

## READING an EXPOSURE METER

An exposure meter will appear in the viewfinder when the camera is switched to Manual Exposure Mode. It will show if the combination of Aperture and Shutter Speed settings that are set will let in too much light (over-exposure), just the right amount (proper exposure), or let in too little light (under-exposure). The amount of light is calibrated in  $f$  stops. Each full stop is twice as much, or half as much light as its neighbor. There are typically clicks on the lens to adjust for  $\frac{1}{3}$  stops in-between the full stops.

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-2            -1            0            +1            +2

Whenever the Aperture or Shutter Speed is changed, the amount of light that will hit the film or sensor will change. The goal is to have the exposure meter pointing to 0, meaning that the proper exposure is set and the right amount of light to make a good photograph is entering the camera.

### AVERAGING METERS

Light meters do not really tell how to set the right exposure, however. They have no idea what you're taking a picture of. What they are really doing is averaging all the light coming into the lens, paying more attention to the center area, and comparing the tonality of that light, the luminance, to middle gray. Then they will tell you how much light to let into the camera to render your subject middle gray.

Now you have to make an aesthetic judgment about the tonality of the subject. Is it lighter or darker than middle gray?

- If the subject is lighter than middle gray then overexpose the shot somewhat.  
The extreme situation would be shooting snow.  
This would require a +2 stop overexposure.
- If your subject is darker than middle gray then under exposure the shot somewhat.  
The darkest shadows with detail are usually -2 stops darker than middle gray.

When shooting film, the medium requires that you pay more attention to shadows, just because the way film is processed. Once the shadow detail is gone, it cannot be fixed in the darroom. With digital photography the highlights are more important because It is very easy to blow out the highlights.. Once the highlight detail is gone it can never be fixed in Photoshop.

### BRACKETING

One way to be sure exactly an appropriate exposure setting to being used is to bracket the exposures. This means taking three shots of the same subject. One will be what you think is right, another  $\frac{1}{3}$  to  $\frac{1}{2}$  stop underexposed, and another  $\frac{1}{3}$  to  $\frac{1}{2}$  stop over exposed. In more dramatic lighting situations it may be appropriate to bracket even wider than this. I stop in each direction, or make a 5-shot bracket. Some cameras have the ability to set this as a shooting option so the camera will bracket automatically.

## EXPOSURE TECHNIQUE

### APERTURE, technical explanation

Aperture is the opening inside the lens. It opens and closes to let more or less light enter the camera. The size of the opening is named according to the focal length of the lens. The actual size is not important, just its relative size. The important point is that  $f/4$  on any lens for example, lets in the same amount of light. This allows lenses to be easily interchangeable.

The standard full  $f$ /stops on a camera are as follows:

2 .. 2.8 .. 4 .. 5.6 .. 8 .. 11 .. 16 .. 22 .. 32

There are numbers for the  $\frac{1}{3}$  stops between each of these. A good way to remember is:

**BIG NUMBER = small light / small number = BIG LIGHT**

The name of each  $f$  stop is written as

$f$	meaning focal length of the lens
/	over or divided by
4	a number

For example:

- a 50mm 'normal' lens set to  $f/2$  has an aperture of 25
- a 35mm wide angle lens set to  $f/2$  has an aperture of 17.5mm
- a 200mm telephoto lens set to  $f/2$  has an aperture of 100mm

Since the wider lens lets in more light than the normal lens, the aperture has to be smaller to let in the same amount of light. The inverse is true for the longer lens, i.e. a 200mm lens needs to have an aperture of 100mm to let in the same amount of light at  $f/2$ .

The bottom line is that you do not have to remember any of this when shooting.

Just understand that  $f$ /stops are consistent from lens to lens.  
 $f$ /stops of the same number let in the same amount of light  
no matter what lens is being used.

