Photography Intermediate

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1. Introduction

This document is called 'intermediate' because it builds on the author's previous 'primer' document to provide direction for students of photography who want to build on their foundation level of photographic competence to learn specialist skills to achieve success, particularly in photography competitions.

This document is deliberately camera-technology agnostic. However, it does explain some features found in modern cameras to help the student photographer avoid some of the potential pitfalls associated with modern 'intelligent' cameras. As camera technology becomes more 'intelligent' it also becomes more complicated. A sensible approach for managing the numerous menu options in a new sophisticated camera is to turn all the fancy modes off, to put the camera into a basic simple mode of operation which the photographer is familiar with, then turn on features as they are required. Changing one variable at a time allows the photographer to see the effects of that change.

It assumes the photographic equipment discussed here-in is available to the student; though it is acknowledged that may not always be the case. Homebrew techniques can often overcome the absence of expensive professional-grade equipment so experimentation is encouraged.

2. Focus Modes

Focusing is a complex aspect of photography which can confuse the novice and frustrate the experienced photographer equally. Focus is simple in concept but complex in practice because there are many focus modes. Focus is complicated due to the fact the object being photographed may be static or moving and several different automatic modes are designed into the camera for user convenience and for rapid focus optimisation. There are also technical constraints to the effectiveness of auto-focus modes. For example, if the scene to be photographed is plain and featureless, auto-focus may struggle to 'lock on' the focus, requiring the photographer to use the manual focus mode.

The various focus modes and their uses are summarised as follows:-

AF-S is a 'single-shot' focus mode for automatically adjusting and locking-on the focus to a static object e.g. for a portrait. When the camera achieves focus it 'locks-on' and no longer adjusts the focus, which is useful because it allows the photographer to re-frame the image without altering the point of focus.

AF-C is a 'continuous' focus mode for tracking moving objects to keep them in focus e.g. for sports photography. The camera's auto-focus motor constantly adjusts the point of focus to find the optimum focus setting. Note: If the object to be photographed is not moving, the camera will rapidly pulse or flutter the focus resulting in the object being rapidly in and out of focus. If the shutter operates when the focus is sub-optimal, the resultant image will be slightly out of focus, so AF-C should only be used when either the camera or the object to be photographed is moving.

AF-A is an 'automatic' auto-focus mode available on some makes of camera. This mode lets the camera automatically choose between AF-S and AF-C modes. If the camera senses movement of the

object being photographed, or senses the camera is moving, it goes into AF-C mode to track the moving object.

DMF is a 'direct manual focus' mode. This allows the camera to rapidly auto-focus first (as for AF-S mode) then allows the photographer to make small manual adjustments to refine the focus before the shutter is pressed.

MF is the 'manual' focus mode which lets the photographer adjust the focus, without any automated adjustments. Some cameras have an 'MF Assist' feature which uses digital zoom to temporarily zoom in to give a close-up view to assist accurate manual focusing.

Eye Focus is an advanced feature where the camera detects eyes and locks the focus onto an eye because this is optimum for portraits. Some cameras can only detect human eyes but some can also detect animal eyes too. i.e. for portraits of people and pets the eyes needs to be in focus. Eye focus mode can be assigned to a custom button on the back of the camera to enable the photographer to choose when this feature is used.

Focus Area is a feature which allows the photographer to choose which part of the image is used for auto-focusing. The options are normally a single central focus spot, an adjustable spot to allow the photographer to move the focus spot to the part of the frame to be used for focusing, and multi-focus which is where the average focus across the entire image is used to get the best average focus. It is often regarded as beneficial to use a centre focus spot with the AF-S mode so the photographer can half-press the shutter when the centre spot is on the object to be in focus, then whilst the shutter is half-pressed re-frame to compose the image then press the shutter down the rest of the way to take the photograph.

Peaking Level and Colour are features to assist manual focusing. The camera detects edges and when the edges are sharp it highlights them in the viewfinder. The highlighting colour can be selected (e.g. red, yellow or white) to give a good contrast to the object being photographed or for user preferences.

Pre-AF is a feature to allow the camera to immediately auto-focus itself before the shutter button is pressed. This can be helpful but often causes the camera to focus on things the photographer did not intend to focus on. It can be used to good effect when used in combination with the 'focus hold' or 'focus-lock' mode which allows the photographer to stop the camera changing the focus setting once correct focus has been acquired.

Focus Hold is a feature which allows the photographer to focus on an object then lock the focus to stop focus changing to allow the image to be re-framed.

3. Depth of Field

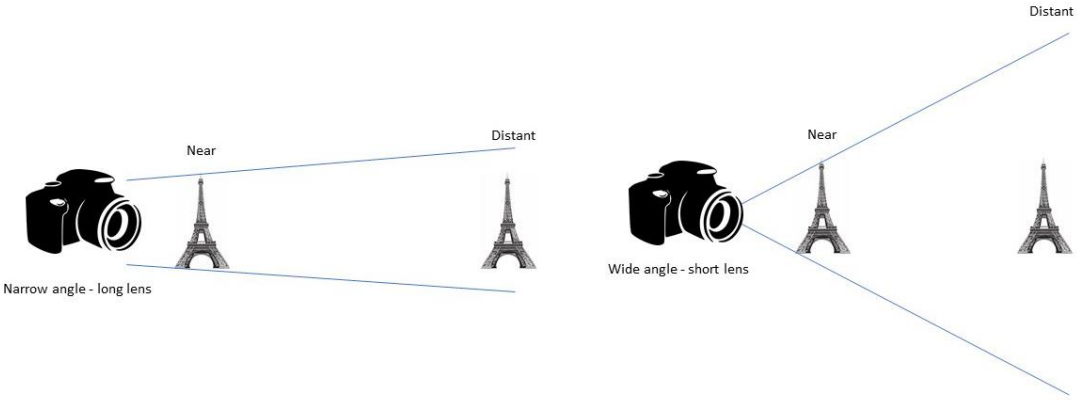
The depth of field (aka field of focus) is the name given to the range of distance which is in focus. This is determined by a number of variables which includes focal length, distance to subject, the acceptable circle of confusion size, and aperture. The diligent student of photography could research the mathematics used to calculate the depth of field. This may be of academic interest but is not too practical when operating a camera. However, a more practical approach is to use a 'depth of field calculator' application either on the internet or as a mobile phone app. By entering details of the camera, focal length and aperture of the lens, and distance to the object being photographed the app gives the distance in front the object and the distance behind the object which are in focus, hence the total range which is in focus.

