Lens Facts and Opinions Updated

Ken Eis

New Topics

- What lenses are available
- What focal length do you need?
- Cleaning
- What's the difference between a 105mm macro and a 105mm telephoto?
- Macro vs copy lenses
- Buying considerations
- Extension tubes and tel extenders
- What you really need.

Lenses available

Very good third party new (the digital optimized lenses are better by far)

Sigma(DG), Tamron(Di), Tokina

Stay away from Vivitar and Quantery

Used lenses from your camera manufacturer

photogon.com other web sites.

Lens selection guide at

http://www.digital-slr-guide.com/support-files/digital-slr-lens-wishlist.pdf

What focal length do you need?

- Depends on your photographic interests
  - Birds need 300mm plus must have tripod
  - Sports activities you need a fast tel zoom like a 70-200mm f2.8
  - Portraits 50-200 mm very fast prime or zoom
  - Landscape – wide angle to short tel 24-100mm slow is OK.
  - What do you use right now???

Lens focal length vs perspective

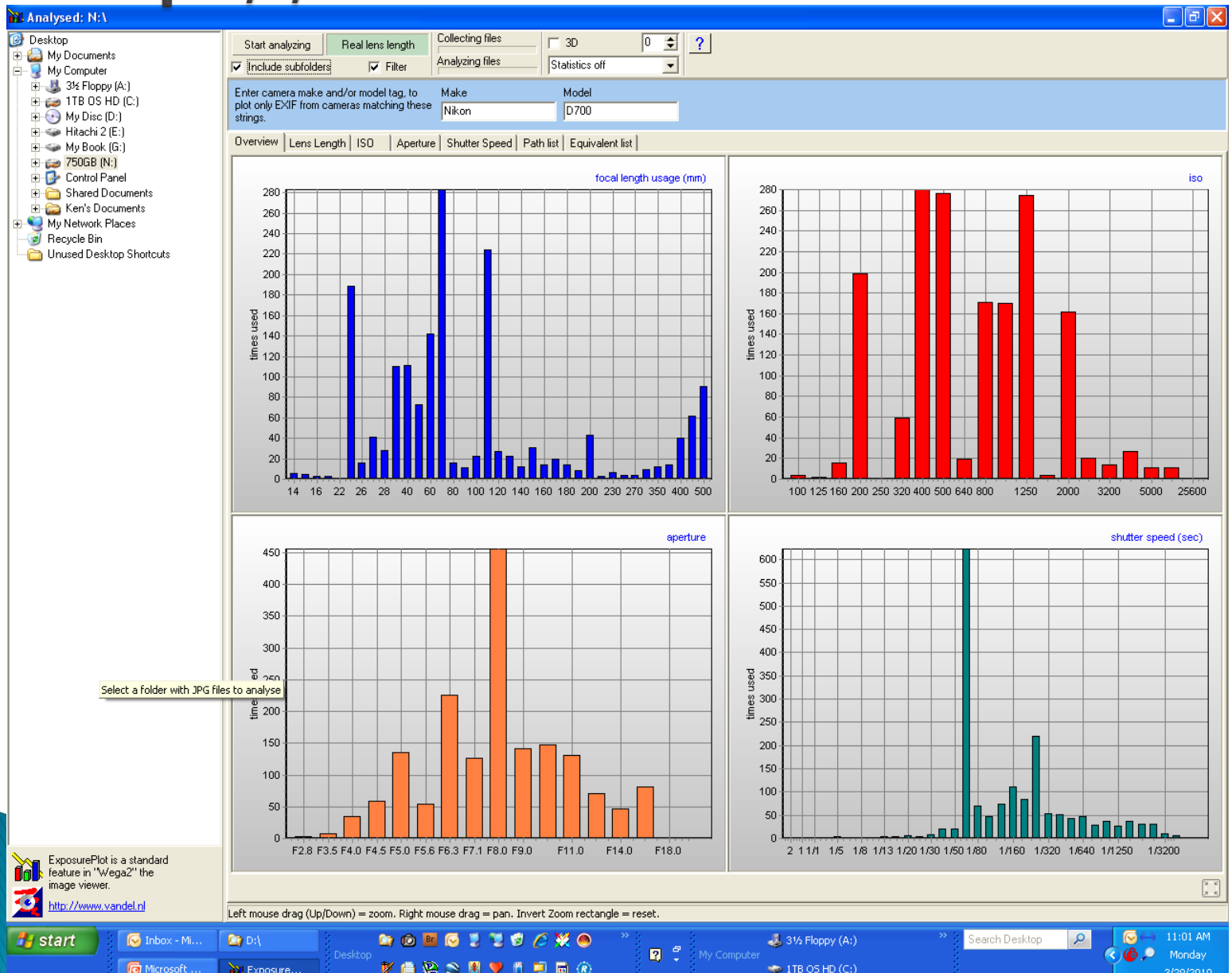
20mm

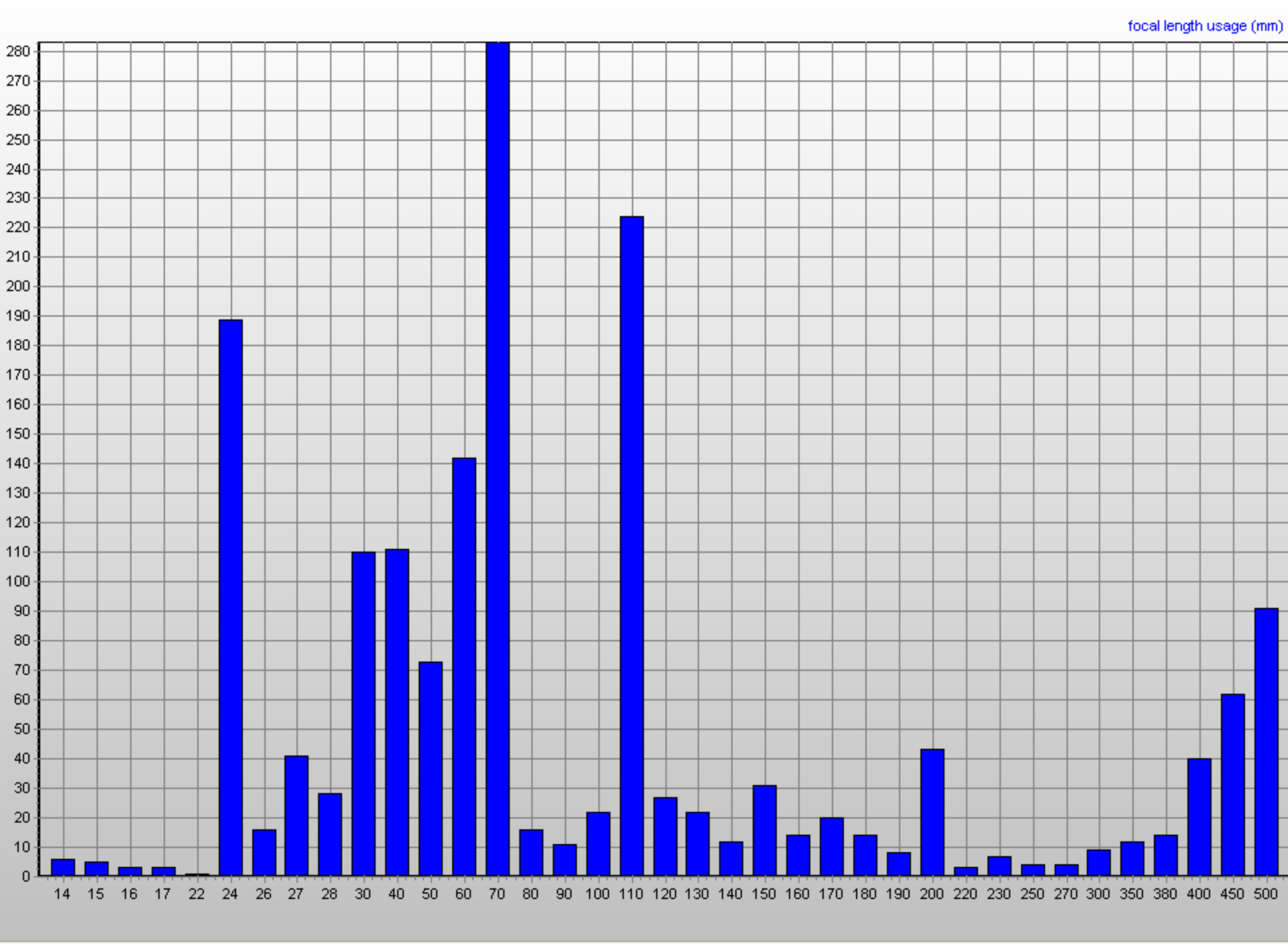
50mm

200mm

400mm

http://www.vandel.nl




focal length usage (mm)
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
14 15 16 17 22 24 26 27 28 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 220 230 250 270 300 350 380 400 450 500

