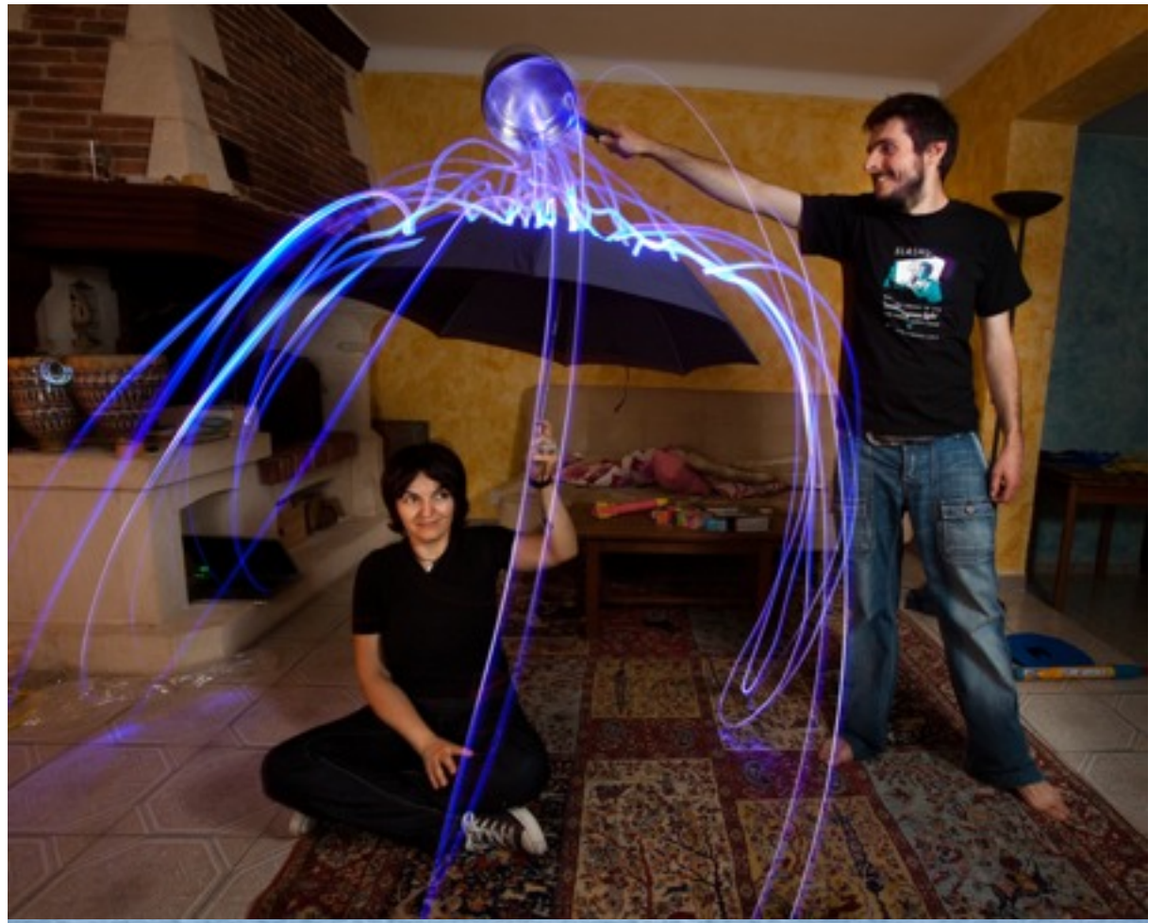
Photography 101

Fredo Durand
MIT CSAIL

What do I know about good pictures?

- **Not much: amateur photographer, wildlife, travel, portrait**



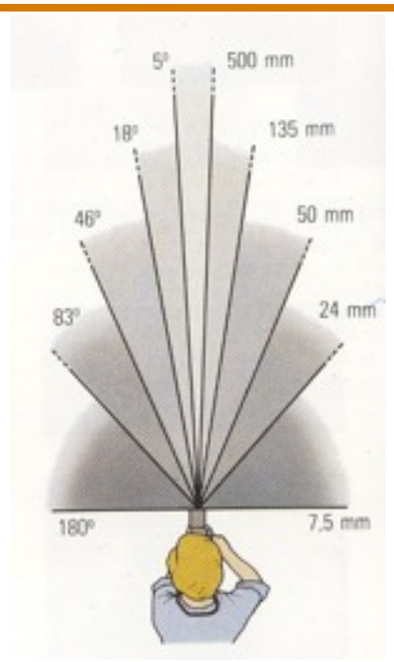
I like equipment

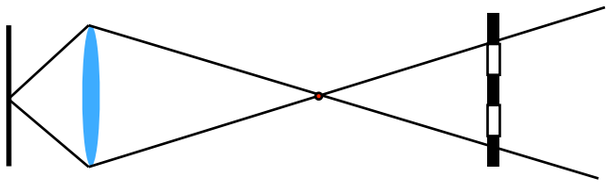
- **I am a geek!**

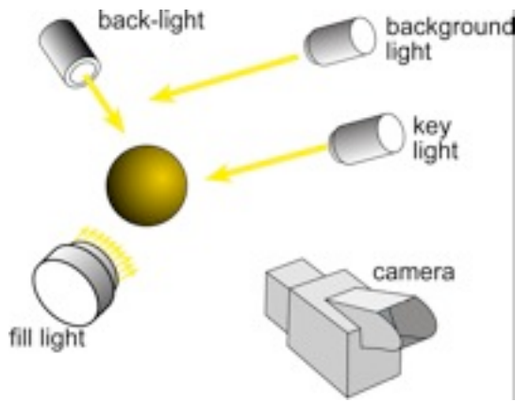
- **Also I teach**
  6.815 Digital and Computational Photography
  6.865 Advanced Computational Photography

Plan

- **Imaging parameters**
  - Camera
  - Lighting
  - Software

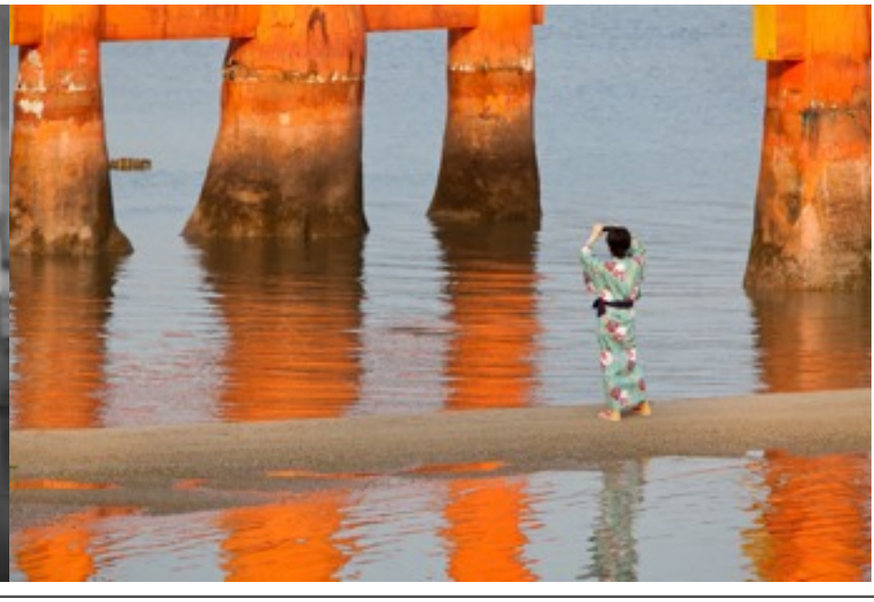






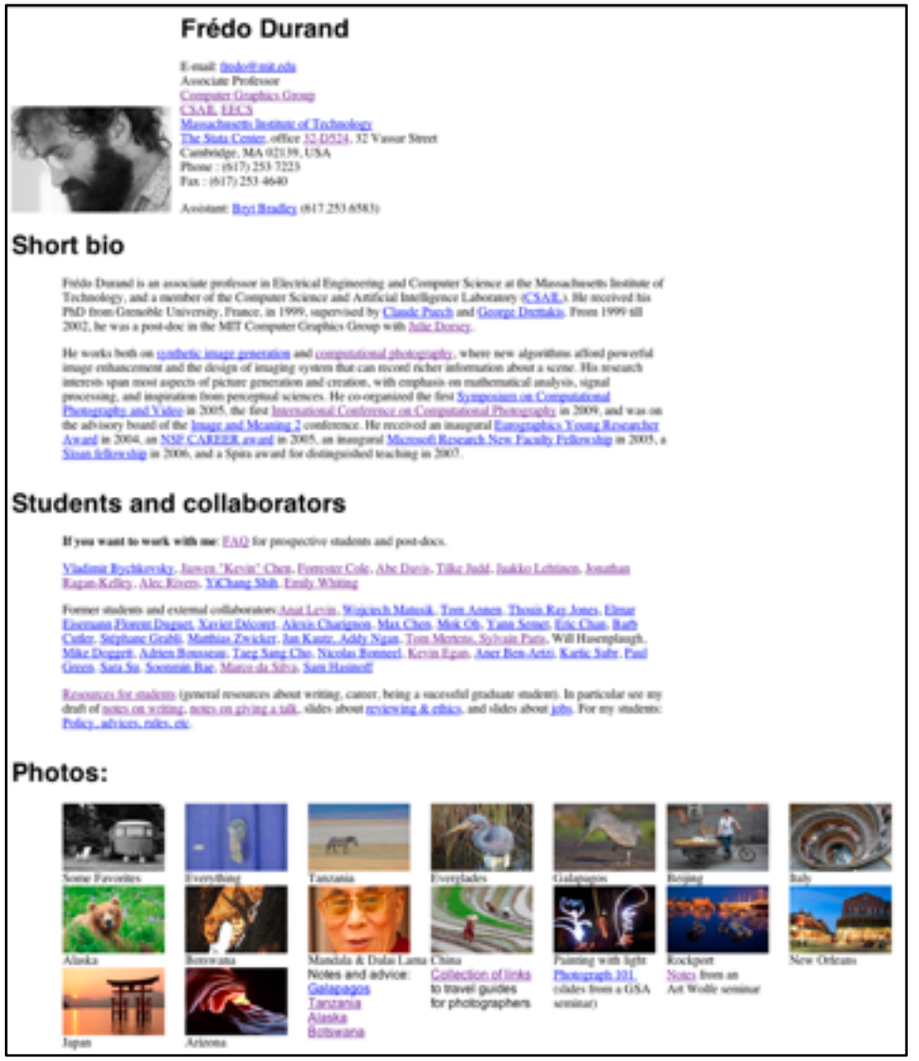
- **Equipment**

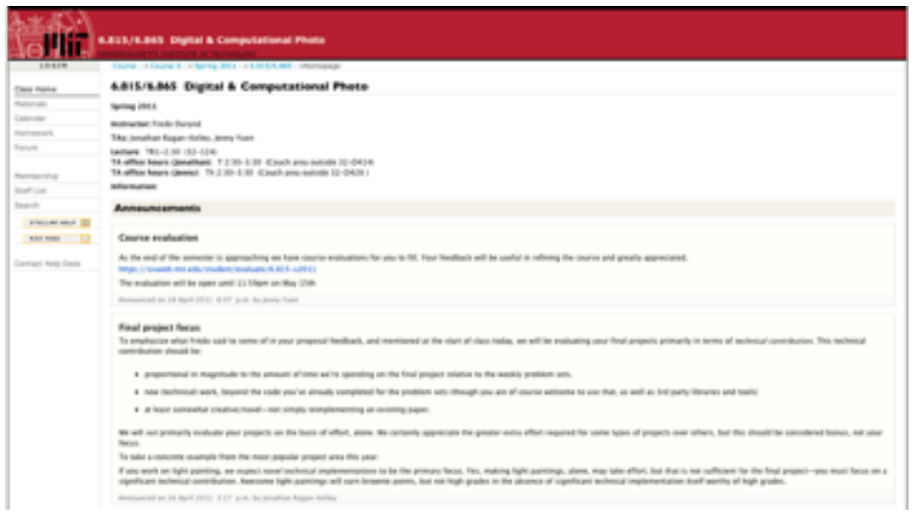
- **Improving your pictures**



Slides are online

- **http://people.csail.mit.edu/fredo/**
- **More material at**
  - http://stellar.mit.edu/S/course/6/sp11/6.815/
  - http://graphics.stanford.edu/courses/#cs178





Imaging parameters

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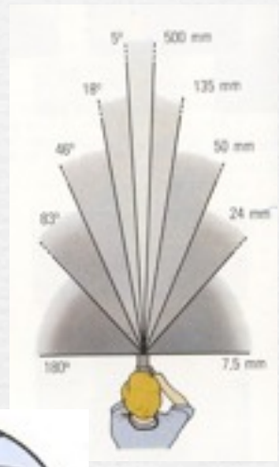
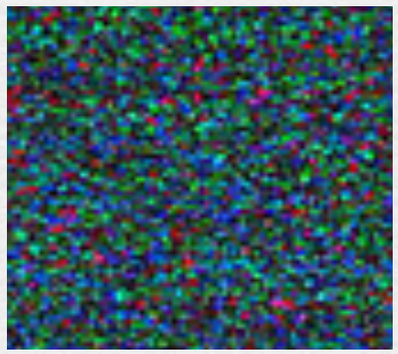
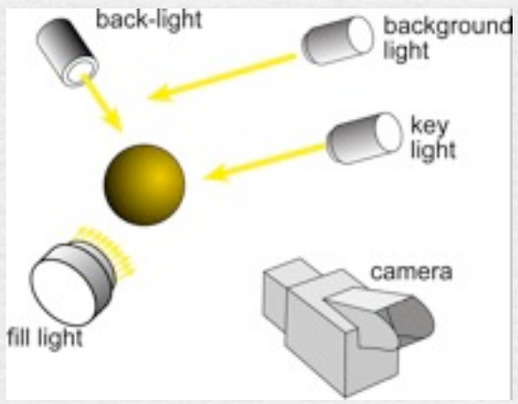
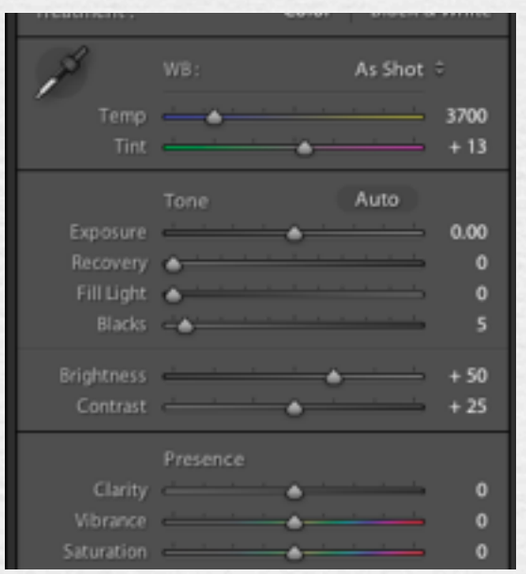
Imaging parameters

- Focal length
  - Sensor format
- Shutter speed
- Aperture
- ISO
  - Noise, sensor size
- Lighting
- Software



