

CHOOSING AND USING DIGITAL CAMERAS

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OVERVIEW

- Photography Basics
 - Aperture – shutter speed – ISO relationship
- Types of Cameras and their differences
 - Digital SLR's
 - Hybrids and mirrorless
- How to use them – setup tips, tricks and advice
- Software solutions

COMPROMISE

Photography is the combination of capturing an artistic vision (or simple documentation) by choosing a set of technical compromises

There is no one camera that is the best at everything

Hopefully this presentation will help you get the best out of the cameras you already have, or helps you in deciding what to purchase.

PHOTOGRAPHY BASICS

The relationship between:

- aperture
- shutter speed
- intensity of light (luminosity- ISO rating)

APERTURE

- (Often labeled as A or Av on lenses or dials) typical ranges are from f1.8 to f22 (depending on lens)
- Used to regulate the amount of light entering the camera but also has a direct effect on DOF
- Lower numbers indicate wider openings – when you need more light – like in low light areas – also creates a shallower DOF
- Higher numbers indicate smaller openings – when you need less light – like on a bright sunny day – Larger/Wider DOF

SHUTTER SPEED

- Often labeled as S or Tv (for time value)
- Shutters can be opened for seconds, minutes, even hours or they can be as short as 1/10,000 of a second. If you are shooting at that speed, you probably have a combination of bright light and high ISO
- Slow shutter speeds are often used to convey motion – waterfalls or other movement – If the speed is too slow – we get camera motion movement and wind up with blurred photo.

Slow shutter speed on tripod

$\frac{1}{2}$ second



SHUTTER SPEED

- In the old days of 35mm photography, we could use the rule:
- 1 over the focal length of the lens – to be the slowest hand-holdable shutter speed to prevent blurring due to camera shake.
- Today – focal lengths don't mean the same thing because image sensor size can be quite different from camera to camera. As well, we have optical image stabilizers that use either gyroscoped camera lens elements or gyroscoped in-the-camera-body image sensors to minimize blur due to camera shake. Which all means you can shoot handheld in lower light situations, or when you want to lower the ISO setting on the camera.
- This will not compensate for blur due to subject movement

ISO-1

- ISO setting is used to adjust (or amplify) the sensitivity of the sensor in the camera
- Turning up the ISO to higher numbers is something like turning up an audio amplifier if your source recording is way too low. (or if the light is too low) If you have to boost the signal electronically, you wind up getting noise (hum... crackle... noise).

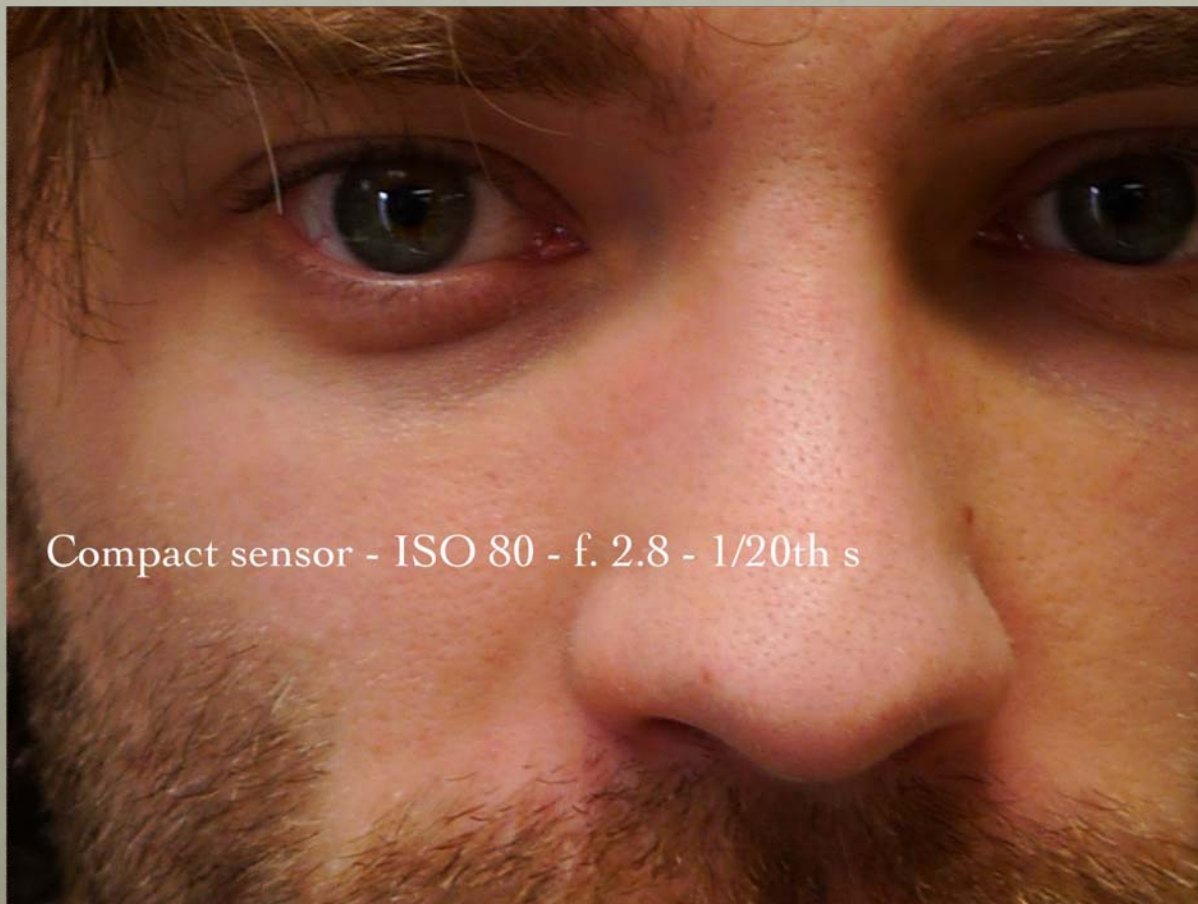
ISO-2

- Similar to audio noise, when you have to dial up a higher ISO value to compensate for low available light... you can get an overall more correct exposure – but at the sake of introducing some digital noise to your image.
- For that reason, we prefer to use as low an ISO setting that will allow for an acceptable hand-holdable shutter speed and/or the desired DOF that we get through our selected aperture value

