

## MODULE 5. Camera and Lighting -- Equipment and Techniques

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### Aim:

An overview of technical aspects – cameras, lenses, settings, and lighting equipment and its use.

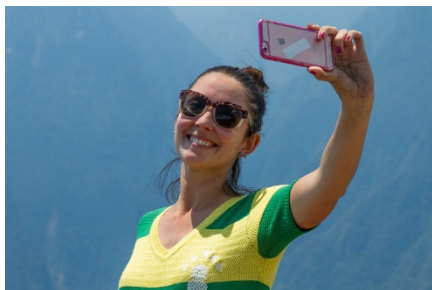
### Purpose and Outcome

To help participants better understand the effects of different camera settings and lens focal lengths; to show how (sometimes simple) equipment can be used for portrait lighting and backgrounds.

### Notes

#### Cameras

“So, what is the best camera for portraiture” you might ask. The only answer I have, is “the one in your hand”. Of course, some cameras have advantages over others. The wet-plate camera at the right *could* be used to take portraits, but why would you put in the effort to use it when the mobile phone in your pocket will take a better image, far more conveniently.



Some things to consider. I have full frame DSLR and a 70-200 f2.8 lens. Excellent gear, very sharp, but also very bulky, heavy, and obvious. It's the sort of gear that might make a casual model a bit nervous (or, if you are in India, you'll find people flocking to get you to take their photo because you have a fabulous camera – cultural differences abound). And after an hour of portraiture with that camera and lens hand-held, your arms and back will be shaking with fatigue. The same camera

with my tiny 50mm F1.8 lens is much less imposing and easier to carry, and it also takes good portraits. But it doesn't have the focal length reach of the big lens (see later). I also have an Olympus micro four-thirds (MFT) camera with a 12-40 F2.8 (24-80 equivalent) lens. So tiny and light and innocuous, but it also takes excellent images. Worldwide, the commonest camera used for portraiture is the humble mobile phone – think selfies and the like. They tend to lack a little in manual settings and limited choice of focal length (though technology is advancing), but a lot of outstanding portraits are taken with a mobile phone.

That said, some camera features can make your life easier. Autofocus can be a boon, especially with a dynamic situation, eg with a dancer. If your subject is moving, try using one of the tracking focus modes. Some cameras have face-detect focus that you can set to identify eyes and set the focus on the eye, which may help if you are using a wide aperture with shallow depth of field. Exposure settings may allow you to automatically balance a fill-flash and ambient light or allow you to control multiple studio flashes from your camera (saves a lot of running around a studio playing with settings on individual flash heads).

Being able to use your camera in tethered mode (ie connected to a computer) can also be useful in some situations. Viewing live on a large computer screen gives a very different feel to the view on the camera back or viewfinder. It makes it easier to see the fine details and refine the light setup. It is also easier to show the images to your model as you explain what you want to achieve, and to modify poses. And it can make self-portraiture easier (tether to your mobile phone and you can control the camera from where you are posing and see the exposures without moving). Many recent models have built in WiFi, so you can potentially tether wirelessly rather than using a cable between your computer/pad/phone and the camera. Tethering is very dependent on your make and model of camera, so hunt out the relevant instructions in the manual or on the web if you need them.

<https://digital-photography-school.com/tutorial-shoot-tethered/>  
<https://www.diyphotography.net/introduction-tethered-shooting/>

*Try using manual settings on camera and lights*

Usually, when taking portraits, the lighting is fairly uniform shot-to-shot. If you set your camera to manual for shutter speed, aperture and ISO, it puts you in control, not the camera's electronics. You'll not have to worry about the "gosh, I wish the camera had used F2.8 not F8" sorts of moment when you are processing the images. If you are aiming for high-key or low-key effects, the auto exposure functions are unlikely to get the desired exposure without dialling in exposure compensation, so you may as well use manual settings from the start. When using flash or studio lights, choose your camera settings to suit the effect you want, then adjust the brightness of the lighting to get the best exposure. With ambient light, usually the light levels are fairly constant, so you can use manual, and adjust, as needed, when the model moves to a new position, or you modify the lighting (eg adding a reflector). Get your model to relax in about the location you have chosen and take some quick test shots. Check/adjust exposure using the camera playback to get the exposure settings sorted before you start posing your model (tell your model what you are doing so they don't wonder why you aren't posing them).