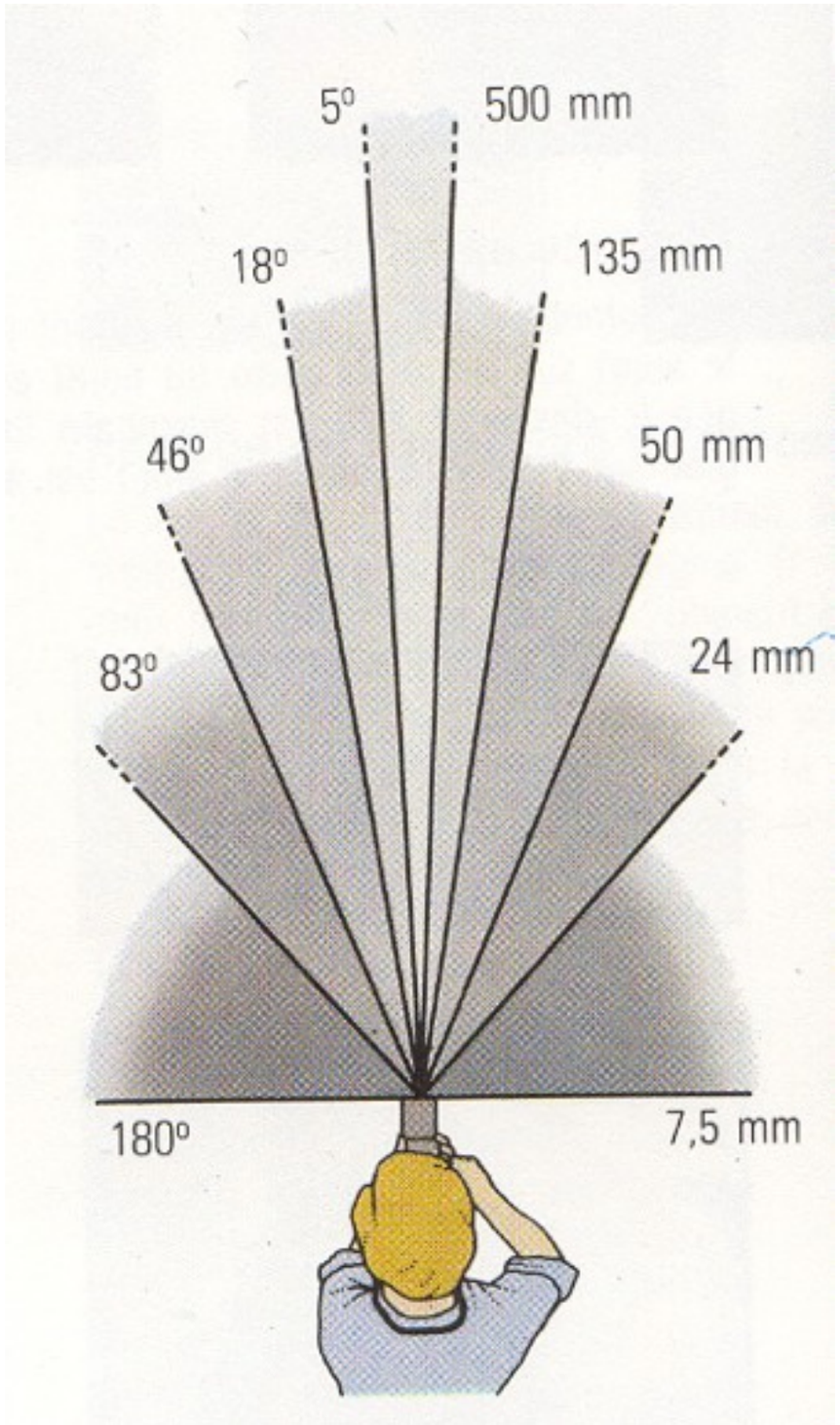




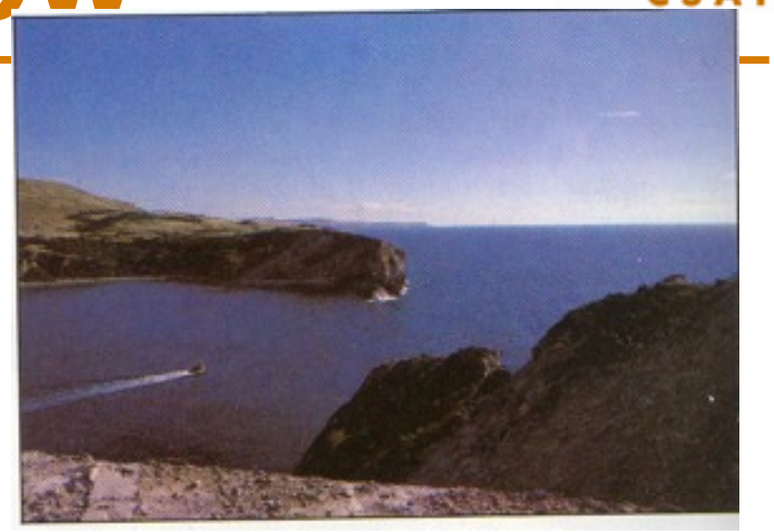


Focal length = field of view

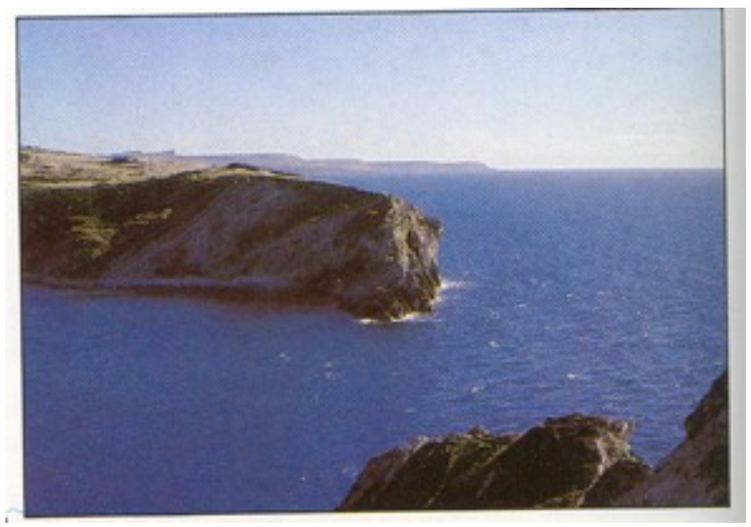
- **zooming changes the focal length**



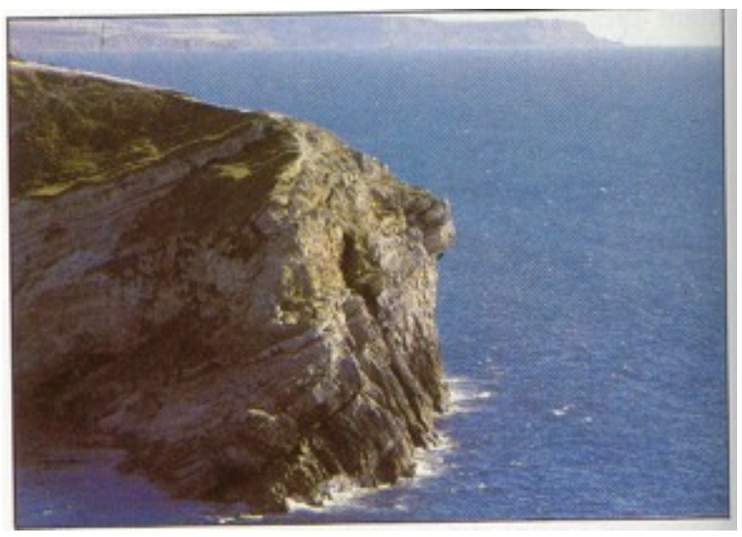
24mm



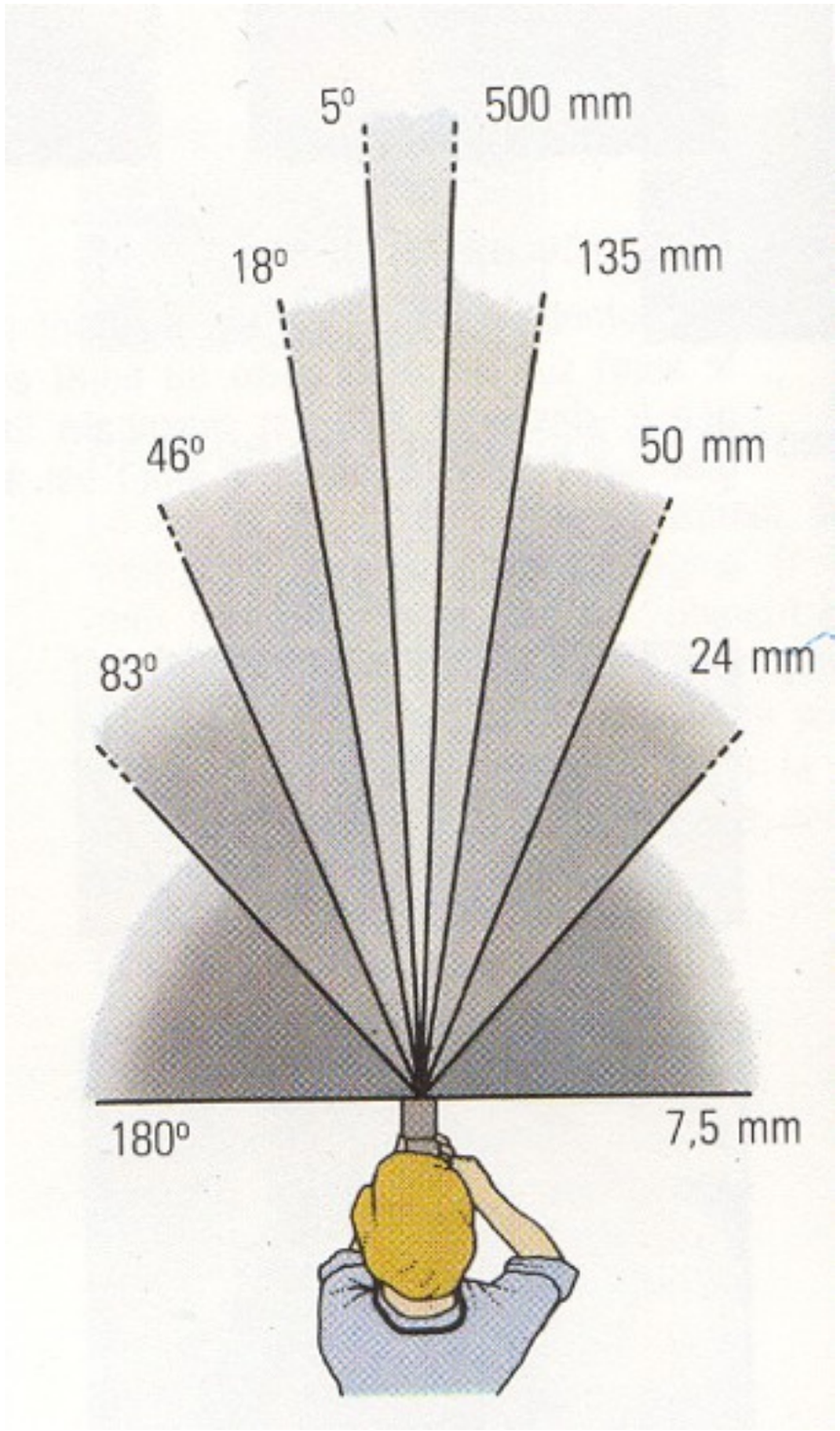
50mm



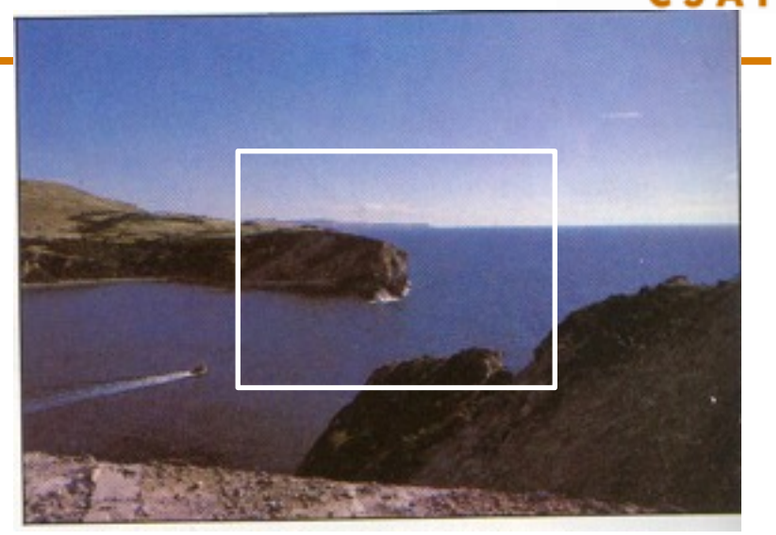
135mm



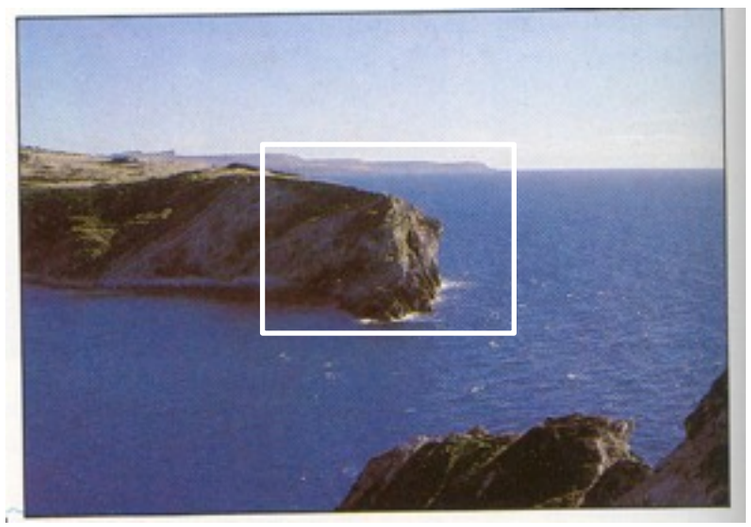
Focal length = cropping



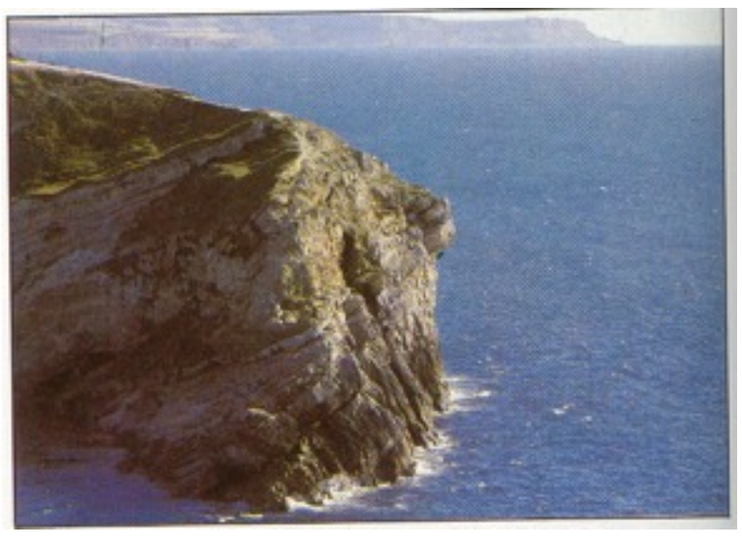
24mm



50mm

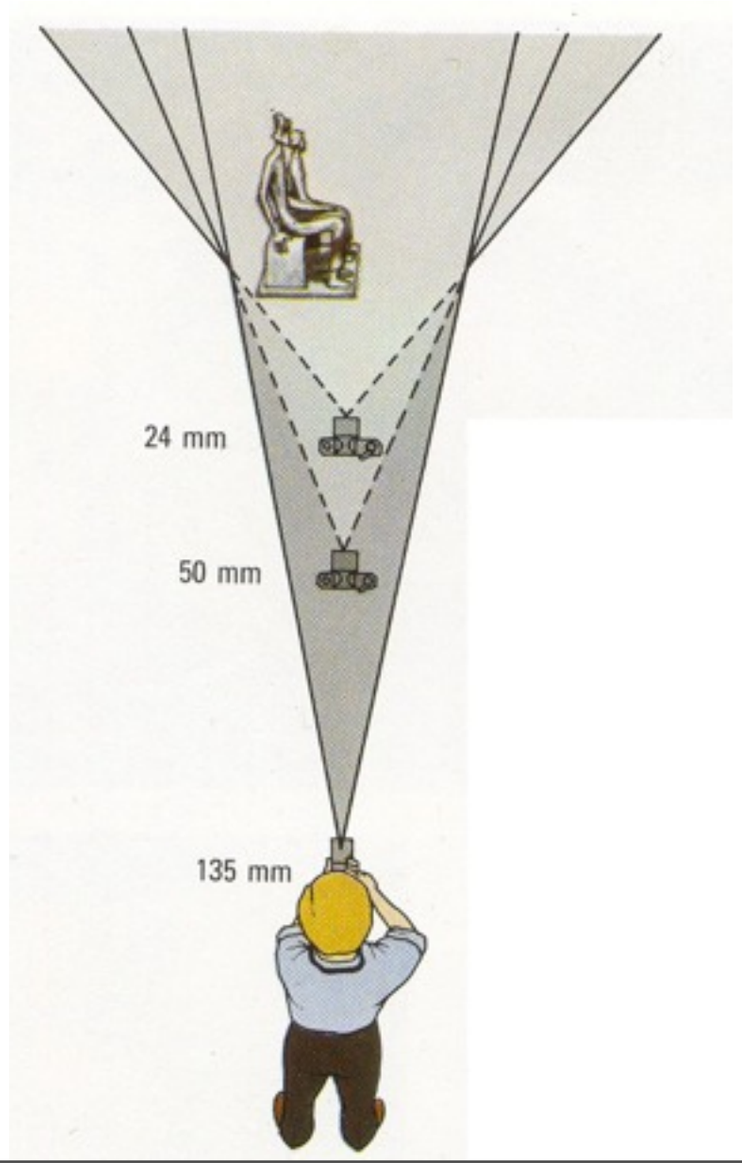


135mm

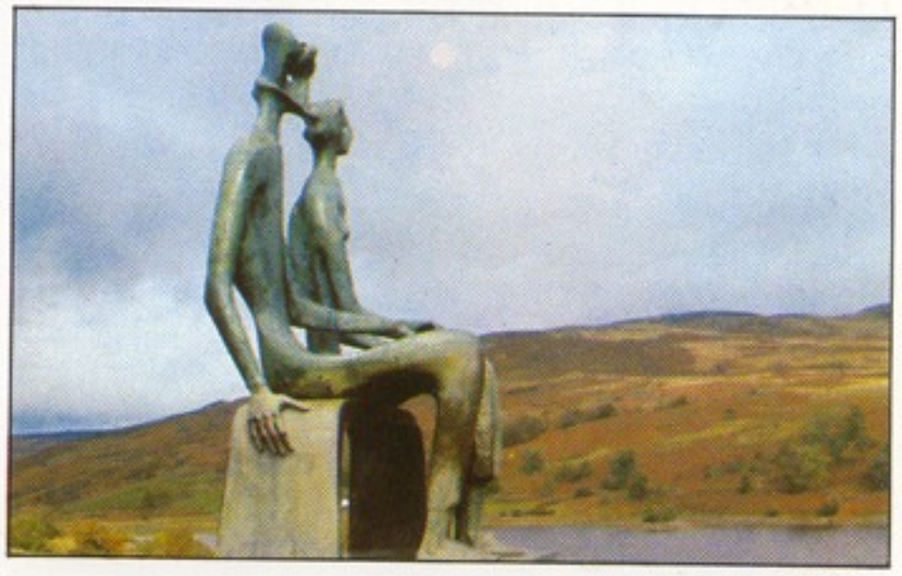


Focal length vs. viewpoint

- **Telephoto makes it easier to select background (a small change in viewpoint is a big change in background.**



Grand-angulaire 24 mm



Normal 50 mm

Longue focale 135 mm

Perspective vs. viewpoint

- **Portrait: distortion with wide angle**
- **Why?**

Wide angle

Standard

Telephoto

Very wide angle: include but distort

- **Difficult lens to use because it includes so much**
- **enables wide range of scales**

24mm

18mm

16mm

Normal: neutral

50mm

55mm

50mm

Medium telephoto: isolate

95mm

110mm

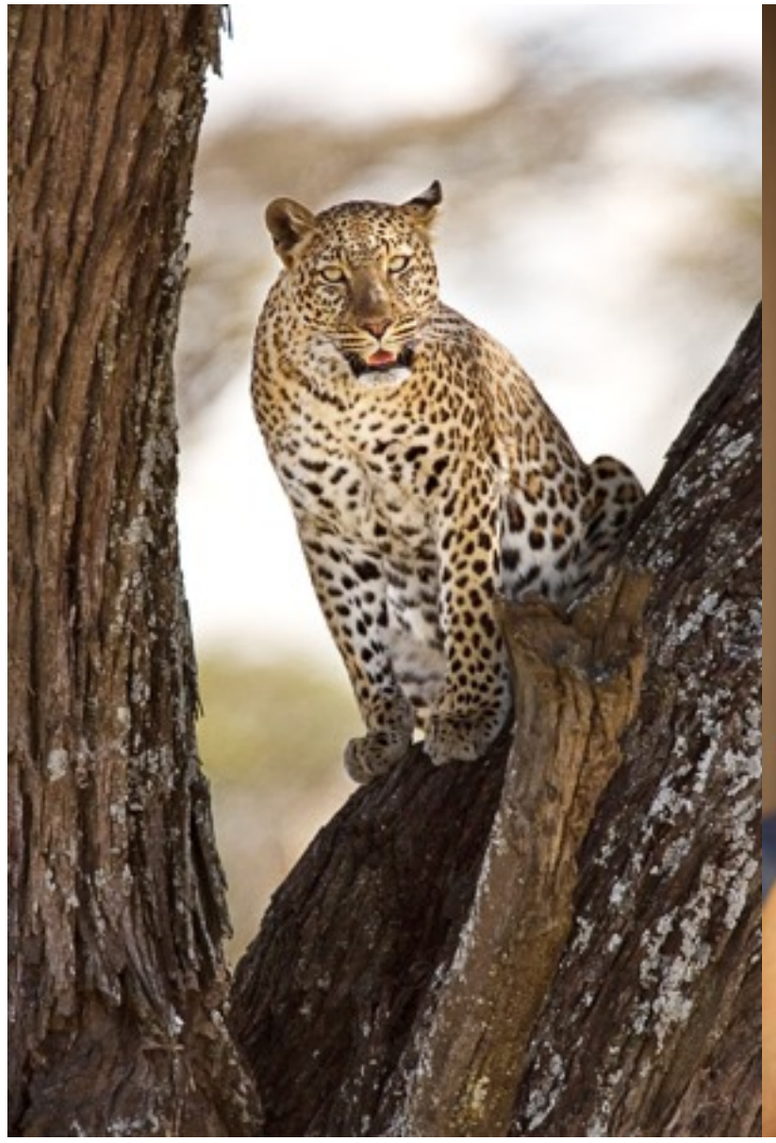
110mm

150mm

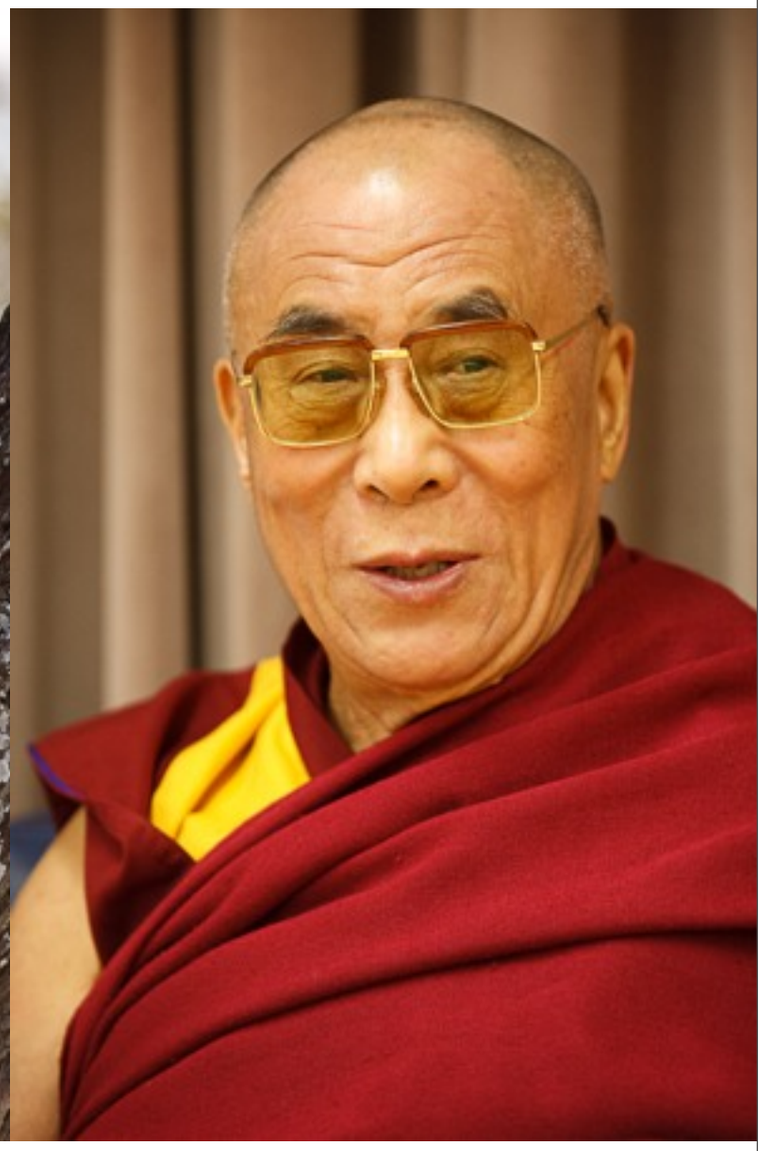
Super telephoto

910mm

910mm

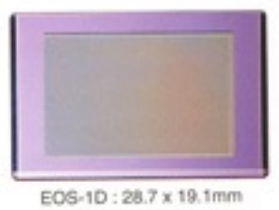


910mm

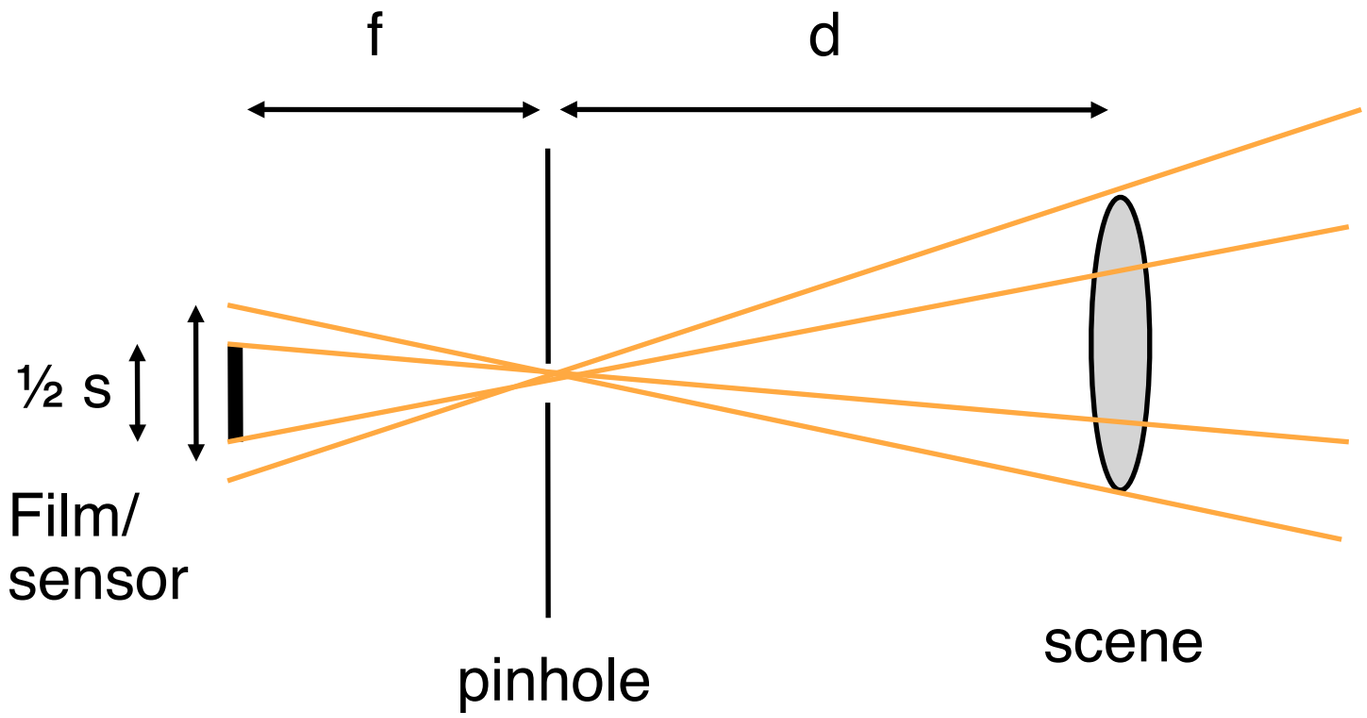


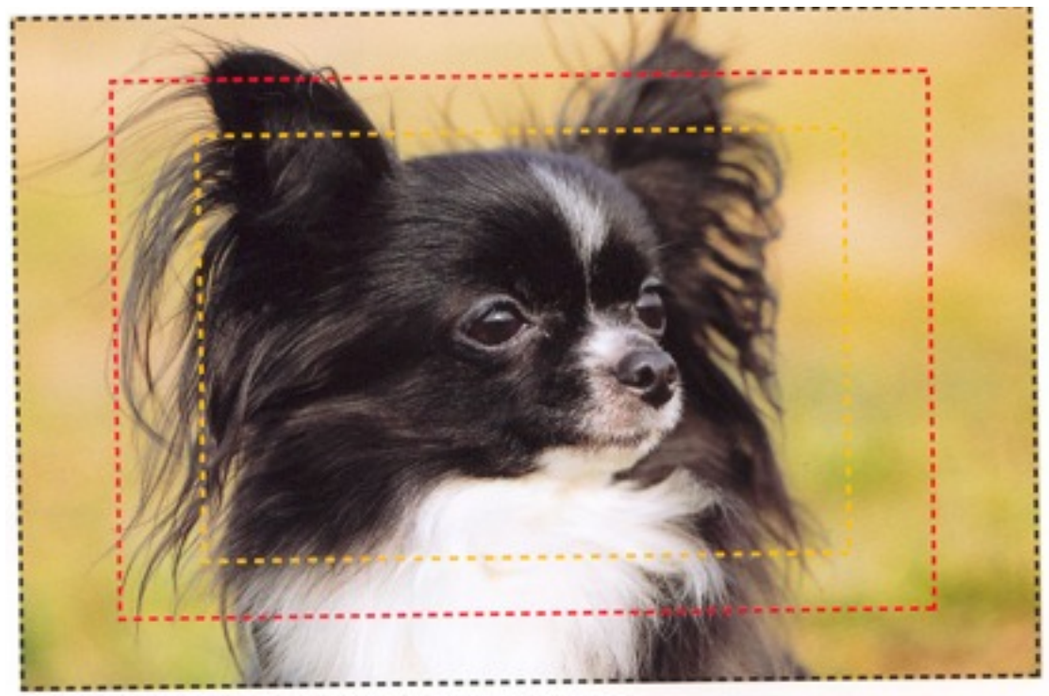
390mm

Focal length & sensor

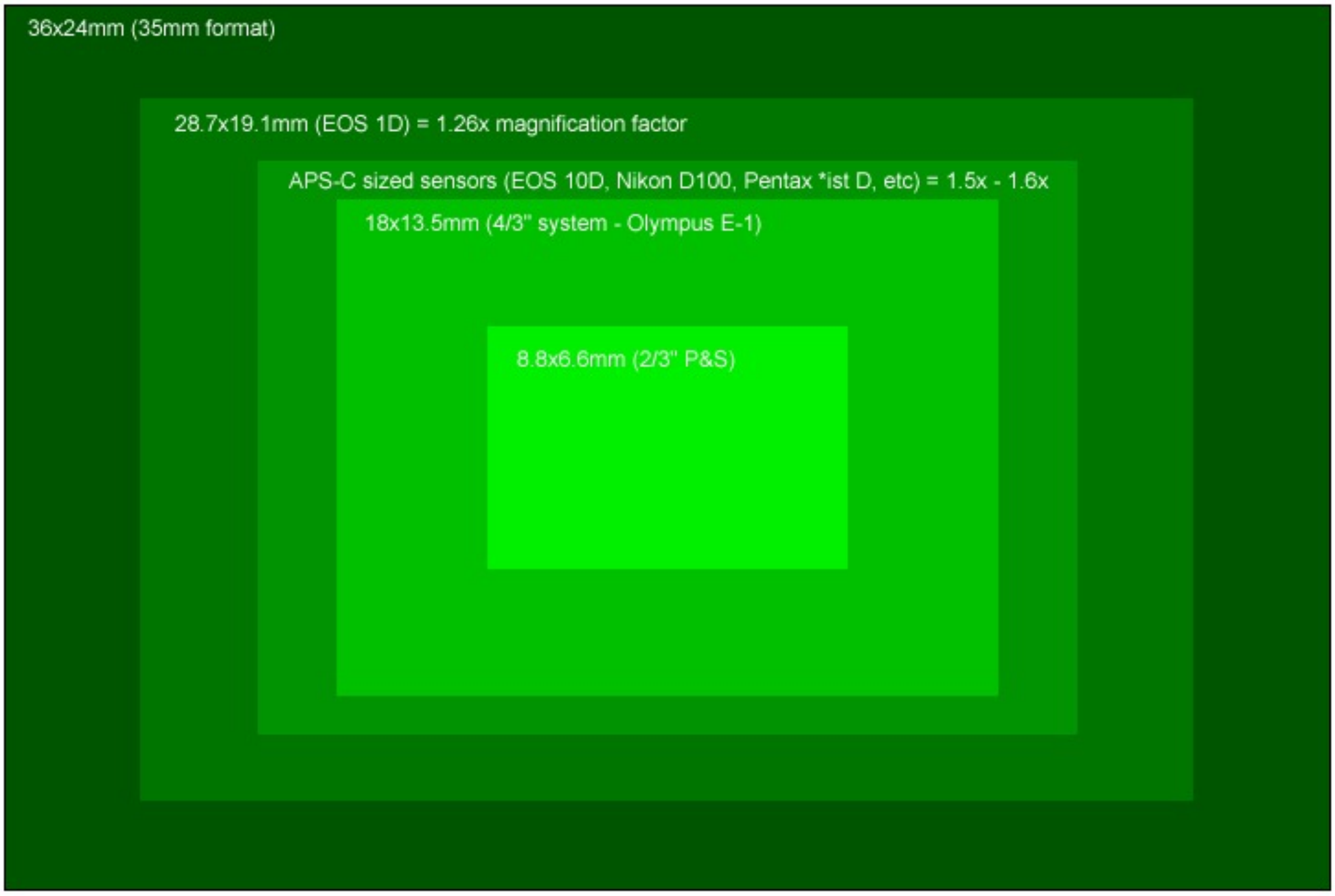


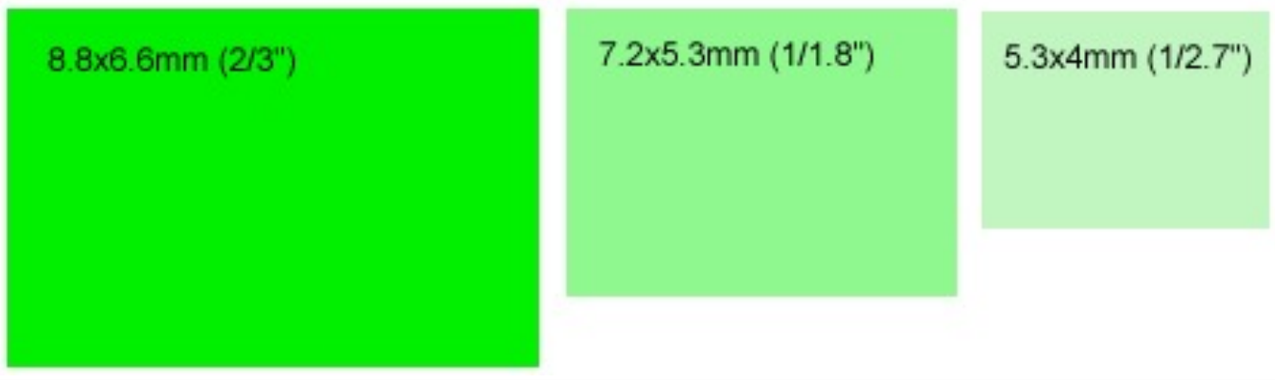
- **What happens when the sensor is half the size?**
  - It's like cropping!
  - The field of view is reduced by a factor of 2
  - The equivalent focal length for is multiplied by 2
  - Hence the so-called crop factor,
    and the notion of 35mm equivalent focal length
- **Most affordable SLRs have a 1.5 crop factor**