### SHUTTER SPEED, technical explanation

The shutter is a curtain behind the lens that keeps light from hitting the sensor. When a photo is taken, the shutter opens to let light hit the sensor. The Shutter Speed controls how long the shutter will stay open to make an exposure. A slower speed lets in more light, while a faster speed lets in less light. Again, the way to remember is:

**BIG NUMBER = small light / small number = BIG LIGHT**

Changes in Shutter Speed are also called 'stops' of light. The standard full stops of exposure in Shutter Speeds are:

1000 .. 500 .. 250 .. 125 .. 60 .. 30 .. 15 .. 8 .. 4 .. 2 .. 1

These numbers represent fractions of a second, e.g. 1000 is really  $1/1000^{\text{th}}$  of a second while 4 is  $\frac{1}{4}$  of a second. There are also speeds at  $\frac{1}{3}$  stop intervals between the numbers, but the numbers above are the standard shutter speeds. Many cameras also go beyond these values. Some go as fast as  $1/4000^{\text{th}}$  of a second, while many go as slow as 8 full seconds.

## EXPOSURE AESTHETICS

The big question, the real question is: How do you want your photographs to look? What is the photo about? It is not enough to get the exposure right. Once you know what your subject is, you have to use Depth of Field and Movement to make the intent more clear. Aperture controls Depth of Field while Shutter Speed controls Movement, and their creative use can greatly effect how the camera renders the subject's appearance.

APERTURE, aesthetic explanation

The range of the focus in a photograph is known as Depth of Field. This term describes how deep the space is between the closest object in focus and the farthest. The center of the Depth of Field is about  $\frac{1}{3}$  of the way back into this range.

Aperture controls Depth of Field. [SPACE]

Some photographs use a very deep Depth of Field so that everything is in focus. Others employ a very shallow Depth of Field so that only one small plane is in focus. The optical depth of this range is controlled by the size of the Aperture, as described above.

The size of the Aperture also controls how much light enters the lens to hit the film or sensor in the back of the camera. The Depth of Field therefore, is technically controlled by the Aperture, but its use is controlled by an aesthetic decision about how the photograph should look and how much should be in focus. This is a very important tool, that establishes a hierarchy that leads a viewer through the subject matter in the photo.

Use a small Aperture to produce a deep Depth of Field when a detailed rendition of a subject with everything is in focus is desired. The smaller the aperture is the greater the depth of field will be, meaning more things will be in focus at the same time.

Use a larger Aperture for a more shallow Depth of Field when only a specific section of the photograph is to be in focus. This will focus in on the plane of interest and throw the rest of the photo softer. The amount of difference between the focused and unfocused areas depends on how large the Aperture is. Shooting with the lens 'wide open' will give you the narrowest depth of field and can be a great looking effect.

Sometimes an Aperture setting somewhere in the middle range will do just fine, if the space is not a critical feature of the subject.

SHUTTER SPEED, aesthetic explanation

The world is constantly in motion. The Shutter Speed of the camera controls how long the shutter will remain open to capture movement and also allow light to hit the film or sensor. The longer the shutter stays open, the more time will pass during the shot and the greater the chance for something to change its position. The degree of movement captured depends on how fast or slow the shutter is.

Shutter Speed controls Movement [TIME]

Use a shorter, faster Shutter Speed to eliminate any movement in the subject, freezing motion and freezing time. A very fast Shutter Speed can render what is called 'camera vision', frozen movement that the human eye cannot perceive.

Using Shutter Speeds in the middle of the range yield photos that look more or less normal, with slight variations depending on how fast or slow objects are moving through the frame of vision. This can be fine, especially if the sense of movement or passage of time is not important to the subject.

Use a longer, faster Shutter Speed to allow some larger amount of time to pass while the shot is being made. This will let moving things appear blurry, hence the term 'Motion Blur'. This will render moving objects soft, melting time, which is sometimes desirable. This technique can be used to express what it *'feels like'* to do something rather than just its appearance.

## EXPOSURE ADJUSTMENT

Exposure is the art of determining how much light you need to render a negative with just the right density in the highlights down to the shadows. An aesthetic decision has to be made about the content of the photo to be shot, before a technical decision of exactly which shutter speed and  $f$ /stop can be made.

"Exposure is really an aesthetic decision first, followed by a technical response."

### AVERAGE

Let's consider a basic exposure, right in the middle, with average Depth of Field and average Shutter Speed. This is what you most likely get if the camera is set to Program Mode (no control). Below is the range of  $f$ /stops and shutter speeds on a typical camera. Those in brackets are found on a View Camera but usually not on a standard 35mm SLR.