In the same vein, in a studio type of setting I almost always set my flash or studio lights to manual. I get full control over the lighting. If I have a black background or a white background I don't want some auto setting changing exposures because more or less of the background is showing as the model moves. I manually set the flash powers to get good exposure (in concert with my manual camera settings) on the skin where I need it, and, once set, I no longer have to worry about it until I change the lighting arrangement, so I can keep my attention on the posing and composition, not the technical aspects of exposure. Check your exposures from time to time to make sure the highlights on the skin are not blown out. It is better to underexpose than to overexpose. If you underexpose you can recover the exposure in post processing (with a small increase in sensor noise and possibly some loss of details in dark shadows). If you overexpose you will find there is less flexibility to recover highlight detail in post processing.

As with most rules of thumb, there are exceptions where auto exposure modes may be what you need. For example, you may be in a situation of constantly varying lighting, with a fast moving environment (eg taking photos at a wedding, or that family get-together) where you may be roaming round taking photos as opportunities arise. You don't have the luxury of posing your subjects. Lighting varies -shade or sun, indoors (near or far from that window) or outdoors... Then auto settings can be very valuable.

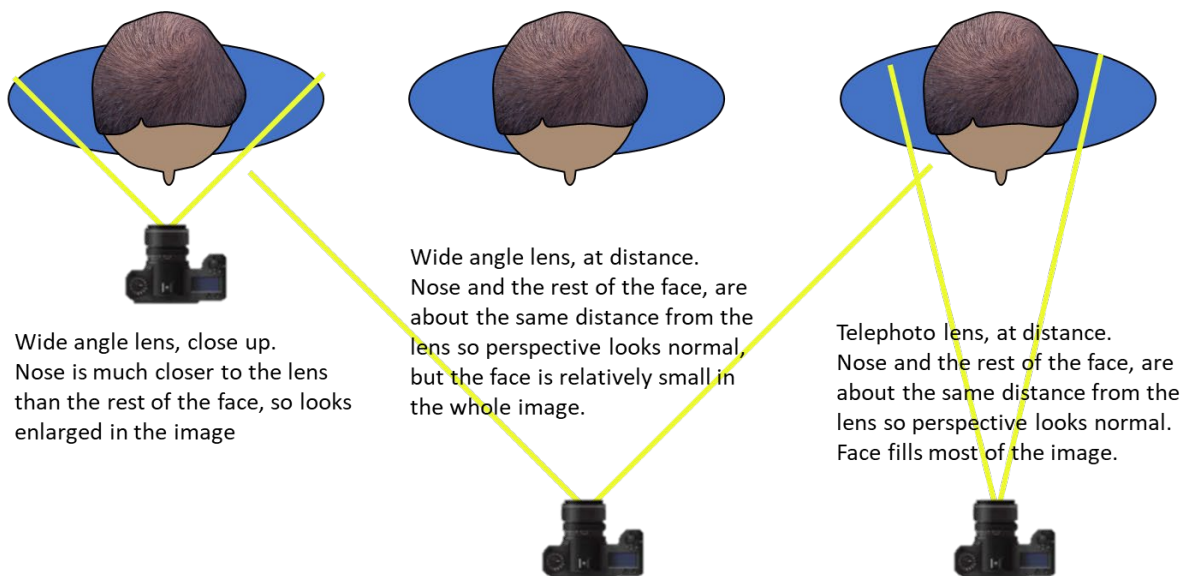
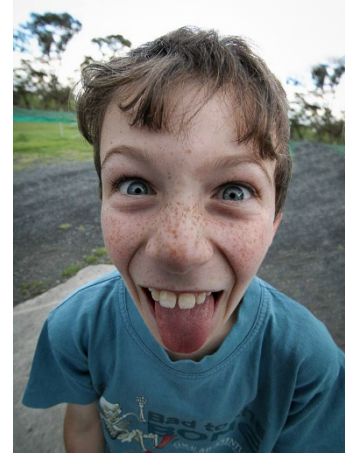
Another trick: to catch a fleeting expression in a dynamic situation, try using continuous shutter release (motor drive). It is astonishing how quickly facial expressions change, and it is almost impossible to catch that critical moment with single shot mode.