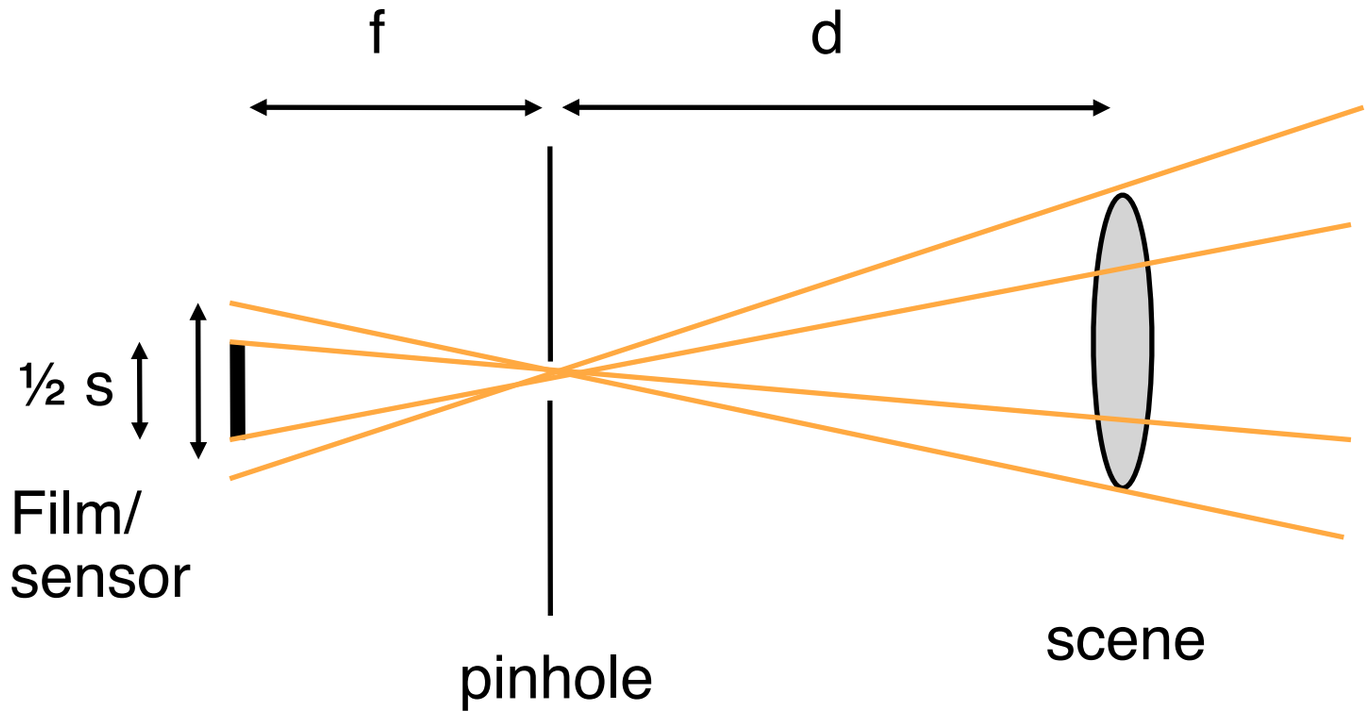
http://www.photozone.de/3Technology/digital_1.htm





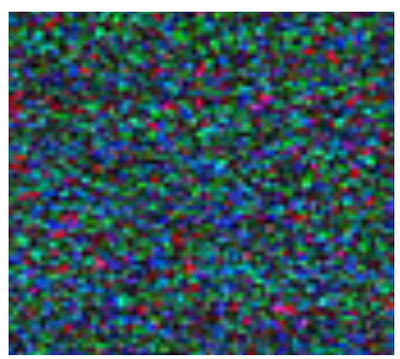
Consequences of smaller sensor

- **Different field of view for same focal length**
  - hence the "crop factor"
  - a 100mm on a low-end SLR has the same field of view as a 150mm on a high-end one



- **Larger depth of field**

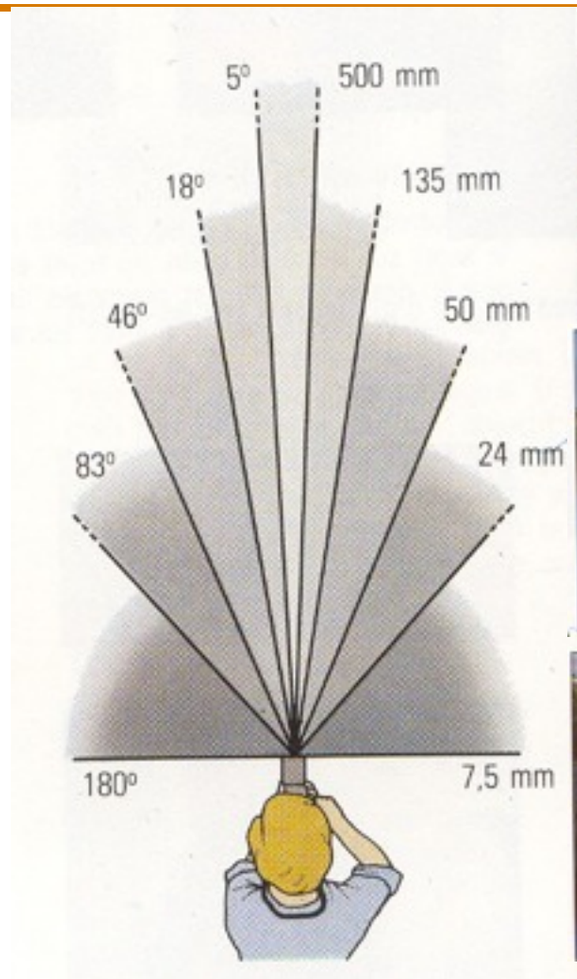
- **Increased noise**

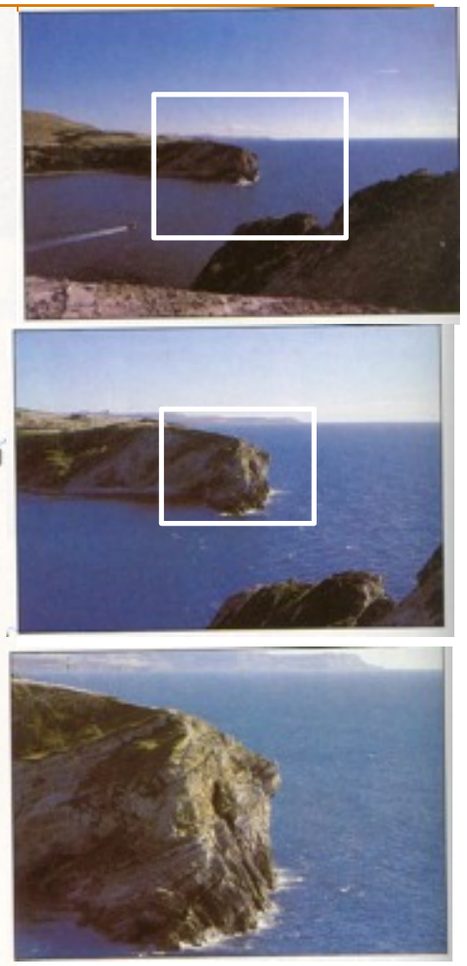


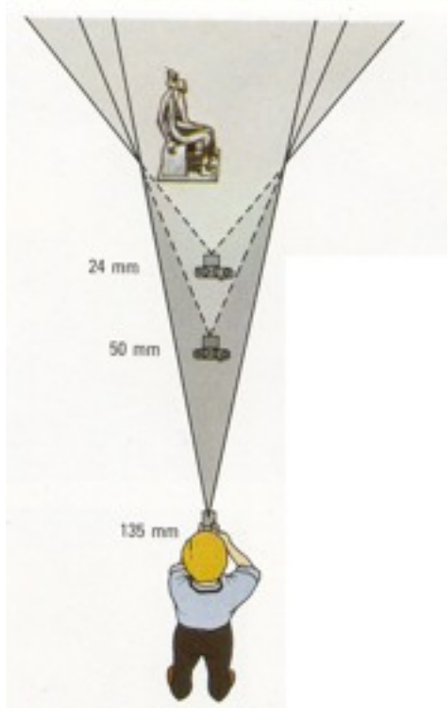
Recap: focal length

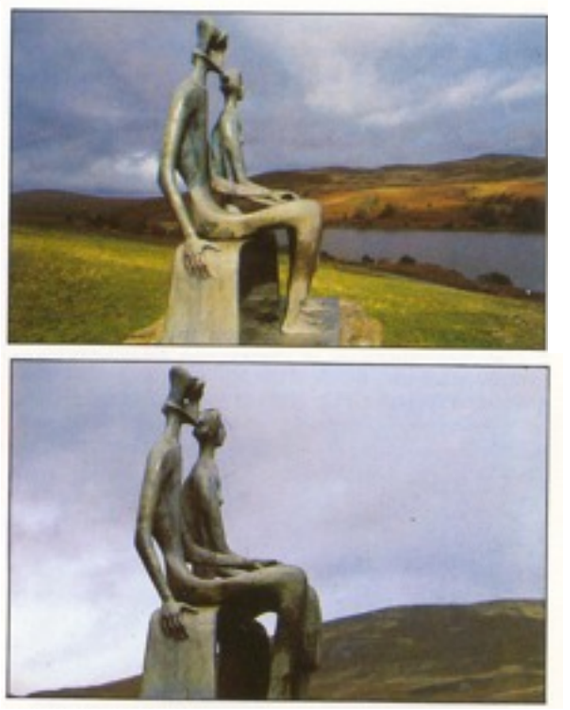
- **focal length**
  = field of view
  = cropping
- **depends on sensor size**
- **zooming changes the focal length**
  - wide angle : <35mm
  - telephoto : > 85mm

- **difference between viewpoint and focal length**









Exposure

- **Get the right amount of light to sensor/film**
- **Two main parameters:**
  - Shutter speed
  - Aperture (area of lens)

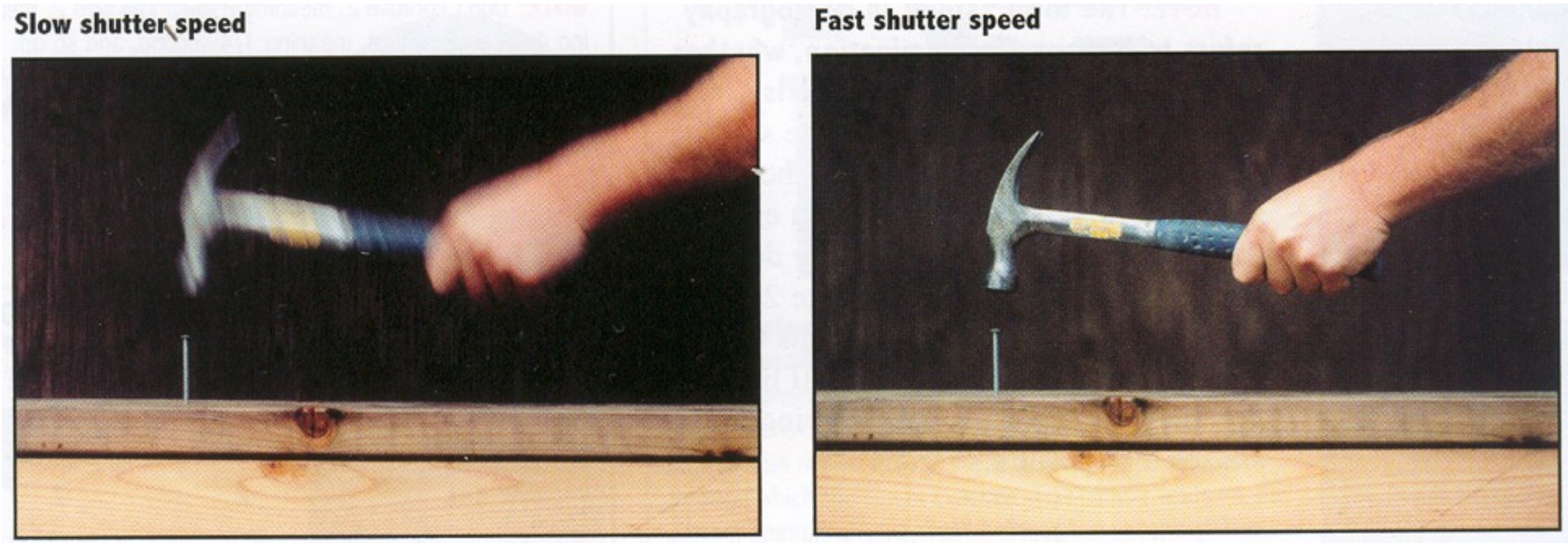
+ sensor/film sensitivity (ISO)

Main side effects

- motion blur
- depth of field

Main effect of shutter speed

- **Motion blur**



From Photography, London et al.

Effect of shutter speed

- **Freezing motion**

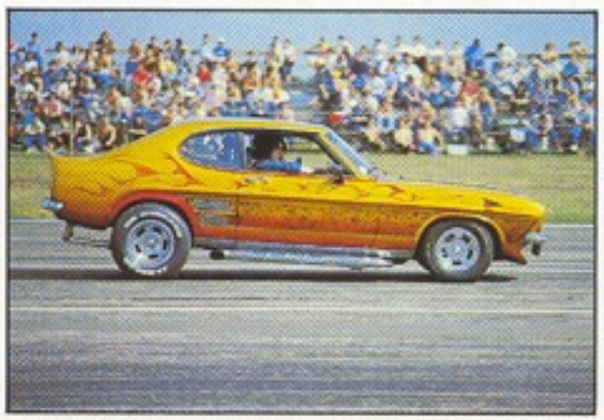
Walking people

1/125

Running people

1/250

Car



1/500

Fast train

1/1000

Note: it doesn't mean that shutter speed is proportional to the speed of the object. A photographer usually tracks the subject.

Slow shutter speed for motion blur

0.8s

Tracking & slow shutter speed

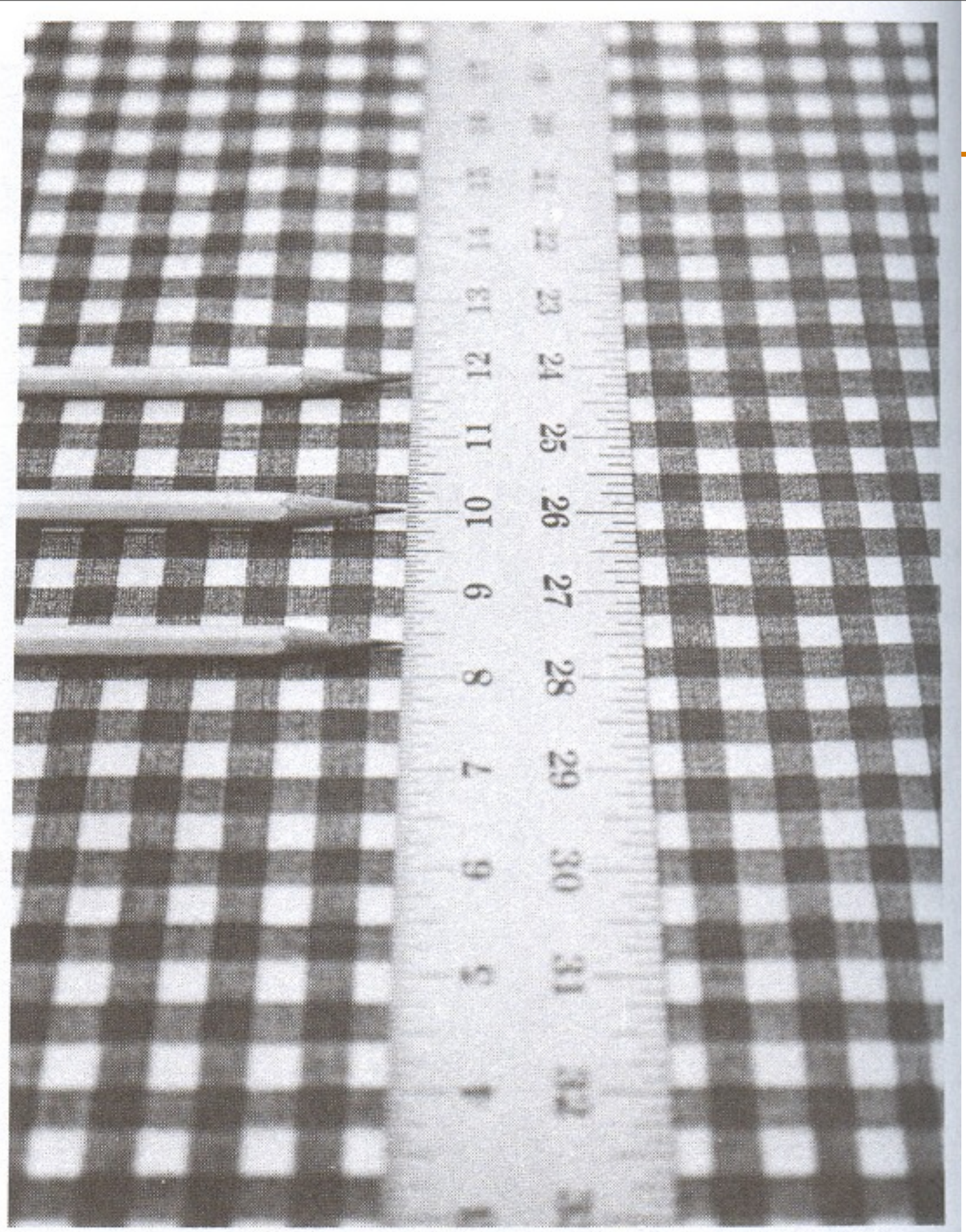
1/8

Slow shutter speed to get light

15s

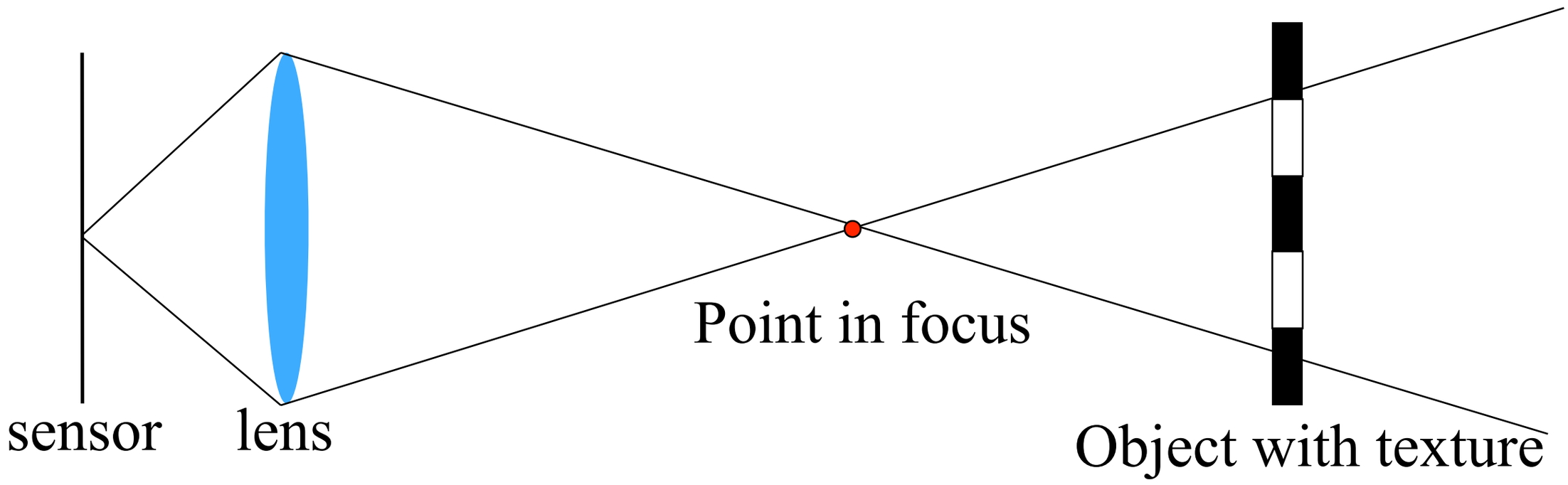
Aperture

- **Diameter of the lens opening (controlled by diaphragm)**
- **Expressed as a fraction of focal length, in f-number**
  - f/2.0 on a 50mm means that the aperture is 25mm
  - f/2.0 on a 100mm means that the aperture is 50mm
- **Disconcerting: small f number = big aperture**
- **What happens to the area of the aperture when going from f/2.0 to f/4.0?** divided by 4 (square of f number ratio)
- **Typical f numbers are**
  f/2.0, f/2.8, f/4, f/5.6, f/8, f/11, f/16, f/22, f/32
  - See the pattern?