Assume that the combination of  $f/5.6$  at  $1/60^{\text{th}}$  of a second is the right amount of light to render middle grey in the subject as middle grey on the film. This combination will give you an average amount of Depth of Field and capture an average amount of time. The key word is 'average', but what if you need more specific control of your photo?

(1.4)	2	2.8	4	5.6	8	11	16	(22)	(32)	(64)
1000	500	250	125	60	30	15	8	4	2	1

### SHUTTER SPEED, aesthetic + technical explanation

The SHUTTER SPEED controls TIME.

What if you need to get a crisp shot of something moving rapidly? A shorter, faster Shutter Speed is required. The Shutter Speed can be reduced by 3 stops from the original example, but 3 stops of light is lost. This is  $1/8^{\text{th}}$  the amount of light. To compensate for this the Aperture can be opened by 3 stops, letting in 8x more light. The combination of  $f/2$  at  $1/500^{\text{th}}$  of a second lets in the same amount of light as before. The exposure is exactly the same as the Average shot, but the photograph will look completely different! You will get your clear movement but you will lose the Depth of Field and only 1 plane will be in focus.

If this is satisfactory, shoot.

	open 3 stops [8x]									
(1.4)	2	2.8	4	5.6	8	11	16	(22)	(32)	(64)
1000	500	250	125	60	30	15	8	4	2	1
	close 3 stops [ $1/8$ x]									

### MELTING TIME / FASTER SHUTTER SPEED controls MOVEMENT

Sometimes you may want the Shutter Speed to be very slow, to emphasize the movement. This can be about what it *feels like* to do something rather than just capturing its appearance.

## EXPOSURE ADJUSTMENT, cont'd.

APERTURE, aesthetic + technical explanation

The APERTURE controls SPACE.

What if, on the other hand, you need to get a shot with everything clearly in focus. A smaller Aperture is required. You can close down the Aperture by 3 stops, but 3 stops of light is once again lost. This is  $1/8^{\text{th}}$  the amount of light. To compensate for this loss of light the Shutter Speed can be slowed down, opening up by 3 stops, letting in 8x more light. The combination of  $f/16$  at  $1/8^{\text{th}}$  of a second lets the same amount of light come into the camera as we had before. The exposure is exactly the same but the photograph will look completely different in the opposite direction! You will get deep Depth of Field but you will lose the crisp movement.

If this is satisfactory, shoot.

					close 3 stops [ $1/8x$ ]					
(1.4)	2	2.8	4	5.6	8	11	16	(22)	(32)	(64)
1000	500	250	125	60	30	15	8	4	2	1
					open 3 stops [ $8x$ ]					

## BALANCE

Actually, ALL of the Shutter Speed and Aperture combinations in the chart let exactly the same amount of light into the camera. The decision of which combination to use is an aesthetic one in the end. How do you want your photograph to look? What is it about? What is more important, the Time or the Space in the photograph?

The combination in these charts, however, is only for one specific amount of light in the scene. The two sets of numbers, the Shutter Speeds and Aperture settings, shift relative to each other as the light changes. You will rarely have this same alignment.

The Exposure process has 5 steps:

- determine the right amount of light for the given lighting situation
- decide if Time or Space is the priority
  - determine which setting takes priority - the Shutter Speed or the Aperture
- set the prioritized setting first
- set the other setting to let in that right amount of light
- compromise

You will find that you rarely have enough light to get the exact desired Shutter Speed and Aperture combination. You usually have to make some sort of compromise.

Eventually you have to get good enough at making all of these decisions so that you can forget the process and incorporate the decision making in with your framing and composition. It all has to happen at once. This is the function of Discipline - so that you can connect your heart to your hand without your head getting too much in the way. When you get this together, you become a Zen Master of exposure.

## MOVEMENT AND DEPTH OF FIELD - Shooting Assignment

### EXPOSURE

For the time being we will assume that your meter is relatively correct in its suggestions of how to set your shutter speed and  $f$ /stop. Follow those suggestions for this assignment.

### GENERAL CONDITIONS

Shoot outside in an average lighting situation.

Use ASA 400 speed film to shoot.

Write down the subject matter, shutter speed, and  $f$ /stop specs for all shots.

Do not rewind the film all the way into the film cassette! This saves one step.

### MOVEMENT

Find a scene or subject with consistent movement; get close enough so the moving part of the subject fills the viewfinder.