## Lenses

Focal length, maximum aperture and other qualities like sharpness and bokeh all affect how well a lens performs as a portrait lens. However, you don't need to go to great expense to buy a specialist lens just for portraiture. Most standard lenses do a fine job.

### Focal Length

Many people like to use a focal length between 50 and 100 mm (full-frame equivalent; 30-60 mm APSC; 25-50 mm MFT). Why is that? 50 mm approximates the perspective of the human eye, so you get a natural looking perspective. If you get too wide and too close you start to get distorted perspectives, as in the image to the right (24 mm lens, very close up). This isn't a problem of the lens, but of distance. To get the face to fill the frame with a 24 mm lens you need to be very close. If I stepped back 2 metres and took a photo of the same boy, there would be no obvious distortion, but the frame would include the whole body and a lot besides. Wide angle is good for comic effect and works for environmental and whole-body portraits. If you want full face portraits, longer focal lengths are better.



Note that the same sort of perspective distortions apply not only to noses. If you want to emphasise a model's long legs, use a wide angle and a low viewpoint. Want to emphasise the chin, take the photo from a low position; to minimise the chin, choose a higher viewpoint. If a model is posed so the hand is closer to the camera than the face, the hand will look larger (relatively); than if the hand were positioned further from the camera. Using a longer lens minimises these effects since you will be further from the model. If you are taking a full-face portrait 3 or 4 metres from the model using a 200 mm lens, a difference of a few centimetres in hand position won't make much difference to the size of the hand relative to the face in the image. So, keep your camera at a reasonable distance from your subject if you want to avoid the sorts of perspective distortion I discuss here. At least two metres is a rule of thumb, regardless of what focal length lens you use. Of course, if an altered perspective is what you want, get as close as you (and your model) are comfortable with. It can open up lots of creative possibilities.

Most cameras come with a good quality zoom lens that covers that range (for portraiture I often use a 24-105 F4 lens on my full frame camera). You get a lot of versatility, and although F4 is not especially wide, it is wide enough for a lot of portraiture. If you want shallower depth of field, standard zooms in that range start getting expensive, but a fixed focus lens might fit the bill. The “nifty-fifty” approximates the perspective of the human eye. They come with wider apertures than most zooms, and generally are relatively cheap. I sometimes use a 90 or 100 mm F2.8 macro lens – it also makes a great portrait lens. They are sharp, light weight, and have a reasonably wide aperture.

### *Aperture*

Aperture affects depth of field. Often, with portraiture, a shallow depth of field is desired to isolate the model from the background. When using ambient light a wide aperture may allow you to use a faster shutter speed to minimise motion blur or camera shake, or a lower ISO to reduce digital noise in the resulting image. Note that depth of field is determined not just by aperture, but also by focal length (at say f2.8 a wide angle lens will have greater depth of field than a telephoto lens); and a smaller sensor (eg micro four thirds, will give greater depth of field than full frame at a given aperture). If you want to explore this, try a depth of field calculator (eg <https://www.photopills.com/calculators/dof> ).