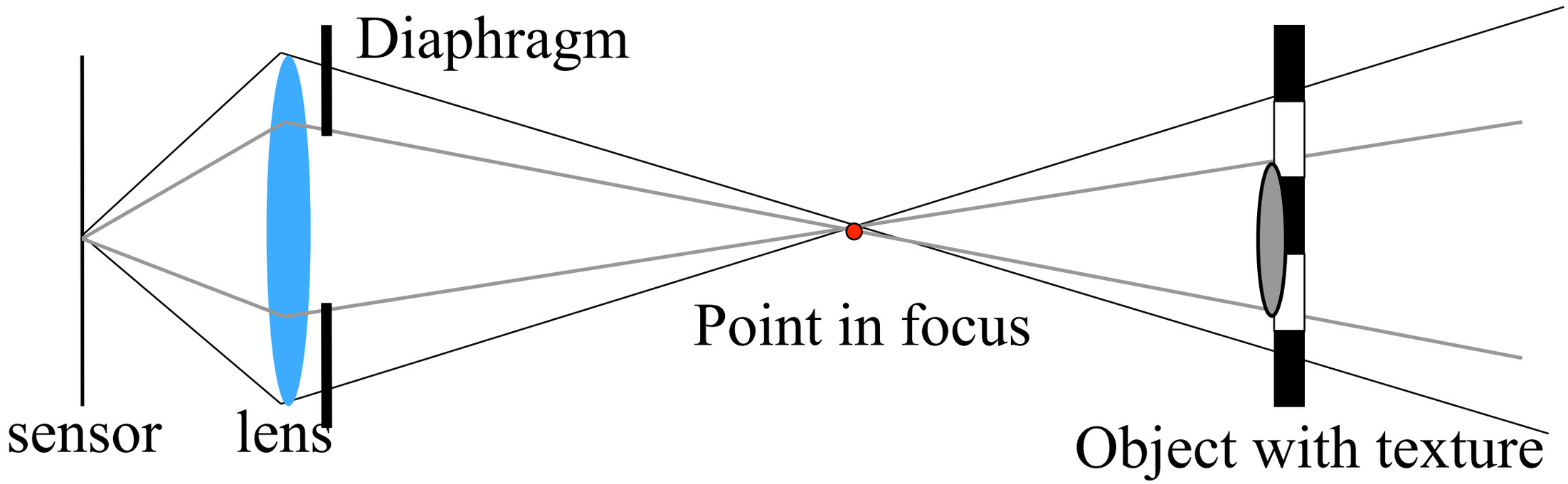
Depth of field

- **Pixel is an integral over a cone of light**
  - Converges at focal plane
  - But blurs for other distances

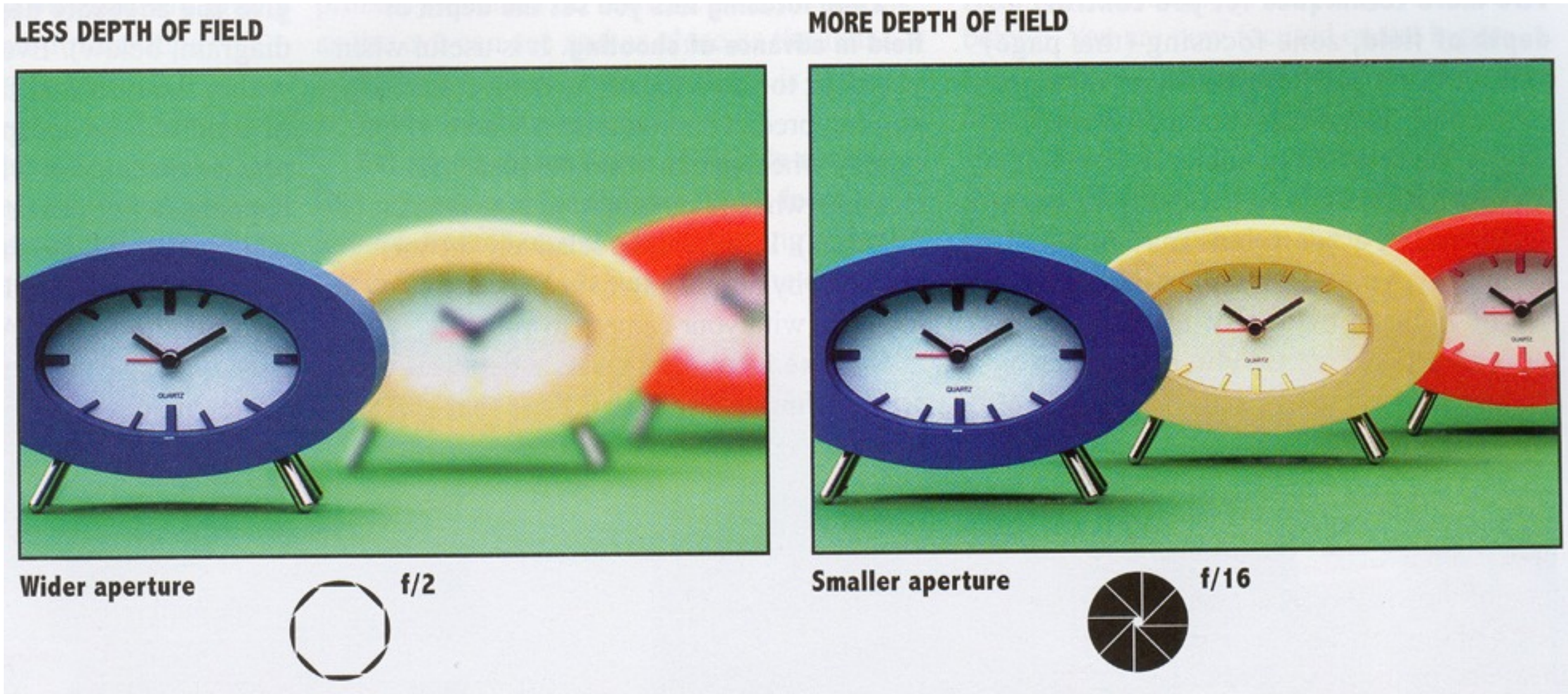


Depth of field

- **What happens when we close the aperture by two stop?**
  - Aperture diameter is divided by two
  - Depth of field is doubled



Depth of field



From Photography, London et al.

Is depth of field good or evil?

- **It depends, little grasshopper**
- **Want huge DoF: landscape, photojournalists, portrait with environment**
- **Shallow DoF: portrait, wildlife**

Michael Reichman

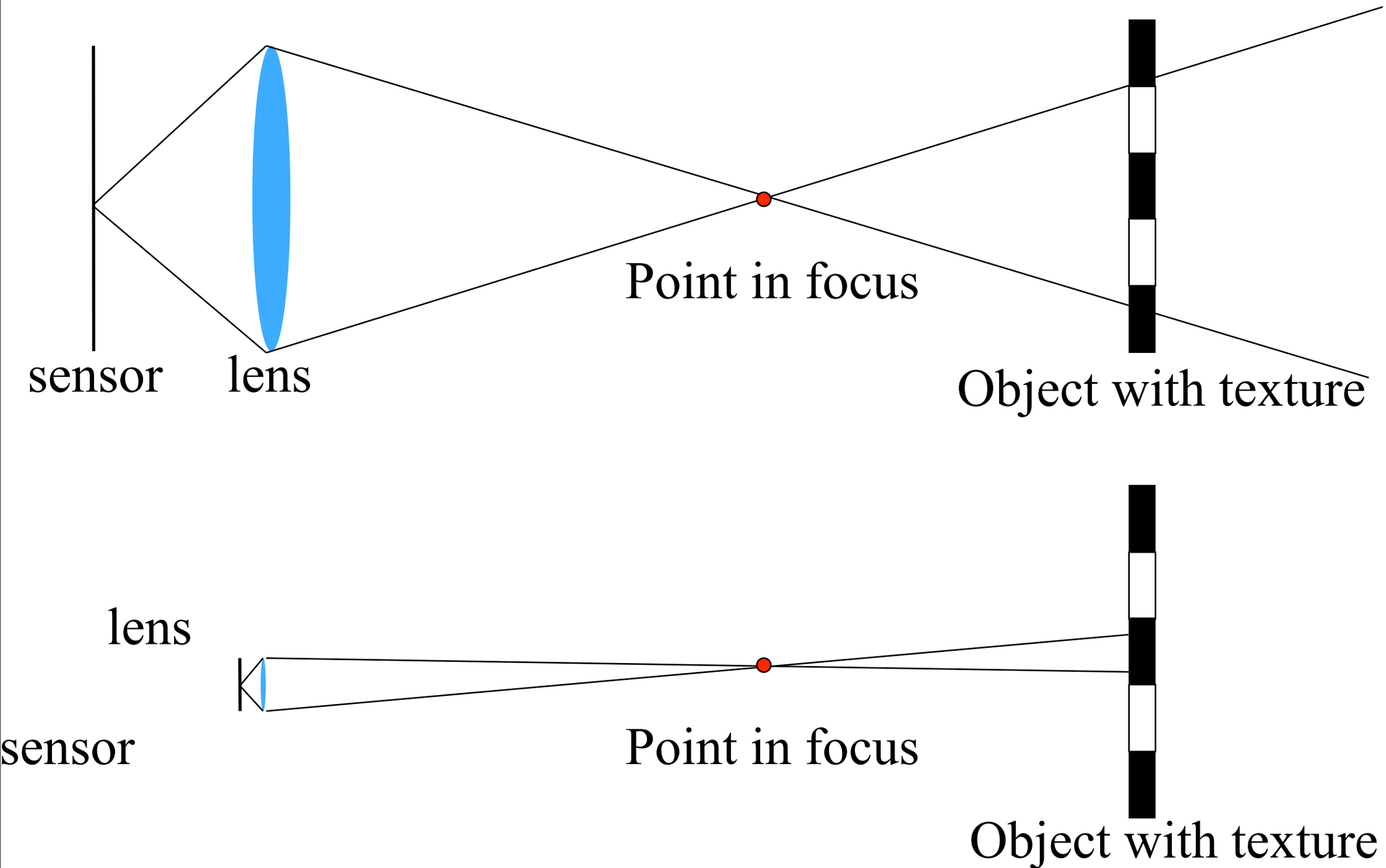
Steve McCurry

Shallow depth of field: portrait

85mm f/1.2

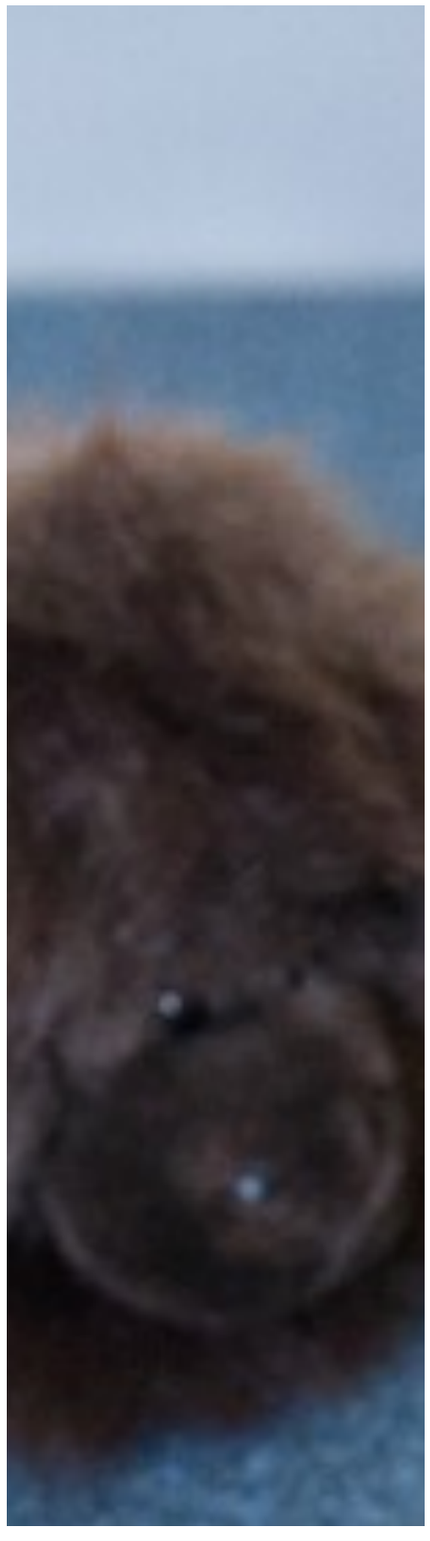
Depth of field

- **It's all about the size of the lens aperture**



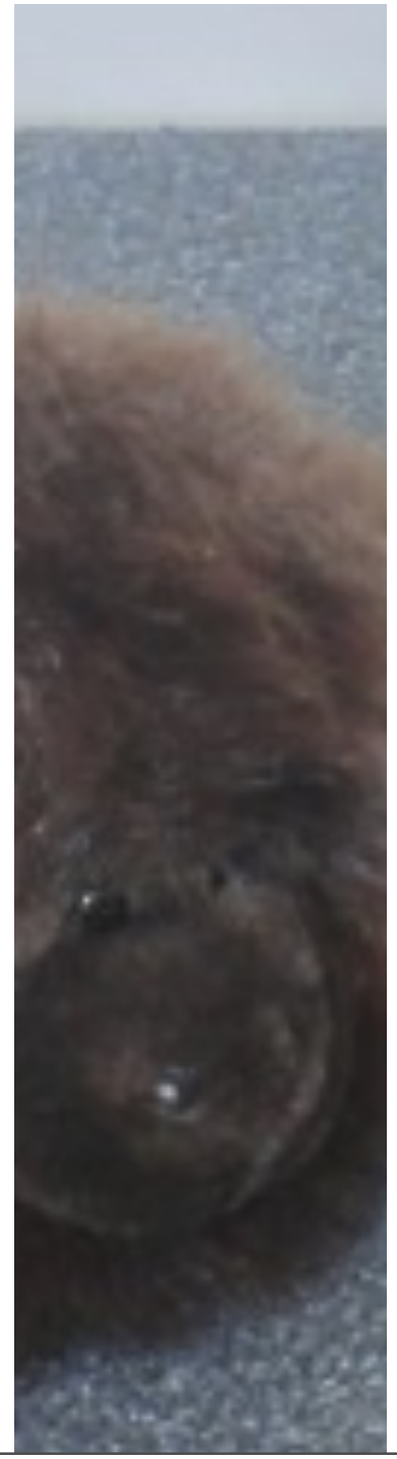
Depth of field & sensor

- **Nikon D3s: 36x24mm**



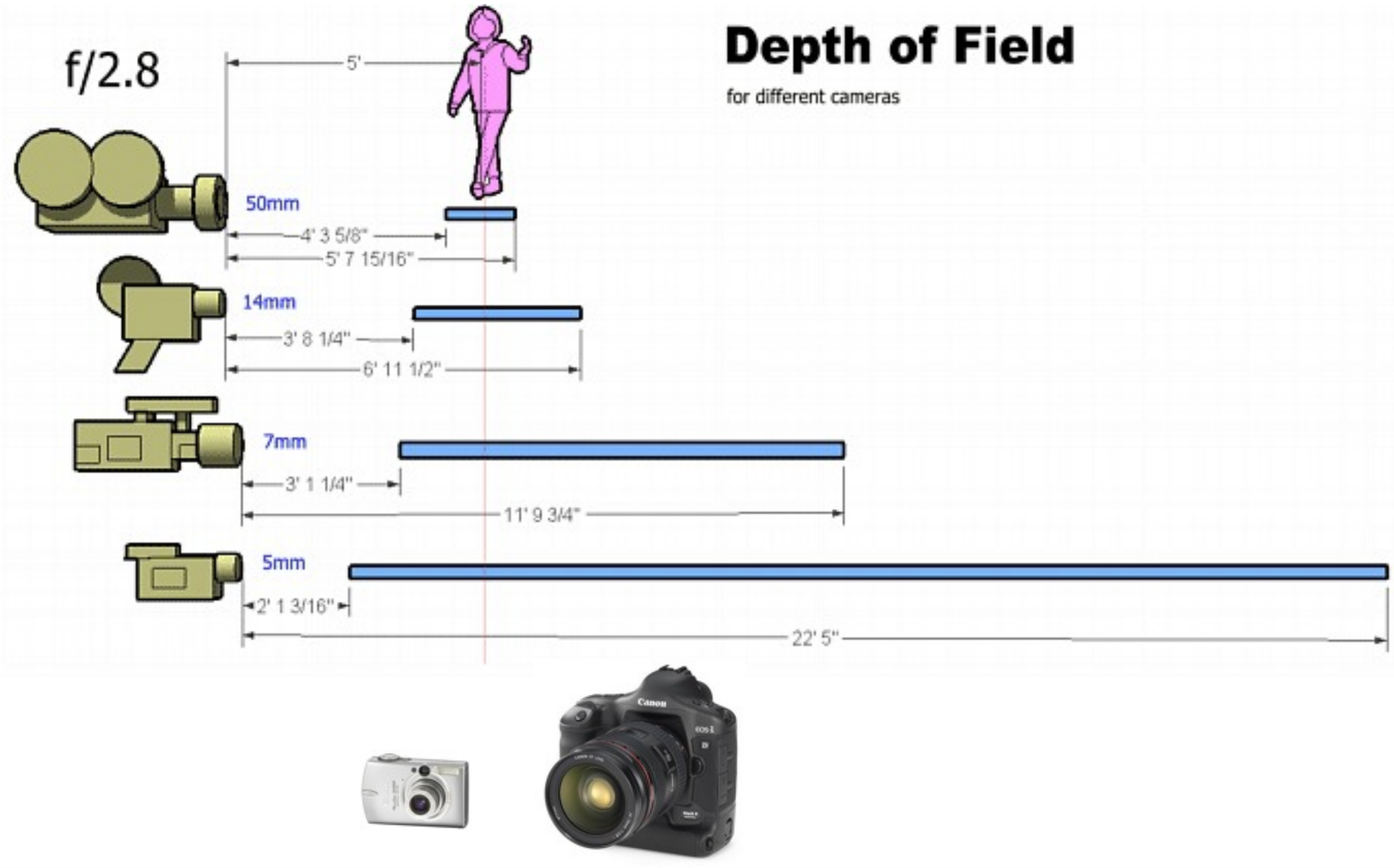
Depth of field & sensor

- **Sony DSC-TX9: 6.17 x 4.55 mm**



Small sensors=>large depth of field

- http://www.mediachance.com/dvdlab/dof/index.htm



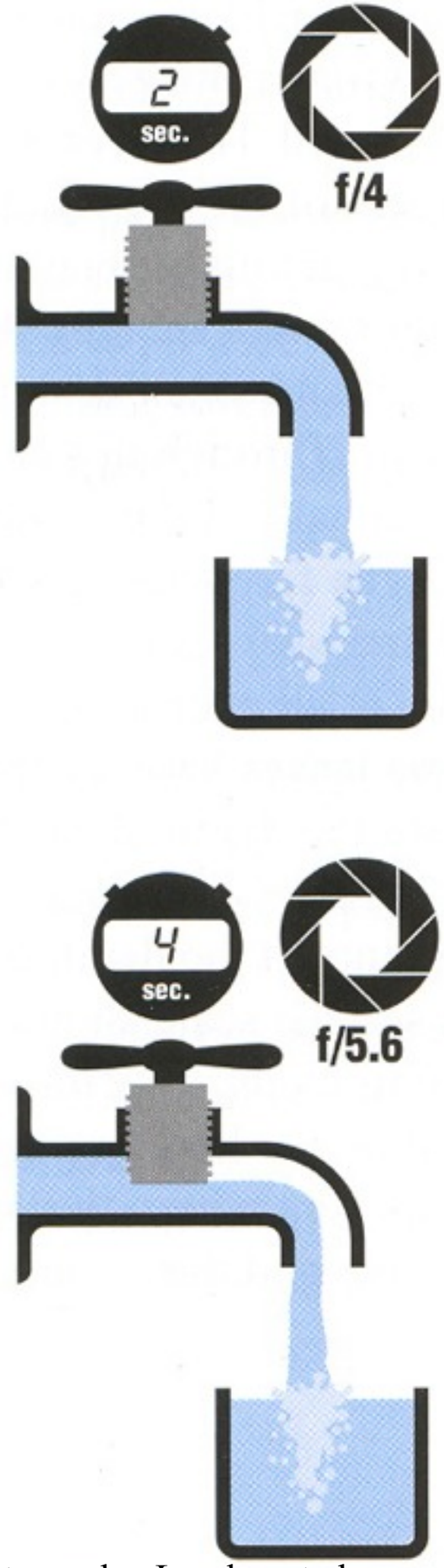
Exposure

- **Two main parameters:**
  - Aperture (in f stop)
  - Shutter speed (in fraction of a second)

- **Reciprocity**

The same exposure is obtained with an exposure twice as long and an aperture *area* half as big

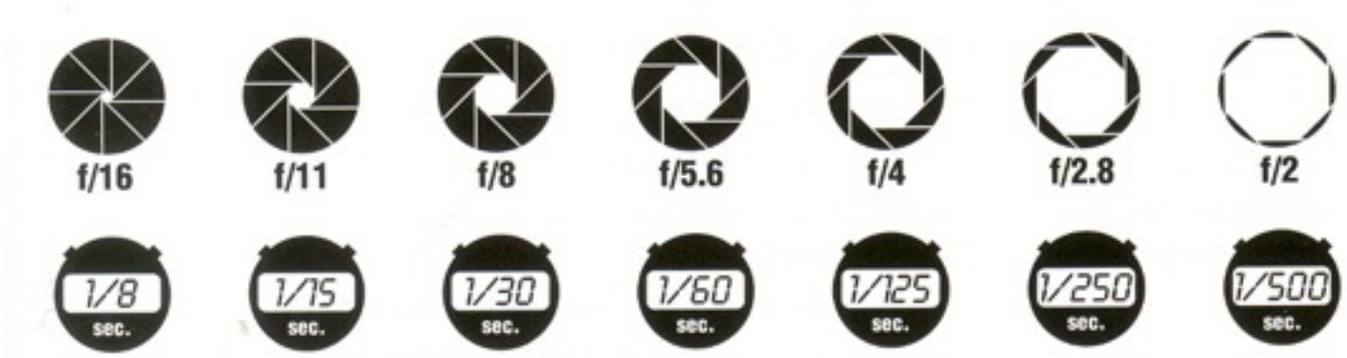
  - Hence square root of two progression of f stops vs. power of two progression of shutter speed
  - Reciprocity can fail for very long exposures



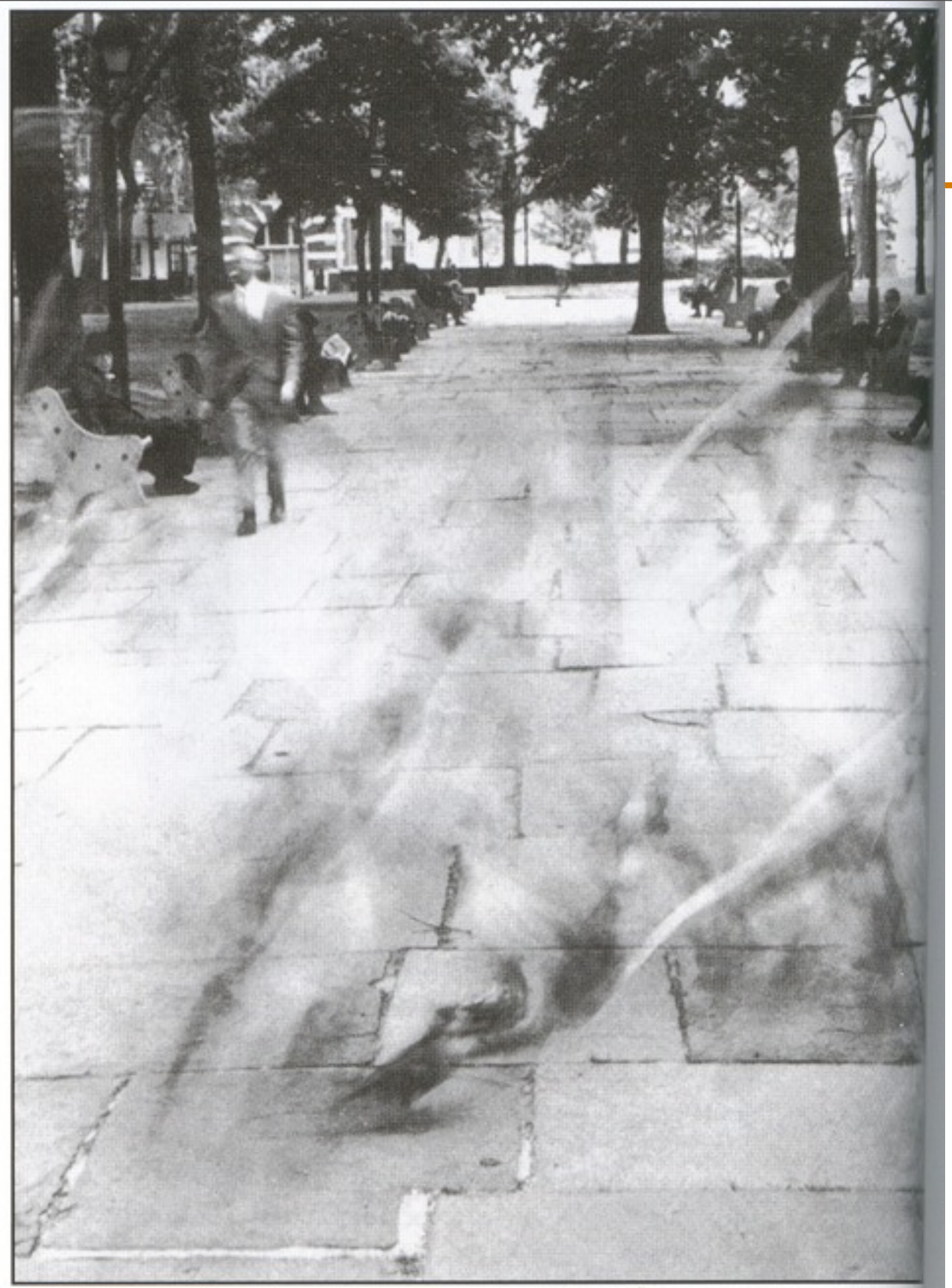
From Photography, London et al.