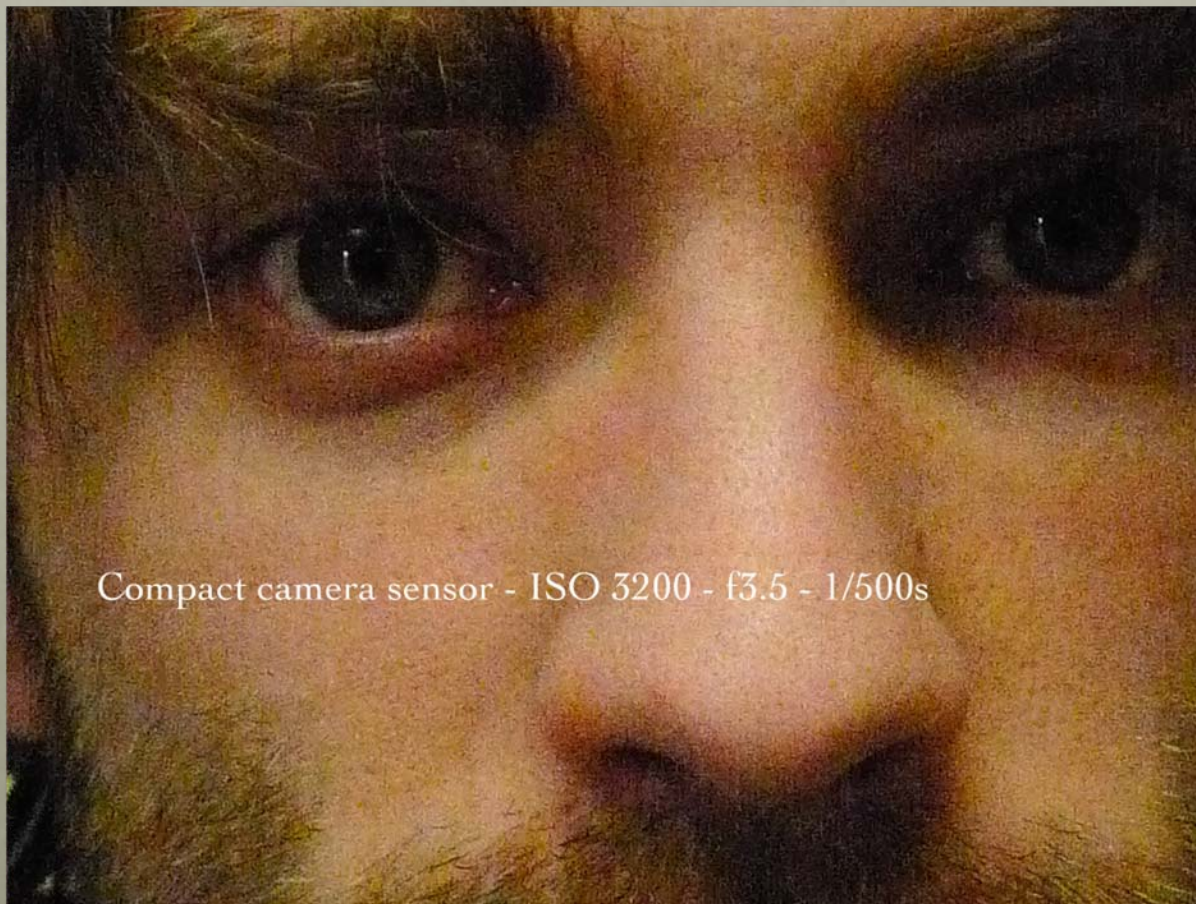
ISO-3

- Remember – Using a lower ISO – means less digital noise in image.
- Digital SLR's are making great leaps and bounds in high ISO-low available light shooting... far surpassing what high speed film could do for us in the past.
- Compact cameras – not good with high ISO and low light.
- Auto ISO settings – chooses optimal





Compact sensor - ISO 80 - f. 2.8 - 1/20th s



Compact camera sensor - ISO 3200 - f3.5 - 1/500s

DIFFERENCES IN CAMERA TYPES

Most obvious
differences are:

Size

Weight

Cost





WHAT'S THE DIFFERENCE?

The most significant factor contributing to the difference in size, weight and cost is the

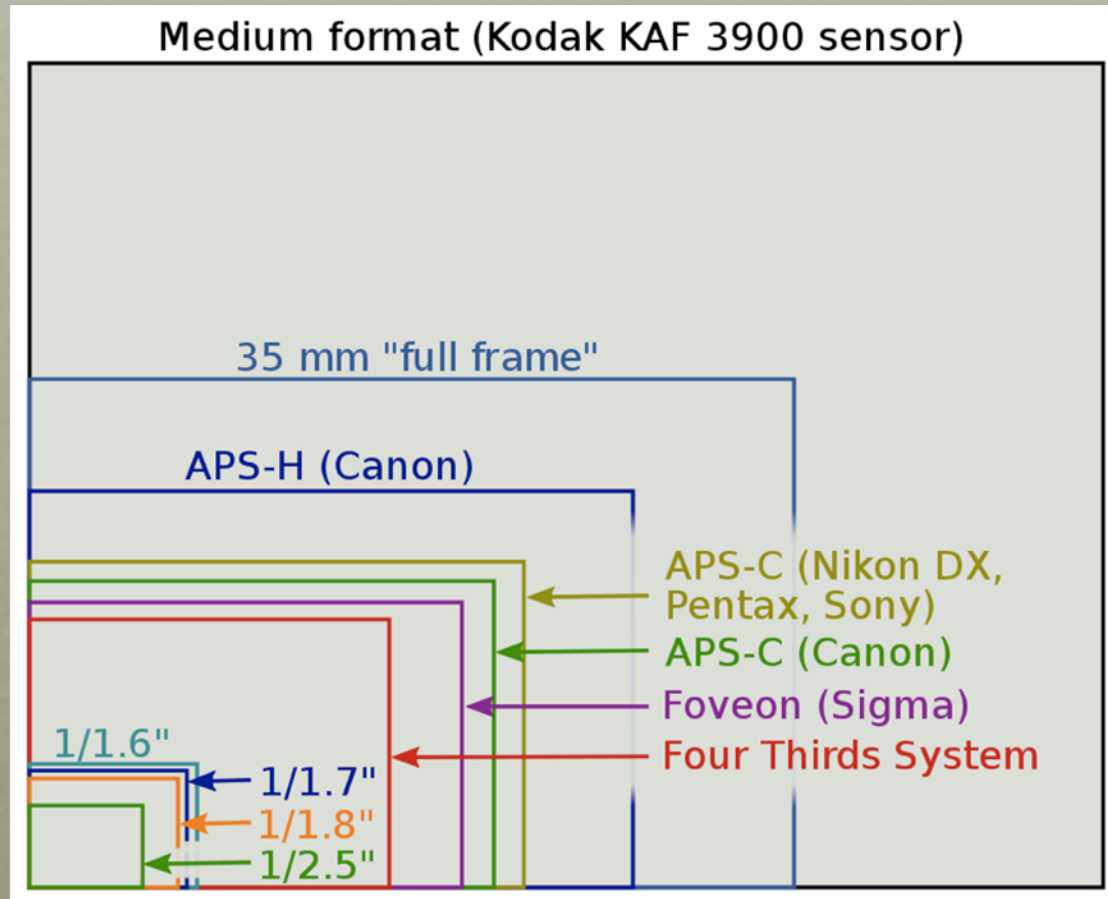
Sensor Size

Compacts vs 4/3'rds vs APS vs FF

In the days of film we were use to the idea that the little cameras used the same size 35mm film as the big cameras

SENSOR SIZE COMPARISON

[HTTP://EN.WIKIPEDIA.ORG/WIKI/IMAGE_SENSOR_FORMAT](http://en.wikipedia.org/wiki/Image_sensor_format)



PIXEL DENSITY MATTERS

- Measured in pixel per square centimeter
- Compare the pixel density of sensors in of a full frame (35mm size sensor) in an SLR to that of a compact camera
- 21MP Canon 5D Mark II (**2.4 MP/cm²**) (Full frame SLR sensor) sensor size equals area of 35mm film

Verses

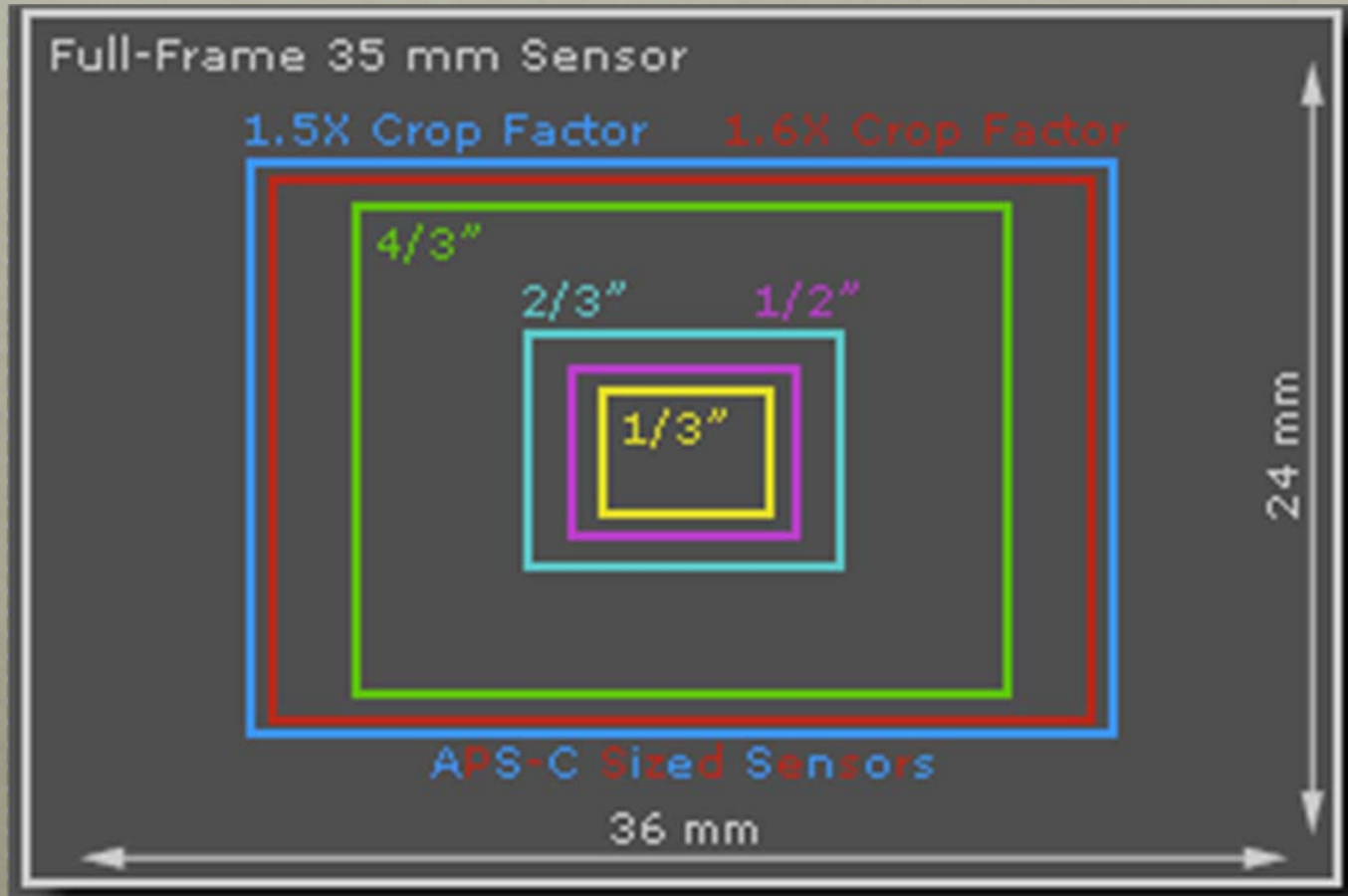
- Compact camera such as the 14.1MP Canon PowerShot SD1400IS (**50MP/cm²**)
- Low light sensitivity is poor in small sensors due to pixel density