Beware of using too wide an aperture. For example with full-frame sensor and a 200mm focal length at 2 metres distance (a tight head image) at f2.8 you get a critical depth of field of about 2 cm, which might make it difficult to get all of the face in critically sharp focus. Experiment with your own cameras and lenses to work out what apertures work for you to get acceptable sharpness of subject and suitable blur for background. Of course, with some subjects some softness may be desired. Thing dreamy images of young people, for example. You may find that F1.4 or even wider achieves what you want in your images.

Note, one way to increase background blur is to increase the distance between your model and the background. With a model leaning against a brick wall it may be difficult to achieve a blurred wall without making parts of the head a bit soft. Move yourself and your subject so there is a couple of metres between subject and wall, and you’ll find it much easier to get a sharp face with blurred background.

### *Shutter Speed*

You can use higher shutter speed to minimise camera shake and subject movement. The rule of thumb to avoid camera shake is to use a shutter speed that is the reciprocal of the focal length. For example, with a 200 mm lens use at least 1/200 sec ; for 50 mm lens use at least 1/50. Using modern camera/lenses with image stabilisation you can hand hold at much slower speeds, but this won’t help if the subject is moving. With a model in a static pose, 1/125 is usually reliable to avoid blur from subject movement. But if the model is moving – say a dancer jumping – you may need 1/1000 sec or faster to freeze the motion.

If you are using flash, then you would normally set the camera to the fastest flash sync speed (typically about 1/200 sec). The flash duration will be much shorter than this, so you can freeze subject movement despite the slow shutter speed.

If you are using a mix of ambient light and flash, you will need to balance the speed/aperture/ISO to get sufficient ambient light and adjust the flash to balance with the ambient light as desired. Set your camera to suitable settings of speed/aperture/ISO for the ambient light. Then add additional flash light either using manual flash power control, or automatic control. Most cameras and flashes allow you to choose a flash exposure-compensation setting to assist in balancing ambient and flash

illumination, or use manual settings on camera and flash (a few test exposures should be sufficient to manually set the camera and flash to get good exposure balance, then you can start taking your portrait sequences).

### *ISO*

You will find many pieces of advice telling you to use the lowest ISO possible. However with modern cameras, sensor noise is becoming much less of a problem. Experiment with your own equipment to see how much noise you get as you increase ISO setting. You may well be pleasantly surprised. In my opinion, it is better to adjust the aperture to get the depth of field you want and set a speed that will give you a sharp picture without camera shake or movement blur. If this results in a higher ISO, so be it. It is likely the sensor noise will not be intrusive unless you have a very darkly lit subject forcing ISOs above 1600. It is better to have a crisp looking portrait with a bit of sensor noise than have a fuzzy portrait (focal blur/camera shake/motion blur) with no sensor noise. If the situation gets you into extreme ISO territory, the other alternative is to add more light (if possible – depending on the situation this may not be feasible).

### Tripods

Shooting with a handheld camera gives you a lot of flexibility to rapidly change your viewpoint and is fantastic in a dynamic situation where a model may be moving, but with a more static modelling situation a tripod can be a boon. It frees you to concentrate on the lighting and composition without the restrictions of a tiny eyepiece. And since you are not hiding behind a camera, it makes it easier to develop a rapport with the model. The model will see your face unobscured by the camera and will relax more. And if you are using that heavy 70-200 f2.8 lens and full frame body, your arms, shoulders and back will welcome the lack of weight. Tripods also facilitate self-portraiture, especially if you tether your camera to your phone or a computer so you can see the camera view from your sitting position.