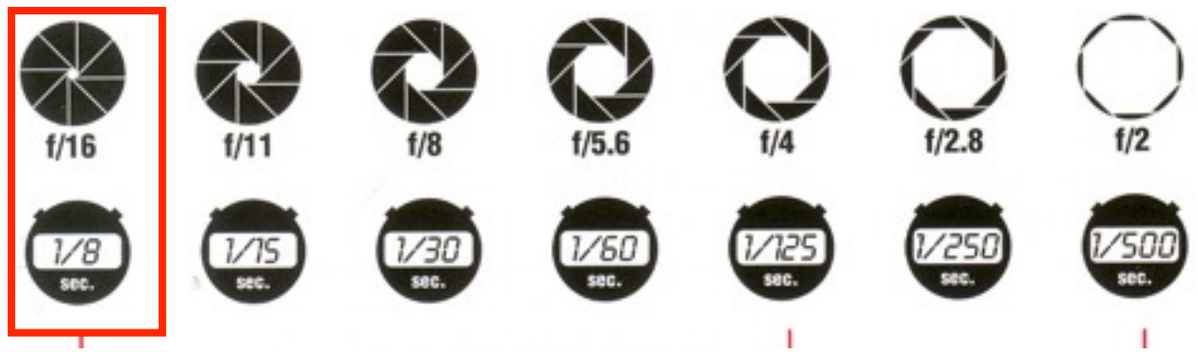
Reciprocity

- **Assume we know how much light we need**
- **We have the choice of an infinity of shutter speed/ aperture pairs**



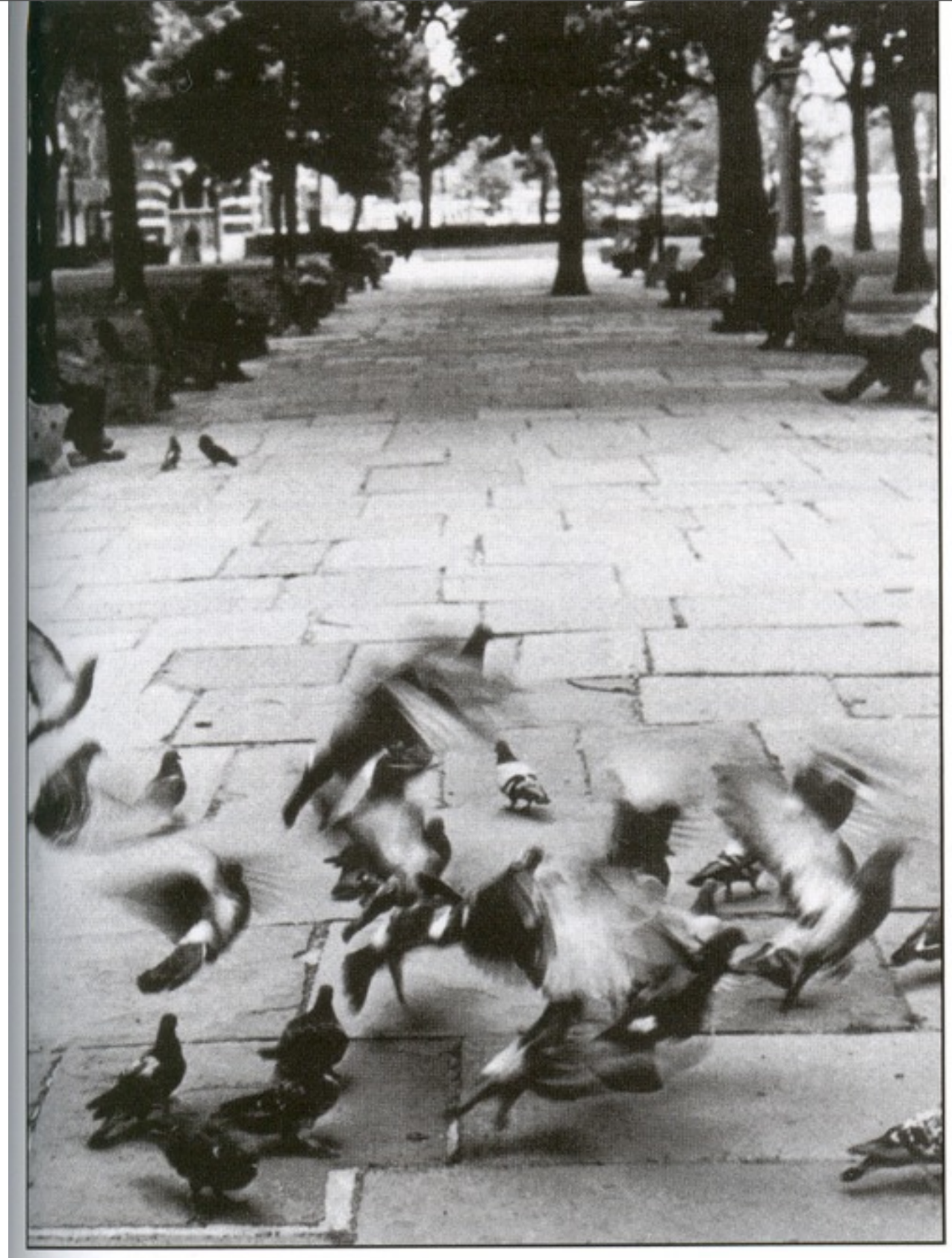
- **What will guide our choice of a shutter speed?**
  - Freeze motion vs. motion blur, camera shake
- **What will guide our choice of an aperture?**
  - Depth of field, diffraction limit
- **Often we must compromise**
  - Open more to enable faster speed (but shallow DoF)

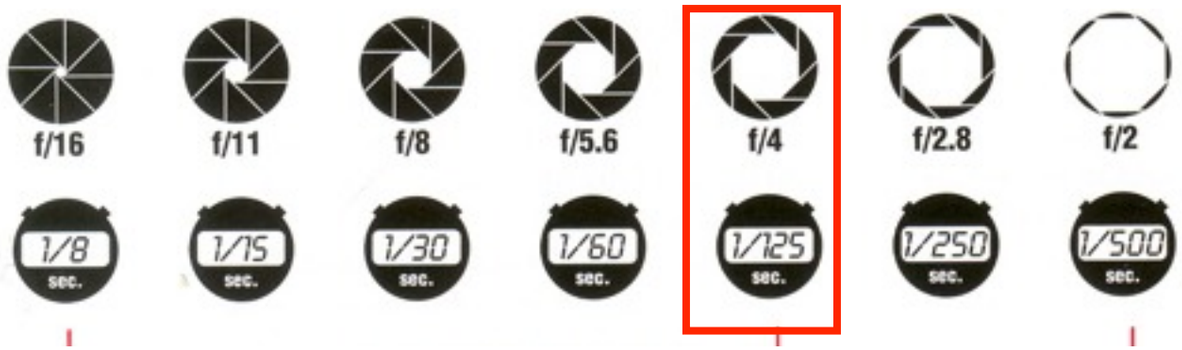




Small aperture (deep depth of field), slow shutter speed (motion blurred). *In this scene, a small aperture (f/16) produced great depth of field; the nearest paving stones as well as the farthest trees are sharp. But to admit enough light, a slow shutter speed (1/8 sec) was needed; it was too slow to show moving pigeons sharp. It also meant that a tripod had to be used to hold the camera steady.*

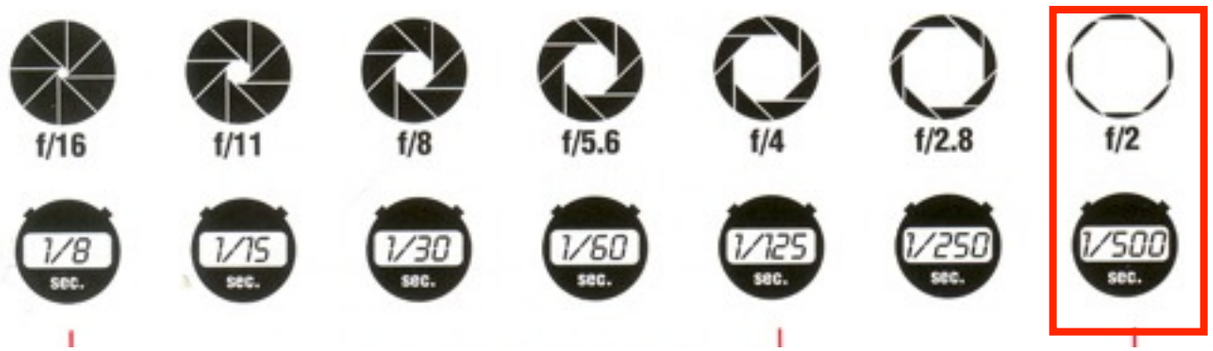
From Photography, London et al.





Medium aperture (moderate depth of field), medium shutter speed (some motion sharp). *A medium aperture (f/4) and shutter speed (1/125 sec) sacrifice some background detail to produce recognizable images of the birds. But the exposure is still too long to show the motion of the birds' wings sharply.*

From Photography, London et al.

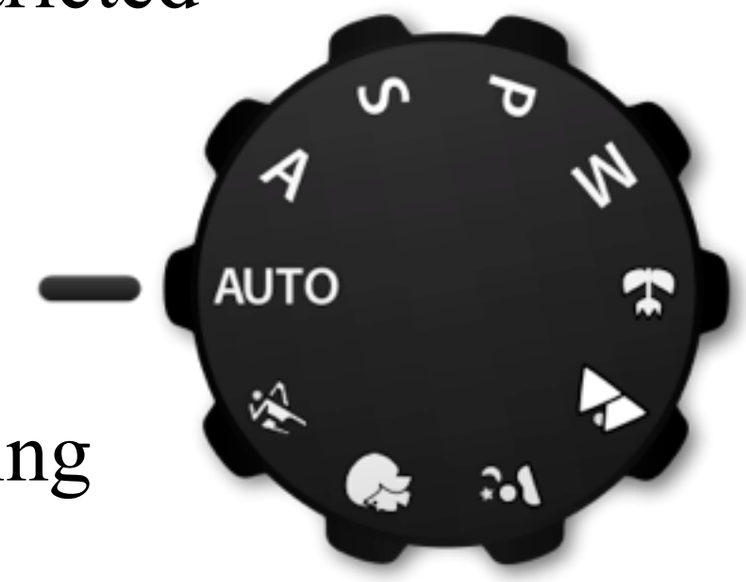


Large aperture (shallow depth of field), fast shutter speed (motion sharp). *A fa*
shutter speed (1/500 sec) stops the motion of the pigeons so completely that the
flapping wings are frozen. But the wide aperture (f/2) needed gives so little depti
of field that the background is now out of focus.

From Photography, London et al.

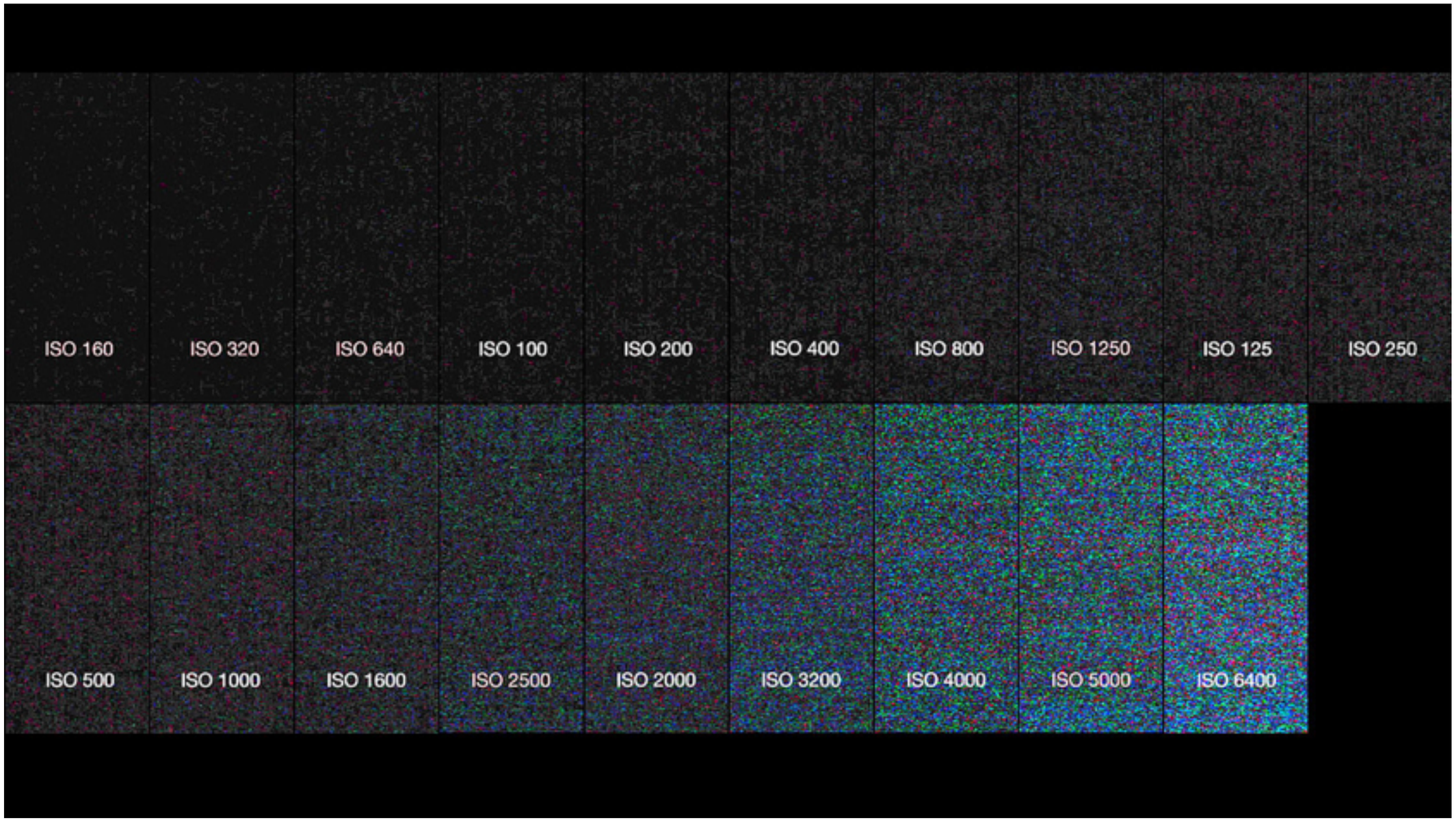
Exposure modes

- **Aperture priority: A (My favorite, I use it 90% of the time)**
  - Direct depth of field control
  - Cons: can require impossible shutter speed (e.g. with f/1.4 for a bright scene)
- **Shutter speed priority: Tv or S**
  - Direct motion blur control
  - Cons: can require impossible aperture (e.g. when requesting a 1/1000 speed for a dark scene)
    - Note that aperture is somewhat more restricted
- **Program**
  - Almost no control, but no need for neurons
- **Manual**
  - Full control, but takes more time and thinking



Sensitivity (ISO)

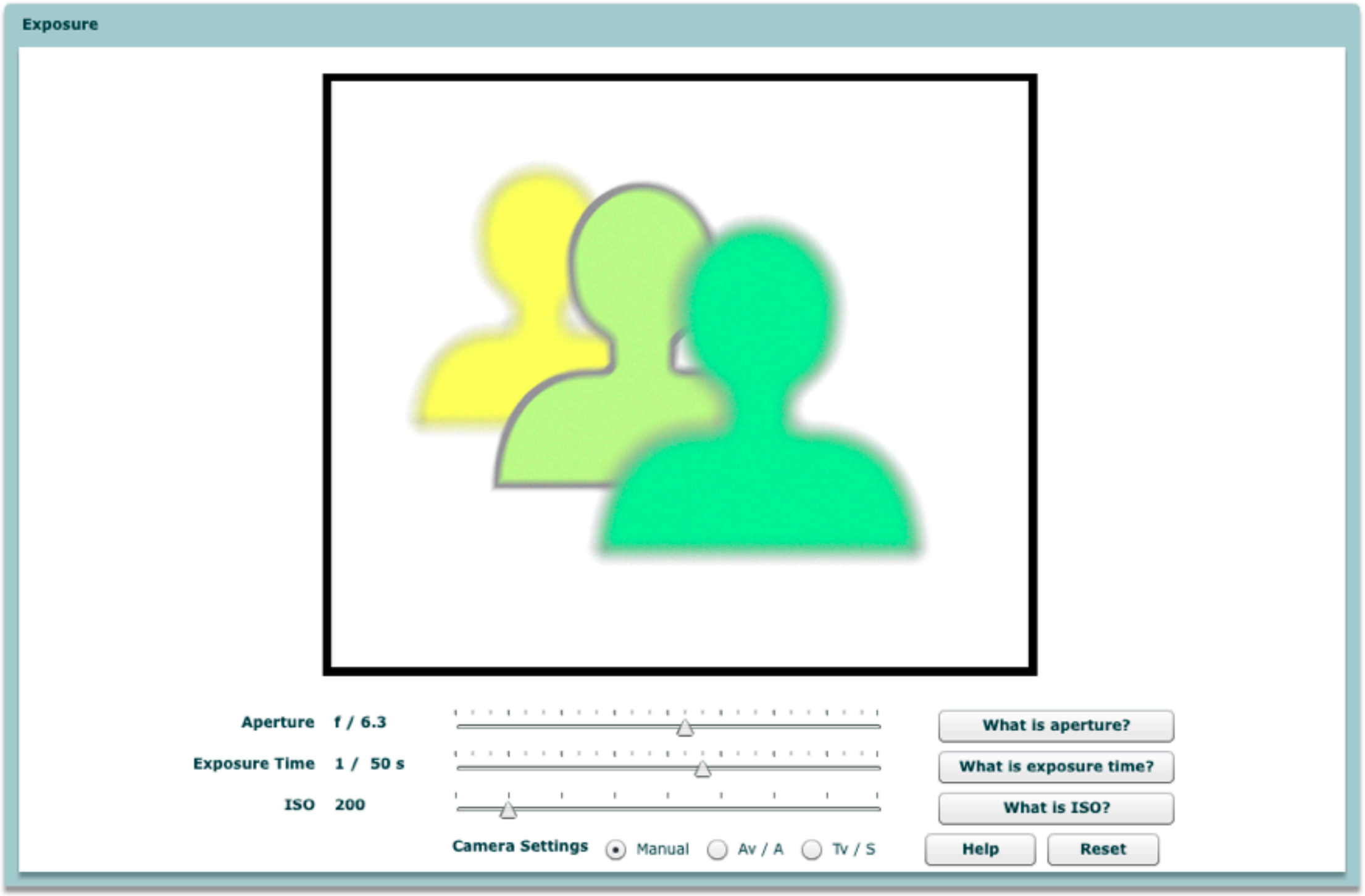
- **Third variable for exposure**
- **Linear effect (200 ISO needs half the light as 100 ISO)**
- **Trade sensitivity for noise**



http://wiegaertnerfilms.com/tutorials/the-best-iso-settings-for-canon-video-dslrs/

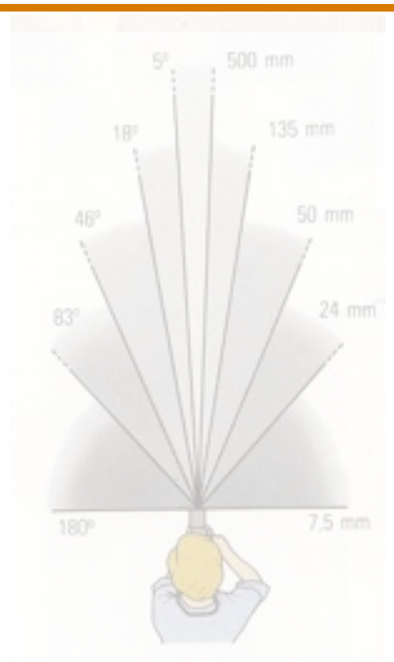
Demo

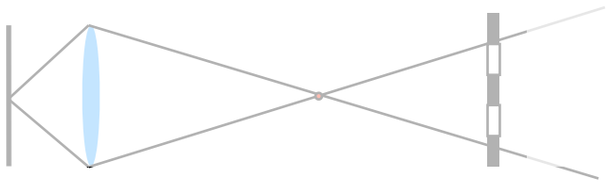
– *http://graphics.stanford.edu/courses/cs178-10/applets/exposure.html*

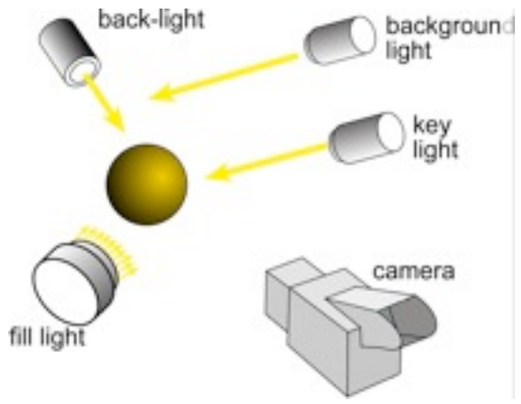


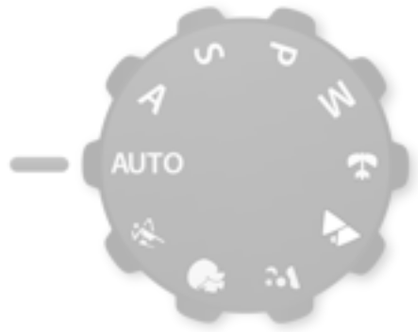
Plan

- **Imaging parameters**
  - Camera
  - Lighting
  - Software

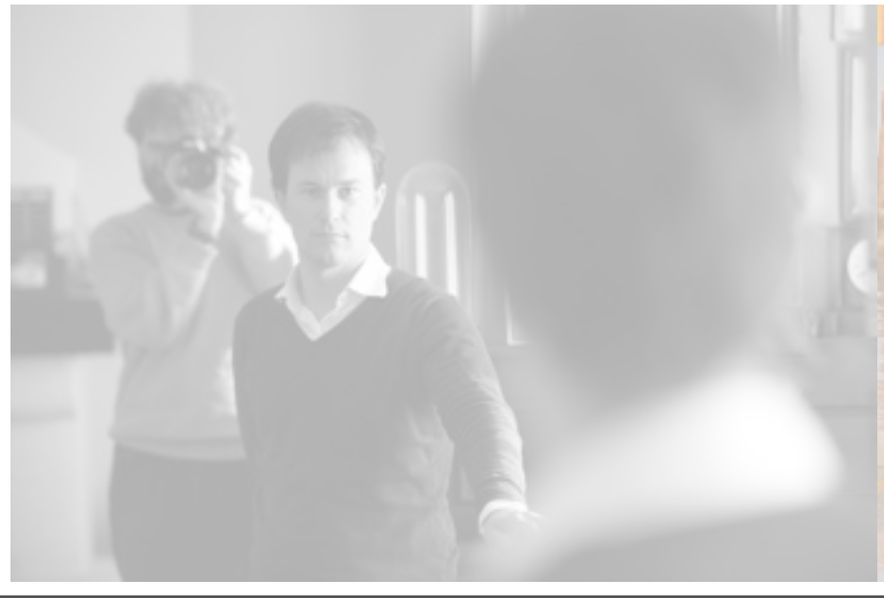


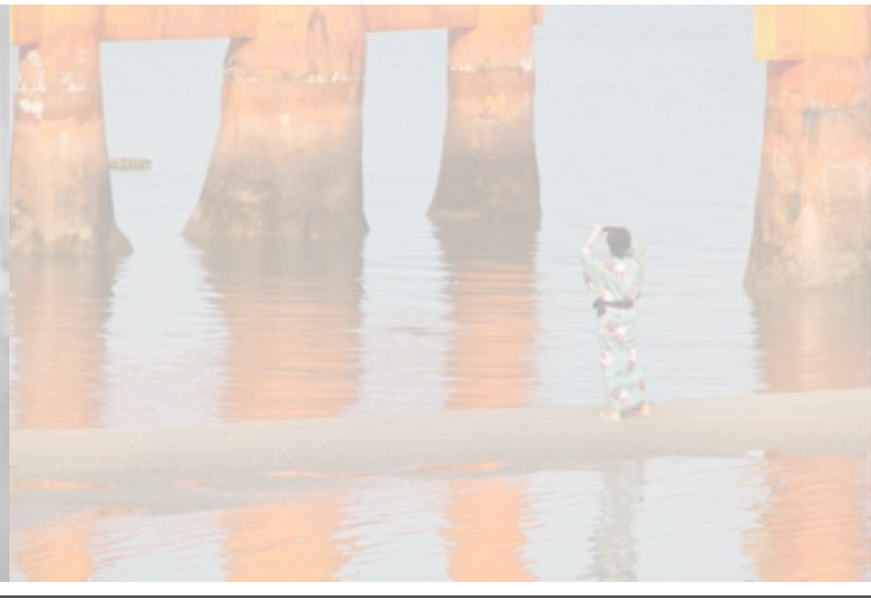






- **Equipment**
- **Improving your pictures**





Light

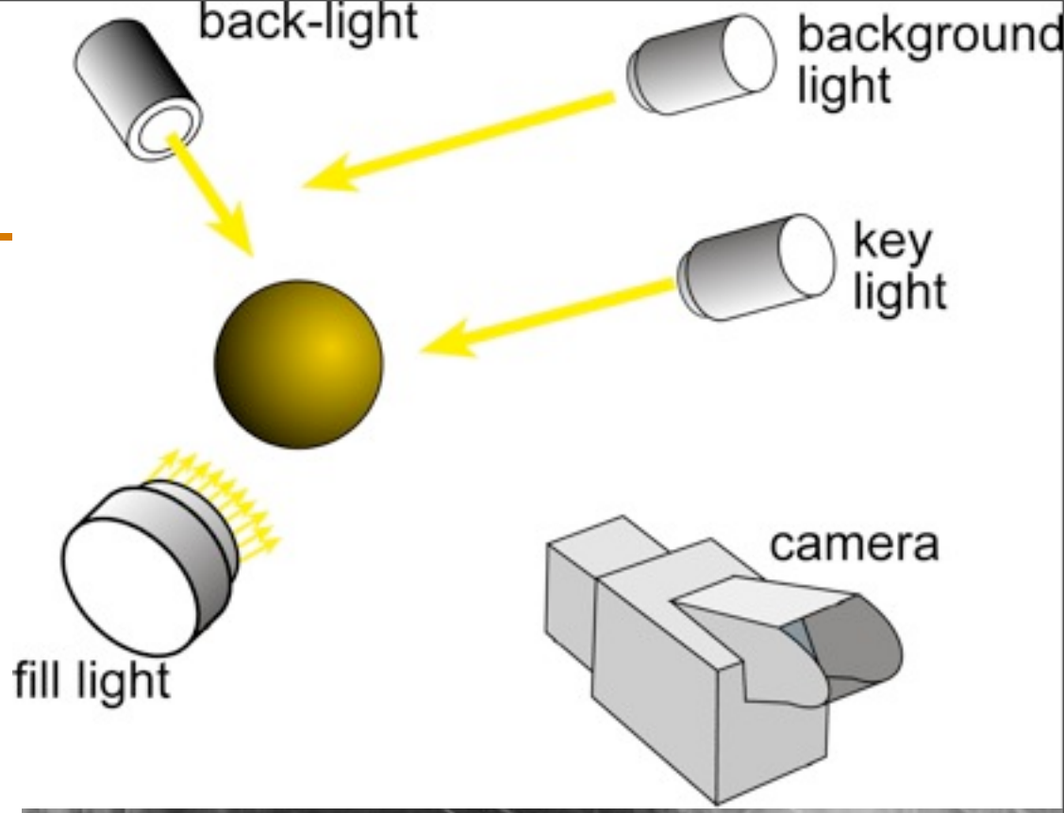
Bad light

Light

- **Control light**
  - Time of day
  - Location, direction
  - Add light (flash)
  - Reflect light
- **Goals**
  - Control contrast
  - Shape modeling
  - Story telling, art