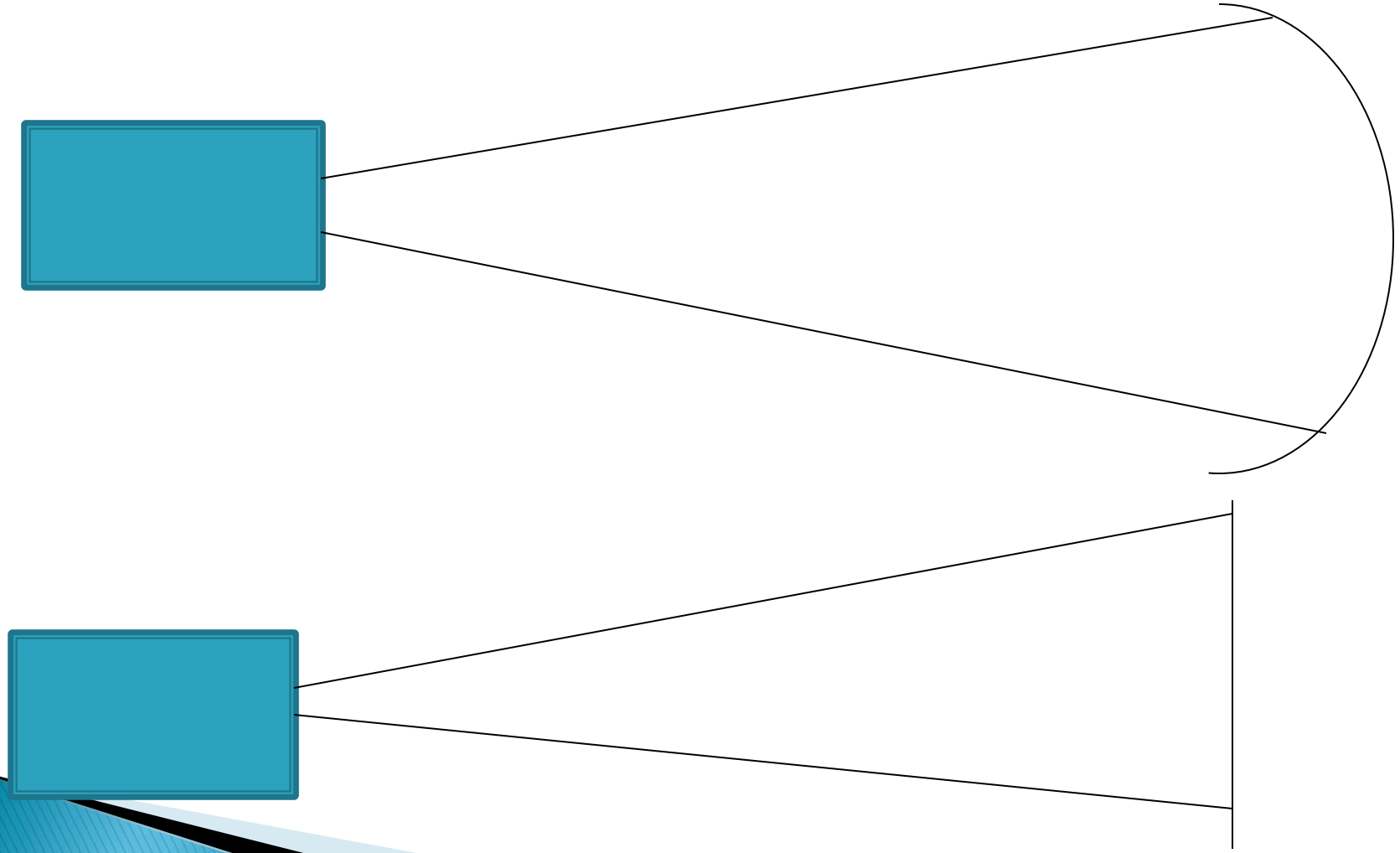
Cleaning easy to hard

- Rocket blower…not canned air
- Art brush blower
- Your breath
- Micro fiber cloth
- Lens cleaning cloth
- Tap water
- Wet Chemicals
- Factory cleaning

Difference between macro and normal

- Marco lenses are very good normal lenses
  - You should consider as an example a 180mm Sigma macro for a short telephoto
- Difference is the resolution of the focal mechanism is optimized differently
- Normal has most of its focal turn in the 3-10 foot range, macro most in the .5-2ft range.

Macro vs copy lenses is focus



Buying considerations

- Do you really need a super wide angle lens?
  - Still life NO
  - http://www.panoramafactory.com/download.html
  - Or Elements, CS2,3,4,5 or LightRoom all have stitching automation.
- Do you need a macro? Short tel with extension tubes works fine.

How to use

- Telephotos need tripod
- Long tels (400+) need really big tripods
- Macro also benefits from a tripod
- Brace camera on tree, poles etc.
- Monopod more convenient and really improves photos in mid range.
- Shutter speed mantra is always shoot faster then 1/focal length. So a 500mm lens should be used faster then 1/500 sec. With vibration reduction you can go two f-stops slower ie 1/125 sec.