### Backdrops

The background is a vital piece of your image. Sometimes you can use the current location. Travel and environmental portraits make use of this. But consider the following:

- focus/depth of field. Do you want the background to be out of focus, which helps make your model, in sharp focus, the dominant element of the image? Do you want the background to be sharp, providing a context/narrative for the model? In this case, try to arrange the model in the background so that leading lines or other compositional elements give an appropriate balance and structure. Try to avoid bright spots in the background that might draw the eye from the subject (consider moving the model, reframing, or taking out distractions in post-processing. Move the model away from the background towards the camera to increase your ability to get focal blur on the background,
- Brightness/balance. Try to avoid the background dominating. For example, move the model forward from a wall and into brighter light so they are brighter than their background. Consider using fill light or reflectors to selectively brighten the subject so the background becomes relatively darker.
- Colour. A busy, bright, colourful background may distract from the subject. Consider converting to monochrome or desaturating in post-processing.
- If the background is messy/ bright etc, look around. Can you move the model to capitalise on a more suitable background? Is there a bland wall, a nice hedge that will blur into a nicely mottled background, a dark space – it may look messy, but if it is 3 stops darker than the light on the model, it will be effectively a black background.



- In a studio situation, you might have access to backdrops of various colours, shades and textures. With a white backdrop you also have the potential to project light onto the background like a screen, to get patterns and textures that may enhance the image.

### Lighting equipment

Artificial lights may include continuous lights, flash units and studio lights.

#### Colour Balance

Different light sources have different colour temperatures. You can use a grey card to set the colour temperature of your images (if you don't have one, a neutral grey colour swatch from a paint store will do the job). Get your model to hold the neutral grey card facing the camera and take an exposure. You can then use this to adjust the colour temperature of the resulting image so that the grey card is neutral. Assuming the lighting is constant, you can set the colour balance for all the images to match the one with the grey card.

#### Continuous lights

With continuous lights you can see how the lighting works on your subject, giving you opportunity to adjust the lighting to get the appearance you want before you take photos. However continuous lights are generally less bright than flash, which may give some limits on exposure times/apertures. They may be based on quartz halogen light or LED so you may need to compensate for colour temperature differences between light sources in a multi-light setup. These days you can buy LED light units that you can dial both brightness and colour temperature, and these are not necessarily very expensive.



A small, battery powered LED light being used in an outdoor photoshoot at night. A small light like this won't compete with a daytime shoot in full sun, but is very versatile with less ambient light. In this case, the light is hand held, so the photographer can move the light around to get the lighting desired, whilst using the other hand to operate the camera.

#### Flash/strobe

A flash unit (aka speedlight) on the hot shoe of your camera directly aimed at your subject will generally give very flat, unflattering light, red-eye effects, and harsh shadows behind the model. Redirecting the flash to point towards a white roof or wall (bounce flash) can improve the lighting, but the effect is somewhat unpredictable, requires a white surface to bounce off, and reduces the amount of light that reaches the subject. Using the flash off-camera with a wireless trigger gives much more flexibility in setting up lighting. You can generally have multiple flashes linked, use light modifiers to control the light, and position the lights where you want them. You may need light stands (or willing assistants) to assist with holding the lights where you want them (I sometimes use an old tripod as a very stable light stand, but custom-made light stands are not too expensive). Most flashes have controls that allow you to adjust the flash brightness so with multi-flash setups you can balance the lighting from each unit to achieve the lighting pattern you want.

#### Studio Flash

Studio flashes generally combine a continuous "modelling" light with a very powerful flash. They are usually much more bulky than plain flash units and may be wired to the 240 V power or have battery packs (which tend to be expensive but make the units much more flexible – you can use them outdoors where you have no power points to plug into, and you have fewer wires to trip over in a studio). You can generally control light output over a considerable range, so with a multi flash setup you can tweak the brightness of different units to get the lighting effect you want.

### Light modifiers

With off-camera lighting you would generally need some light stands to hold your light sources in the desired position and light modifiers to, as the name suggests, modify the light. An unmodified light source is effectively a point source of light which will give harsh shadows. Light modifiers allow you to spread the effective light source over a larger area to give softer shadows, direct light in particular directions, or to shade areas so they are not illuminated (eg a well-lit subject with an unlit background).