As a general guide, a short focal length lens such as 28mm gives a greater depth of field than a longer lens with a focal length of, say, 180mm. For a camera with a full-frame sensor and with the object to be photographed 10m from the camera, the depth of field is as follows:-

180mm lens, f22, 10m to subject = 2.8m DoF
180mm lens, f2.8, 10m to subject = 0.34m DoF

28mm lens, f22, 10m to subject = infinity DoF
28mm lens, f2.8, 10m to subject = 30m DoF

The long focal length lens has a narrower viewing angle i.e. the light is travelling more parallel. The short focal length lens has a wider viewing angle so the light is more convergent. This means objects in the distance appear smaller than objects nearer the camera. The long focal length lens causes objects in the distance to appear nearer because their size appears similar to objects nearer the camera. This can be demonstrated by the following diagram:-



Some cameras allow the aperture to be closed-down to the current setting to allow the photographer to see the depth of field through the view-finder. This can be helpful but is not ideal as the amount of light through a small aperture is small making the image seen through the viewfinder quite dark.

4. Control of Exposure

The various types of sensor in digital cameras and the various types of photographic film, each have a limitation called '[dynamic range]'. The dynamic range is the range of light intensities which can be detected and handled correctly by the camera. The greater the dynamic range the better.

At the lower end of the dynamic range very small amounts of light may not be detectable by the sensor or film such that a small change in light is not detected. This means information is lost due to a lack of sensitivity. Similarly, at the higher end of the dynamic range very large amounts of light may not be detectable by the sensor or film such that a small change in light is not detected.

If film is being used, rather than a digital camera, the photographer should look at the datasheet for the film to see the film manufacturer's guidance on exposure settings and optimisation. For example, some types of film have non-linear sensitivity characteristics such that long exposures of more than one second need to be adjusted so the camera increases the shutter time more than a

light meter recommends e.g. Ilford FP4+ requires a 20 second shutter when a light meter recommends a 10 second shutter time.

Digital sensors are manufactured using semiconductor materials based on silicon. Modern semiconductor manufacturing techniques can etch a large number of light detector circuits (known as a photo-detector) onto a given area of silicon. A photo-detector with an amplifier is known as an active pixel sensor. For example, a digital sensor the same size as a 35mm film frame (36mm x 24mm), known as a 'full frame' sensor, can now have over 60 million active pixel sensors. Each active pixel sensor represents a picture element or 'pixel'. Each pixel is typically represented by 12 or 14 bits (binary digits) of data, depending on the camera design. 12 bits gives 4096 different values, 14 bits gives 16384 values and 16 bits gives 65536 values. It follows that cameras which represent each pixel with 14 bits or 16 bits of data have the ability to more accurately represent the pixel data, hence dynamic range than one using 10 or 12 bits. The bits of data must also represent the colours so the bits per pixel the more accurate the representation can be.

The physical size of each photo-detector has a significant influence on its dynamic range. If all other design factors are equivalent, the larger each photo-detector is the better the dynamic range. However, there are other techniques camera manufacturers can use to improve the dynamic range of a given size of sensor, such as stacked sensors, back-illuminated sensors, etc.

An image needs to be exposed within the dynamic range of the sensor or film. The histogram in a modern digital camera gives an indication to the photographer of where in that dynamic range the light is. The histogram is a graph which shows the number of pixels used for each of the red, green and blue colours and the intensity of the light. The histogram can indicate the risk of the image being too dark, too light or have 'clipping'. Clipping occurs when the light intensity is stronger or weaker than the sensor can handle so information is lost or 'clipped' off. See 'blinkies' described below.

In digital sensors the sensitivity is not perfectly linear from dark to light. Semiconductor sensors tend to have better performance at the light end of the scale (right-hand side of the histogram). This means that an image taken with a slightly higher exposure value (Ev) with most light energy to the right of the histogram has a better chance of being corrected in post-processing than an image exposed to the left of the histogram i.e. too dark. This means digital photography has a technique called 'expose to the right' (ETTR). This is opposite to the behaviour of film, where under exposure can often be compensated when printing images from negatives.

An 'exposure compensation' control is often available in modern cameras. This allows the photographer to force all images to be under or over exposed by the amount set by the 'exposure compensation' control. For example, a digital camera could be set to over expose by one 'stop' by setting the 'exposure compensation' control to +1 EV. A suggested amount of ETTR compensation is +2/3EV i.e. set the 'exposure compensation' control to +0.7 EV. When the 'exposure compensation' control is used it tells the camera to alter the shutter time (Tv) or aperture value (A) by the chosen amount to force the exposure value (EV) to be off-set by that amount.