Studio Lighting

- **E.g. 3-point lighting**
  - –Reduce dynamic range
  - –Emphasize silhouettes
    =>3D cues



- **Goals of lighting:**
  - –Manage dynamic range
  - –Reveal shape, layout, material
  - –Tell story

Bottom line

- **Don't get married on a sunny day!**

Go in the shade

- **Light is more diffuse**

Bad

Better

Overcast days are the best

- **Just don’t put the sky in the frame**

The weather conditions

The pictures

Other overcast-day pictures

Best time of day: sunset & sunrise

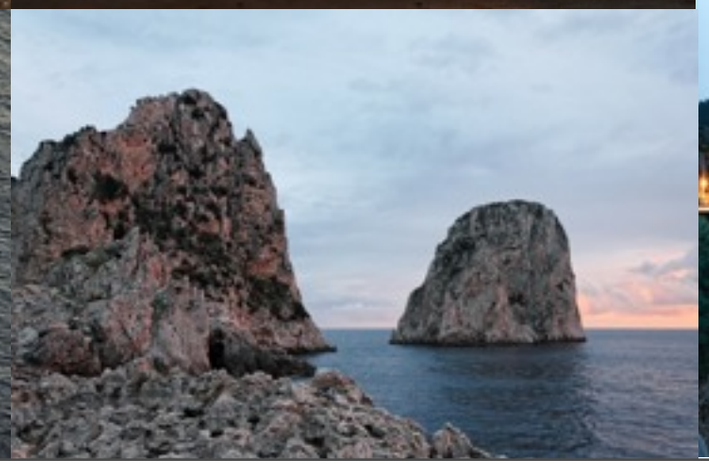
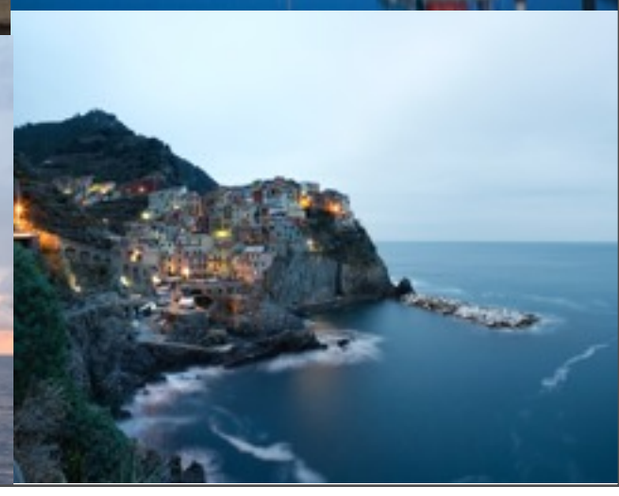
- **+/- 1 hour**
- **“Golden hours”**
- **Night photography: always near sunset/sunrise**
  - because of nice diffuse light

Mid day: often not great	less than 1 hour after sunrise/ before sunset	During sunset or sunrise	After sunset





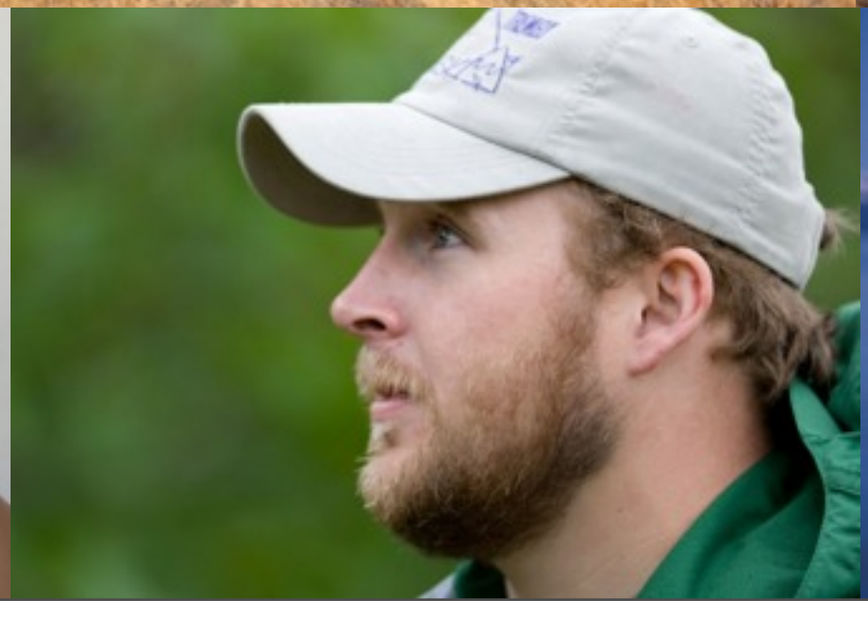


less than 1 hour after sunrise

During sunset/sunrise

After sunset



- **10 minutes after sunset**

Add fill flash

- **For harsh lighting conditions**
- **Illuminate shadows with flash to reduce dynamic range**
- **But set the flash to -1.5 or -2 EV**
  (3 to 4 times darker than existing lighting)

3 Use flash outdoors

Bright sun can create unattractive deep facial shadows. Eliminate the shadows by using your flash to lighten the face. When taking people pictures on sunny days, turn your flash on. You may have a choice of fill-flash mode or full-flash mode. If the person is within five feet, use the fill-flash mode; beyond five feet, the full-power mode may be required. With a digital camera, use the picture display panel to review the results.

On cloudy days, use the camera's fill-flash mode if it has one. The flash will brighten up people's faces and make them stand out. Also take a picture without the flash, because the soft light of overcast days sometimes gives quite pleasing results by itself.

▪ Learn more about composing people pictures

Subject is dark

After

http://www.kodak.com/eknec/PageQuerier.jhtml?pq-path=317&pq-locale=en_US

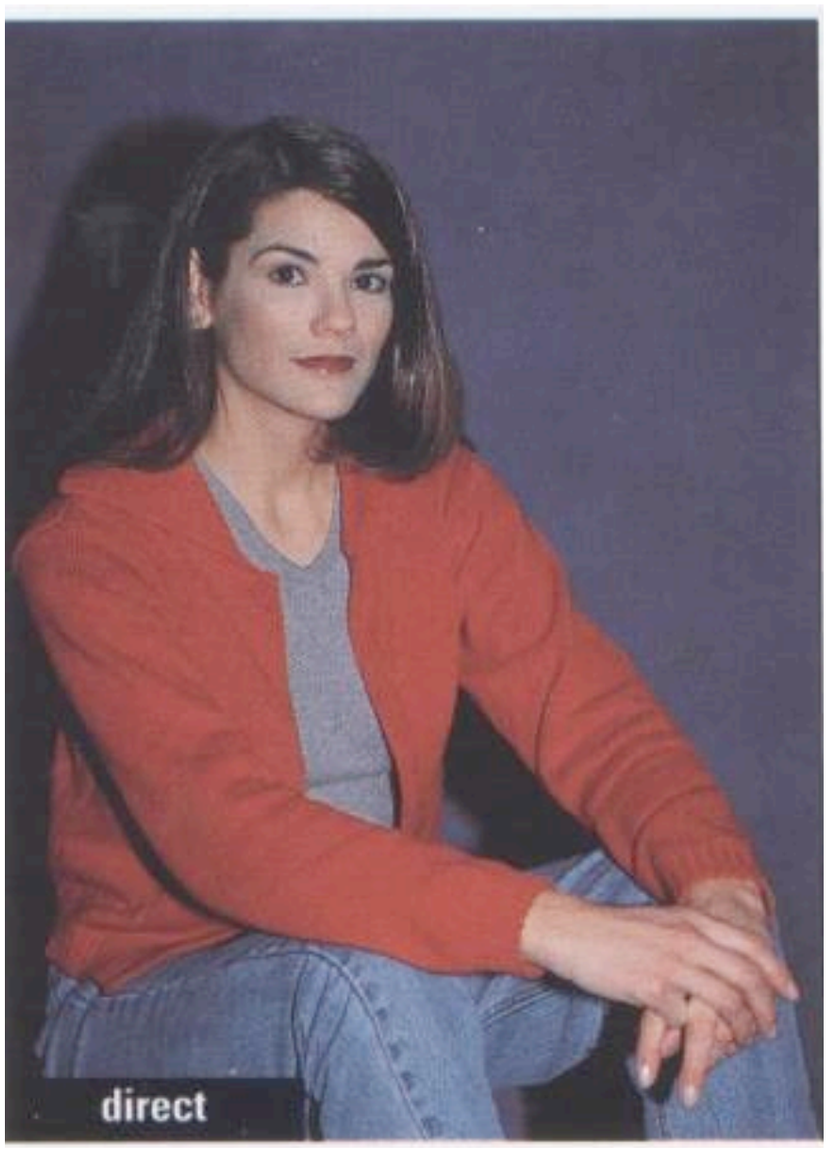
Without flash

With fill flash

Flash as the main light source

Problems:

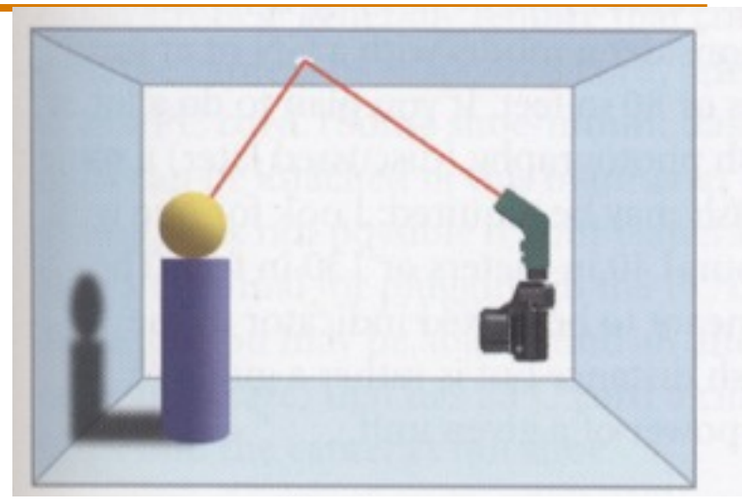
- poor location, no shape modeling
- small light source
- annoying shadows
- often, too white compared to available light

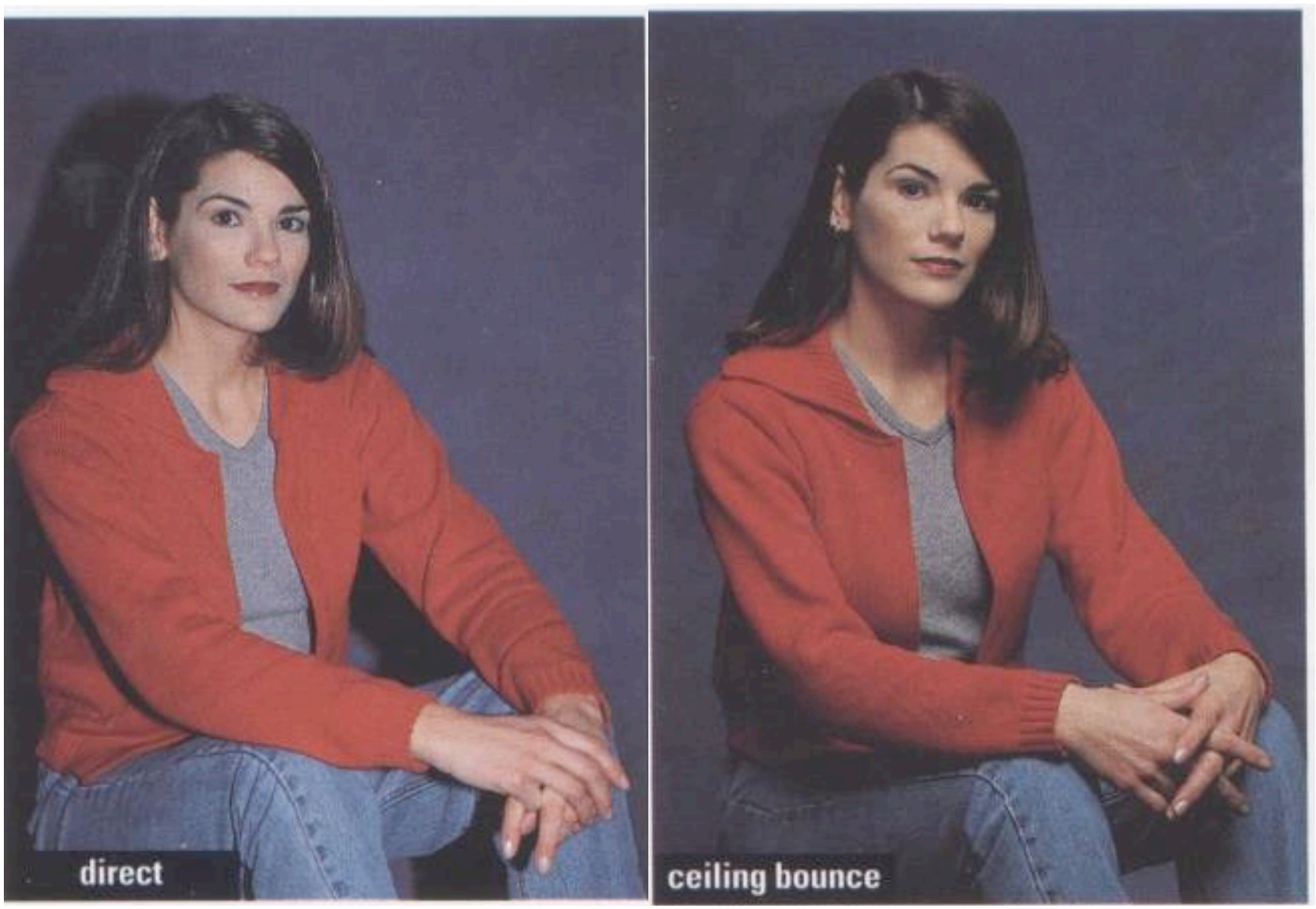


National Geographic Photography field guide

Solution: bounce flash

- **Ceiling bounce:**
  much better, more diffuse
- **Disadvantage: shadows under the eyes**

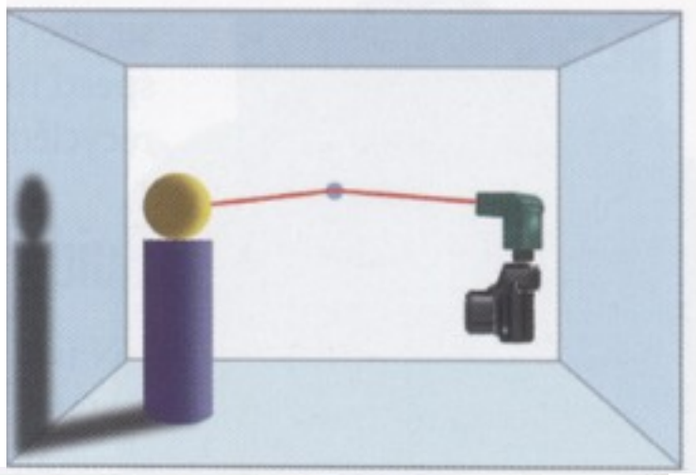


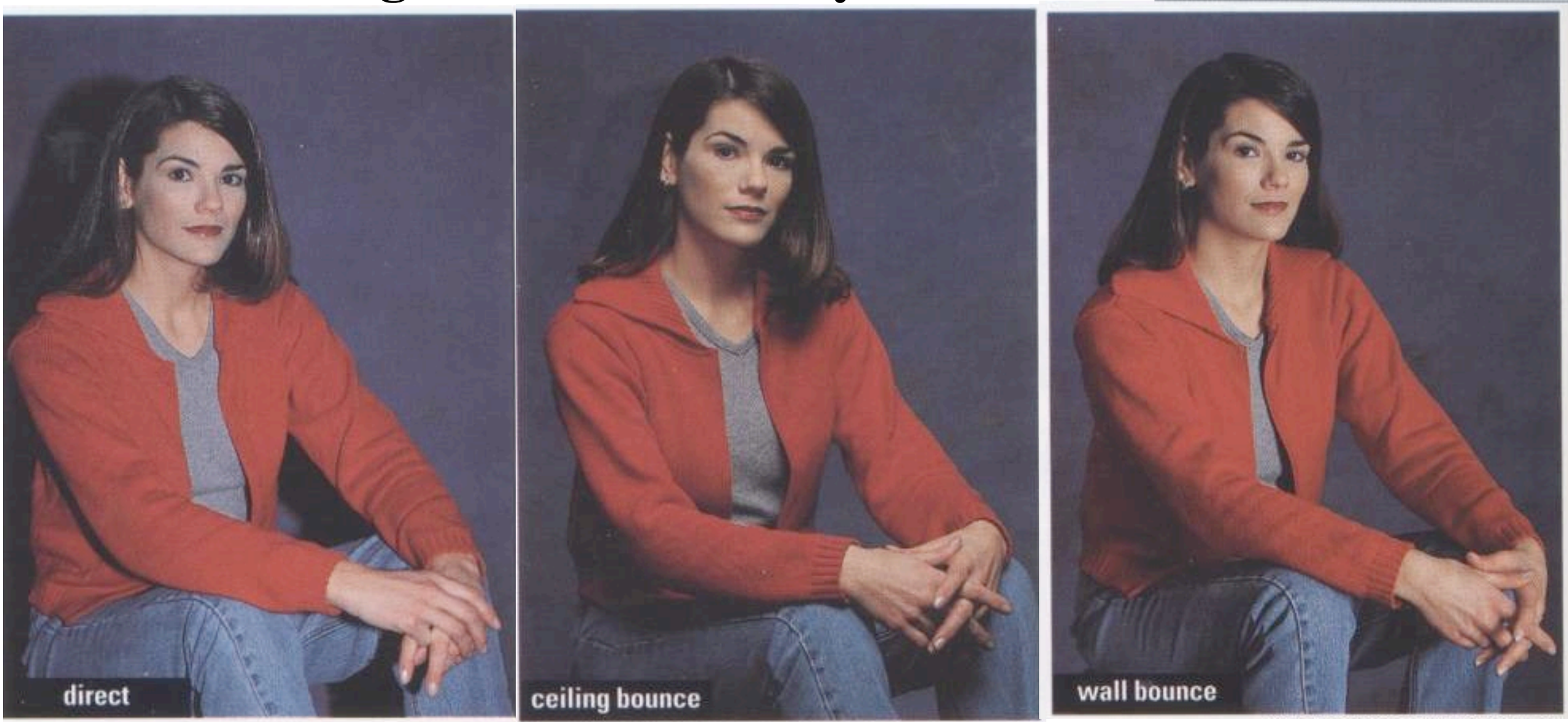


National Geographic Photography field guide

Solution: wall bounce flash

- **Better shape modeling (light from the side), good lighting of the eyes**
- **Disadvantage: walls not always white**





National Geographic Photography field guide

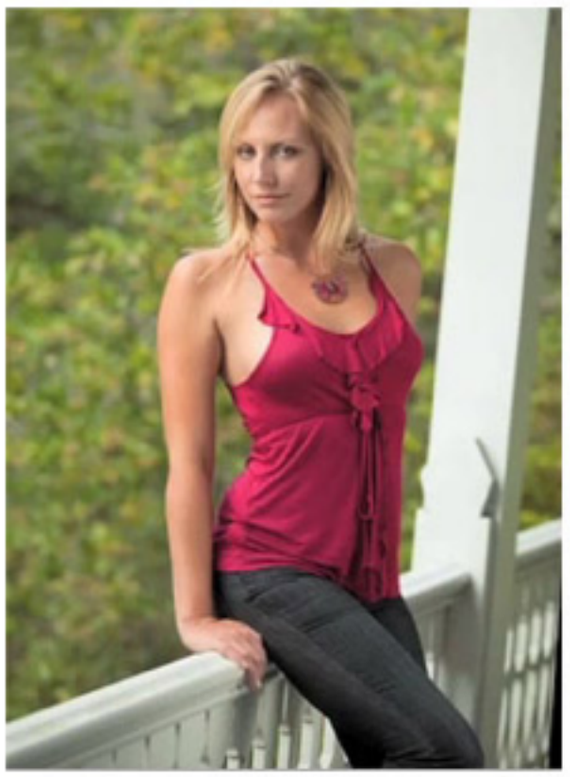
Flash Diffuser

- **Two tricks:**
  - diffuser illuminates the whole room, light is very diffuse but also illuminates directly
  - diffuser is orange and matches ambient light

Reflect light

See the difference a reflector can make.

