The chicken/egg photographic dilemma

EXPOSURE: APERTURE & SHUTTER

What is a camera?

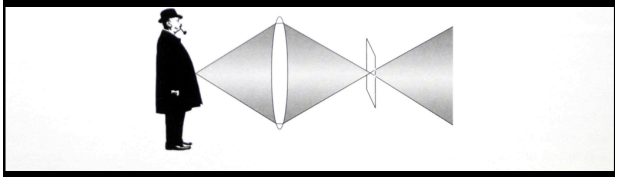
Aperture, focus, and depth of field

Part One

The Aperture

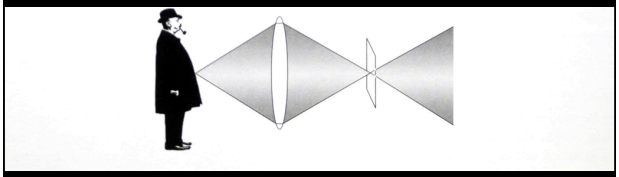
Focus and Depth of Field

- A lens can only focus on a single distance at a time



Focus and Depth of Field

- However, part of the scene will be acceptably sharp in front and behind the focus plane

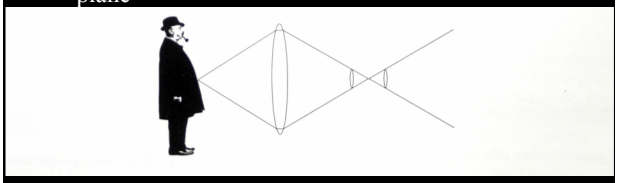


Point of Focus - near

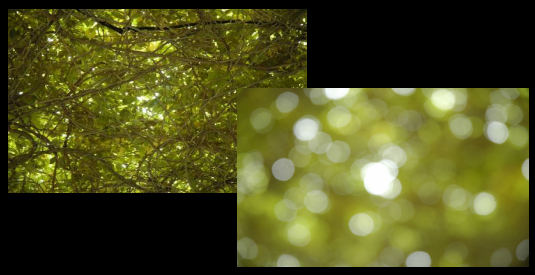
Point of Focus - far

Focus and Depth of Field

- Objects will gradually become more and more out of focus as distance increases from the focal plane

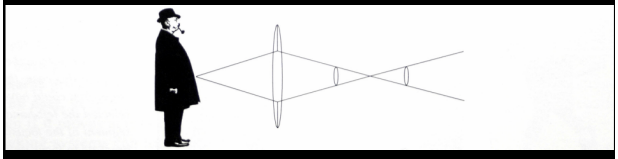


Focus and Blur



Focus and Depth of Field

- Depth of Field is the part of the scene that appears acceptably sharp in the photograph



Measuring the *f* Stop

$$f \text{ stop} = \frac{\text{Lens Focal Length}}{\text{Aperture Diameter}}$$

Doing the Numbers

F Stop	*1*	*2*	*4*	*8*	*16*
Aperture diameter approx	100	50	25	12.5	6.25
Focal length	100	100	100	100	100

f numbers - doubling & halving the light

F Stop	*1*	*1.4*	*2*	*2.8*	*4*	*5.6*	*8*	*11*	*16*	*22*
	< Wider aperture, therefore more light					Narrower aperture, therefore less light >				
Aperture diameter approx	100	75	50	37.5	25	16.7	12.5	8.4	6.25	4.2
Focal length	100	100	100	100	100	100	100	100	100	100

Controlling Depth of Field focus on the front person

Focus on centre figure, shallow depth of field

Focus on centre figure, deep depth of field

Controlling Depth of Field

- Zone Focussing
  - To obtain focus between two different distances in the frame
- Rule of Thumb
  - Normal subjects
    - Focus 1/3 way in
  - Close-up subjects
    - Focus 1/2 way in

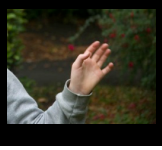
Shutter speed

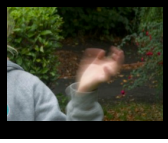
Part Two

The Shutter

Shutter Speeds

- Short Exposure Times
  - Freezes subject
  - Requires a larger aperture
  - Overcomes camera movement
- Long Exposure Times
  - Subject blur
  - Requires a smaller aperture
  - May require tripod





Shutter changes

- Changing *Shutter* speed either halves or doubles the light on the film, for example 1/30

Shutter Speed	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2
Effect on the light falling on film	1/16	1/8	1/4	1/2	1	X 2	X 4	X 8	X 16
	< < < Light halves per shutter speed					> > > Light doubles per shutter speed			

Aperture changes

- Changing *Aperture* either doubles or halves the light passing through the lens, for example *f*5.6

f Stop	1.4	2	2.8	4	5.6	8	11	16	22
Effect on the light passing through the lens	X 16	X 8	X 4	X 2	1	1/2	1/4	1/8	X 16
	< < < Light doubles per *f Stop*					> > > Light halves per *f Stop*			

Putting it all together

Part Three

What is the relationship between aperture and shutter?