All cameras have performance limits which the photographer can often work-around, or work within. Due to the non-linear performance of digital sensors and film, a technique called High dynamic range (HDR) can more fully exploit the limits of the sensor or film. HDR images can be created by merging a series of images of the same scene which have different exposures (Ev). Merging the images is usually done in post-processing on a computer. The result is an image which has a full tonal range from dark to light. A similar technique using combination printing from two negatives was used in the 1800's by Gustave Le Gray.

Dynamic Range Optimisation (DRO) is a feature available in some digital cameras. The concept is that it lightens the dark areas and darkens the light areas to level the contrasts within the dynamic range of the sensor. It is usually restricted to changing the JPEG images created in the camera and does not apply to raw images. Such adjustments can be done in post-processing so the photographer may prefer to use raw images and do any adjustments on a computer afterwards, as for HDR.

Exposure affects the colour rendition capability of the sensor. For accurate, true to life, colour rendition the sensor must be operating within its dynamic range. Care needs to be taken when 'expose to the right' (ETTR) is used to ensure colours are not clipped. Colour adjustments can be made in digital image post-processing so the photographer may need to do some colour adjustments on a computer when using the ETTR, DRO or HDR techniques.

Digital cameras offer a number of different exposure metering modes. For multi-area exposure metering the sensor is divided into areas and the exposure level of each area is calculated in the camera and an average taken. An alternative exposure metering mode is centre-weighted metering where the light intensity, hence exposure level, is based on a small centre spot of the sensor. This mode enables the photographer to point the centre spot at the lightest or darkest area, lock the exposure setting to that value, re-frame the image and shoot the picture. The centre weighted exposure control is useful when photographing the moon, for example. The exposure level is normally a dynamic adjustment and it is only held at the point the shutter is pressed. Most digital cameras allow the photographer to lock the exposure setting at a chosen point in time. This is called auto-exposure lock (AEL) or similar title. Some cameras have a feature called 'blinkies'. This causes over-exposed parts of an image to flash on the camera's screen or viewfinder to warn the photographer. A small area of over exposure may be acceptable but larger areas should be avoided.

Cameras and flash guns often allow the photographer to make manual adjustment to the exposure. This is known as exposure compensation (EC on a camera) or flash exposure compensation (FEC on a flash gun). The adjustments are usually graduated in one 'stop' increments or '1/3 stop' increments. After the aperture, shutter and ISO settings are selected the exposure compensation adjustment allows the photographer to manually force under or over exposure. This is useful for making fine adjustments whilst shooting pictures or experimenting by taking a number of shots, each at a slightly different setting, allowing the photographer to select the shot with optimum exposure during post-processing.

Bracketing is a long-established photographic technique where the camera takes a few shots each with slightly different settings within a bounded range such as +/- 3 stops. The camera allows the photographer to select the range of values and the camera controls the multiple shots each with a slightly different setting. Bracketing could be used to take a set of shots with different apertures or different shutter speeds or different focus settings. The photographer should learn what the camera offers and consider using bracketing where the required setting is uncertain.

The expression 'the bigger the better' sometimes holds true, but not always. When selecting a lens, the diameter of the lens is a relevant parameter. The larger the diameter the larger the aperture setting can be and the more light can be allowed through to the sensor. The larger the lens diameter the higher the cost because it uses more glass. Low cost cameras tend to save costs by using a small diameter lens which limits the range of aperture settings available and reduces the amount of light entering the camera. Increasing the ISO setting to compensate just results in a grainy image. Lenses with an aperture size larger than f2.8, e.g. f2 or f1.8, tend to be expensive (for a given focal length).

The actual aperture diameter and actual focal-length may be scaled up or down in the camera design by the manufacturer to achieve the standard range of aperture values. These values are linked to the

sensor size and focal length of the lens. The point of reference for these actual dimensions is currently taken to be 35mm film size. A full-frame digital sensor has the same dimensions as one frame of a 35mm film. If the sensor is smaller than 'full-frame' then the lens can be smaller, cheaper and lighter.

The actual f-number is the ratio of the focal length of the lens and aperture diameter.
These numbers are related to each-other by √2 e.g. f2.8 = f4/√2. This is defined by the following mathematics:

If the diameter of the aperture is, say, 10mm then the area is 3.14159 x 5mm x 5mm = 78.54 sq mm
If the desire is to halve the amount of light reaching the sensor then the aperture area has to be halved to 39.27 sq mm. To achieve this the aperture diameter has to be divided by 1.414 i.e. √2.
If the diameter of the aperture is reduced by 10mm/1.414 to become 7.07mm then the area is 3.14159 x 3.536mm x 3.536mm = 39.27 sq mm. Each time the area of the aperture is halved the diameter is reduced by √2. This mathematical explanation is only relevant if the student photographer wants to understand the numbers used for aperture settings.

The International Organisation for Standardisation (ISO) has published documents which define the sensitivity of sensors and various types of film. For modern digital stills cameras the document is called ISO 12232:2019. Other ISO standards documents define sensitivity for various types of film. To standardise the definition of sensitivity of the sensor or film a range of ISO numbers are used. The basic ISO numbers are ISO 100, 200, 400, 800, 1600, etc. Each time the ISO number doubles, the sensor sensitivity doubles, thus requiring half the light for a given exposure value Ev.