MORE MEGAPIXELS = BETTER MYTH

- Truth is – too many pixels per square centimeter means that each pixel site does not capture light efficiently... it's simply too small
- You can buy 14MP cameras in both compact and SLR sizes
- 14 million photosites on the sensor of the compact camera are not going to be nearly as large as the 14 million photosites on the SLR sensor
- Larger photosites on sensors capture light more efficiently
- Cameras often sold on the number of megapixels

SENSOR SIZE COMPARISON

[HTTP://WWW.CAMBRIDGEINCOLOUR.COM/TUTORIALS/DIGITAL-CAMERA-SENSOR-SIZE.HTM](http://www.cambridgeincolour.com/tutorials/digital-camera-sensor-size.htm)



SLR LENSES

- Lens / sensor – two most important aspects of camera
- Sensor size – lens choice – AF-s size or Full Frame
- 1.6 crop factor and field of view on APS sized sensors

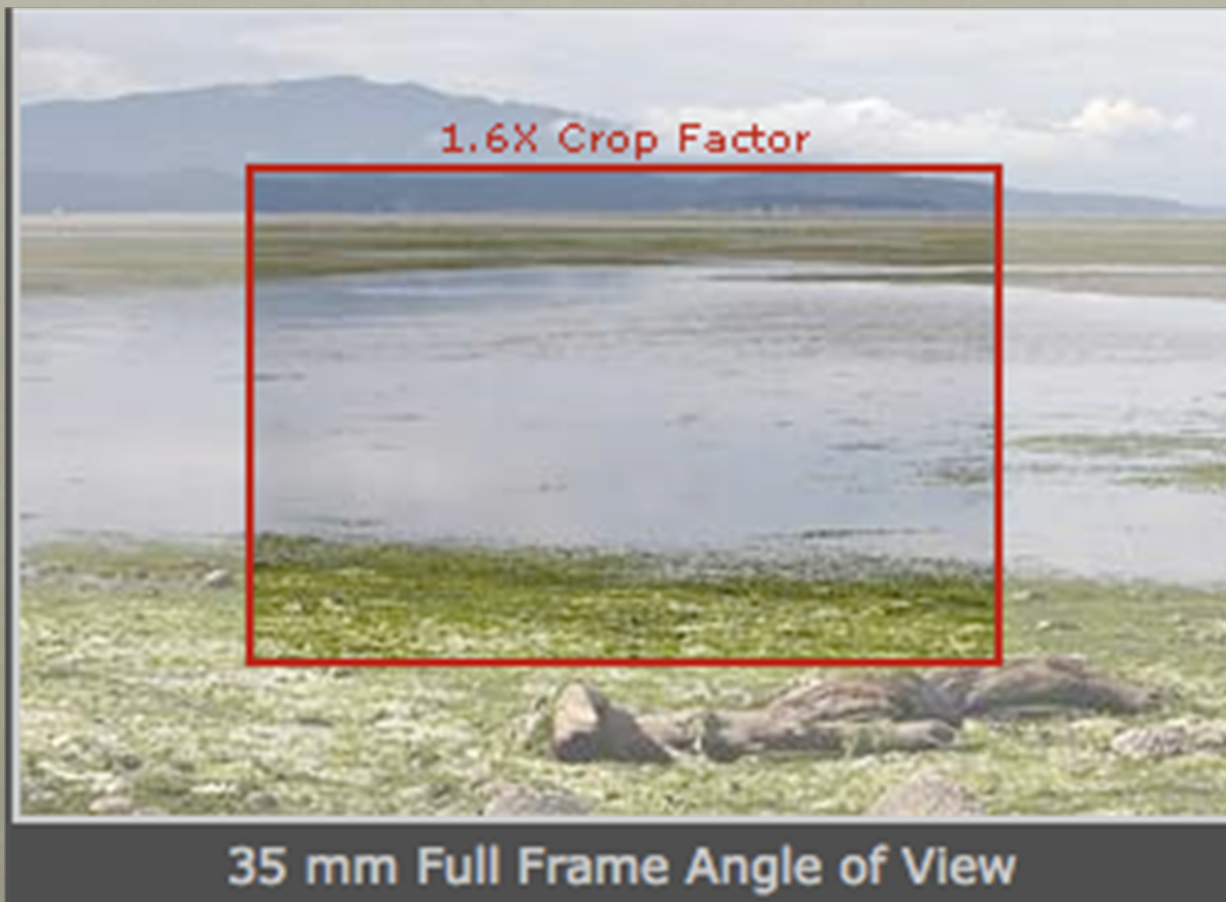
(35mm FF becomes 56mm lens)

(50mm FF becomes 80mm)

- Fixed focal lengths vs zooms
- Maximum aperture – stopping down - sharpness

SENSOR SIZE 1.6X CROP

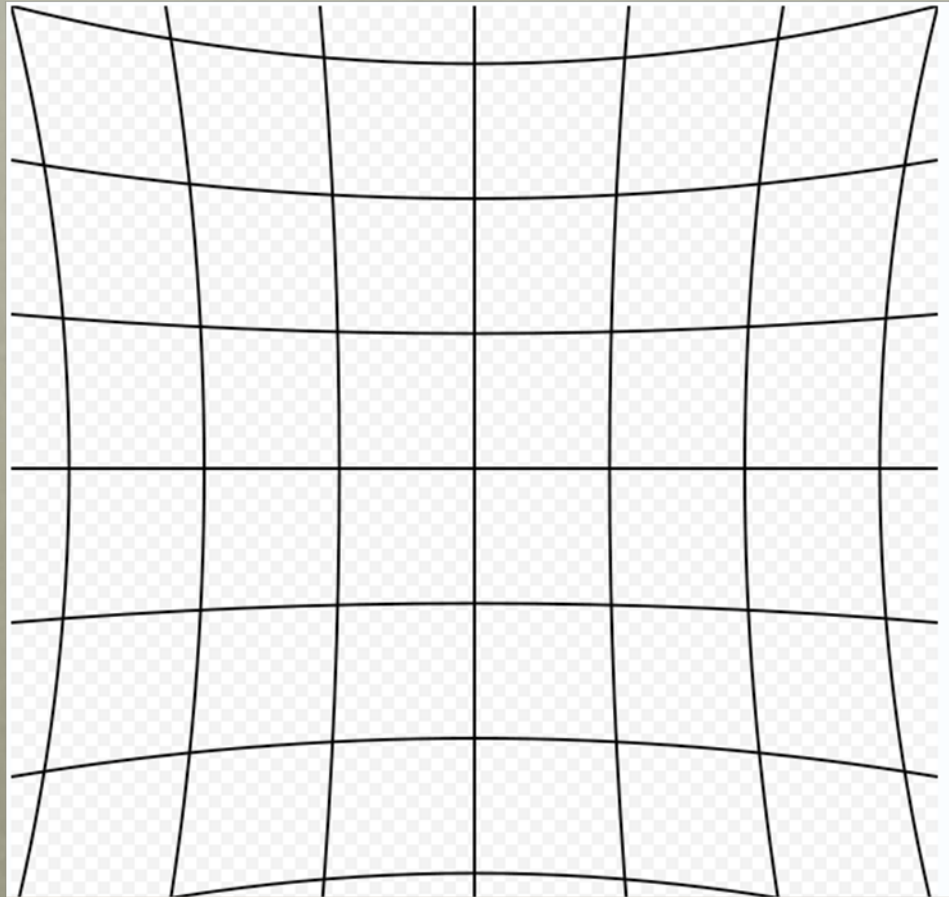
[HTTP://WWW.CAMBRIDGEINCOLOUR.COM/TUTORIALS/DIGITAL-CAMERA-SENSOR-SIZE.HTM](http://www.cambridgeincolour.com/tutorials/digital-camera-sensor-size.htm)