- Set shutter to the maximum (1/1000th sec.); set  $f$ /stop so the meter says okay; shoot one frame.
- Reset shutter speed one stop slower; reset  $f$ /stop to compensate for the loss of light; shoot again.
- Continue taking the same picture at every shutter speed until you run out of  $f$ /stops.

Find another scene with consistent movement and repeat the above procedure until you shoot all 36 exposures on your roll of film.

- For the 4th and 5th series, try starting with a slower shutter speed (maybe 1/25) to see how the really slow shutter speed appear.

### DEPTH OF FIELD

Find a scene with depth, rows of things not too far apart; get close enough so the closest thing is only a foot or so in front of you; focus about one-third of the way back;

- Set your  $f$ /stop to maximum ( $f$ /1.8 usually); set shutter speed so the meter says okay; shoot one frame.
- Reset aperture one stop smaller; reset shutter speed to compensate for the loss of light; shoot again.
- Continue this process, taking the same picture at every  $f$ /stop on your lens.

Find another scene with depth and repeat the above procedure until you shoot all 36 exposures on the roll.

### FOR NEXT CLASS

Bring the exposed film into the next class for development.

Contact sheets of these shots will be handed in to the instructor.

READ chapters 5 and 6 in the Horenstein book, if you have it, so you will have an idea of what will be discussed in the next class.

This is Experiential Learning. It is not stuff that you can learn by reading and listening. You can only learn it by doing. If you are confused after the lectures that explain the preceding material, that is okay. Technology does that. Even if while listening to the lectures you think everything makes sense, that is technology fooling you. It is easy for something to sound like it makes sense. Then when you go out to do it, it may get confusing again. That is okay. Photography is learning how to dance with your camera. Once you have learned how your camera deals with all these technical concerns, you can forget it all and work by instinct. This is the function of discipline. So stick with it, get used to it, learn it, and then forget it. Okay?

## DARKS AND LIGHTS - Shooting Assignment

The first seven or so frames of each of these two rolls will produce an exposure test. The resulting negatives will all be one stop different from each other in exposure. Viewing these will give you a good idea of how your film and your meter interact.

Shoot outside in bright shade. Write down all the exposure information!  
You can only do this assignment using your camera in fully manual mode.

### DARKS

- find a very dark or black textured cloth
  - set yourself up so that the cloth completely fills the frame
- set  $f$ /stop to  $f/5.6$
- adjust the shutter speed until the meter says the light is right
  - LEAVE SHUTTER SPEED AT THIS SETTING until you finish these exposures
- take one exposure at every  $f$ /stop available, starting with the largest ( $f/1.8$  or  $f/2$ )
  - use full  $f$ /stops, if the lens has clicks at half  $f$ /stops,  
move two clicks between frames
  - your meter will start yelling that you are over or under exposing
  - that is exactly what you want in this case
- finish the roll of 36 exposure ASA 400 film by taking three bracketed shots each ( $-1$ , norm,  $+1$ ) of situations where 80% of the image is overly dark or black.
  - make sure to WRITE DOWN the data for every shot.

### LIGHTS

- find a very light or white textured cloth
- using the same procedure as above, shoot a full range bracket of the cloth
- finish the roll of 36 exposure ASA 400 film by taking three bracketed shots each ( $-1$ , norm,  $+1$ ) of situations where 80% of the image is overly light or white
  - make sure to WRITE DOWN the data for every shot.
  - Do not rewind your film all the way into the film cassette!

AFTER the film is placed into negative files, go back to your notebook and write down the  $f$ /stop and shutter speed for each shot on the plastic below each frame. Do this carefully and make sure you have the right information under the right frame. (the frame numbers may not match up because you may have started shooting on frame 0 or frame 2). This process is very important because these contact sheets will serve as reference sheets for all future shots.

PRESENT contact sheets of these two rolls plus contact sheets of the depth-of-field and movement shots from last week to the instructor. When returned, file the contact sheets in your Negative Storage Binder next to the appropriate negative file sheet. Remember to keep a log of every shot you take in a small notebook that you can keep with your camera. Write down the frame number, subject,  $f$ /stop, and shutter speed for each shot, and the type of film for each roll. It pays to be compulsive when doing photography.