5. Flash Lighting Techniques

Assuming one flash gun and a digital camera in M mode is used, the photographer would normally use a low ISO setting and small enough aperture to eliminate ambient light (but wide enough aperture to achieve the required depth of field) and a shutter speed as fast as feasible within the 'flash sync speed' ('flash sync speed' is explained below). Taking a test shot without activating the flash is the way to verify the ambient light has been eliminated. Using a medium neutral density (ND) filter such as ND4 can help reduce ambient light when a wide aperture is required to achieve a shallow depth of field. If some ambient light is desirable e.g. to give a lighter background, the settings can be adjusted and a further test shot taken to get the required ambient exposure without flash.

To get the required amount of flash light the flash gun can initially be set to a medium setting such as 1/8th power and a test shot taken. The flash power can then be adjusted up or down as required. Alternatively, if a hand-held light meter is available this can be set to flash activation mode, white dome over the sensor, placed near the object and facing the camera then the flash activated. The light meter will provide the speed and aperture values for a given ISO setting.

If the flash gun and camera are compatible and the flash gun mounted on (or connected to) the camera, it may be possible to use direct electronic communication to allow the camera to tell the flashgun when it has received enough light. This is called 'through the lens' (TTL) control of the flash gun. The camera has control of exposure provided exposure metering is configured to appropriately measure the flash lighting. The TTL feature is ideal for taking flash shots in a hurry.

The flash sync speed is an important limitation which needs to be understood and carefully managed. Synchronising the flash from the flash gun with the shutter is an important aspect of flash photography. The flash could be timed to occur just as the shutter is opened or just before the

shutter closes or in the middle of the period when the shutter is fully open. If the shutter speed and flash speed are not compatible some undesirable effects can be seen, such as a black bar across the image. This occurs when the camera has a mechanical shutter and the flash fires whilst the mechanical shutter is partly in front of the sensor. Ideally the shutter should be fully open when the flash fires so the sensor is exposed to all the flash light. A mechanical shutter on a modern camera is often designed to have two curtains which move vertically in front of the sensor in the position called the focal plane. The focal plane is where the light from the lens converges. One shutter curtain will be covering the sensor and one retracted when at rest. When the shutter is activated the curtain covering the sensor moves to reveal the sensor, exposing it to light from the lens, then the other curtain moves to cover the sensor to close the shutter. For slow shutter speeds only one curtain is in front of the sensor at a time. For fast shutter speeds, rather than revealing the entire sensor, as one curtain moves off the sensor to expose it to light the other curtain moves to cover the sensor shortly afterwards. i.e. both curtains are moving. The mechanical shutter therefore presents a 'slot' opening and the slot moves across the sensor. If this is the case, the duration of the flash would need to be long enough to span the time the slot takes to traverse the entire sensor. Flash guns with a 'high speed sync' feature do exactly this, the flash duration is longer. If the 'high speed sync' feature is not used with a fast mechanical shutter the image is likely to be dark or have a black region at the top or bottom or both top and bottom. The student photographer must therefore get to know the camera and flash gun's design features and characteristics then make adjustments accordingly to get the desired results.

If only one flash gun is available it is possible to light an object from two or more directions by using reflectors. These can be made from crumpled aluminium foil, white card, etc or purpose-made reflectors bought. Alternatively, multiple flash guns can be used to light an object. A typical studio lighting set-up may have four power-adjustable flash lamps with modelling lamps. Modelling lamps provide continuous light when the flash is not active for setting-up the scene and they allow auto-focus to be used prior to flash activation. If four flash guns or studio flash lamps are available, two could be used to illuminate the background to eliminate shadows and the other two can be used to light the object from the front, sides or from above. If flash is used to illuminate the background it should be low-level flash a few 'stops' below the main flash guns used to light the main object.

It can be regarded as normal for one flash lamp pointed towards the object to be the main, the other directed onto the object to be the secondary and the two others used for illuminating the background or back-lighting the object to be tertiary.

Multiple flash guns or studio lamps can be triggered from the camera by either:

a) cables
b) wireless trigger and detectors
c) optically

or a combination of these.

For example, a wireless trigger may be fitted to the camera's hot shoe which sends a wireless signal to a wireless receiver connected to the main flash gun or studio lamp. When that main lamp is activated its flash activates the optical sensors on the other lamps causing them to flash in unison. Alternatively, the first lamp could be connected to the camera via a cable and the other lamps are activated via optical sensors. A similar approach can be used to trigger multiple flash guns if they can all detect the one wireless trigger signal from a transmitter on the camera.

Coloured gels on the flash gun or filters on the camera can be used to achieve a range of tint effects. Using multiple flash guns each with a different coloured gel allows multi-coloured tints to be projected onto the object being photographed. Putting coloured filters on the camera can either

give the whole image a coloured tint or it can be used to alter the white-balance and compensate for different types of lighting such as incandescent lamps, fluorescent lamps, xenon lamps, etc.

This could be used instead of using the camera's internal 'white balance' settings (white balance is explained below). As mentioned in the 'primer' document, light can be regarded as a wave with a particular frequency. The frequency defines the colour of the light. e.g. Blue and violet light have a higher frequency than yellow and red light. The colour can also be measured using a colour temperature scale in degrees Kelvin (K). Incandescent lamps (old style filament light bulbs) have a colour temperature between approx. 2600K and 3000K. A 100 watt halogen lamp has a colour temperature of 3200K. A white fluorescent lamp has a colour temperature of 4000K. A Xenon flash gun has a colour temperature between 5000K and 6000K which is similar to the colour temperature of daylight. Modern LED lamps have their colour temperature stated on the box such that 'warm white' has a lower Kelvin value than a 'cool white' LED lamp. This means LED lamps with a high colour temperature, available from good DIY shops can be used as photography lamps. It is also possible to buy a ribbon with many small LED lamps on. These can be used to create low-cost circular photographic lamps.