- Beauty dish – a dimpled reflector around the flash that gives directionality, but a softer light than the direct flash.
- Soft boxes – These are enclosures around the flash that spread the light over a large surface giving a soft light effect
- Umbrellas – these may be either reflective or transmissive. With the flash fired away from the subject into a reflective umbrella the subject is lit by a diffuse source. Or an umbrella may be placed between a direct flash and the subject to diffuse the light, again making it softer. Umbrellas are cheaper than soft boxes but may not give as soft a light as a softbox with an internal diffuser.
- Reflectors – these may be as simple as a sheet of white cardboard or a piece of white cloth. Photographic reflector sets are not too expensive, and usually come in various sizes, with white, silver, gold and black faces and a diffuser panel. They have a wire frame that allows you to fold and pack them into a small package and quickly unpack to a much larger size. A reflector can be used to bounce light from a main light into otherwise shadowed areas, to fill the shadows, effectively giving you a second light source without the expense of an additional strobe. Note that reflectors can also be very effective when used with ambient light setups. You can also use a reflector as a bounce surface to get a diffuse light source from a flash in the absence of umbrellas or soft boxes.

A silver reflector gives a harder, colder light than a white reflector; a gold reflector adds warmth; and a black “reflector” takes away light so can enhance shadows rather than filling them. Different angles on the reflector affect the light, as does the distance between the reflector and the subject (it can be quite close, as long as it is out of frame). Experiment, to see what effects you can get. In a studio setup black panels (also called flags) are often used to limit light bouncing onto the subject from different directions, as well as for creating shadows to prevent overspill of light from the light source(s). Most reflector sets come with a black side (usually backing the white reflector) that is designed for this.

An old projector screen makes an excellent reflector. They are large and usually come with a built-in stand. (Projector screens can also be used as a white backdrop, or as a stand over which you can drape a different coloured cloth for a background).

- If you are using stands to hold backdrops, lights etc, you might want to have a weight or two to help stabilise the stands, especially if you are working outdoors. I find draping a 5 kg bag of rice over the legs of the stand makes it much harder for the stand to be blown or knocked over. A cloth or plastic bag with marbles or gravel is also a good option. When travelling, I have a calico bag that I can fill with rocks from the local environment or with a Ziploc bag full of water and tie to the stem of the stand. That way I can add weight when I need it (eg to stabilise a tripod in a windy place) without having to carry the weight to the venue.

Studio flash with Beauty Dish light modifier which directs the light towards the model and softens the lighting a little.



This setup gives directional light with the brightest area towards the centre of the illuminated area.



Flash through an umbrella gives much softer lighting than direct flash. A silver reflector can fill shadows – here held by the model.



Studio flash with soft-box modifier which spreads the point light from the flash through internal diffusion panels and reflections to make a large, uniform light source (this soft box is 60x90 cm). Note the broad spread of light on the wall. I've also added a gold reflector, in this case hung from a light stand to the opposite side of the model to fill in the shadows.

The next figure shows portraits taken with different reflectors using this setup.



A collapsed umbrella and light stand shows their portability.