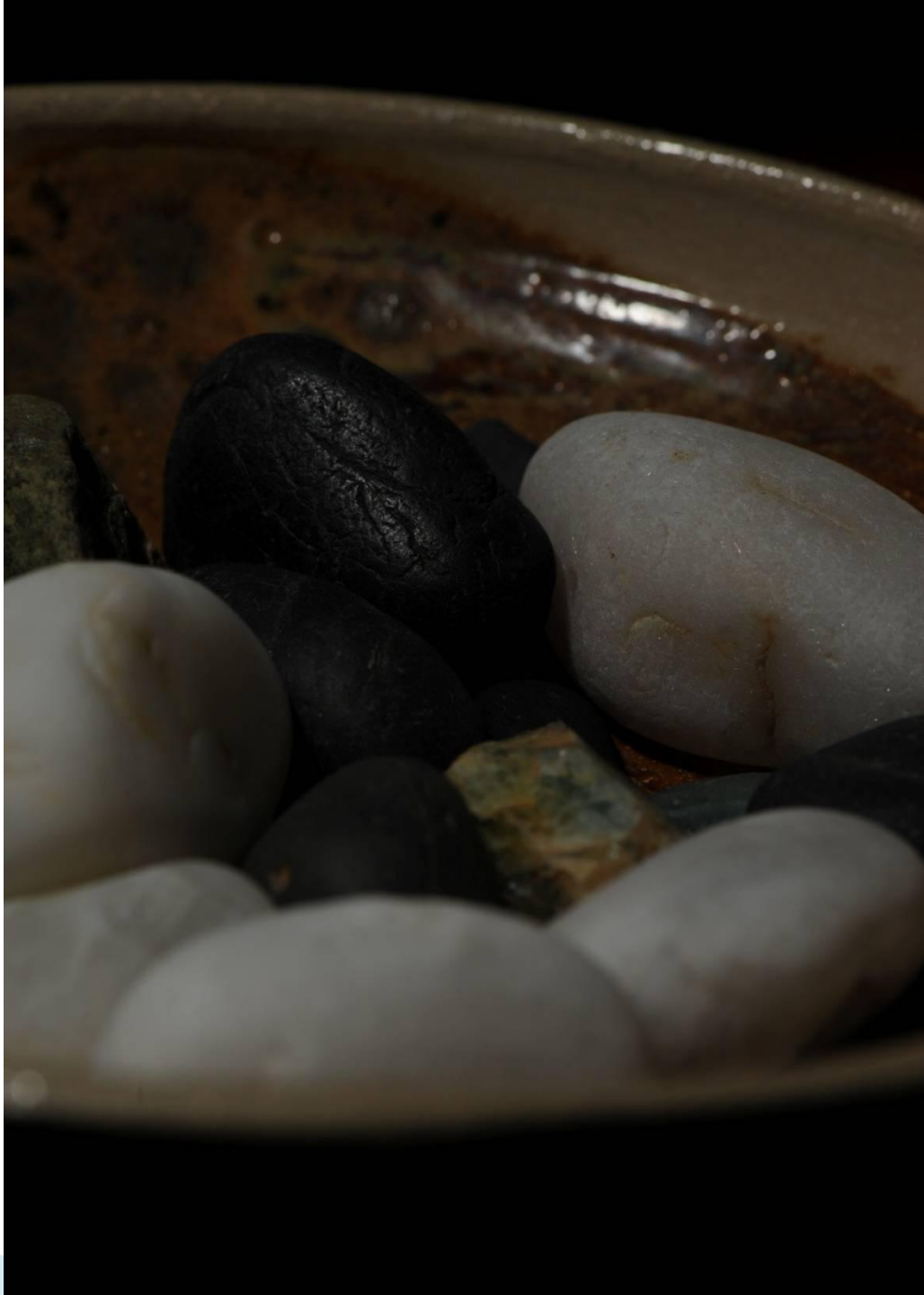
Filter considerations

- Filters to consider
  - circular polarizers
  - Neutral density 4 to 8 nd
  - Close up – Canon D500 very good and works on all brands
  - Buy one filter for the largest lens thread and then step down adaptors for your other lenses so you only need one really good filter for all your lenses.

Depth of field Considerations

- DOF is most common problem when taking macro shots.
- Demo
- DOF and foreshortening are similar but different in composition with telephotos

All at f16
front distance
6 inches back
distance 12
inches



Using Helicon Focus Pro

Heliconsoft.com
$55 for pro version

Extension tubes

Extension tubes make any lens a macro

- Warning you can't use a tube longer then the focal length of the lens.
- Example you can't use a 20mm extension tube with a 18mm lens. It will not focus since the focal point will be outside the camera!
- There is no optical degradation because they only use air.
- The Kenko set is great and maintains all auto features of your camera and lens.

Tel Extenders

- Come in 1.4x 1.7x and 2.0x
  - 1.4 makes a 100mm lens a 140mm equivalent
- Need to use the same brand as your tel lens
  - Example don't use a Canon extender with a Sigma lens
- All degrade the image and reduce the f-stop 1.4x drops 1 f stop, 1.7x 2 f stops and 2.0x 3 fstops
- Newest Canon and Nikon extenders reduce IQ very little with their paired lenses---very expensive

Lens reviews

- http://www.naturfotograf.com/lens_surv.html (Nikon)
- http://www.dpreview.com/lensreviews/ All
- http://www.lensplay.com/lenses/lens_ratings.html (Canon)

What you really need

- A new lens is not the only answer. Software can be a cheaper solution ie wide angles
- Kit lenses are generally equal to pro lenses at f8 and above.
- If you want the absolute best IQ cheap then buy a 1st party prime.
- Depends on your shooting style and subject.
- High ISO cameras relax lens needs. You can shoot f8, 1/500 sec in less then bright light at iso 1600 etc.

Additional sites

- Sigma lens finder
  - http://www.sigmaphoto.com/sigma-lens-finder
- Tokina lenses
  - http://www.tokinalens.com/products/tokina/index.html
- Tamron lenses
  - http://www.tamron.com/lenses/default-photo.asp

Tips on shooting

- Telephoto zooms- they all have flare so be very careful when shooting towards the sun or other strong lighting sources. The lens shade doesn't totally prevent it.
- Macro subjects-try and get the subject all in the focal plane for best DOF (after you go to f16-f22)
- Don't use cheap non-coated filters.
- Perspective control consideration

End

Topics

- F-stop
- Compatibility
- Perspective
- Focal Length
- Depth of Field Hyper
- Normal Lens
- Lens descriptors
- Naming
- Tel converters
- Prime vs Zoom
- Lens elements
- Panorama considerations
- Bokeh
- Distortion/pincushion
- Barrel distortion
- Vignetting
- Image quality
- Diffraction limit
- MTF

Compatibility with camera

- Auto focus
- Exposure metering (matrix)
- Mount
- Flash system
- Full frame vs 1.5 or 1.6x DSLR bodies

Focal Length Naming for DSLRs

Lens Focal Length*	Terminology	Typical Photography
Less than 21 mm	Extreme Wide Angle	Architecture
21-35 mm	Wide Angle	Landscape
35-70 mm	Normal	Street & Documentary
70-135 mm	Medium Telephoto	Portraiture
135-300+ mm	Telephoto	Sports, Bird & Wildlife

F-Stop

- F1.4 to f2.8 “fast” on normal lenses
- Fast means its getting bigger and heavier
- F 2.8 400mm lens is very fast f 2.8 50mm is considered slow.

