Keep a record of the type of reflector used with each image and the distance of the reflector from the subject.
Flash
Flash is the term given for a pulse of very bright light of exceptionally short duration. The light emitted from a photographic flash unit is balanced to daylight and the duration of the flash is usually shorter than 1/500 second.
When the photographer requires additional light to supplement the daylight present flash is the most common source used by professional photographers. Although it can be used to great effect it is often seen as an incredibly difficult skill to master. It is perhaps the most common skill to remain elusive to photographers when working on location. Reviewing the image via the LCD screen will help the photographer master the skills more quickly. The flash is of such short duration that integrating flash with ambient light is a skill of previsualization and applied technique. The photographer is unable to make use of modelling lights that are used on studio flash units (modelling lights that can compete with the sun are not currently available). The skill is therefore mastered by a sound understanding of the characteristics of flashlight and experience through repeated application.

Characteristics
Flash is a point light source used relatively close to the subject. The resulting light is very harsh and the effects of fall-off are often extreme (see page 15, ‘Characteristics of Light > Intensity > Fall-off’). One of the skills of mastering flash photography is dealing with and disguising these characteristics that are often seen as professionally unacceptable.
Choice of flash

Choosing a flash unit for use on location may be decided on the basis of degree of sophistication, power, size and cost.

Most commercially available flash units are able to read the reflected light from their own flash during exposure. This feature allows the unit to extinguish or ‘quench’ the flash by a ‘thyristor’ switch when the subject has been sufficiently exposed. When using a unit capable of quenching its flash, subject distance does not have to be accurate as the duration of the flash is altered to suit. This allows the subject distance to vary within a given range without the photographer having to change the aperture set on the camera lens or the flash output. These sophisticated units are described as either ‘automatic’ or ‘dedicated’.

Automatic

An automatic flash unit uses a photocell mounted on the front of the unit to read the reflected light and operate an on-off switch of the fast-acting thyristor type. The metering system works independently of the camera’s own metering system. If the flash unit is detached from the camera the photocell must remain pointing at the subject if the exposure is to be accurate.

Useful specifications

Perhaps the most important consideration when selecting an automatic flash unit is its ability to make use of a range of f-stops on the camera lens. Cheaper units may only have a choice of two f-stops whereas more sophisticated units will make use of at least four.

Ideally the output of a professional unit will have a high ‘guide number’ (an indication of the light output). The amount of time the unit takes to recharge is also a consideration. Many flash outfits have the option of being linked to a separate power pack so that the drain on the unit’s smaller power supply (usually AA batteries) does not become a problem.

The flash head of a unit will ideally swivel and tilt, allowing the photographer to direct the flash at any white surface whilst still keeping the photocell pointed at the subject.
Dedicated

Dedicated flash units are often designed to work with specific cameras, e.g. Nikon ‘speedlights’ with Nikon cameras. The camera and flash communicate more information through additional electrical contacts in the mounting bracket of the unit. The TTL metering system of the camera is used to make the exposure reading instead of the photocell. In this way the exposure is more precise and allows the photographer the flexibility of using filters without having to alter the settings of the flash.

In addition to the TTL metering system the camera may communicate information such as the ISO of the capture medium and the focal length of the lens being used. This information may be automatically set, ensuring an accurate exposure and the correct spread of light.

Features such as automatic fill flash, slow sync, rear curtain slow sync, red eye reduction and strobe are common features of some sophisticated units. Often the manuals accompanying these units are as weighty as the manual for the camera which they are designed to work in conjunction with.

Setting up a flash unit

- Check that the ISO has been set on either the flash or flash meter and the camera.
- Check that the flash is set to the same focal length as the lens. This may involve adjusting the head of the flash to ensure the correct spread of light.
- Check that the shutter speed on the camera is set to the correct speed (often slower than 1/250 second on a DSLR camera using a focal plane shutter).
- Check that the aperture on the camera lens matches that indicated on the flash unit. On dedicated units you may be required to set the aperture to an automatic position or the smallest aperture.
- Check that the subject is within range of the flash. On dedicated and automatic units the flash will only illuminate the subject correctly if the subject is within the two given distances indicated on the flash unit. If the flash is set incorrectly the subject may be overexposed if too close and underexposed if too far away. Check the accuracy of the flash output using a flash meter (see ‘Guide numbers’ in this chapter).
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Guide numbers

Michael E. Stern, photographer and lecturer at Brooks Institute, talks us through the subject of guide numbers (GN) that are used to express the power of a class of electronic flash unit known as the speedlight. Speedlights are small flash units that work with DSLR 35mm cameras. Regardless of the stated guide numbers, professionals perform a guide number test to accurately measure and understand what the GN is for each speedlight unit and camera combination they work with.