Without a Reflector

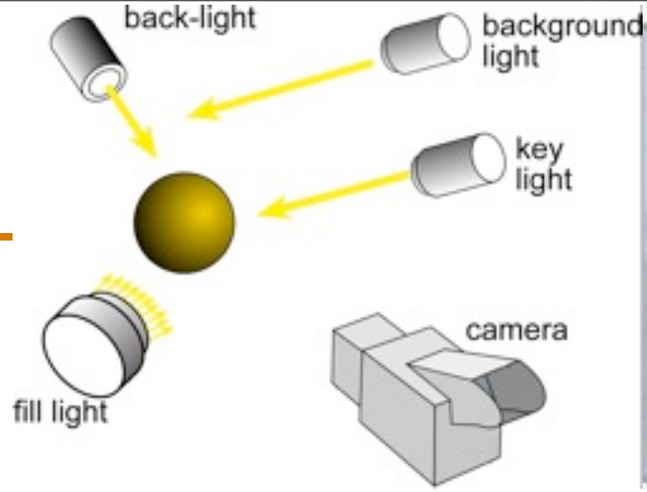


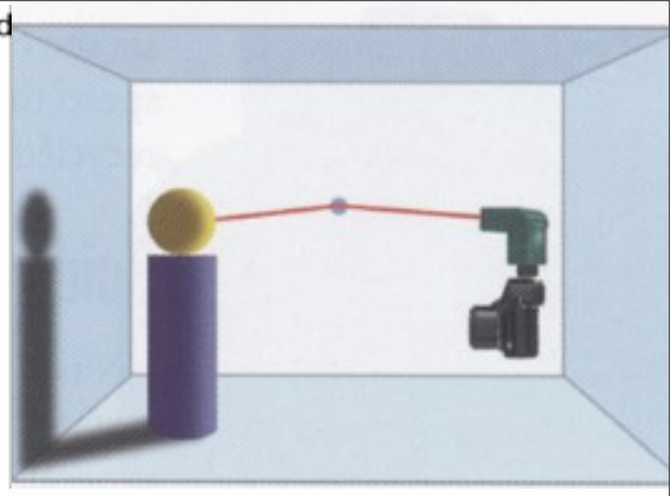
Adding a Reflector

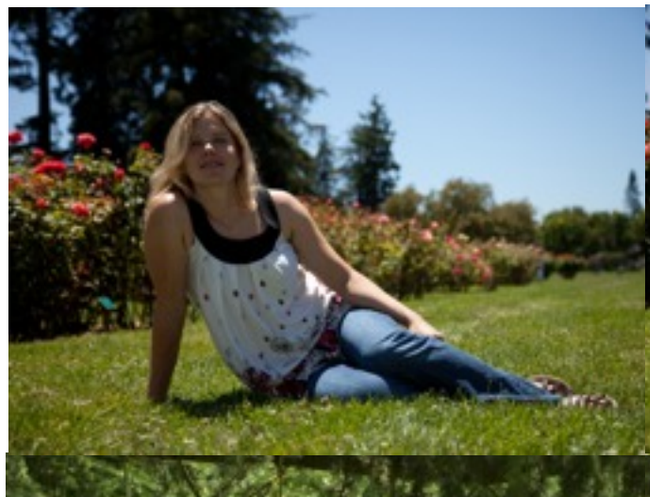
http://studiostyles.net/location-lighting-techniques-finding-the-light/

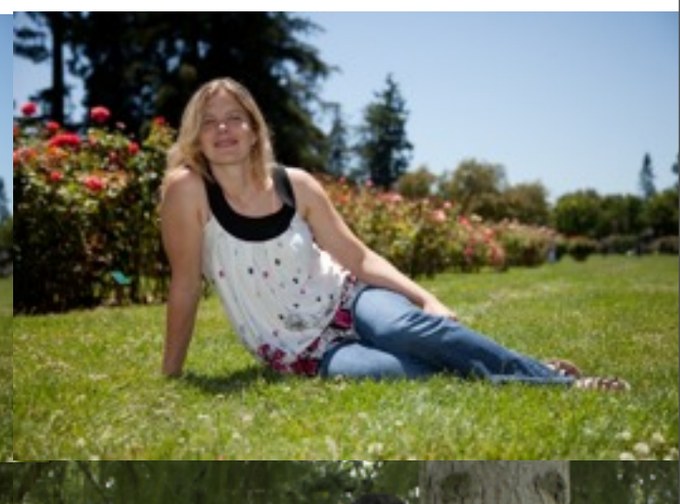
Recap: Light

- **Control light**
  - Time of day
  - Location, direction
  - Add light (flash)
  - Reflect light
- **Goals**
  - Control contrast
  - Shape modeling
  - Story telling, art



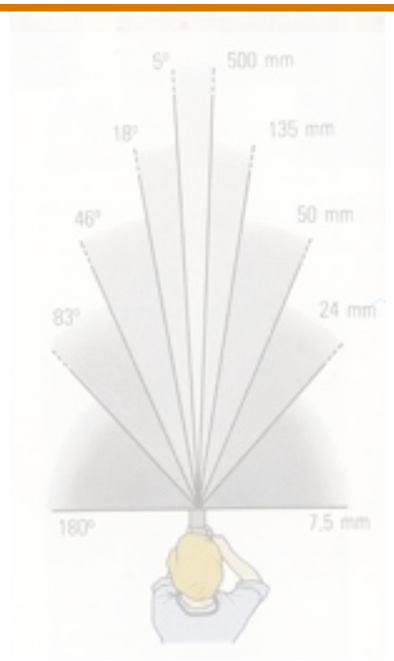


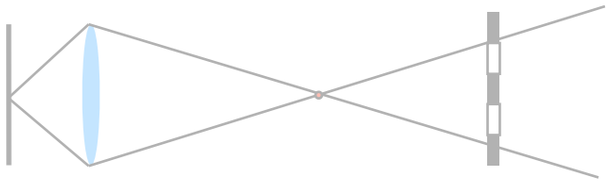


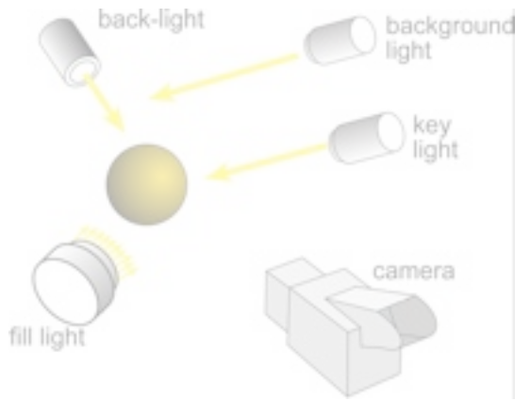


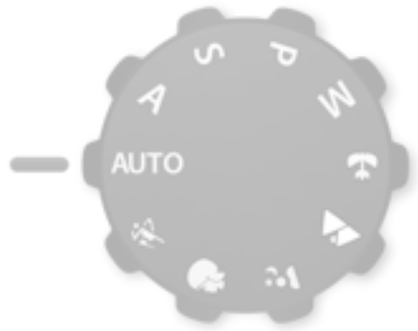
Plan

- **Imaging parameters**
  - Camera
  - Lighting
  - Software

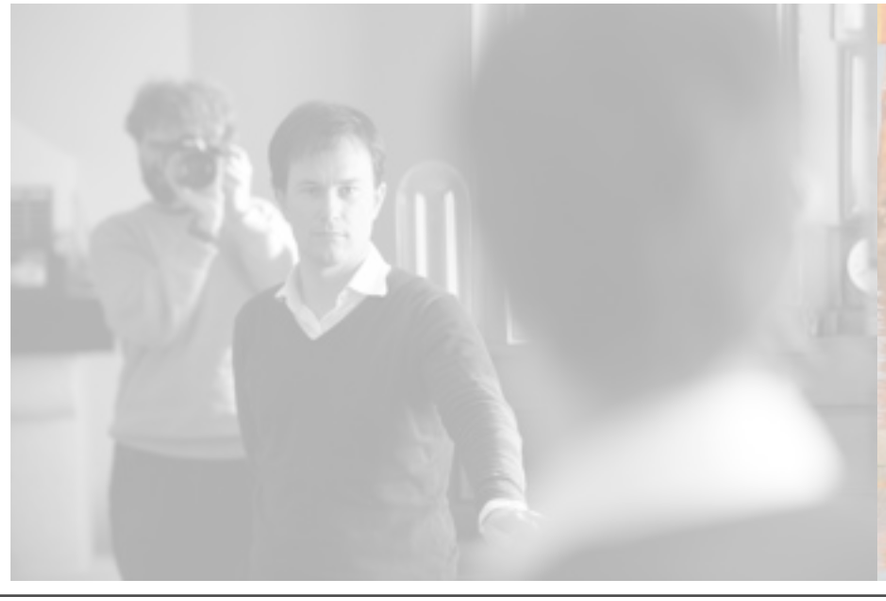


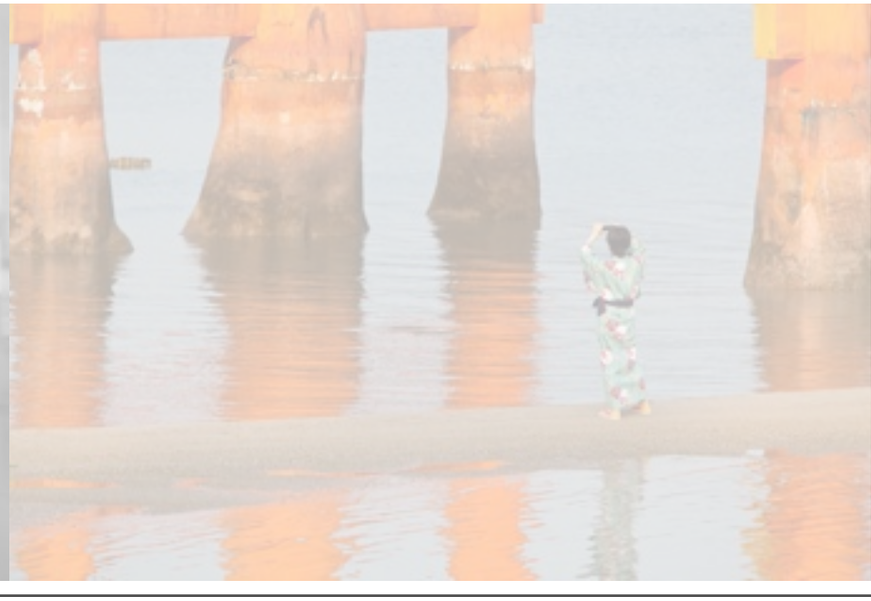






- **Equipment**
- **Improving your pictures**





Software

- **Software adjustment can make a big difference!**

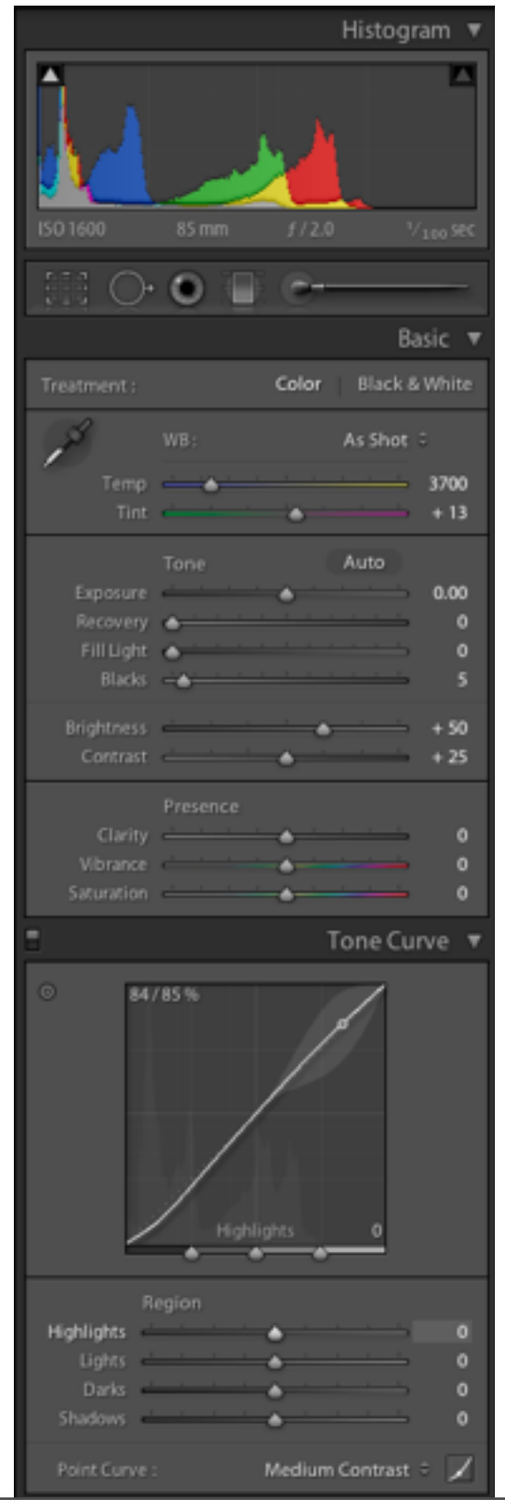
Before

After

Here:
exposure
curve
clarity
vibrance

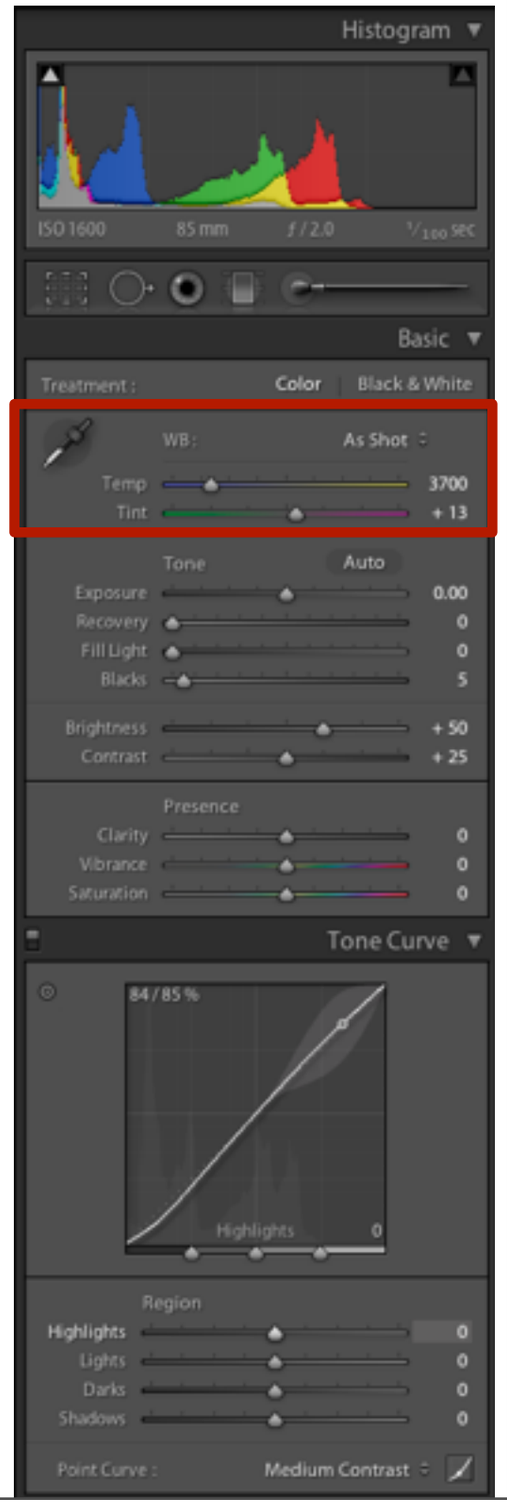
Software

- **Shoot in RAW for more flexibility**
- **Photo management & lightweight editing**
  - Lightroom, Aperture, Lightzone, Darktable
  - Fix white balance (make white white!)
  - Adjust exposure (e.g. brighter for snow scene)
  - Crop to improve composition
  - Manage contrast using the curve
  - Boost saturation (or vibrance) a little.
  - Add light to dark areas (fill light)
  - Sharpen a bit
  - Convert to black and white
- **Use Photoshop only if you really need to**



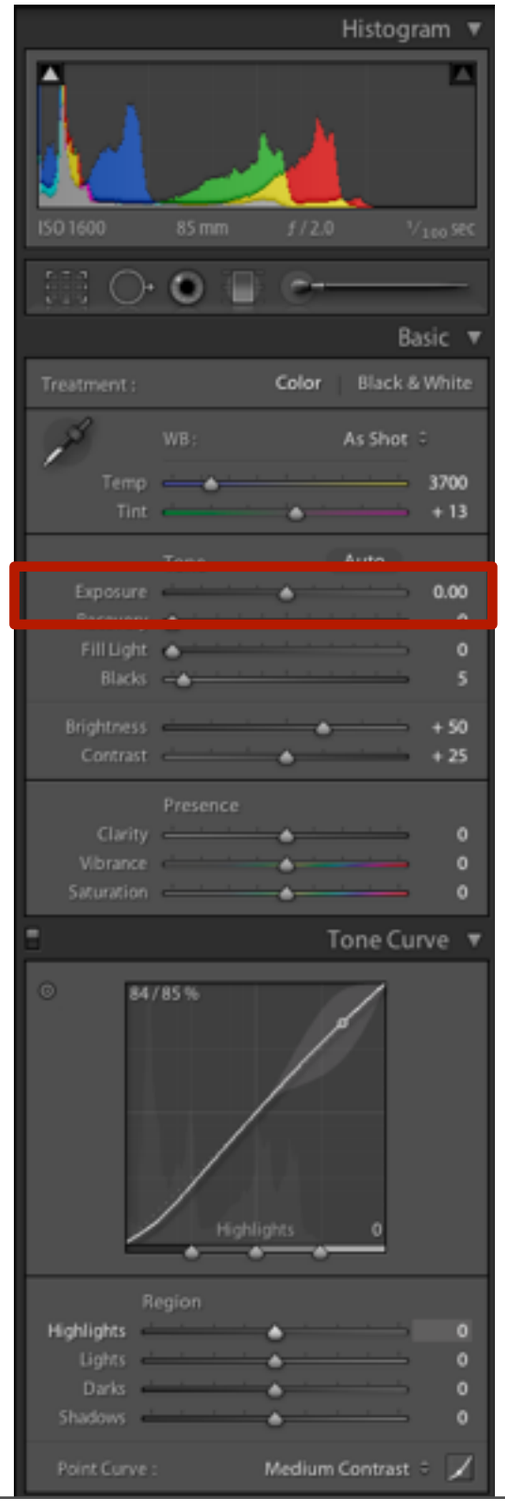
White balance

- Party name tags provide excellent white references!



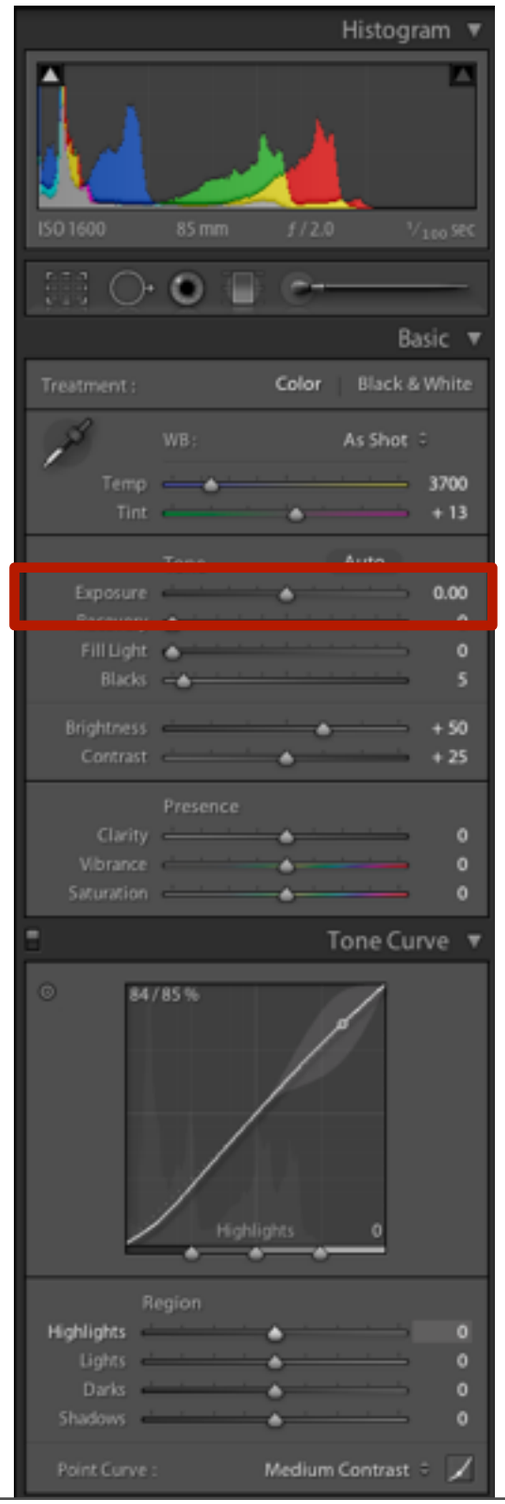
Exposure correction

- **I told the camera to make the image 1.8 times brighter**
- **Still too dark**



Exposure correction

- I told the camera to make the image 1.8 times brighter
- I still had to brighten it in software



Crop

Manage contrast with the curve

- **Before curve adjustment**

Manage contrast with the curve

- **After curve adjustment (a tad overdone)**

Boost saturation or vibrance

- **Before**

Boost saturation or vibrance

- **After**

Fill light

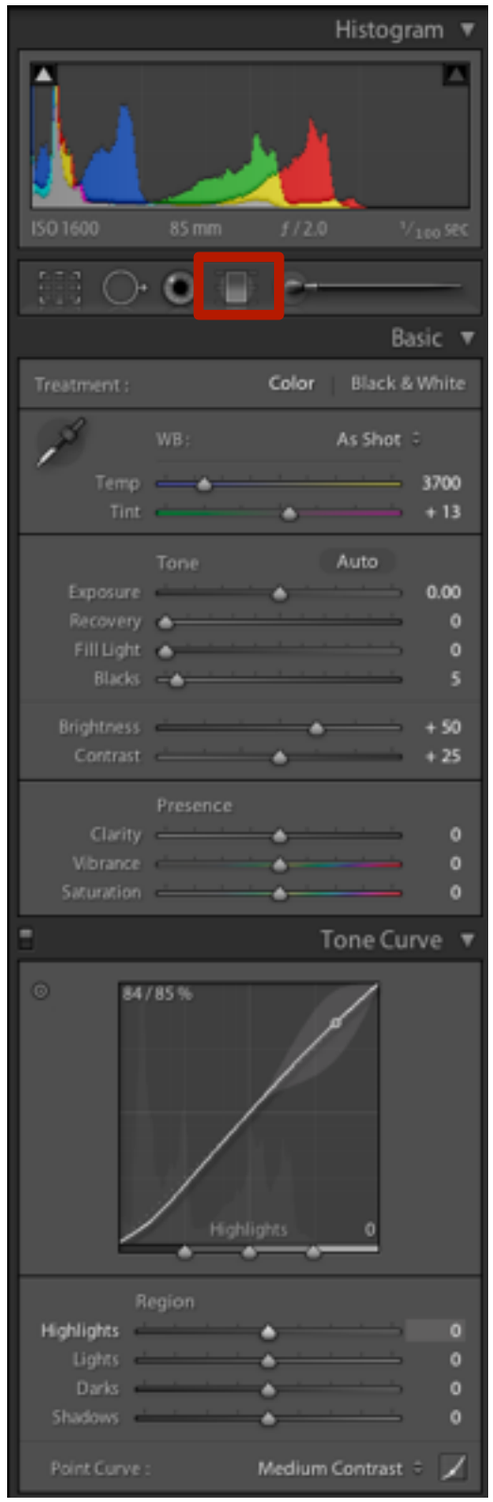
- **Before fill light**

Fill light

- **After fill light**

Graduated filter

Before

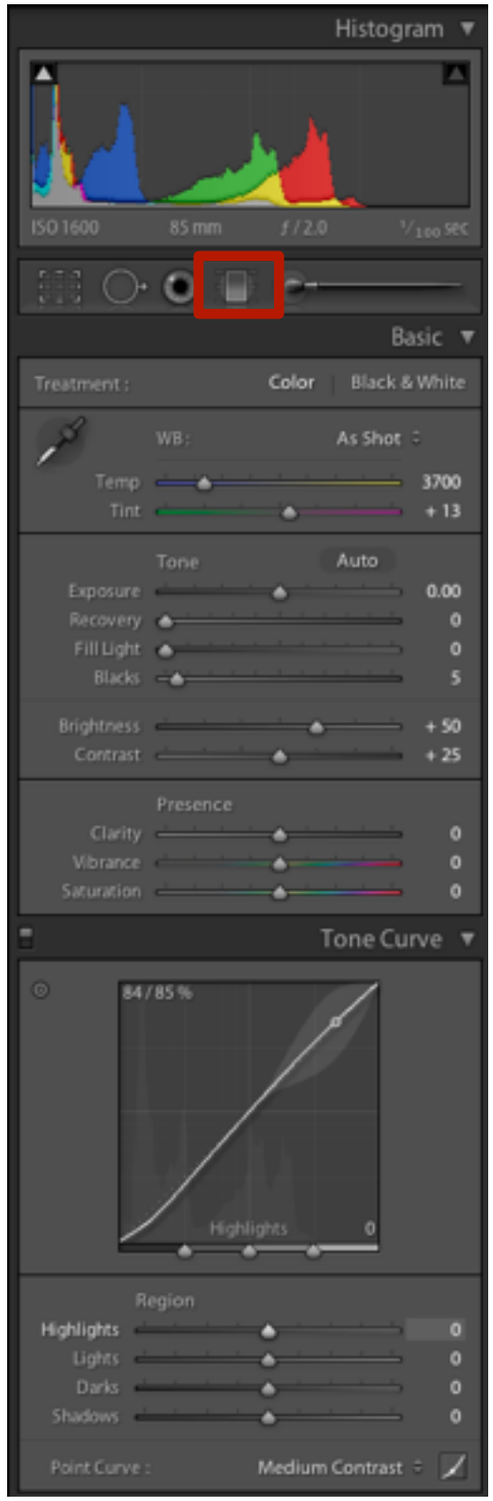


Graduated filter

Darken sky

After

Brighten ground



Black and white

- **Helps when colors are distracting**

Black and white

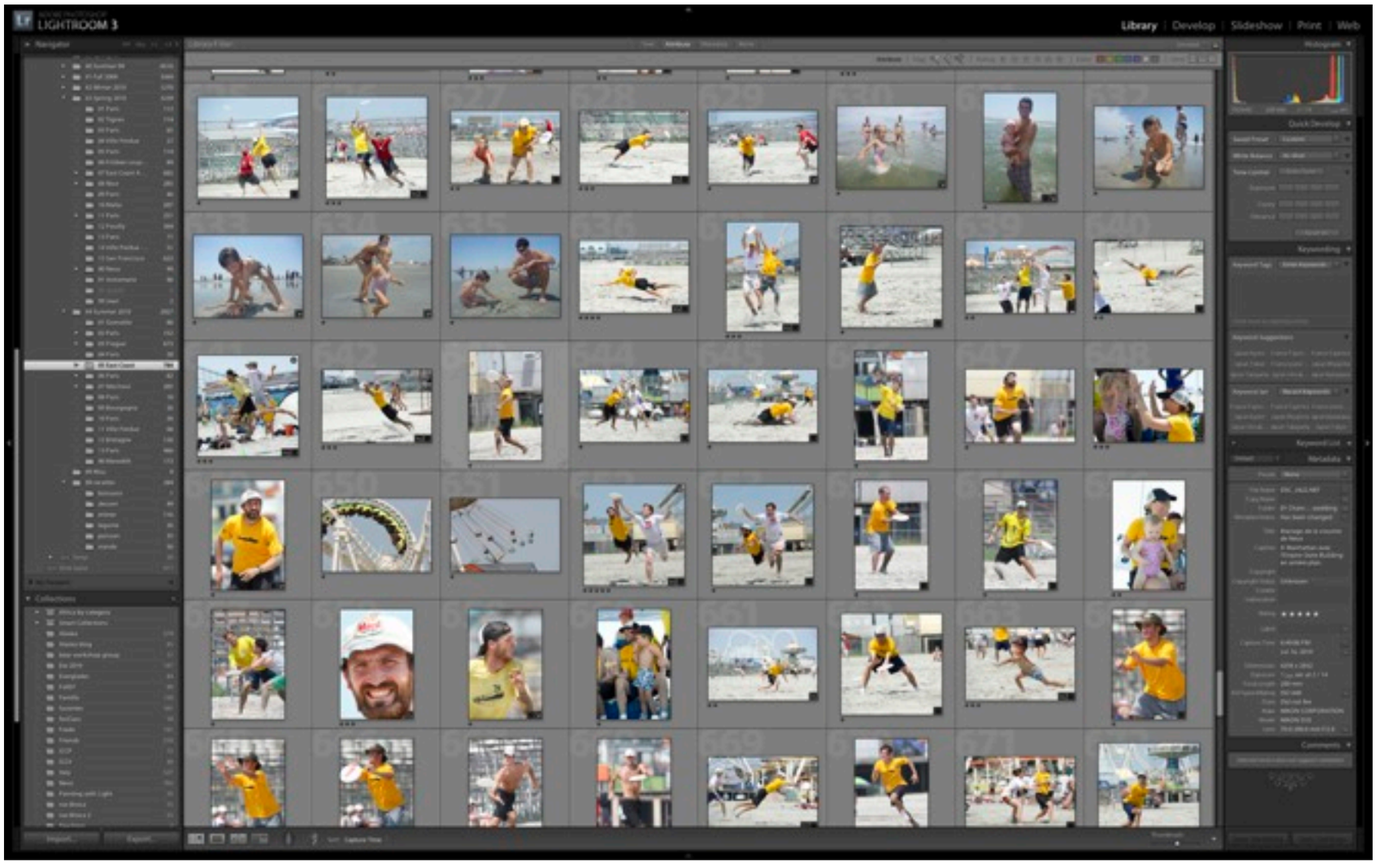
- **Often needs to boost contrast**

Other useful tools/sliders

- **Black point**
- **Recovery (to save clipped highlights)**
- **Denoising**
- **Clarity**
- **Local adjustments and gradient**
- **Vignetting**
- **Optical aberration correction**
- **Perspective correction**