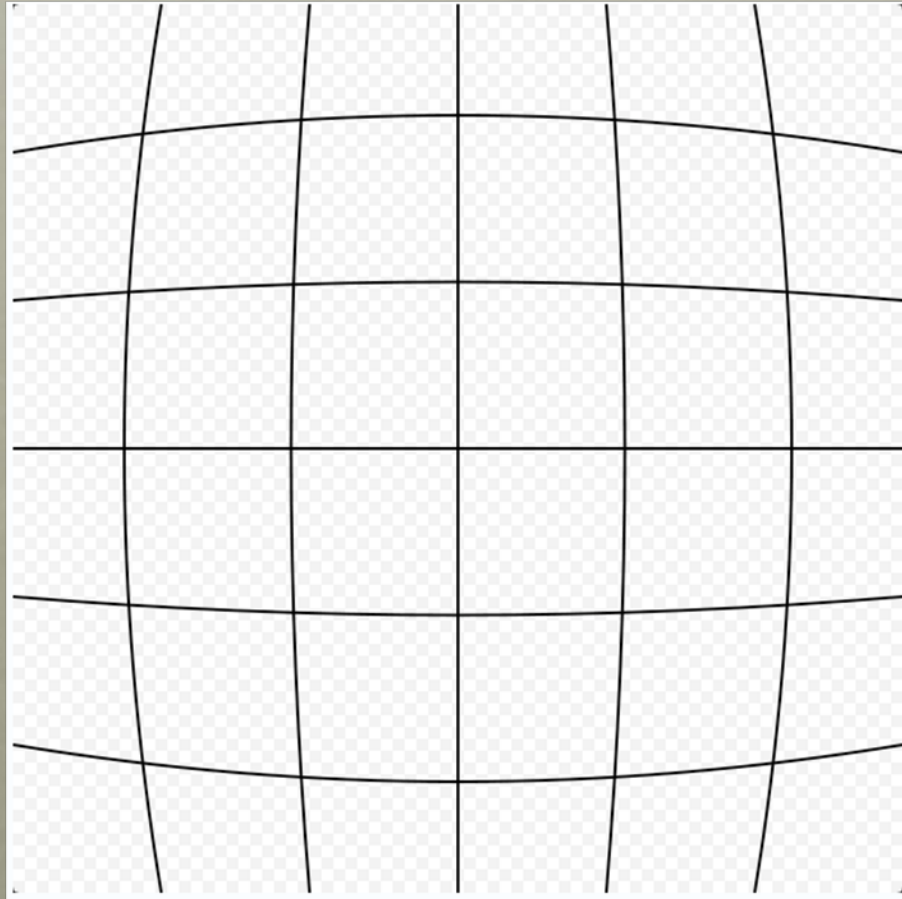
LENS DISTORTION

- When copying textual materials straight on, avoid focal lengths that have visible distortion – pin-cushioning or barrel
- To test optimal focal lengths to avoid distortion, perform test shots with graph paper and see which focal lengths present little or no distortion.
- Use this focal length and move height of tripod or copy stand closer or further away.

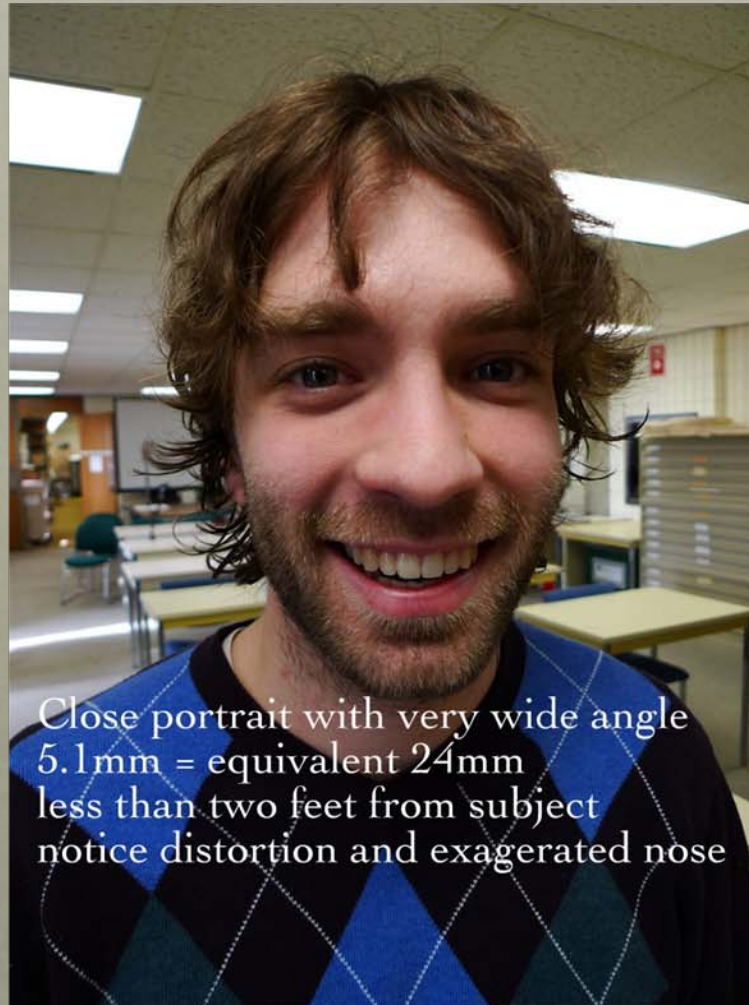
PIN-CUSHIONING



BARREL



BARREL DISTORTION AT WIDE ANGLE AND CLOSE RANGE



Bartholomaeus 24 Junii 1703

OPERA *Lafarge*

PETRI BLESEN-
SIS, BATHONIENSIS

*petri
fol. 503
473
nota 563*

QVONDAM IN ANGLIA AR-
CHIDIACONI, ET APVD CANTVA-
RIENSEM ARCHIEPISCOPVM
CANCELLARIUM.

OPE ET STUDIO

IOANNIS BVSÆI NOVIO-

magi, Societatis IESV Theologi,

EX PERVETVSTIS BIBLIOTHECIS

nunc primum in lucem producta, ac innumeris mendis collatione aliquot Co-
dicum M. SS. emaculata, variisq; Lectionibus, Notis, Præfa-
tionibus & Indicibus illustrata.

QVORVM OMNIUM,

ELENCHVM PAGINA PROXIMA
REPRÆSENTABIT.



B. PAVLVS IN II. AD TIMOTH. CAP. IV.

Testificor coram DEO & IESV CHRISTO, qui iudicaturus est viuos &
mortuos, & per aduentum ipsius & regnum eius prædica verbum. in-
sta opportunè, argue, obsecra, increpa in omni patientia & doctrina.

MOGVNTIÆ.

EX OFFICINA TYPOGRAPHICA IOANNIS ALBINI.

cl. 15. C.

1600

320758

E L E N C H V S
O M N I V M Q V Æ I N H O C
O P E R E C O N T I N E N T V R.