Softbox, no reflector



Softbox, silver reflector



Softbox, black reflector



Softbox, gold reflector



Softbox, white reflector



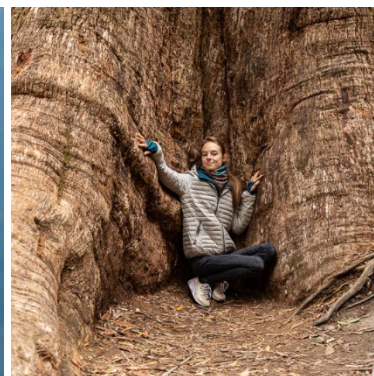
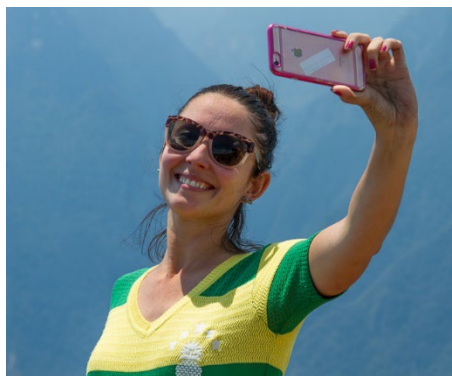
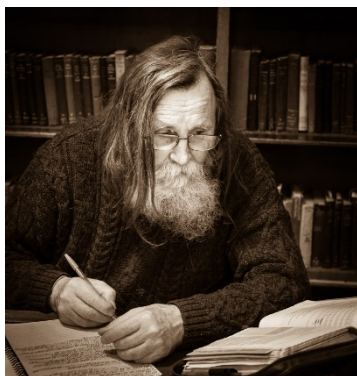
Note the different effects with different reflectors. The black reflector has little effect here, but if there was a source of light (or reflection) from the right of frame, it would block this. The gold reflector adds a warm tint. In this case silver and white are similar.

One light setup using the studio flash and softbox setup shown on the previous page.



### Locations

Ok, perhaps not quite “equipment” but location is important. For outdoors portraiture the world is your oyster. Choose somewhere with nice light, nice context, and shoot away. Indoors, do you need a studio? Whilst a professional studio can provide some additional opportunities, you can make use of many sorts of indoor space for portraiture. Light from a window may be all you need. Many of my portraits are taken using ambient light through a window. You can create a studio setup in your home by shoving furniture around and setting up a backdrop (or maybe your walls are all you need for a backdrop). There may be some limitations – for example standard room ceiling heights might preclude setting up a flash or studio light facing down on the head of a standing subject (but get creative – sit them down and you get lots more head room for lighting). You probably need a clear floor space of about 4 metres so you can set up your model with space to the backdrop, and a couple of metres between the model and the camera, and a bit of space behind the camera for you the photographer.



Search the web for ideas to set up an inexpensive home studio. You can improvise a lot using everyday items, or a bit of DIY, and these days you can get a lot of cheap but effective gear online. Flash lights, umbrellas, stands and backdrops can be fairly portable so you can potentially also set up for portraiture away from home.

### Props

When taking a portrait some props may be of use. Something as simple as a cup of tea helps build a story. Interesting clothing (Op Shops are a good source), jewellery, hats, chairs, tools, furniture, pets, umbrellas (see image on page 6) ... you can use lots of things as props to help build a narrative into your portraiture.



“Hot Cuppa” by Helen Warnod

## References and Further Reading

Note: everyone has their own way of doing things, so you will notice there are some conflicting recommendations in these references. Take it all with a grain of salt, experiment, and make up your own rules based on your own experiences.

<https://www.dpmag.com/how-to/shooting/classic-portrait-light-2/>

[https://en.wikipedia.org/wiki/Photographic\\_lighting](https://en.wikipedia.org/wiki/Photographic_lighting)

<https://digital-photography-school.com/6-portrait-lighting-patterns-every-photographer-should-know/>

<https://expertphotography.com/tips-for-setting-up-your-home-portrait-photography-studio/>

<https://www.digitalphotomentor.com/10-camera-settings-equipment-tips-portrait-photography/>

<https://digital-photography-school.com/side-by-side-comparisons-of-basic-studio-light-modifiers/>

## Homework

Think about what equipment and resources you have for portraiture. Take portraits some of these resources using them in a way that you have not tried before. Submit an image from this set, and provide a brief description of what you used, how it was set up, and the camera settings, and a reflection on how successful you think this was.

Name your image in the format **Your Name\_Module 5\_image title.jpg**

Send the image and notes and reflective comments by email to [geoff@geoffshaw.com](mailto:geoff@geoffshaw.com) by the Tuesday 20<sup>th</sup> April so we can collate them for the next Zoom on Thurs 22<sup>nd</sup> Apr.