The aperture range of a lens refers to the amount that the lens can open up or close down to let in more or less light, respectively. Apertures are listed in terms f f-numbers, which quantitatively describe relative light-gathering area (depicted below).

Bigger and Heavier

Depth of field and Hyper focal Distance 1.5x camera f 8.0, 1 meter focus – nothing to do with brand

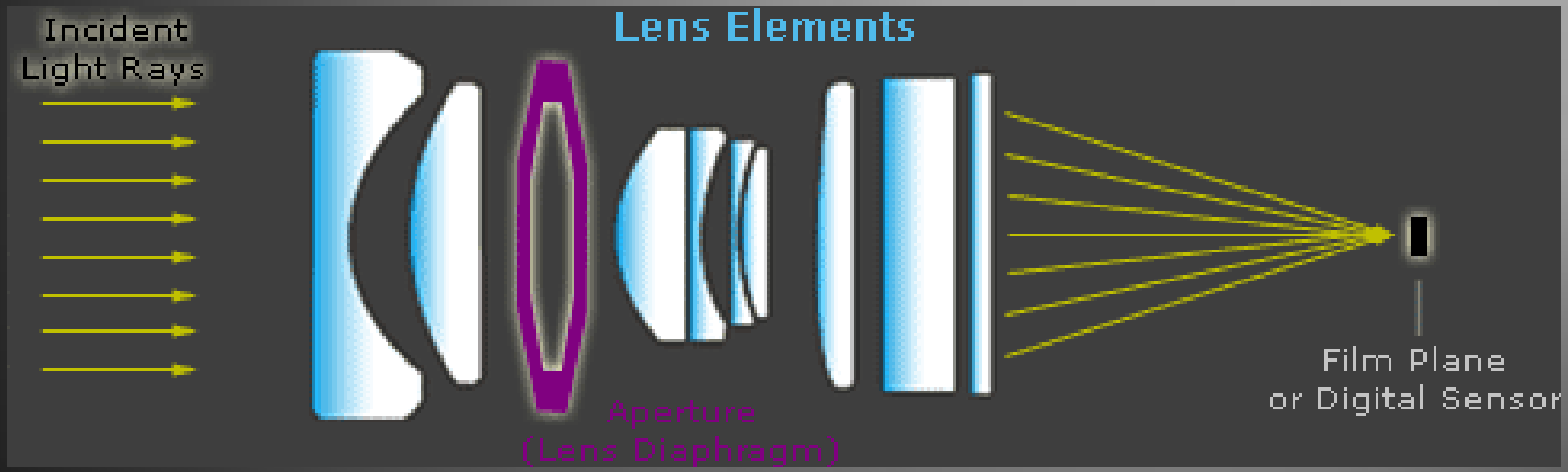
- 50mm
- 12mm
- 200mm
- 400mm

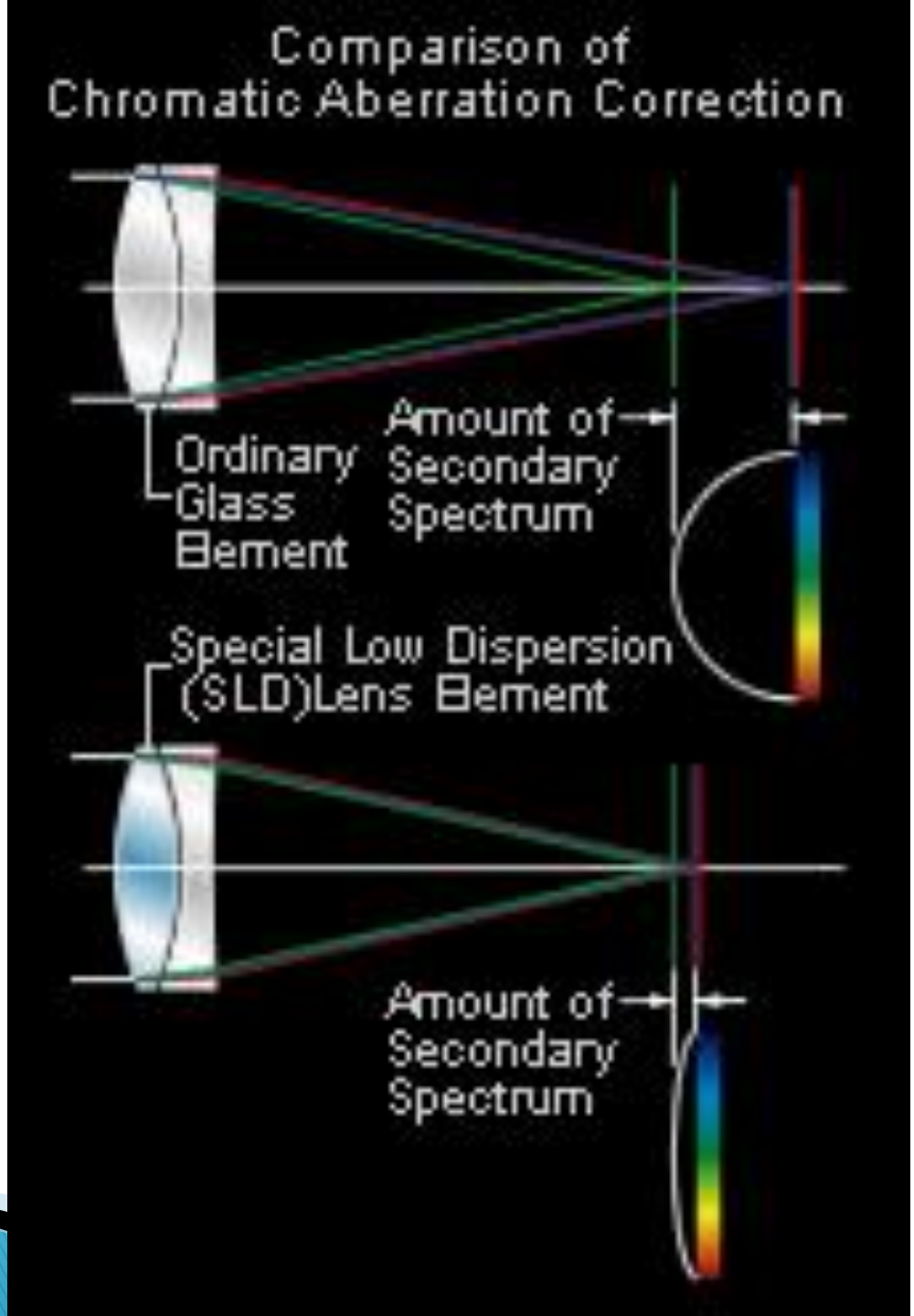
- DOF .133m hyp 14.4m
- Infinite
- .007m hyp 230m
- .001m hyp 921m