- I. **P** R A E F A T I O N E S binae. altera ad Archiepiscopum Moguntinum, altera ad candidum Lectorem.
- II. Elenchus Auctorum, quorum testimoniis P. Blesensis usus est.
- III. Elenchus duplex in Epistolas. alter eorum, ad quos epistolas suas Blesensis dedit. alter eorum, quorum nomine quasdam epistolas conscripsit.
- IV. Epistolarum C L X X X. Liber Vnus.
- V. Elenchus exhortationum, vel sermonum.
- VI. Sermonum L I. Liber Vnus.
- VII. Elenchus Opusculorum Decem.
- VIII. Tractatus de Transfiguratione Domini.
- IX. Tractatus de Conuersione S. Pauli Apostoli.
- X. Compendium super Iob.
- XI. Tractatus de peregrinatione Hierosolymitana acceleranda.
- XII. Instructio Fidei Christianae ad Soldanum Iconij.
- XIII. Liber de Confessione sacramentali.
- XIV. Liber de Penitentia, vel Satisfactione.
- XV. Canon Episcopalis, vel Tractatus de Officio Episcopi.
- XVI. Inuectiua contra deprauatorem.
- XVII. Tractatus de Amicitia Christiana.
- XVIII. Variæ Lectiones & Notæ breues in Opera P. Blesensis.
- XIX. Index testimoniorum S. Scripturæ, veteris & noui Testamenti.
- XX. Index rerum præcipuarum & Sententiarum.
- XXI. Index Prouerbiorum, vulgariumque dictorum à Blesensi usurpatorum.
- XXII. Index vocum barbararum, vel quæ barbaræ videri possent.

A C C E S S I T

Tractatus carmine conscriptus de mysteriis Venerabilis Sacramenti Eucharistiae, auctore Petro, ut apparet, Blesensi.

R E V E

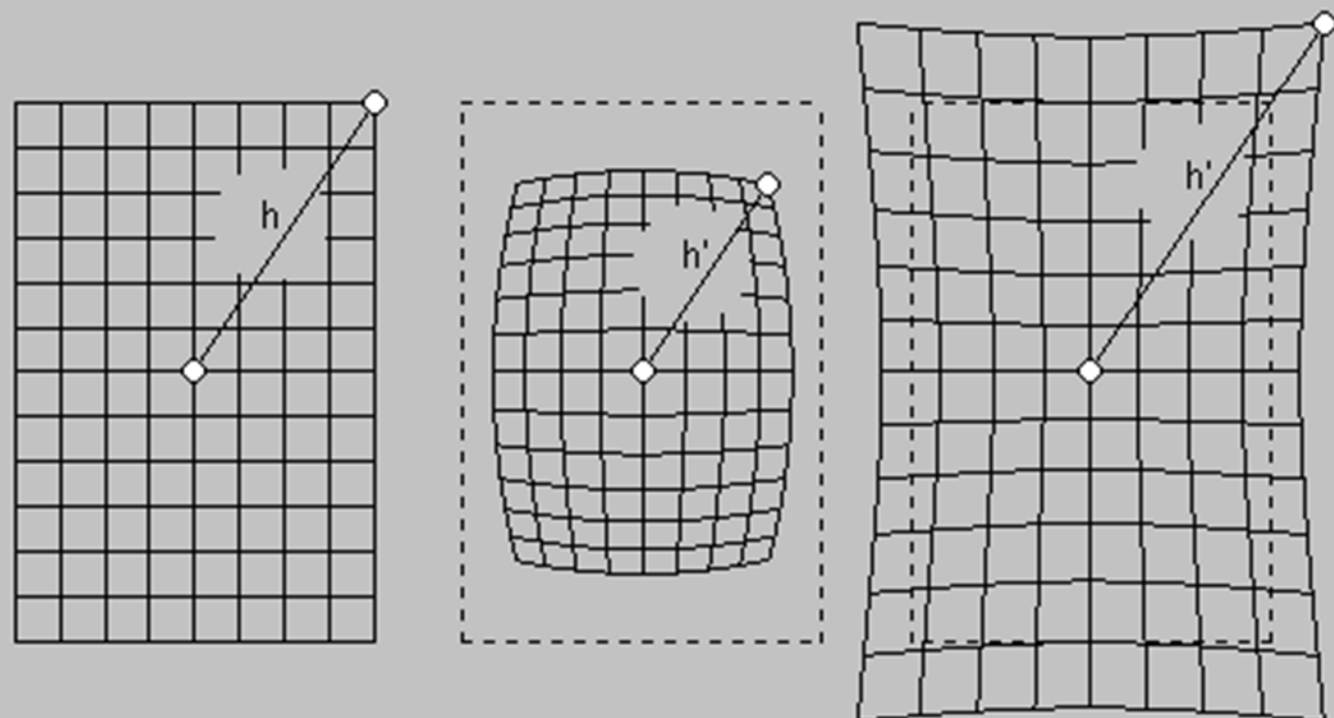


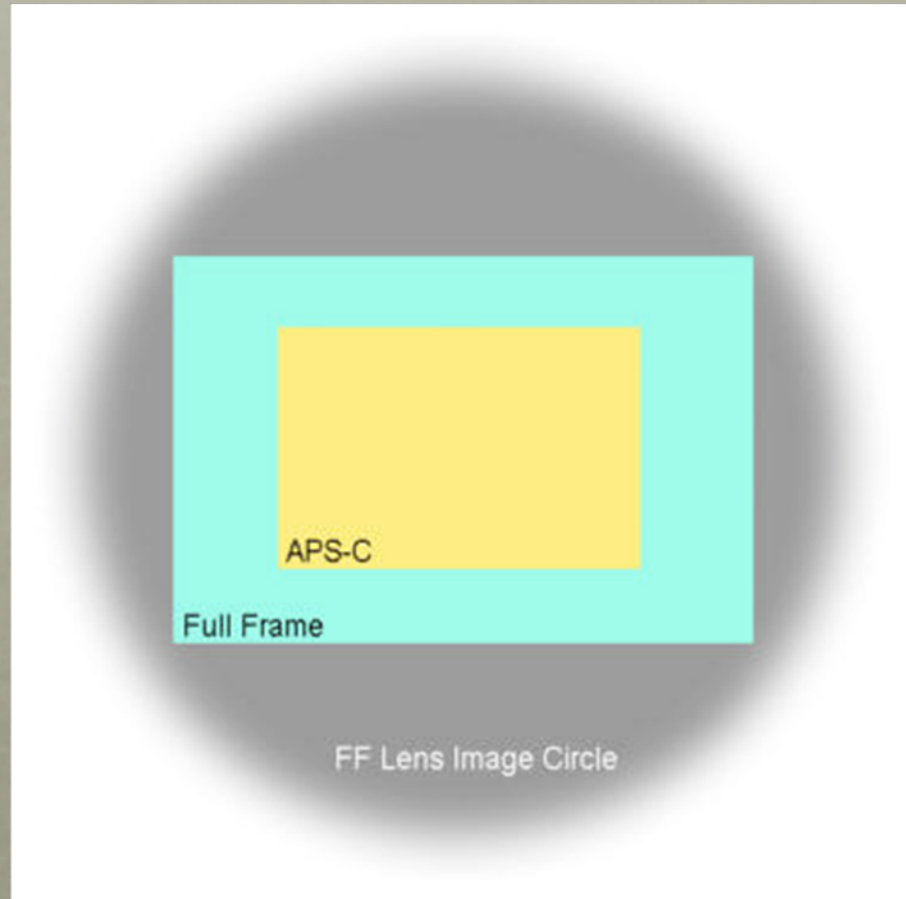
Figure 1. Distortion of a rectangular grid. Left: undistorted grid. Middle grid: barrel distortion. Right grid: pincushion distortion.