Testing the guide number of a speedlight

The guide number calibration test is simple to perform and provides valuable information for photojournalists who routinely have to create images under difficult lighting conditions, and to help photographers in general who choose to make lighting ratios with multiple speedlight units. The GN formula and its two derivatives are as follows:

\[ \text{FSD} \times \text{Aperture} = \text{GN} \]
\[ \text{GN} / \text{Aperture} = \text{FSD} \]
\[ \text{GN} / \text{FSD} = \text{Aperture} \]

The test is based on these parameters: the flash unit is set to full manual power and the zoom head is set to 50mm. The ISO is set to 100 and a camera sync speed of either 1/200, 1/250 or 1/500 second is selected. The FSD is set at ten feet exactly.

The test

- Find a dimly lit room and position the flash exactly ten feet away from your subject wearing a white shirt (we don’t want the ambient light contributing at all to the exposure value). For additional information have the subject holding either a gray card or a Macbeth Color checker. Double check the ambient light level by exposing a frame using the sync speed at f/8 (flash switched off). If the frame is black then the ambient light level is correct.
- Point the flash unit at the subject.
- Make a series of exposures beginning with f22 and ending with f8. Open up your aperture in 1/3 stop increments (you will have ten exposures when completed). Alter your exposures via the aperture and not the shutter speed.
Evaluating the results
Open up the two or three images in Photoshop that look correct in the sRGB or Adobe RGB (1998) working space. Set the color picker to a 3 x 3 or 5 x 5 average. Select the image with the best detail in the white shirt, i.e. the brightest highlights in the white shirt should fall between 240 and 250 to ensure that they print with detail. Evaluation of the subject’s skin tone is also an important part of this measurement process. Skin tones vary so strive for a balance between ‘white with detail’ numbers and good skin tone values. It is highly recommended that a gray card or Macbeth Color checker be included as part of this test. Measure the gray card and look for a value of between 105 and 130. The precise number can vary due to inconsistencies in manufacturing of gray cards. If the gray card is not parallel to the camera the numbers can vary considerably. You’ll have better luck with a Macbeth Color checker but make note that its middle gray is around 121 in the sRGB and Adobe RGB color spaces. As long as emphasis is placed on ‘white with detail’ numbers followed by skin tone and then middle gray values, an optimum exposure will be identified.

Finishing up
To better illustrate this concept, a frame will be selected and plugged into the formula. The frame captured using an aperture of f11 is selected as the optimum frame. It has white with detail and good skin tone values. An accurate GN for the particular flash unit and camera combination can now be established. It is 10 feet x f11 = a GN of 110 (FSD x Aperture = GN).

The photographer must now be comfortable with the implications of changing either the ISO on the camera or the FSD. If the ISO increases by one full stop from 100 to 200 then the aperture can also be adjusted one full stop to maintain an appropriate exposure, e.g. f11 to f16. This is known as equivalent exposures.

When the FSD changes the photographer divides the guide number by the distance to establish the most appropriate aperture to use. In our example, using the GN of 110, at just over 27 feet from the subject the photographer would have to use an aperture of f4 (GN ÷ FSD = Aperture) to maintain an appropriate exposure.
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Flash as the primary light source

The direct use of flash as a professional light source is often seen as unacceptable due to its harsh qualities. The light creates dark shadows that border the subject, hot-spots in the image where the flash is directed back into the lens from reflective surfaces and ‘red-eye’.

Red-eye

Red-eye is produced by illuminating the blood-filled retinas at the back of the subject’s eyes with direct flash. The effect can be reduced by exposing the subject’s eyes to a bright light prior to exposure (‘red-eye reduction’) or by increasing the angle between the subject, the camera lens and the flash unit. Red-eye is eliminated by moving closer or by increasing the distance of the flash unit from the camera lens. To do this the must be removed from the camera’s hot shoe. This is called ‘off-camera flash’. Red-eye can also be removed in post-production editing software.