Modern digital cameras normally have a control called 'white balance'. This alters the colours to make them nearer to how they look in daylight. An incandescent lamp gives off a yellow light so images taken with incandescent light need to have their colour temperature increased to make them look equivalent to how they would appear in daylight. White balance can be used to make an image appear as if taken in daylight or it can be used to deliberately give a colour tint to an image if desired. When using flash it is best to select the camera's white balance setting for flash rather than using auto white balance or any other white balance setting, unless done-so knowingly. The main requirement to enable white balance adjustments is to not mix colour temperatures. Multiple light sources of different types and temperatures will make it hard for the camera to automatically adjust the white balance and be hard for the photographer to adjust the white balance in post-processing. It is best to use a single light source or multiple lights with the same colour temperature.

6. Composition for Pictorial Effect

The 'primer' document introduced the concept of a 'record shot' and 'pictorial effect'. The term 'record shot' is not derogatory, it is a 'factual' shot as opposed to an 'artistic' shot. An image can be both factual and artistic hence a record shot with pictorial effect. For example, an ornithologist may wish to have a record shot of a bird in its natural environment, such as a kingfisher sitting on a stick. An image of a kingfisher sitting on a stick will have better pictorial effect if it does have good composition compared to the same bird and stick having poor composition. The difference is all to do with lighting, background and the relative positions of the bird & stick to background & foreground objects. Human psychology is what makes a picture 'pleasing' versus 'incongruent'.

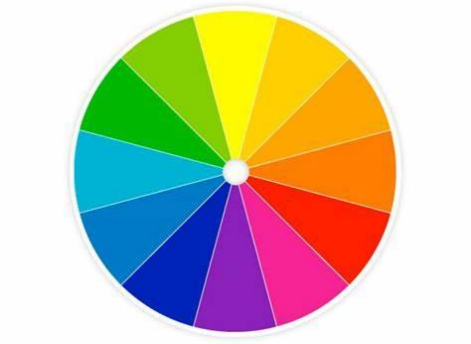
The word chiaroscuro (based on the Italian words for light and dark – the 'c's are pronounced like 'k's) has been used for centuries to describe the range of light and dark areas of a picture or painting. Photographers use this word too. The human eye naturally gravitates to the light or dark areas of a picture. This can be used by the artist or photographer to achieve good pictorial effect. By ensuring the main object or subject of the picture is well lit and the less important areas of the picture are in the shade, the photographer can lead the viewer to concentrate on the picture in the intended way. Having one main object of attention in a picture is called 'unity'. This avoids the viewer being distracted by other objects in picture competing for the attention of the viewer. If a background object is much brighter or much darker than the main object the eye is distracted away from the main object and towards the bright or dark object. The range of objects in brightness and shade can be used to form structures such pyramidal forms, lines and balance. If the main object is

light, the picture should have ‘echoes’ of that lightness elsewhere. Similarly of the main object is dark, the picture should have ‘echoes’ of that darkness elsewhere. This gives balance. The fact the other objects or areas of light or dark are subdued means it is possible to have ‘unity’ whilst also achieving ‘balance’. It should be clear to a viewer what the photographer’s intent is.

If a picture has multiple objects they should either be presented as an interacting pair or presented as an odd number to give best pictorial effect. A pair of objects can have one more dominant than the other to achieve one main subject and a secondary ‘balancing’ object or the two could be equal and interacting such that it is the interaction that forms the ‘unity’ hence object of the picture.
To achieve good pictorial effect when photographing a group of people it is best to have an odd number of people and to position them to form pyramidal forms i.e. triangles or opposing balanced diagonal lines.

From the earliest days of photography, in the Victorian era, photographers turned to the great masters of art (John Constable, Thomas Gainsborough, J M W Turner, Rembrandt van Rijn, etc) for inspiration and guidance on good composition and pictorial effect. Students of photography would be well advised to also study art and the works of the great masters. The aspiring photographer should aim to apply those same ‘rules of composition’ to create photographic images which are pleasing to the eye. The rules of composition can be broken but the photographer should only do so knowingly.

Modern-day photographers and artists have something which the Victorian era photographers did not; that is ‘colour’. Colour could be regarded as a distraction because it is not essential for creating images with good pictorial effect. Some photographers choose to only create black and white images because it requires a particular set of skills. Photojournalists kept on using black and white film long after colour film was available because newspapers were still printed in black and white. When newspapers and magazines adopted colour, the photojournalists began using colour too. Colour is certainly another variable for the modern-day photographer to consider. It requires skills which are not relevant for black and white images. As mentioned above, light has a frequency and the range of frequencies is called a spectrum. As exists in music, light can have harmony and contrasts. If all the visible colours are presented as a continuum in a circle, known as the ‘colour wheel’ it is possible to explain the effects colour has on pictorial affect.



Colours adjacent to each other on the colour wheel are in harmony. Colours opposite each other on the wheel are contrasts e.g. purple and yellow appear on opposite sides of the colour wheel, as do red and green. Contrasts give good pictorial effect, as do colours in harmony. Use of the colour wheel in graphic design or decorating your home can give pleasing results. Poor choice of colour combinations in graphic design, such as the colour of letters on a background, can make the writing hard to read. If the photographer is colour blind (most often it is males who have colour blindness) he could specialise in black and white photography to achieve success and not bother with colour photography.