- Aperture = Intensity
- Shutter Speed = Time

- Exposure = Intensity X Time

- The term *Exposure* implies the combination of *Aperture* and *Shutter Speed*

Reciprocity

- This is a reciprocal relationship.
- Any change to the *Aperture* means an equal and opposite change to the *Shutter Speed* in order to maintain the **same** exposure.
- If the *Exposure* remains the same then the chip or film still receives the same amount of light.

F Stop	1.4	2	2.8	4	5.6	8	11	16	22
Effect on the light passing through the lens	X 16	X 8	X 4	X 2	1	1/2	1/4	1/8	X 16
Shutter Speed	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2
Effect on the light falling on film	1/16	1/8	1/4	1/2	1	X 2	X 4	X 8	X 16

•Each combination produces exactly the same level of exposure on the film

•1/30 @ *f*5.6 is the same *Exposure* as 1/500 @ *f1.4*

Same *Exposure* using different *Apertures* and *Shutter Speeds*

1/60 @ *f* 4

1/8 @ *f* 11

Same exposure, different visuals

Short exposure – frozen movement
Depth of field - shallow

Long exposure – blurred movement
Depth of field - deep

Summing it up

Exposure metering

Part Four

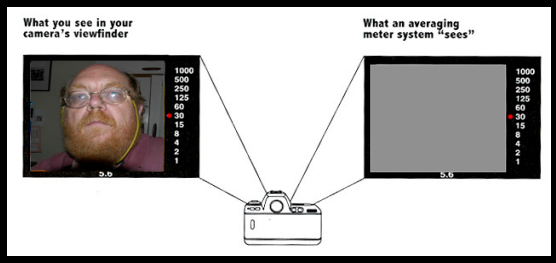
Exposure

- Exposure = Intensity X Time
- Intensity = Lens aperture (*f stop)*
- Time = Shutter Speed

What is the relationship between aperture and shutter?

- Aperture dictates
  the intensity of the light through the lens
- Shutter dictates
  the time (duration) of the light falling on the chip or film

What a Meter "Sees"



What a Meter Measures

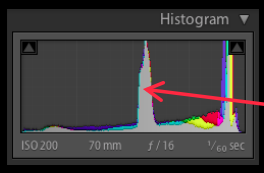
- The meter averages the scene to a "Middle Grey"
- Referred to as **18% Grey**

18% Grey Card

- It reflects 18% of light falling on it
- An exposure reading taken from an 18% grey card places the exposure on a predictable point on the characteristic curve
- Such a negative should reproduce the image of an 18% grey card as an 18% grey print

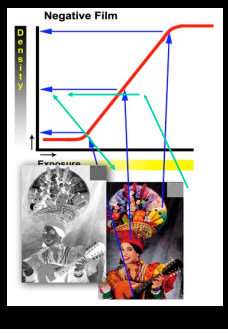
Digital example

- Places the exposure on centre of the histogram



Film example

- Places the exposure on the centre of the straight line portion of the charecteristic curve.



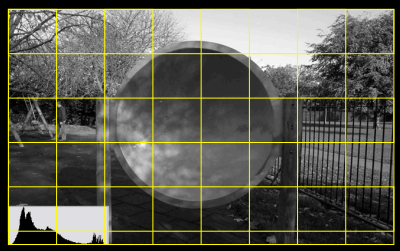
Typical Camera Meter Modes

- TTL meters vary depending on camera
- Typical modes:
  - Average Metering
  - Centre Weighed Metering
  - Matrix (or Multisegment) Metering
  - Spot Metering

Average Metering

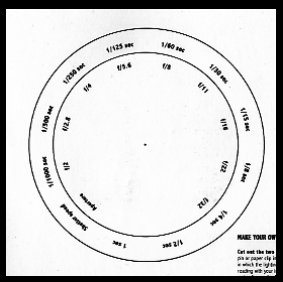
Centre Weighed Metering

Matrix (Multisegment) Metering



Spot Metering

Exposure Dial



- Cut out or copy from the back page of *Photography,* Barbara London
- Assemble the two dials
- Set the aperture and speed dials to your meter reading
- Each pair of settings equals the same *Exposure* level

Don't take all day, the light changes!

- Info @: www.fixerstain.com