Off-camera flash

Raising the flash unit above the camera has two advantages. The problem of red-eye is mostly eliminated. Shadows from the subject are also less noticeable.

When the flash unit is removed from the camera’s hot shoe the flash is no longer synchronized with the opening of the shutter. In order for this synchronization to be maintained the camera and the flash need to be connected via a ‘sync lead’.

For cameras that do not have a socket that will accept a sync lead a unit can be purchased which converts the hot shoe on the camera to a sync lead socket. If a dedicated flash unit is intended to be used in the dedicated mode a dedicated sync cable is required that communicates all the information between the flash and the camera. If this is unavailable the unit must be switched to either automatic or manual mode.

Keep the photocell of an automatic unit directed towards the subject during exposure.

Hot-spots

When working with direct flash the photographer should be aware of highly polished surfaces such as glass, mirrors, polished metal and wood. Standing at right angles to these surfaces will cause the flash to be directed back towards the cameras lens, creating a hot-spot. Whenever such a surface is encountered the photographer should move so that the flash is angled away from the camera. It is a little like playing billiards with light.

Activity 3

Connect a flash unit to your camera via a sync lead and set the unit to automatic.
Position your subject with their back to a white wall (within half a metre).
Hold the flash above the camera and directed towards the subject.
Make exposures at varying distances from the subject. Keep a record of the position of the flash and distance from the subject.
Repeat the exercise with the unit mounted on-camera.
Discuss the results of the most favourable image, commenting on the light quality, shadows and the presence of red-eye.
Diffusion and bounce

If the subject is close or the output of the flash unit is high, the photographer has the option of diffusing or bouncing the flash. This technique will soften the quality of the light but lower the maximum working distance.

Diffusion

Diffusion is affected by placing tissue, frosted plastic or a handkerchief over the flash head. Intensity of light is lowered but the quality of light is improved. The flash can be further diffused by directing the flash towards a large, white piece of card attached to the flash head. Purpose-built attachments can be purchased.

Bounce flash

The most subtle use of flash is achieved by directing the flash to a much larger, white reflective surface such as a ceiling for overhead lighting, or nearby wall for side lighting. This is called bouncing the flash. To obtain this effect the flash unit must have the ability to tilt or swivel its flash head. If this is not possible the flash can be removed from the hot shoe and connected to the camera via a sync lead. If an automatic flash is being used the photographer must ensure that the photocell is facing the subject when the flash is fired.

Activity 4

Create an image of a person using either diffused flash or bounce flash. For the bounce flash technique direct the flash towards a white ceiling or white reflector positioned to one side of the subject. Vary the distances of the reflector to the subject. Discuss and compare the quality of the light in your resulting image or images.

Note > Ensure the thyristor of the flash unit is directed towards your subject. Alternatively use a flash meter to establish an appropriate exposure.
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Fill flash

Fill flash can be a very useful way of lowering the brightness range. Often the photographer is unable to reposition the primary subject and the addition of fill light from the camera’s position is essential to the image’s success.

The aim of fill flash is to reveal detail in the dark shadows created by a harsh directional light source. The aim is not to overpower the existing ambient light and remove the shadows completely. If the power of the flash is too high the light will create its own shadows, creating an unnatural effect. Mount the flash unit on the camera’s hot shoe and direct the flash towards the subject. To retain the effect of the primary (ambient) light source the flash is most commonly fired at half or quarter power. The ratio of ambient to flash light is therefore 2:1 or 4:1.

Manual - Select a smaller aperture on the camera from the one that is indicated by the flash unit or flash meter, e.g. if the meter or unit indicates f5.6 select f8 or f11 on the camera. Compensate for the reduced aperture by selecting a slower shutter speed on the camera so that the ambient light exposure is still appropriate for your subject. This action will lead to correctly exposing the ambient light and underexposing the light from the flash unit.

Automatic - Many automatic flash units have the facility to fire at 1/2 or 1/4 power, making fill flash a relatively simple procedure. If this facility is unavailable set the ISO on the flash unit to double or quadruple the actual speed of the ISO set in the camera to lower the output.