What is a normal lens

- Focal length = focal plane diagonal
- 35mm normal 24x36mm = 43.27mm diagonal
- Least distortion compared to human view
- 1.5x Nikon normal is = 28.84mm
- 1.6x Canon = 27.05mm
- A good focal length for panorama stitching

Lens Elements (Groups)




Comparison of
Chromatic Aberration Correction
Ordinary
Glass
Element
Amount of
Secondary
Spectrum
Special Low Dispersion
(SLD)Lens Element
Amount of
Secondary
Spectrum

Primes vs Zooms

- Cost
- Weight
- Flair
- Image quality
- Convenience
- On/Off
- Using macro primes as normal lenses

Lens descriptors

- VR/IS/OS – vibration and stabilization. Adds 2-4 f-stop for hand held shots
- Aspherical – corrects for spherical lens aberrations and chromatic aberrations
- IF – internal focus for length and rotation
- ED, UD, APO, LD glass Fluorite etc – low dispersion glass reduces chromatic aberration.
- HSM USM AF-S camera screw vs in lens focusing
- Coating multicoatings
- N or DG finish and other back of lens coatings
- Filter thread size
- Full frame and Dx lenses
- Vignetting
- Rectilinear or fisheye for wide angle lenses only

P&S camera lenses

- 3 and 4 x zooms tend to have better optical qualities then 6 to 12x zooms
- Into diffraction limiting much faster.

Portrait lenses

- For DSLRs most recommend 50-200mm
- Bokeh consideration
- Speed not usually a consideration

Wide Angle for Panoramas

- Typical panorama shots can be taken in two ways
  - Wide angle lens (adds distortion)
  - Stitched normal lens shot (less distortion but need to not have moving objects in image)

Bokeh

- Character of out of focus part of image.
- Bad bokeh would show sharp edged out of focus elements doughnuts etc.
- Bad bokeh from reflex lenses and lenses with less then 7 iris leaves