7. Framing and Cropping

Novice photographers often take photographs too far away from the object being photographed. This is a common mistake for beginners. The result is an image with too much information and inclusion of distractions. Good composition uses the principle of 'unity' i.e. one picture one purpose. If the image is cropped down to the intended object in post-processing the photographer is in effect throwing away (wasting) many pixels which could otherwise be used to improve the image quality. Where possible the photographer should attempt to frame the image so it contains all the required information and nothing else, hence does not need much cropping.

Good pictorial composition is when nothing can be added and nothing can be taken away to make the picture better.

An image is 'stronger' at drawing the viewer's attention to an object if it only contains that object. However, it is often desirable to show the object in its context thus including the surroundings too. The surrounding can either reinforce the viewer's attention onto the main object or distract the viewer from the main object. To reinforce the viewer's attention onto the main object the surroundings need to be subordinate and not distracting. The great masters of painting, before photography was invented, had mastered composition. Therefore, photographers in the 1800s used art composition as a starting point for good photographic composition.

8. Photographic Procedures

Each photographer should devise their own techniques and procedures for creating pleasing photographic images. The 'primer' document suggests for the student photographer considers using a simple three-step process for creating images:-

- The Idea = the concept for the image, identifying the time and place and object
- The Capture = operating the camera and lighting to obtain the intended image
- Realisation = post-processing and mounting of the image to realise the original idea

The idea for an image may be based on what someone else has done before, with or without modification. Good designs are often based on research of what has been done before and enhancing it. Alternatively, it may be something new or significant in some way. Pictures should tell a story and/or convey emotion to have good pictorial effect. Studying the work of artists can be a valuable source of inspiration for photography.

Capturing the image requires competent control of the camera and other variables external to the camera such as lighting, background and composition. A photographer should consider the lighting first, then consider the background then consider the composition in that order. These are then realised into an image by careful control of aperture, shutter, exposure and focus settings of the camera. From the earliest days of photography in the 1850's onwards photographers have been creative in capturing the required image - be it combination printing from multiple negatives or manually creating props and back-drops. These can be used today to overcome the limitations of camera equipment and the surroundings in which the photographer has to work. Lighting (natural or artificial, direction of light, etc), background (depth of field, etc), composition (pyramid forms, lines, balance, unity, rule of odds, colours etc), exposure (high-key, low key, chiaroscuro, etc), focus and framing are the variables the photographer needs to learn and practice until they become second nature and instinctive, like driving a car.

The desired image is realised in post-processing by careful adjustment and removal of blemishes etc. The modern digital photographer needs to master all three of these phases and make them 'second nature' to create images that meet the original intention. It is only when these are mastered that the photographer can achieve reproducibility, leaving the photographer free to concentrate on content, composition and artistic style.

The student photographer could use a checklist to help eliminate common errors in picture composition and realisation. A suggested checklist is given below in appendix A:

9. Post-processing Techniques

From the very earliest days of photography post-processing has been used to achieve the desired effects hence achieve the goals of the photographer. Well know Victorian-era photographers such as O G Rejlander and H P Robinson created photographic images by 'combination printing' using multiple negatives. Merging the sky and/or background from one photographic negative with the subject and foreground from a second negative with a (hopefully) seamless join was a new but widely used technique in the 1850's. In some cases multiple negatives, as many as nine, were used to create composite images. This has always been regarded as acceptable practice so long as the photographer is honest about its use and not deceptive. The same applies today when doing post-processing on a computer. Some competitions may prohibit the use of extensive post-processing and the use of composite images, where-as other competitions may allow it. This is no different to the techniques used by painters for hundreds of years; the watercolour or oils artist may place a person or boat or other object into a painting that wasn't there just to help the composition and overall pictorial effect. This is acceptable so long as the end result is true to nature and it enhances the pictorial effect.

Good digital cameras allow images to be stored in a raw mode. Raw mode is where the data from the sensor is store 'as captured' and without any image manipulation, compression or processing in the camera. This can be regarded as equivalent to the negative from a film camera. It needs to be processed before the image can be viewed properly. Camera manufacturers each have their own proprietary raw file formats. The software used for post-processing would need to be able to accept and manipulate the raw files from the make and model of camera used by the photographer. The American software company Adobe has published and made freely available a specification for a raw file format called 'digital negative'. The file names end in '.dgn'. This is an attempt to create a de-facto standard for raw image files to enable portability and transfer of digital negative files between computer systems.

Raw files need to be 'developed' on a computer (or in a camera) to convert them into a useable format. The raw files contain data about the camera and camera settings as well as all of the image data from the sensor. All the colour information, light intensity and exposure data is present in the raw file. The digital sensor may have a few extra pixels of information around the periphery of the image which can be recovered in post-processing of the raw file. The full dynamic range of light is in the raw file too. Raw files give the photographer a much wider range of adjustment of all image parameters compared to other file formats which have already been developed.

A 'panorama' image is one which is very wide compared to the height. This is often used for landscapes, but can be used for any image type. A panorama image is created by stitching together multiple images to form a wide composite image. The joining of images is done during post-processing on a computer. Good postprocessing software provides a feature for combining multiple images into a panorama. The software looks for overlap between images then aligns the images to form a seamless join. To take a series of photographs for post-processing into a panorama the

photographer needs to consider the need for image overlap and should ensure the points of overlap have multiple edges for the software to use for alignment – the software can't align featureless or low-contrast images. As the photographer turns to take each image, consideration must be given to maintain vertical alignment too because the software will create a panorama image with variations in vertical alignment and the panorama can only be cropped from the image between the lowest top edge and highest bottom edge. To maximise the height available, the photographer can position the camera in portrait position (sideways) and take more images horizontally. A tripod with rotating head is very helpful in creating panoramic images.