Dedicated - Many sophisticated cameras and dedicated flash units have a fill flash option. This should be regarded as a starting point only and further adjustments are usually required to perfect the technique. Power often needs to be further lowered for a more subtle fill-in technique. The photographer may also wish to select a ‘slow-sync’ option on the camera, if available, to avoid underexposing the ambient light in some situations.

Activity 5

Create an image using the fill flash technique.
Lower the lighting contrast of a portrait lit with harsh sunlight.
Experiment to see if you can lower the flash output on your unit to half or quarter power.
Discuss the light quality of the resulting image and the fill/ambient lighting ratio.
Flash as a key light

The main light in studio photography is often referred to as the ‘key light’. Using studio techniques on location is popular in advertising and corporate photography where mood is created rather than accepted. In this instance flash becomes the dominant light source and the ambient light serves only as the fill light.

When the ambient light is flat, directional light can be provided by off-camera flash. This enables the photographer to create alternative moods. The use of off-camera flash requires either the use of a ‘sync lead’ or an infrared transmitting device on the camera.

Slave units

Professional quality flash units come equipped with a light-sensitive trigger (optical slave) so that as soon as another flash is fired by the camera the unconnected flash or ‘slave’ unit responds. On location the slave unit can be fired by the use of a low powered on-camera flash (optical slave), by radio communication (wireless) or infrared. Wireless offers the most flexibility as line-of-sight is not required between the trigger and the slave unit.

Accessories

A tripod or assistant is required to either secure or direct the flash. An umbrella or alternative means of diffusion for the flash may be considered. Color compensating filters may also be considered for using over the flash head. A warming filter from the 81 series may be useful to create the warming effect of low sunlight.

Technique

- Check the maximum working distance of the flash.
- Ensure the key light is concealed within the image or out of frame.
- Diffuse or bounce the key light where possible.
- Consider the effects of fall-off.
- Avoid positioning the key light too close.
- Establish a lighting ratio between the key light and ambient light.
- Consider the direction of shadows being cast from the key light.

When working at night the photographer may have the option of approaching the subject and firing a number of flashes manually during an extended exposure (recharging the unit each time). The photographer or assistant must take care not to illuminate themselves during this process.
The Westcott Spiderlite has the flexibility to use flash, tungsten or daylight balanced fluorescent lamps on location.

The availability of powerful tungsten halogen or daylight balanced fluorescent lamps (although not as powerful as flash) provides the photographer with a realistic alternative to using flash on location. The primary advantage to using tungsten halogen or daylight corrected fluorescent lamps instead of flash is that the light is constant, allowing the photographer to see the lighting effect as they move the light or lights into position.

Note: Although the modelling lights with studio style flash units may prove useful in a studio setting they are usually rendered obsolete on location with the presence of brighter levels of ambient light.

Activity 6
Create an image using introduced light as a directional key light.
Make a record of the ambient exposure without the key light.
Discuss the effects of both the key and ambient light on your subject.
Slow-sync flash

Slow-sync flash is a technique where the freezing effect of the flash is mixed with a long ambient light exposure to create an image which is both sharp and blurred at the same time. Many modern cameras offer slow-sync flash as an option within the flash program but the effect can be achieved on any camera. The camera can be in semi-automatic or manual exposure mode. A shutter and aperture combination is needed that will result in subject blur and correct exposure of the ambient light and flash. To darken the background so that the frozen subject stands out more, the shutter speed can be increased over that recommended by the camera’s light meter.

- Set the camera to a low ISO setting.
- Select a slow shutter speed to allow movement blur, e.g. 1/8 second.
- Take an ambient light meter reading and select the correct aperture.
- Set the flash unit to give a full exposure at the selected aperture.
- Pan or jiggle the camera during the long exposure.

Possible difficulties

Limited choice of apertures - less expensive automatic flash units have a limited choice of apertures leading to a difficulty in obtaining a suitable exposure. More sophisticated units allow a broader choice, making the task of matching both exposures much simpler.

Ambient light too bright - if the photographer is unable to slow the shutter speed down sufficiently to create blur, a slower ISO should be used or the image created when the level of light is lower.