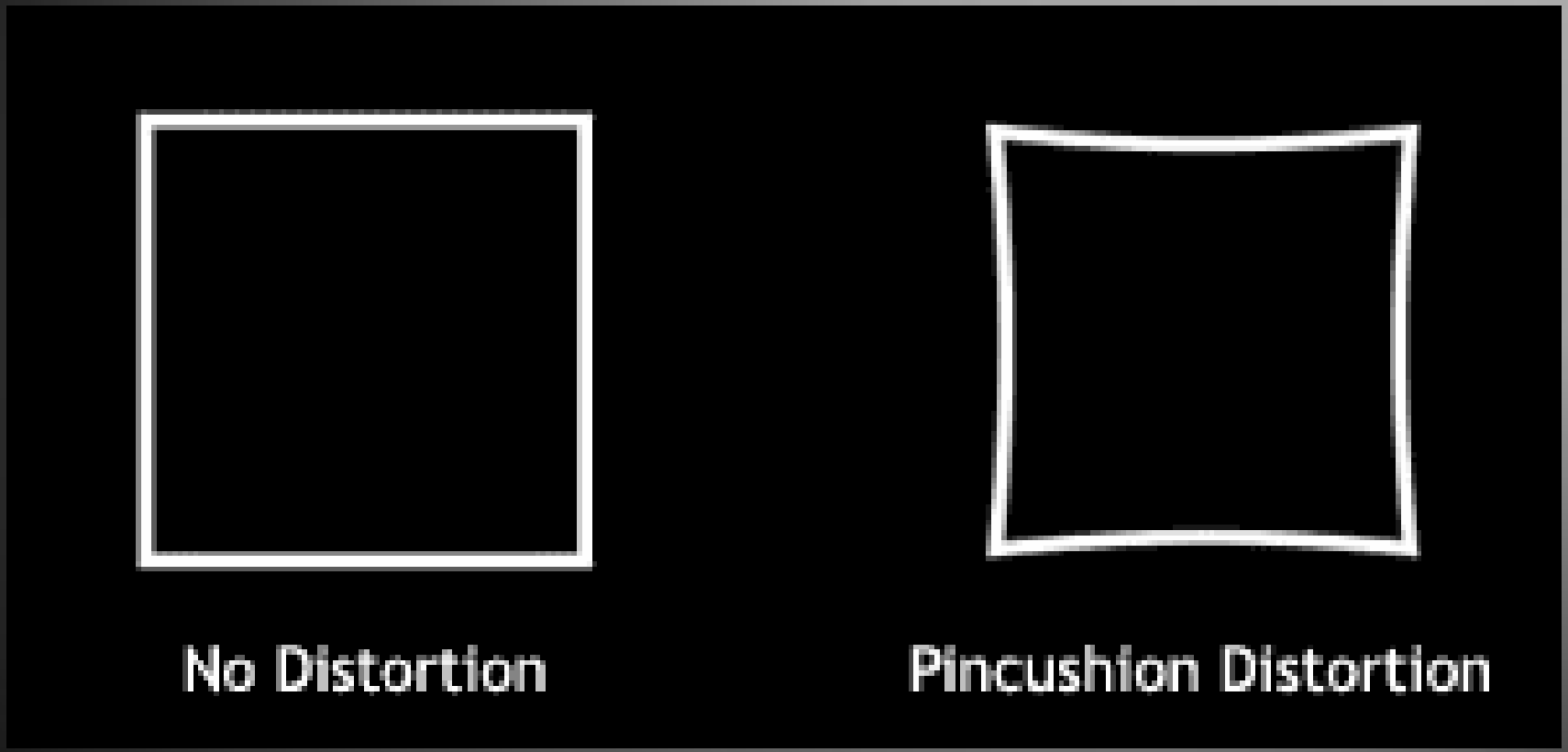

LINDEMANS
BIN 45
CABERNET SAUVIGNON
SOUTH EASTERN AUSTRALIA
2004
©2006 Eric Denney


LINDEMANS
BIN 45
CABERNET SAUVIGNON
SOUTH EASTERN AUSTRALIA
2004
©2006 Eric Denney

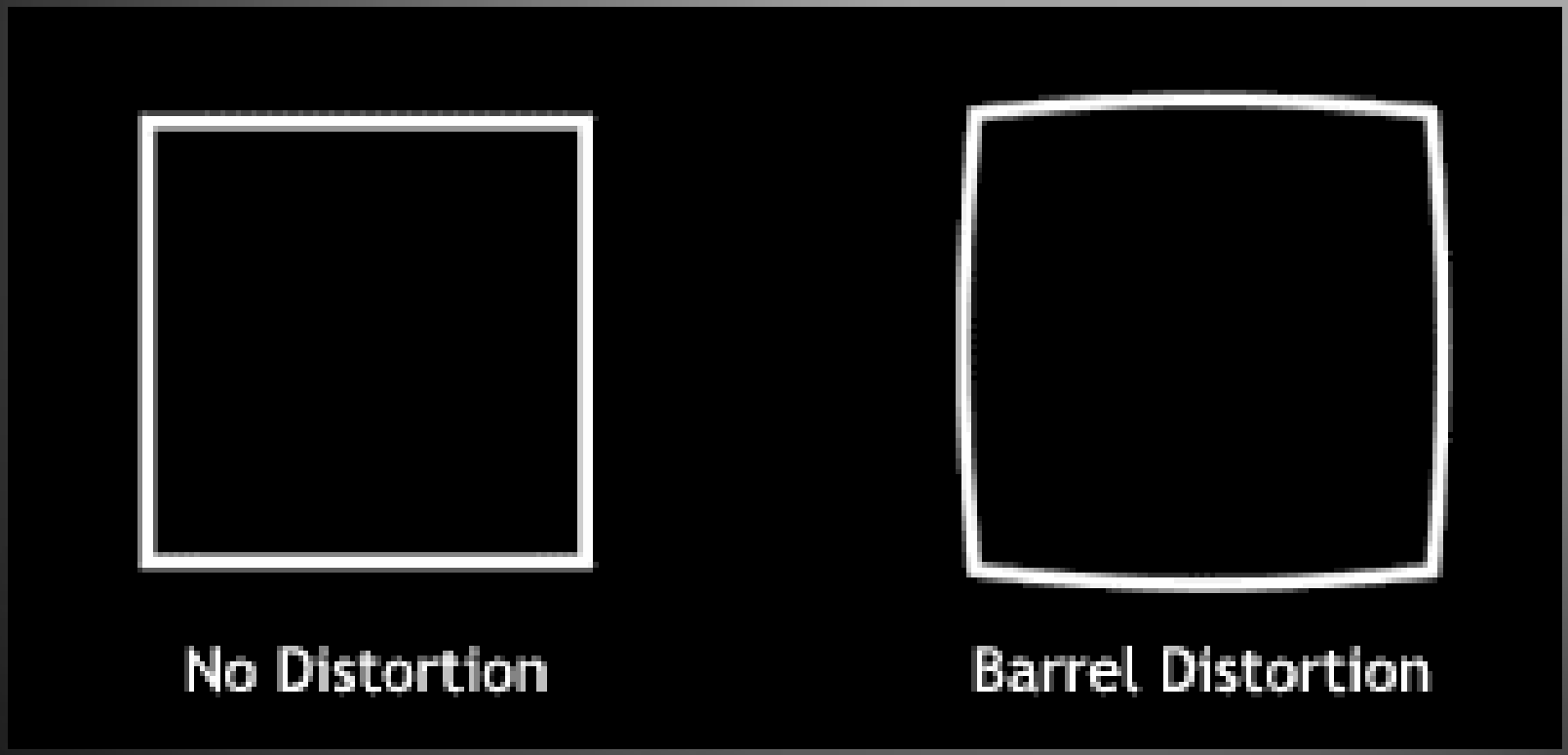
Bokeh shaped like lens iris

Reflex lens

Distortion/Pincushion



Barrel Distortion



Vignetting

Can be corrected in software.
Usually associated with older lenses
Showing up on DX to FF camera body upgrades

IQ considerations don't blame the lens

- Flare (contrast) and lens hoods
- Filters
- Tripods vs fast shutter/high iso
- Small f -stops lens quality DOF
- Large f-stops diffraction (size of camera photocites)

Print lines per inch diffraction limits

Cam~	D40,	20D,	40D,	D200,	D300 ~	1DII,	5D,	D3,	1DIII,	1DsII,	1DsIII
f/2.8 ~	260,	301,	344,	347,	378 ~	299,	372,	376,	343,	432,	477
f/4 ~	245,	266,	290,	297,	313 ~	286,	355,	359,	314,	395,	428
f/5.6 ~	219,	234,	253,	260,	272 ~	257,	319,	322,	279,	351,	377
f/8 ~	189,	199,	212,	218,	227 ~	223,	277,	279,	239,	300,	319
f/11 ~	161,	167,	177,	182,	188 ~	191,	237,	240,	203,	255,	268
f/16 ~	129,	132,	138,	143,	147 ~	154,	192,	194,	162,	203,	212
f/22 ~	105,	105,	109,	113,	116 ~	125,	156,	157,	130,	163,	169

Diffraction limit is result of focal plane size (inter photocite distance) & resolution

Medium and large format cameras much less limited

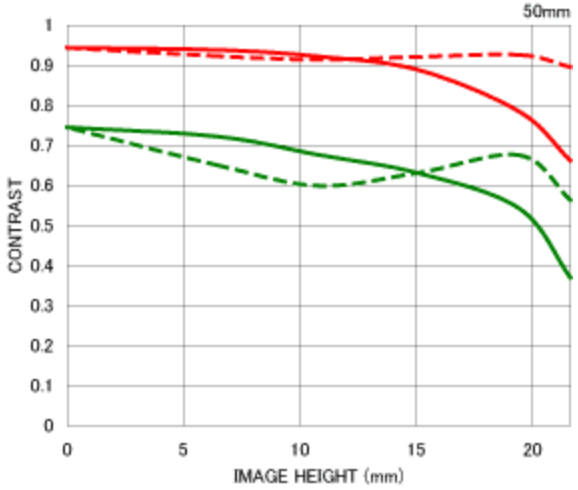
P&S much worse

http://www.cambridgeincolour.com/tutorials/diffraction-photography.htm

MTF