BARREL DISTORTION



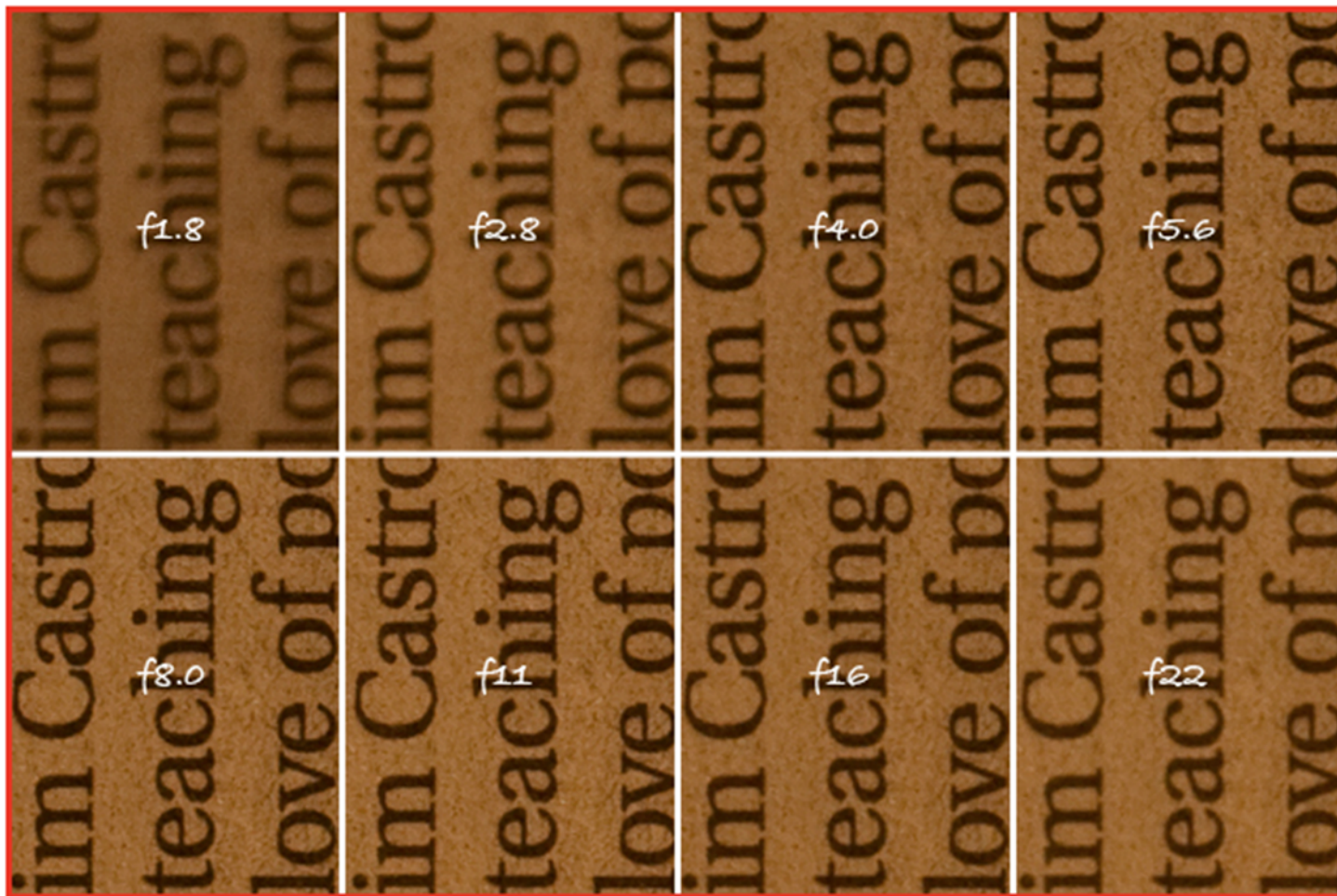
FULL FRAME (35MM) IMAGE CIRCLE

[HTTP://WWW.BOBATKINS.COM/PHOTOGRAPHY/DIGITAL/FULL_FRAME_VS_APS-C.HTML](http://www.bobatkins.com/photography/digital/full_frame_vs_aps-c.html)



CORNER AND EDGE SHARPNESS

[HTTP://WWW.PHOTOGRAPHYBAY.COM/2010/03/26/FINDING-THE-SWEET-SPOT/](http://www.photographybay.com/2010/03/26/finding-the-sweet-spot/)



WHAT TO CONSIDER WHEN PURCHASING A LENS

- Lens quality – sharpness in corners
- image circle of lens compared with sensor
- Zoom lenses vs. fixed lenses
- Flat field – pincushioning and barrel distortion

SHALLOW DEPTH OF FIELD (DOF) WIDE APERTURE 2.8 – TELEPHOTO 300MM – FF SENSOR

Jakie...

Kuala Lumpur

Portrait by Philip Chong, Malaysia

Combining characteristic of depth of field with larger lens aperture with a telephoto lens will yield pleasant result in portraiture photography. Unwanted background will blur out to draw viewer attention to the subject.

Copyright ©-Free 2000. [Philip Chong](#) ©

Malaysian Internet Resources

EOS1n with EF 300mm f2.8 L
Photo data: 1/500 sec f2.8

Press "Command + W " to close this window for **MacUser**; "Alt-F + Alt- C" for PC user.

| [close](#) |



SHALLOW DOF



APS sensor SLR - ISO 100 - f2.8 - 1/20th s



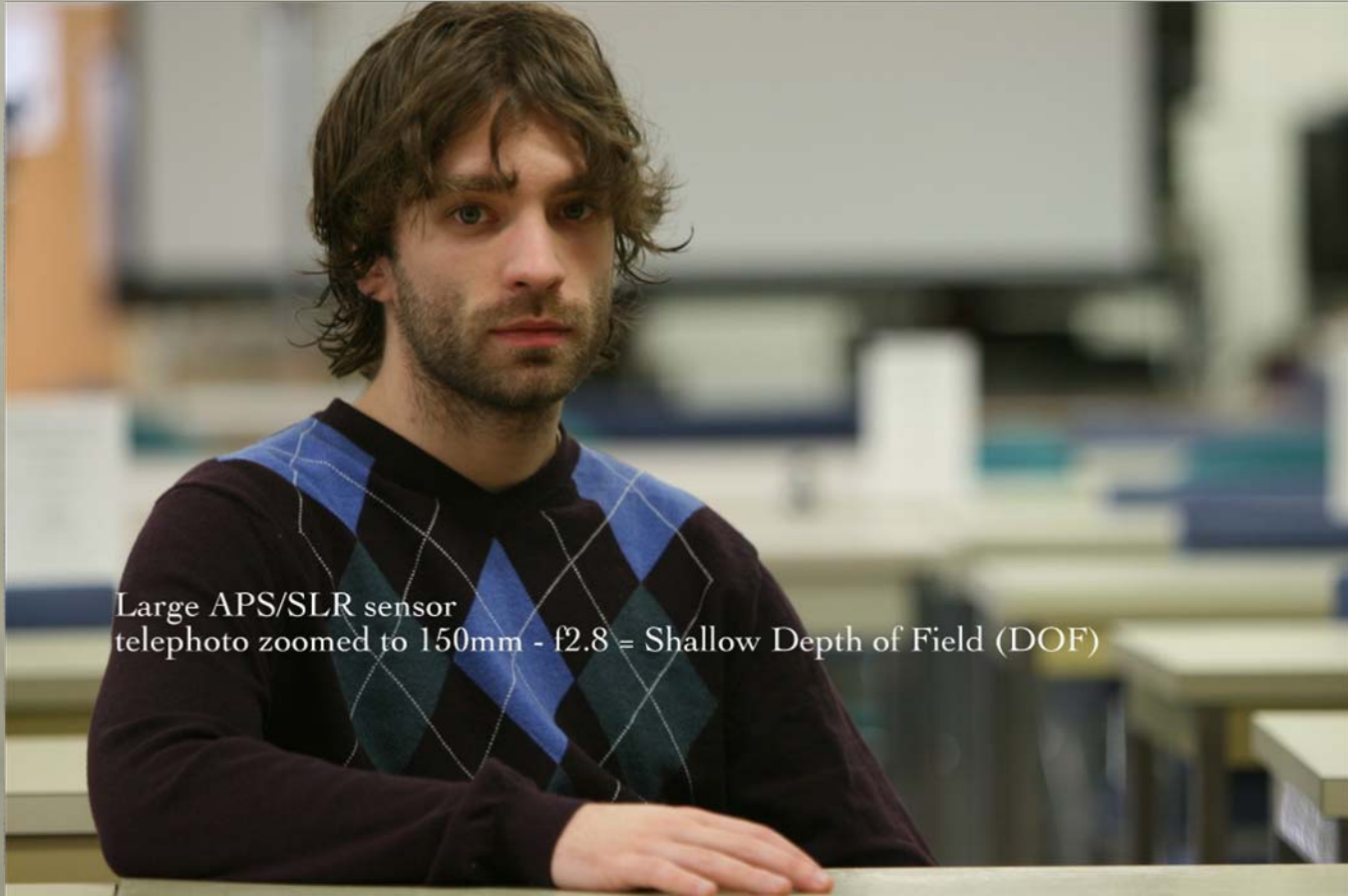
Compact camera sensor - ISO 80 - f 2.8 - 1/20th s