Activity 7

Create an image using the technique slow sync or flash blur.
Choose a subject and background with good color or tonal contrast.
Pan the camera during the exposure.
Discuss the results.
Double exposures

A double exposure can be used to balance the bright ambient light and the comparatively dim interior lighting of a building. Some digital cameras allow for the multiple exposures, that are required to achieve this outcome, to be recorded in-camera. If the camera does not allow for multiple exposures to be made using a single image file, two separate exposures can be combined in post-production. To achieve this result the photographer must use a tripod and take care not to disturb the alignment whilst adjusting the camera to make the second exposure. If the camera’s white balance is set to daylight the interior lighting will record as a different color temperature to the exterior daylight. If the images are combined in post-production the interior lighting is placed on a layer above the exterior lighting layer. Set the interior lighting layer to the Lighten blend mode.
High dynamic range

Contrary to popular opinion - what you see is not what you always get. You may be able to see the detail in those dark shadows and bright highlights when the sun is shining - but can your film or image sensor? Contrast in a scene is often a photographer’s worst enemy. Contrast is a sneak thief that steals away the detail in the highlights or shadows (sometimes both). A wedding photographer will deal with the problem by using fill flash to lower the subject contrast; commercial photographers diffuse their own light source or use additional fill lighting and check for missing detail using the ‘Histogram’ when shooting with a digital camera.

Landscape photographers, however, have drawn the short straw when it comes to solving the contrast problem. For the landscape photographer there is no ‘quick fix’. A reflector that can fill the shadows of the Grand Canyon has yet to be made and diffusing the sun’s light is only going to happen if the clouds are prepared to play ball.

Ansel Adams (the famous landscape photographer) developed ‘The Zone System’ to deal with the high-contrast vistas he encountered in California. By careful exposure and processing he found he could extend the film’s ability to record high-contrast landscapes and create a black and white print with full detail. Unlike film, however, the latitude of a digital imaging sensor (its ability to record a subject brightness range) is fixed. In this respect the sensor is a strait-jacket for our aims to create tonally rich images when the sun is shining - or is it?

Note > To exploit the full dynamic range that your image sensor is capable of, it is recommended that you capture in Raw mode. JPEG or TIFF processing in-camera may clip the shadow and highlight detail (see Adobe Camera Raw).
If we can’t fit all the goodies in one exposure, then we’ll just have to take two or more. The idea is to montage, or blend, the best of both worlds (the light and dark side of the camera’s not quite all seeing eye). To make the post-production easier the photographer needs to take a little care in the pre-production, i.e. mount the camera securely on a sturdy tripod. Take four exposures - two overexposing from the auto reading, and the other two underexposing from the auto reading. One or two stops either side of the meter-indicated exposure should cover most high-contrast situations.

Note > It is recommended that you use the shutter speed to bracket the exposures. This will ensure the depth of field is consistent between the different exposures.

Bracketing exposures
Setting your camera to ‘auto bracket exposure mode’ means that you don’t have to touch the camera between the two exposures, thereby ensuring the first and second exposures can be exactly aligned with the minimum of fuss (the Auto-Align Layers feature in the full version of Photoshop does not work when your layers are Smart Objects). Use a remote release or the camera’s timer to allow any camera vibration to settle. The only other movement to be aware of is something beyond your control. If there is a gale blowing (or even a moderate gust) you are not going to get the leaves on the trees to align perfectly in post-production. This also goes for fast-moving clouds and anything else that is likely to be zooming around in the fraction of a second between the first and second exposures.
Merge to HDR

Merge to HDR is a semi-automated feature in the full version of Photoshop for combining detail from a range of different exposures. A series of bracketed exposures can be selected and the Merge to HDR feature then aligns the images automatically. The Merge to HDR dialog box then opens and the user is invited to select a bit depth and a white point. It is recommended to save the file as a 32-bit image. This allows the exposure and gamma to be fine-tuned after the image is opened into Photoshop by going to Image > Adjustments > Exposure. As editing in 32 Bits/Channel is exceptionally limited the user will inevitably want to drop the bit depth to 16 or 8 Bits/Channel at some stage to make use of the full range of adjustment features.

When the Photoshop user converts an HDR 32-bit image to 16 or 8 Bits/Channel the user can choose a conversion method that allows the best tonal conversion for the job in hand. With very precise working methods HDR images can provide the professional photographer with a useful workflow to combat extreme contrast working environments. For situations where HDR is required but people or animals are likely to move between exposures a manual approach to merging the exposures is highly recommended.