MTF (Modulation Transfer Function) is one of the measurements that evaluates a lens' performance, and it contrast sensitivity at different spatial frequencies.
The horizontal axis is in millimeters and shows the distance from the center of the image toward the edges, and contrast value (highest value is 1) is shown in the vertical axis.

Red=contrast performance Green= sharpness



Spatial frequency	S	M
10 lp/mm	———	·····
30 lp/mm	———	·····

S: Sagittal Line
M: Meridional line

The MTF chart gives the result at the wide-open aperture.

The readings at 10 lines per millimeter measure the lens's contrast ability (red lines), repeating fine parallel lines spaced at 30 lines per millimeter measure the lens' sharpness ability (green lines), when the aperture is wide open.
Fine repeating line sets are created parallel to a diagonal line running from corner to corner of the frame, are called Sagittal lines (S) and sets of repeating lines vertical to these lines are drawn, called Meridional (M) line sets.

MTF

- Good MTF charts do not necessarily mean good image quality
- Bad MTF DOES mean poor image quality.

Tele Converters

- Use same brand as tel lens
- 1.4x drops one stop
- 2x drops two f stops
- Image quality drops with converter magnification factor.

Web sites with lens reviews

- http://www.dpreview.com/lensreviews/
- http://www.slrgear.com/reviews/showcat.php/cat/2
- http://www.naturfotograf.com/lens_surv.html
- http://www.photozone.de/Reviews/overview
- Nikon MTFs on Japanese cite
  - http://www.nikon-image.com/jpn/products/lens/dx/zoom/af-s_dx_ed_18-70mmf35-45g_if.htm
- Canon MTFs at their home web page