Multi-megapixel images can be created by combining images vertically as well as horizontally. This can be achieved by creating multiple panorama images then combining those vertically (or turning them through 90 degrees and creating a panorama from multiple end-on panoramas). The ability to stitch together multiple images, both vertically and horizontally, allows exceptionally high-resolution images to be created using a digital camera with a modest pixel count.

Post-processing software also allows multiple images to be stacked or overlaid on top of each other. This can allow the pixels which are identical in the majority of images to be used and the pixels that are different in the minority of images to be discarded. The resultant image is to create an image which has all the static objects visible and any moving object is removed. This is very useful when the intent is to photograph a building or scene when there are vehicles or pedestrians moving past. By taking multiple images, such as twelve or fifteen, then stacking them in the post-processing software, the resultant image will be free from any moving object, leaving just the static items – it can make a busy street appear empty.

A stack of multiple images, say more than twenty, will also remove noise or grain from the images. Because noise, caused by high ISO settings, is random the stack can take the median value of the pixels thus eliminating random noise. Good image processing software can align the images so multiple images from a hand-held camera can be aligned and the ISO noise removed if sufficient similar images are used in a stack.

Another type of image stacking is known as 'focus stacking' or 'focus merge'. This is where multiple images are overlaid and the areas of the images in focus are retained and the areas which are blurred, hence out of focus, are automatically rejected by the software. The end result is an image with exceptionally good depth of field. This is only effective if the images are identical in all respects apart from focus. It does not work too well if the images contain objects which are moving.

Good post-processing software allows image adjustment layers to be added on top of the original image. This 'non-destructive' approach allows post-processing adjustments to be un-done. When the required adjustments have been completed the resultant image can be exported to consolidate the layers.

Printed images are normally mounted on mount-board for exhibitions or entry into competitions. The mount frames the image so the colour of the mount-board can be selected to give a good contrast to the image to present the image to best effect. In some cases the image is shown on a screen or projected, in which case the background may be dark. If the image is dark and background is dark there may not be a good definition to the edge of the image. If this is likely to be the case a thin border can be added to the image by the post-processing software. This is known as a 'keyline' or 'outline'. The 'outline' should not be too intrusive so should be a neutral shade such as cream or grey rather than red or yellow.

As mentioned above, manipulation of images during post-processing is widely accepted as a way for the photographer to realise the original intent so long as competition rules do not prohibit it and the photographer is open and honest about its use. Extreme amounts of post-processing could remove most, or all, of the original photographic image. This is where the image ceases to be 'photography' and becomes 'graphic design' instead. It is all 'art' so there are no hard and fast rules unless the competition rules state otherwise.

If the photographer uses film it can be converted into a digital image afterwards. The film is developed in a chemical bath as normal then the negatives are scanned electronically to create a digital copy of the image. A very high-resolution digital scanner designed for the purpose can create very good digital images from film negatives. The negative image can then be converted into a positive image by the post-processing software then adjusted as described above. Note than a scanned negative may not give as much scope for manipulation as an equivalent raw file.

10. Printing

Picture sizes typically follow either of two popular standards. Photographs are historically printed in a series of imperial sizes such as 6" x 8" or 12" x 16" etc. Alternatively, pictures can be printed on popular metric paper sizes such as A4 or A3 etc. Picture mount boards can be purchased with pre-cut apertures for either of these picture size ranges e.g. A3 or 16" x 12" which are similar but slightly different.
Any image size can be used for club competitions so long as they can be mounted in 50cm x 40cm mount board. e.g. a 'letter box' aperture can be used for mounting a panoramic image so long as it is less than 50cm wide.

Photographs are normally printed using ink jet printers rather than laser printers because inkjet printers tend to give better quality and higher resolution images. The inks used have a significant effect on the end-result in terms of colour and longevity. Printers designed for printing photographs tend to have more ink colours. Low-cost printer inks are dye-based so tend to fade after six to twelve months. High quality pigment-based inks should be used to print photographs. Dye-based inks soak into the paper which is better for low cost and fast drying bulk printing of office documents. Pigment inks sit on the surface and take longer to dry but give sharper images as required for photography.

Photo paper (e.g. gloss, satin, matt etc) can be purchased for printing photographs using ink-jet printers. These tend to have a coating to support the pigment inks and to give accurate colour rendition. The type of paper used for printing photographs should be chosen based on the image to be printed. e.g. an image with pale pastel shades may look better of fine art or matt or satin paper whereas nature photos may look better on gloss paper. The photographer should choose the most appropriate paper to use to present the image in the best or intended format.

11. Picture Mounting and Presentation

Mount board

For most photography club competitions the picture should be mounted on a card surround called a mount board. Mount board is typically 1.4mm thick card up to 50cm by 40cm. Purpose-made mount board can be bought and the opening or aperture for the picture can be cut to meet the size of the picture. Mountboards with pre-cut apertures of A4, A3, 16"x12" etc can be bought if preferred or a mount board cutter is not available. The colour of the mount board is significant. A white or cream colour is most versatile and suited for most styles of picture. For some pictures a black or dark grey

mount board is more suited. Use of novelty colours is discouraged but can be used if considered appropriate for the picture.