WIDE (LARGE) DOF



Small compact sensor: Even with wide aperture of $f2.0$
wide angle 5.1mm = Large Depth of Field (DOF)

SHALLOW DOF



SHALLOW DOF MACRO SMALL SENSOR LX-3



MACRO – HIGH MAGNIFICATION

Many compact cameras (with small sensors) are very useful for macro photography

Small sensor = Large DOF

However, some distortion can occur

In most cases, highest magnification is also a widest angle

Must get lens very physically close

Sometimes blocks light source



LIGHTING

- What are you shooting? Do you want flat lighting?
- Do you want side lighting and shadows?
- Do you want or need to use flash? Handholding macro shots? (Extreme close up, high magnification)
- Be aware of heat issues – both material that you are photographing and possible overheating of flash
- Differences in “hot” tungsten lights and “cold” compact fluorescent lights



LIGHTING

- If using natural room light be careful that your shadow or the shadow of the camera support does not affect the image
- Using the WB (white balance) settings
- Adjusting WB with settings in degrees Kelvin
- Using a stored image to adjust white balance
- Shooting RAW and adjusting WB after shooting

- Articulated desk lamps with shade
- Light from sides at 45 degrees to avoid glare (lower than example on right)
- Use on both sides
- Set of four lamps - \$80?



CAMERA SUPPORTS

- Tripods
- Easels
- Clamps
- Copystands
- Book copying set ups

COPYSTAND

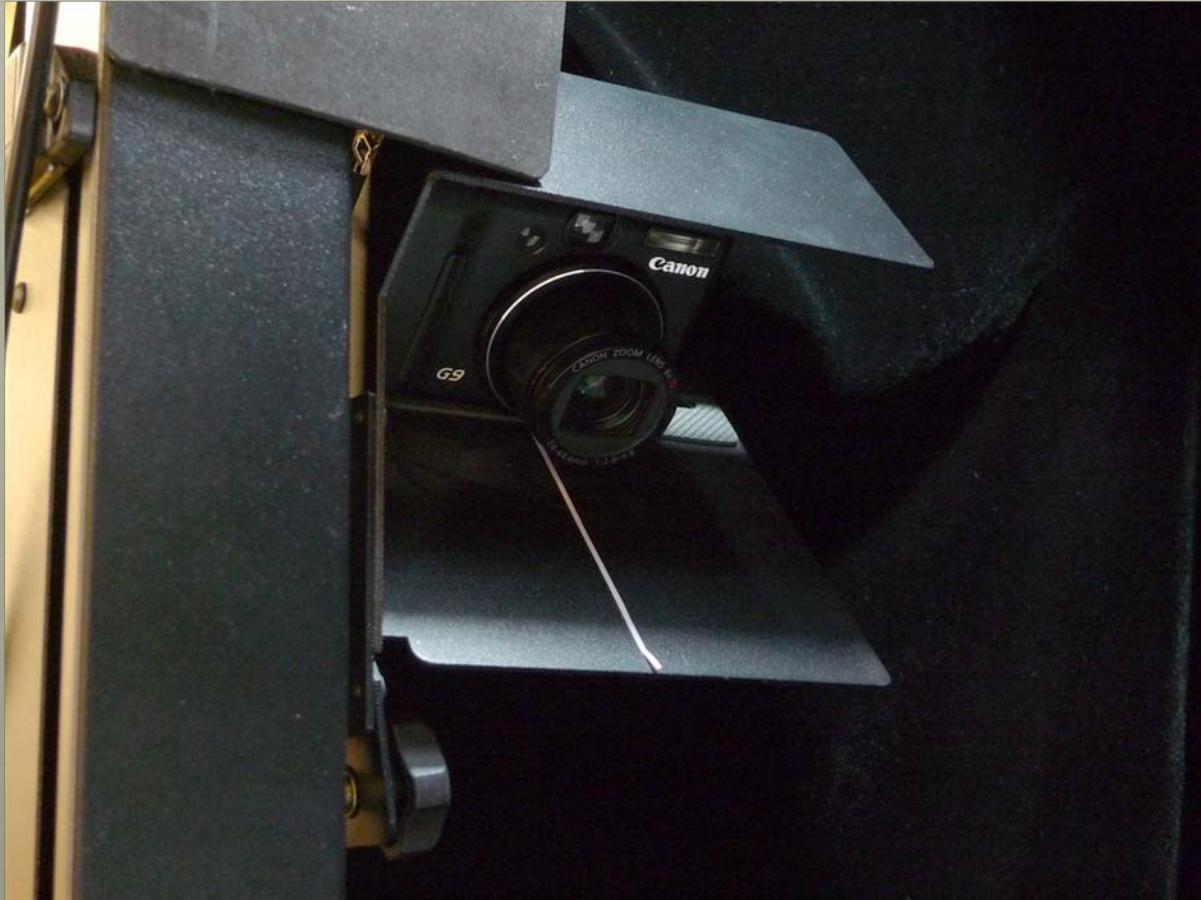




BOOK COPIER



BOOK COPIER 2



HTTP://BOOKSNAP.ATIZ.COM/

BOOKSNAP

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[How does it work?](#)

[Software](#)

[Gallery](#)

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[Tech Specs](#)



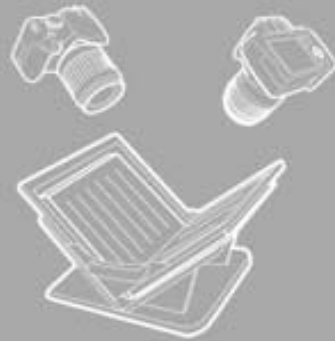
**Release content from books
with a book ripper.**

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BookDrive VS. Overhead scanners

BookDrive



Book opens at about 100°. V glass gently engages the pages and causes natural flattening.



2 area sensors individually capture a true left page and a true right page.



Straight text lines.
Naturally curvature-free.

Overhead scanners



Book has to open fully at 180°. Glass plane or fingers hold the pages from flapping.



1 linear or area sensor captures a spread double page.



Curved text lines requires software fix.

Manfrotto Magic Arm







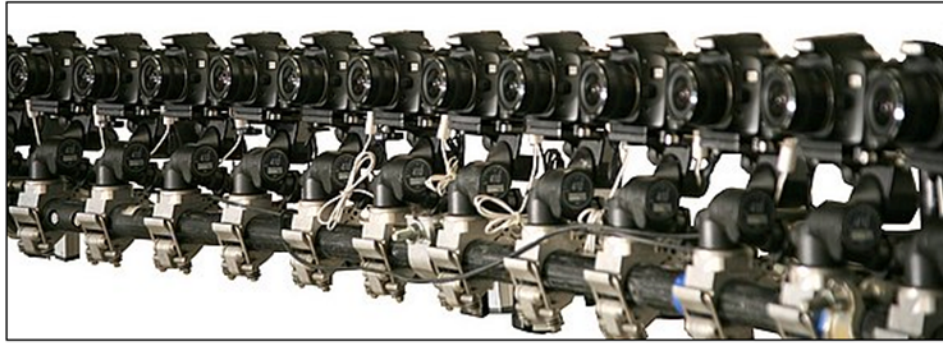
DIGITAL CAMERA AS MICROFICHE READER

- Magic Arm Clamp + Compact camera
- Set in front of microfiche reader
- Works with the oldest microfiche or film readers
- If you can't afford a new machine that prints or emails

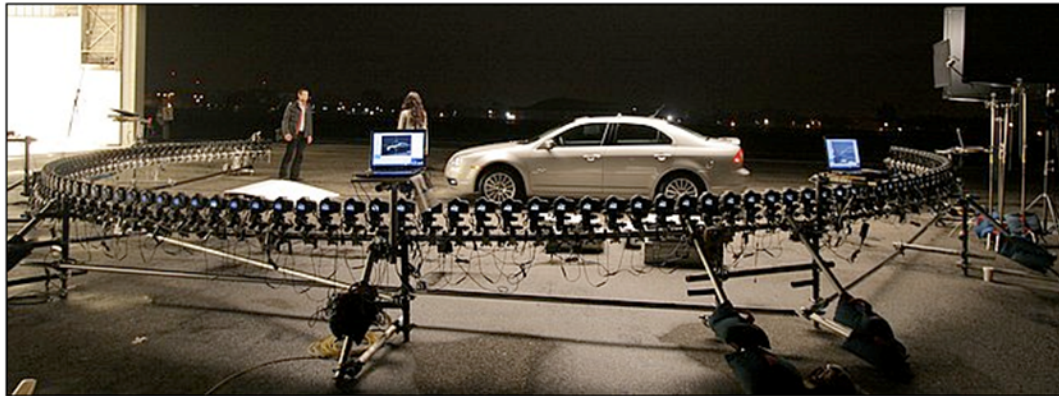
SOFTWARE SOLUTIONS

BREEZE SYSTEMS SOFTWARE

[HTTP://WWW.BREEZESYS.COM/DSLRRMOTEPRO/](http://www.breezesys.com/dslrremotepro/)



Part of an array of 120 Canon EOS 30D cameras controlled using 5 laptops running DSLR Remote Pro Multi-Camera



Shooting a car advertisement at Santa Monica Airport
(DSLR Remote Pro Multi-Camera controlling 120 Canon EOS 30D cameras using 5 laptops)

BREEZE SYSTEMS SOFTWARE

[HTTP://WWW.BREEZESYS.COM/DSLRREMOTEPRO/](http://www.breezesys.com/dslrremotepro/)




BREEZE SYSTEMS SOFTWARE

[HTTP://WWW.BREEZESYS.COM/DSLRREMOTEPRO/](http://www.breezesys.com/dslrremotepro/)



Photo © 2004 Nick Wilcox-Brown



onOne software
Software that gets you back to shooting

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DSLR Camera Remote


PROFESSIONAL EDITION

for Your iPhone or iPod Touch


Control your Canon or Nikon DSLR with your iPhone, iPod touch, or iPad

Available now in the iTunes Store.

- Remotely fire your Canon EOS or Nikon DSLR from your iPhone, iPod touch, or iPad
- Remotely control the camera settings like shutter-speed, aperture, white-balance and more
- View images shot on the camera from your iPhone, iPod touch or iPad
- Look through your camera's viewfinder remotely



Pro version price: \$19.99
Lite version price: \$1.99

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Upgrade Eligibility | Multi-User Discounts Lite Edition Information

[Overview](#) | [Features](#) | [Training](#) | [Examples](#) | [System Req.](#) | [Accolades](#)

MORE TETHERED SHOOTING

- Apple
- Aperture: tethered shooting :
<http://support.apple.com/kb/ht1085>
- Macworld Article: Shoot tethered to control your camera from you Mac:
http://www.macworld.com/article/146453/2010/02/shooting_tethered.html

DE-TETHERED WIRELESS TRANSFER

- Eye-Fi 4GB X2 \$49 to 8GB Pro X2 @ \$149
- If you have a viewfinder that easy to see for positioning your document, you can use a new type of SD card that has a built in Wi-Fi transmitter built into it.
- They are made by: Eye-Fi: <http://www.eye.fi/how-it-works/basics>
- This gives any SD compatible camera the ability to wirelessly transfer images to a computer while shooting is taking place.
- Endless memory – once content is safely delivered it deletes images from card to make more space.



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[Eye-Fi](#) » [how it works](#) » [basics](#)

> basics

> setup

> camera compatibility

> features

[browse cards](#)

basics

makes your camera wireless

The Eye-Fi card is the 1st wireless memory card. It looks, stores media, and fits into cameras just like a regular SDHC card. On top of that, the Eye-Fi card has built-in Wi-Fi that uses your wireless network to effortlessly transfer photos and videos.



memory + Wi-Fi = Eye-Fi

It all started with a very simple idea: what if photos could just fly to where you want them to be? That's how a memory card with antenna and magical superpowers was born.

uses your home Wi-Fi network

Upon setup, specify which networks the Eye-Fi card uses to transfer your media. Add up to 32 networks for your card to use. The next time your camera is on within range of a specified network, your photos and videos will fly to your computer and to your favorite sharing site.

gets media where you want it

During the quick set-up, you customize where you want your memories sent. The Eye-Fi card will only send them to the computer and to the sharing site you choose. Pick from [one of over 25 popular sites](#)



MORE EYE-FI

- Does not have to upload to a computer...
- certain EyeFi cards can upload directly to Picasa WebAlbums or Flickr through Wi-Fi hotspots.
- This also enables automatic Geo-tagging of the images.
- Even if you don't upload... if there are wireless networks within range... the card will automatically geo-tag the images.

SHOOTING TIPS

- Light colored objects – white dress or shirt – bright beach – bright water – snow... all need more exposure in order to look bright on the finished image. Especially white paper. (If shooting documents)
- Dark or black images needs negative exposure compensation to render dark... otherwise they look grey and lighter tones get washed out.
- Focus – on SLRs - move it to a separate button if you can

- Fill the viewfinder (sensor) to maximize the resolution of your image. Avoid cropping.
- If lighting a document on a copy stand, do not let your artificial light source strike the front element of your lens. This can cause what is called lens flare, or just reduce the overall contrast of the image.

ON THE USE OF FLASH

- Try to avoid using the built in on-camera flash.
- If using flash attached to hot shoe.... Avoid direct flash if possible. Look for low white ceiling or wall to bounce off of.

RECOMMENDATIONS

- Tethered shooting or to card?
- Does your camera have an articulated (folding) viewfinder?
- Which way does the viewfinder articulate? If it swings downward... it won't work on a tripod or copystand because the mounting mechanism will be in the way of the opened viewfinder. – Look for sideways folding viewfinders.
- If yes: choice – you don't have to shoot tethered
- Do you have a dedicated computer near to copystand – or laptop?

BEST BETS FOR COMPACTS

- Avoid extreme zooms – not useful in most library work – usually poor macro capabilities
- Panasonic Lumix LX-3 –
 - very good quality – many features – no compromises with lens
 - Lot's of manual control – manual focus, manual exposure, hot shoe for external flash
 - Short zoom – but fast and high quality.
 - One big drawback – no articulated viewfinder

- Recommend Canon's because there is more 3rd party tethering software (although that is beginning to change – Nikon is often supported or currently being developed)
- Canon Powershot G11
- Lower MP density / cm² than many other compacts (stuck with 10MP instead of higher values)
- Side articulated viewfinder
- Hot shoe for external flash
- 5X zoom maintains quality

- Look for swing-out viewfinders and included remote controls
- The problem with high magnification (12X to 20X) zoom lenses
- Pincushioning and barrel distortion
- Lens maximum (widest) aperture at full zoom is rather small. F6.9-8 which means you need to be shooting in a lot of light for handholding, or using a tripod for a slower shutter speed, or using a high ISO to avoid handshake blur – therefore causing massive noise issues on image
- Very slow autofocus at extreme zoom – shooting moving objects is hard.
- Can't use all that 20X zoom on a copy stand

SLR RECOMMENDATIONS

- Canon has more opportunities for remote tethering but that is changing. – Research your options – is remote control software bundled with camera? What is currently available?
- Nikon had lost the lead for a few years, but have come back with a vengeance the last few years. Perhaps a slight edge to them in high end cameras with regards to – low light and high ISO shooting... but for average library work... this is not an issue.

- Cost:
- Do you need a pro-shooters camera that takes 8-10 frames per second, with extreme weather sealing, more megapixels than you need, built strong enough to hammer nails, built in verticle grip, super fast 45 point AF etc... ?

SLR PRICES WITHOUT LENSES

- Canon 1Ds Mark III body with full Frame 21.1 MP sensor sells for \$6,938.00
- Canon 5D Mark II body with Full Frame 21.1 MP sensor sells for \$2,897.00
- Canon EOS 7D SLR with the same 18MP sensor as the T2i sells for \$1,847.00
- The newest Canon SLR - EOS Rebel T2i - 18MP body sells for \$873.00
- Remember FF sensors require extreme high end optics to ensure sharpness in outer circle region of the image circle.

HYBRID 4/3 SENSOR

- Panasonic & Olympus
- Relatively large sensor
- No mirror housing – closer to the size of compacts
- High quality
- Many have swing out articulated viewfinders
- Interchangeable lenses – some zoom, some fixed
- Many have hot shoes for external flash

OTHER CONSIDERATIONS/ACCESSORIES

- External Power supplies – instead of changing batteries
- External viewfinders – electronic & optical
- Wireless flash accessories – Pocket Wizard
- Infrared remote triggers
- Kodak color card – grey card