Cutter tool

Choose a robust metal framed cutter with adjustable cutting depth and marker for the cutter start/end point. The blade should be at an angle of approx. 45 degrees. When cutting the mount board it should be cut from the rear of the board (so sliding the cutter does not mark the front face of the board) by using a ruler or long straight edge to guide the cutter. By putting light pencil lines on the back of the mount board, they can be used to help start and end the cut in the right places thus avoiding under-cut or over-cut. After using the cutter tool a sharp knife such as a 'Stanley knife' should be used to complete the cut in each corner to free the surplus board being cut out to for the aperture of the mount.

Cutting mat

To protect the table or work surface a cutting mat should be used. The mat could be some spare mount board. A purpose made cutting mat can be bought. Such purpose made mats have metric and/or imperial measurement scales on with a grid. The grid on the mat simplifies measurements and getting the cutting lines straight and perpendicular.

Back-board

To protect the photograph behind the mount aperture, a backing board of similar thickness to the mount board should be used. The back-board should be glued to the front mount board rather than using adhesive tape because tape may damage other pictures if stacked together.

Picture labelling

For most photography club competitions the mounted picture should be labelled with the name of the image using a small paper label in the bottom right corner, diagonally and secured on the back of the mount. The name of the photographer, the name of the photographer's club and the image name should also be on the back of the image.

12. Conclusion

As mentioned above, the photographer needs to determine their own preferred equipment, settings, techniques and procedures in order to achieve their desired result. It is this 'need' which is the 'mother of invention' and moves us all forward as photographers. Experimentation with equipment, software, different techniques and procedures is what ultimately achieves innovation and competition.

Pictorial effect in photography is not an exact science, it is very subjective. It is only through comparison between photographer's work and constructive critique that standards are set and bettered. This is why club competitions, inter-club competitions and international competitions are used to drive improvement and to encourage experimentation and innovation. A competition theme drives club members to try new techniques and broaden their skills and hone their competences.

The 'primer' and this 'intermediate' document equip the student photographer with a broad foundation to build upon through self-study and experimentation.

Appendix A – Checklist

The student photographer should check all pictures produced for errors before they are released for other to see. The following list can be used as a suggested set of checks:-

- Is the intent of the picture clear and simple: colour or light/dark (chiaroscuro), objects or emotions, or a combination of these
- Used Rule of Thirds to position main object on a ‘thirds’ line
- Used Rule of Odds (3, 5, 7, etc - If there are multiple items there should be an odd number)
- Has ‘unity’ (single purpose - not multiple points of interest - crop down accordingly)
- Has ‘repetition’ (subordinate 'echoes' of main point of interest)
- Uses chiaroscuro (lights and darks, balance lights with darks via mid-tones, the human eye naturally goes to the light areas or dark spots)
- Use colour balance (opposite sides of colour wheel), the human eye goes to red objects first
- Low-key is high contrast, not a totally black background, include a hint of image in background
- High-key is low contrast but not over-exposed, mostly light with small amount of dark
- Avoid 'split-key' lighting (this is a mix of high-key and low-key in the same image)
- No burn-out, no unintended shadows, light the front or side of objects/animals unless deliberately back-lit
- Correct exposure (accuracy of colour rendition, no clipping, etc)
- Focus (correct depth of field, main object sharp, eyes in focus)
- No camera shake (especially on macro shots and slow shutter speeds)
- Use focus-merge in post-processing if needed to get depth of field
- Stack multiple identical images to reduce noise
- Use high dynamic range (HDR) post processing if needed
- Use camera’s manual mode if subject is ‘static’, else use S or A or P modes
- Image not taken from "5 feet 6 inches off the ground" (use different angle/perspective)
- Correct perspective (verticals are vertical, adjust parallax)
- Point of interest lighter or darker than subordinate parts of picture (subordination)
- Frame/mount colour must suit image colours (i.e. careful use of ice-white or black frames)
- Used matt/textured fine art paper for landscape pictures but glossy for high-res wildlife
- No parallel lines (unless adequately counterbalanced)
- Lines are counter-balanced
- Heavy items at bottom of picture so not top-heavy
- Used lines, curves or circles or spirals to lead-in to point of interest
- No undesirable shadows
- Allowed some blur on moving objects to indicate movement
- Check nothing can be added or taken away to make the picture better
- If a picture of two people they need to interact with each-other, not be two separate people
- If a portrait, the model should be looking at the camera (interacting with the viewer of the photo), unless deliberately different, such as a moody or shy look
- Ensure no banding (strobing between shutter speed and lighting flicker frequency)
- Black and white must include pure blacks and pure whites and uses full range of mid-tones between
- Check background to avoid distractions from the main object (preserve ‘unity’)
- Ensure there are no bright areas near the edge of the picture
- Any writing in the picture must be fully legible or totally illegible
- Contains dramatic skies (not just plain white or grey or blue)
- Ensure sky is not too bright compared to the subject
- The picture tells a story, emotion or expression with good composition and pictorial effect

- Destroy bad images immediately, only share good pictures (protect your reputation)
- Use fill-flash even in daylight, if necessary, to lighten the main areas of the image
- Use pyramid/triangle/wedge shapes for composition
- Only use a 'keyline'/'outline' around a picture if projected with black background
- Ensure mount size suits the size of the picture
- Cut mount aperture to match aspect ratio of the picture, don’t adjust/crop image to fit mount
- Ensure any post-processing hasn’t introduced any unwanted artefacts, such as halos or shadows along edges
- Image is well framed and does not need any more cropping to make the image ‘stronger’
- Multiple types of light source are not present (ensure only one colour temperature is present so white balance can be correctly set)

End