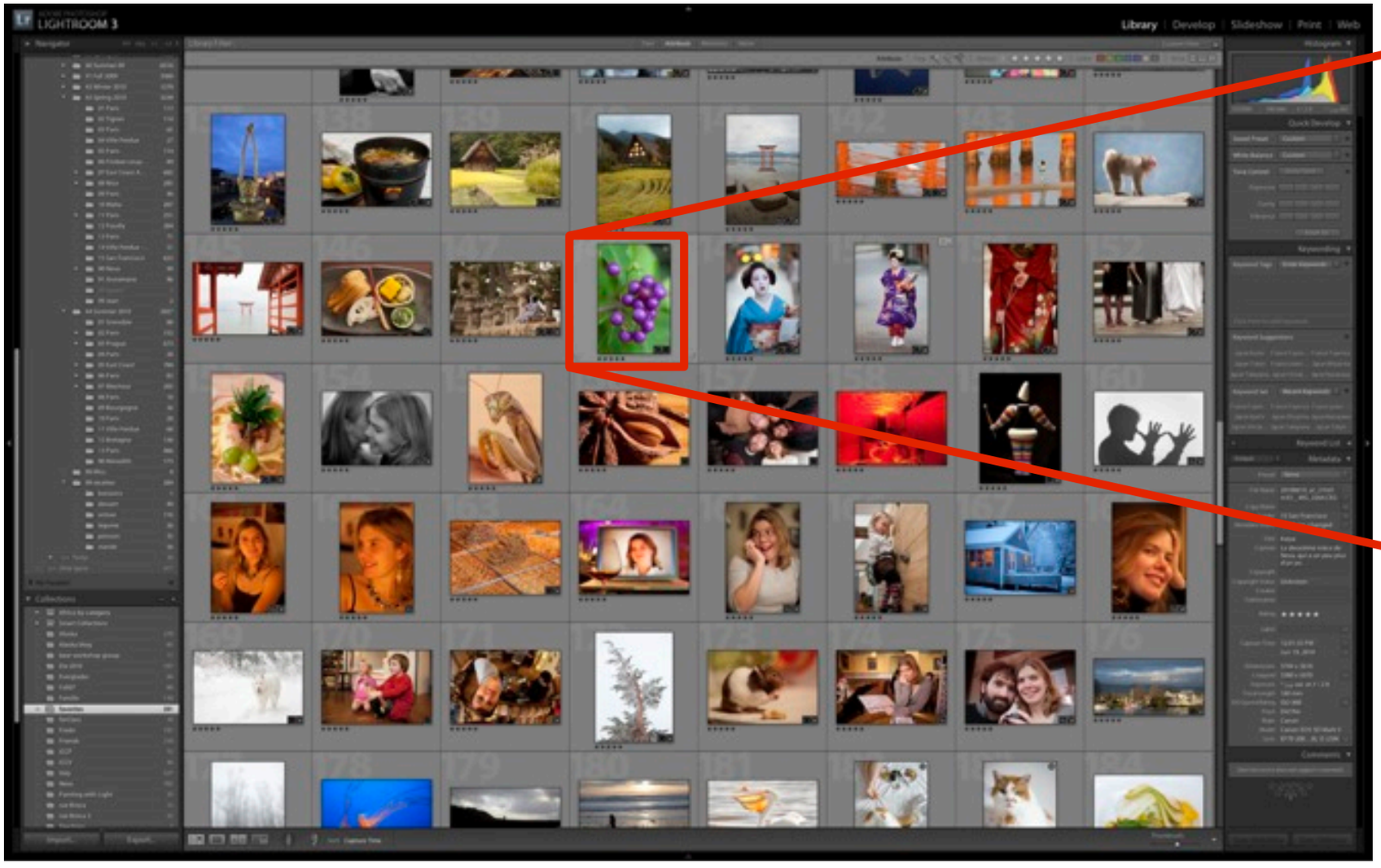
Organize, rate, delete

- **On a photo trip, I keep 1% of pictures**
  - That's also the rate of most pros
  - Yes, I shoot more photos than most people
  - But I also keep a lot fewer



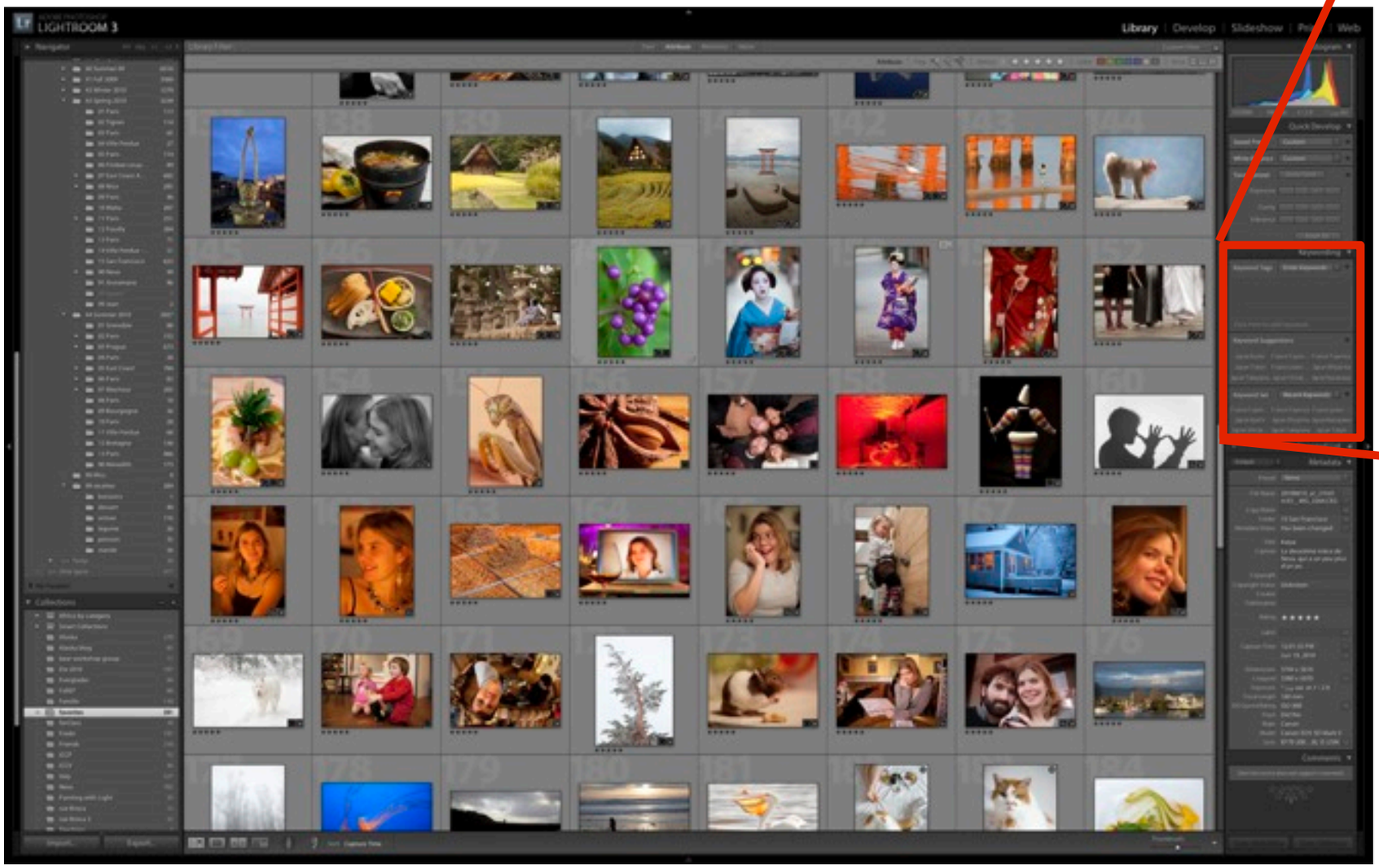
Organize, rate, delete

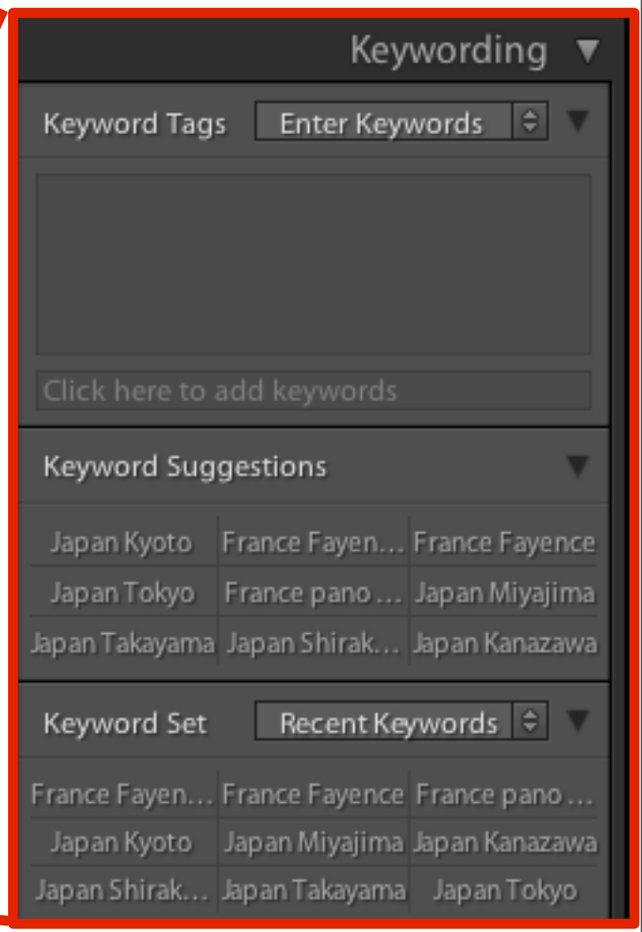
- **My strategy: multipass algorith**
  - Go through all pictures, and rate the OK ones 1 star
  - Go through the 1 star and rate the better ones 2 stars
  - Etc.



If you're really good

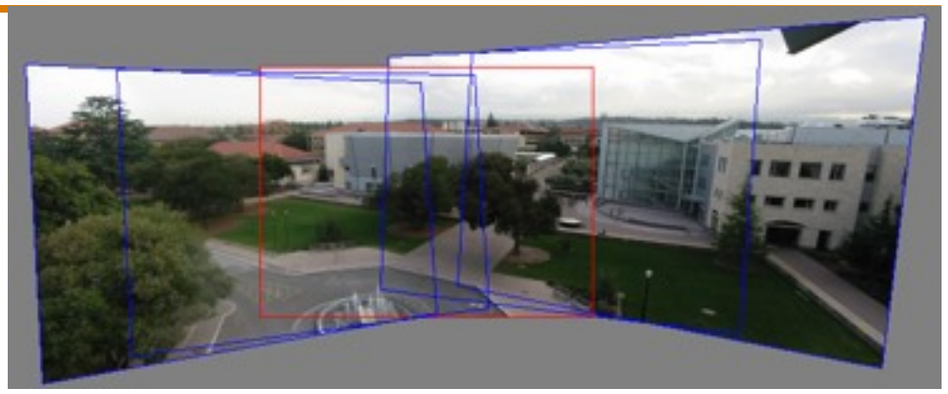
- **Keyword your pictures**

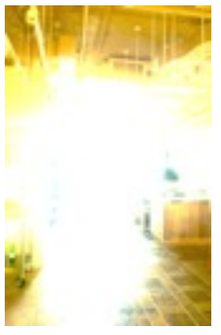


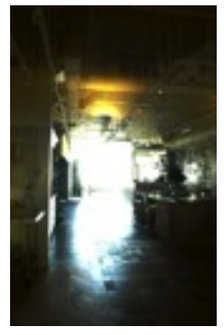


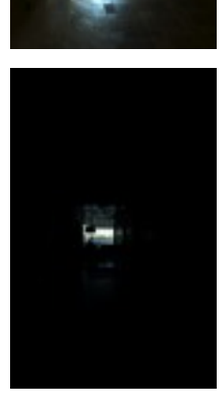
Software ++

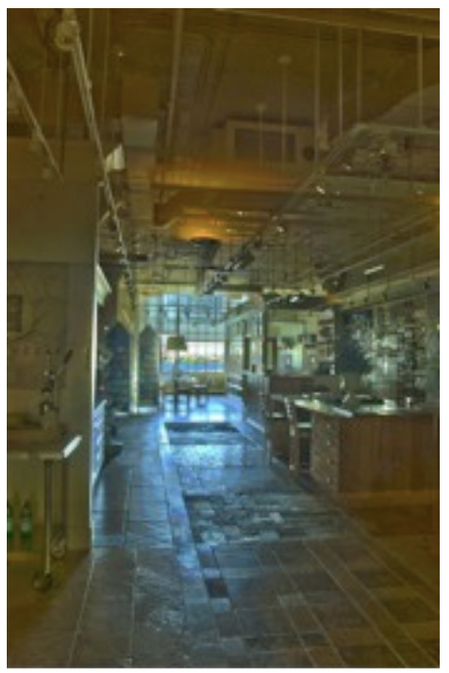
- Stitch panoramas
- High-Dynamic-Range
- Multiple exposures
- Macro focal stack











Recap: Software

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  - Lightroom, Aperture, Lightzone, Darktable
  - Fix white balance (make white white!)
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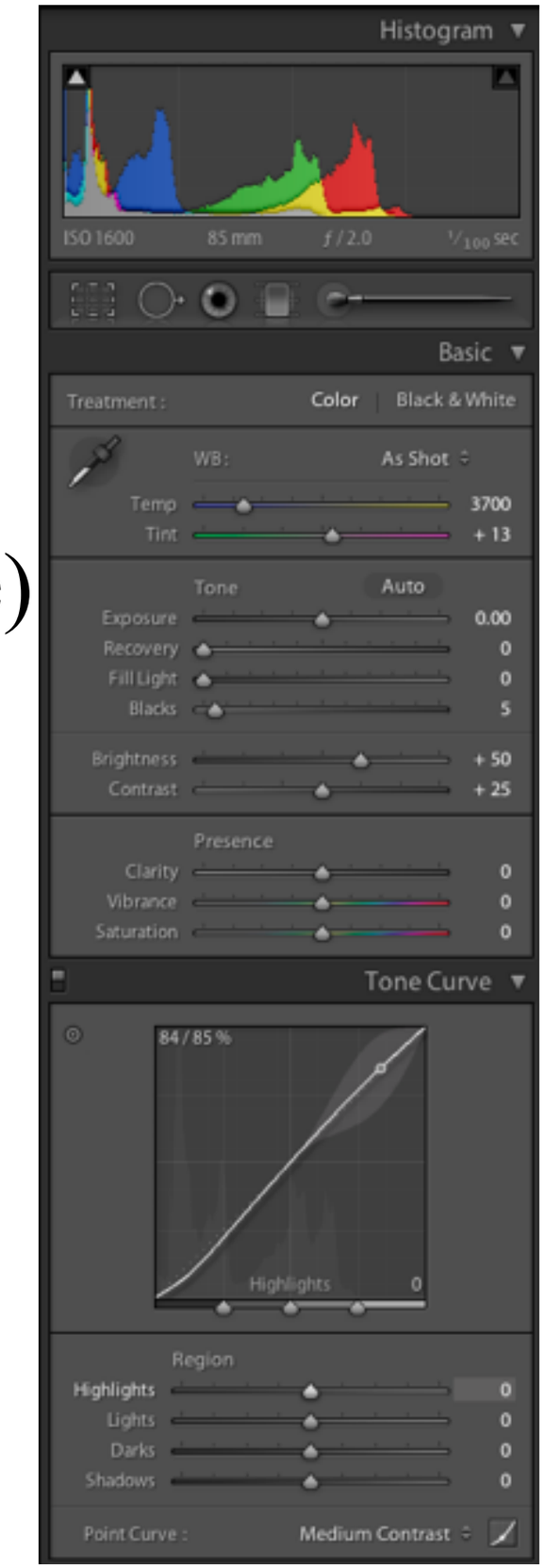

Plan

- **Imaging parameters**
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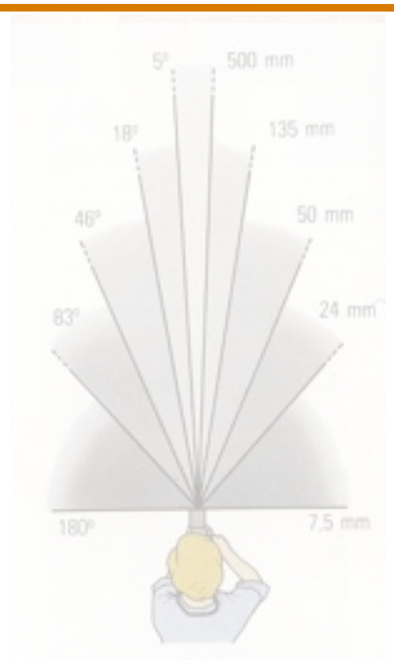
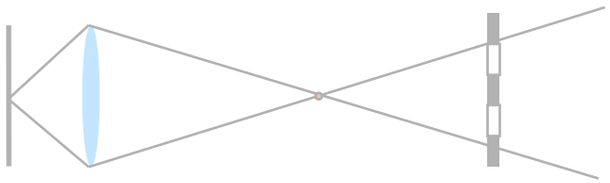
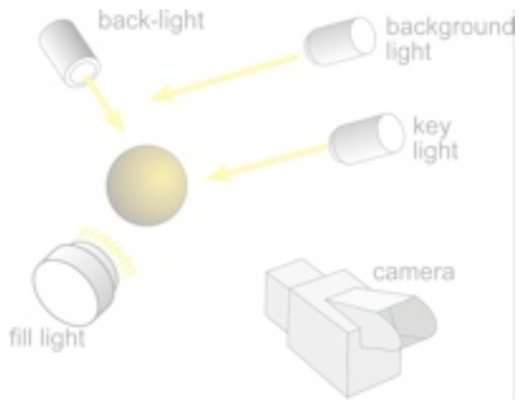
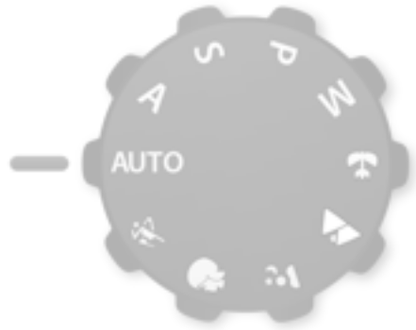
  - Software



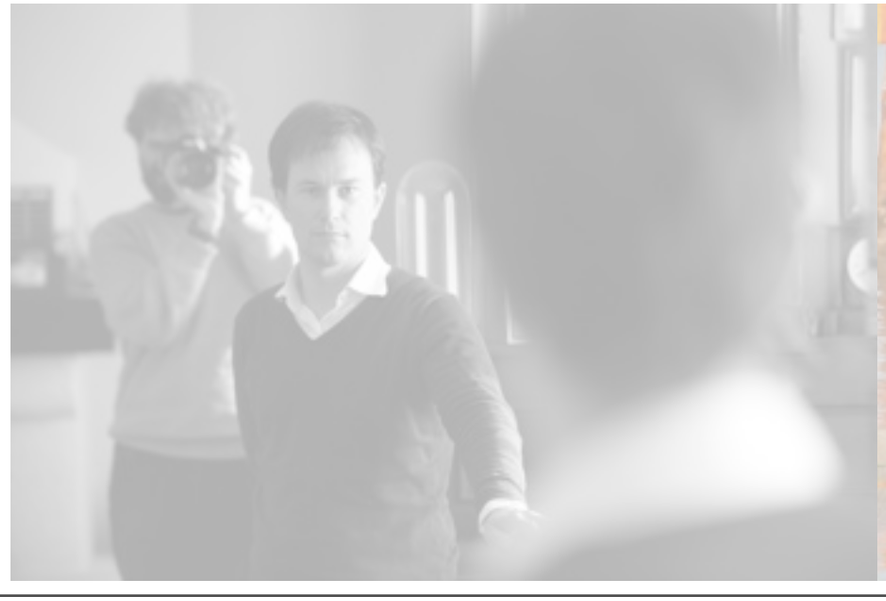


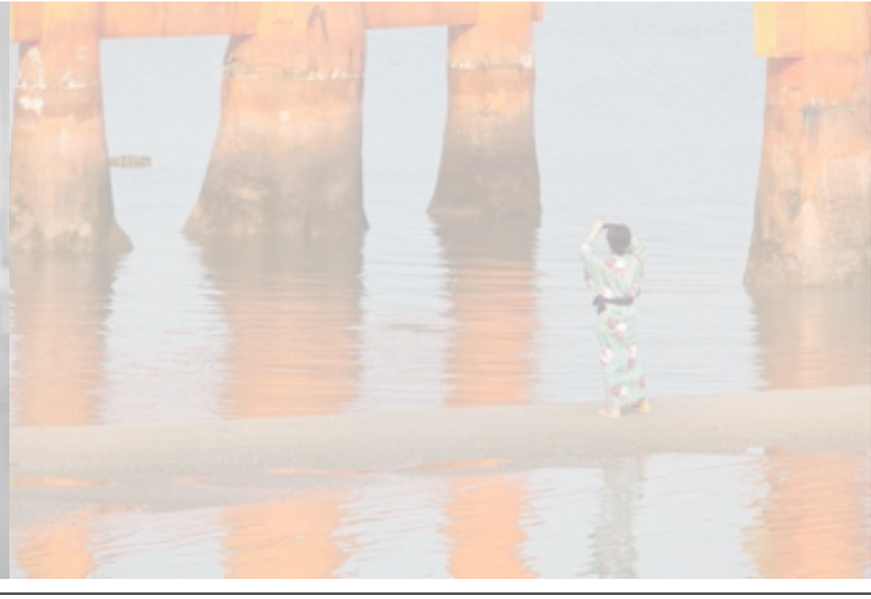




- **Equipment**

- **Improving your pictures**





Equipment

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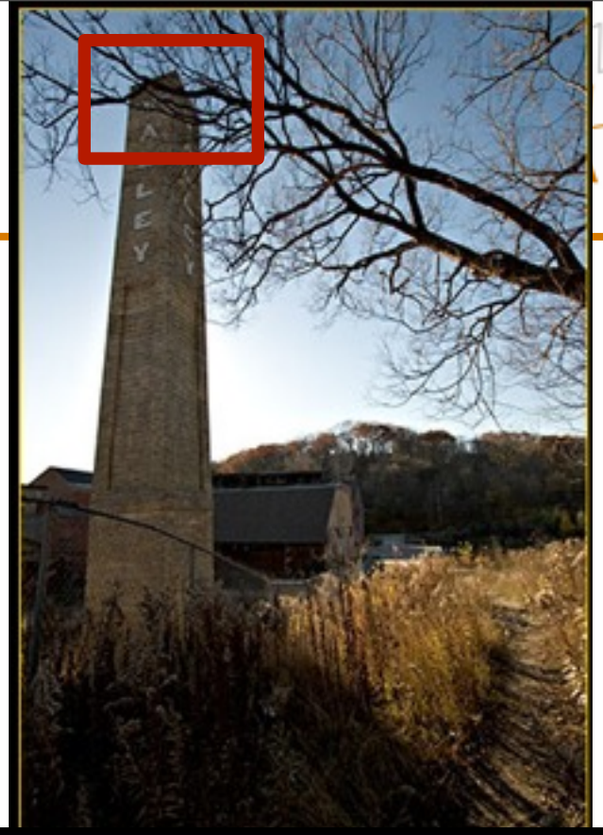
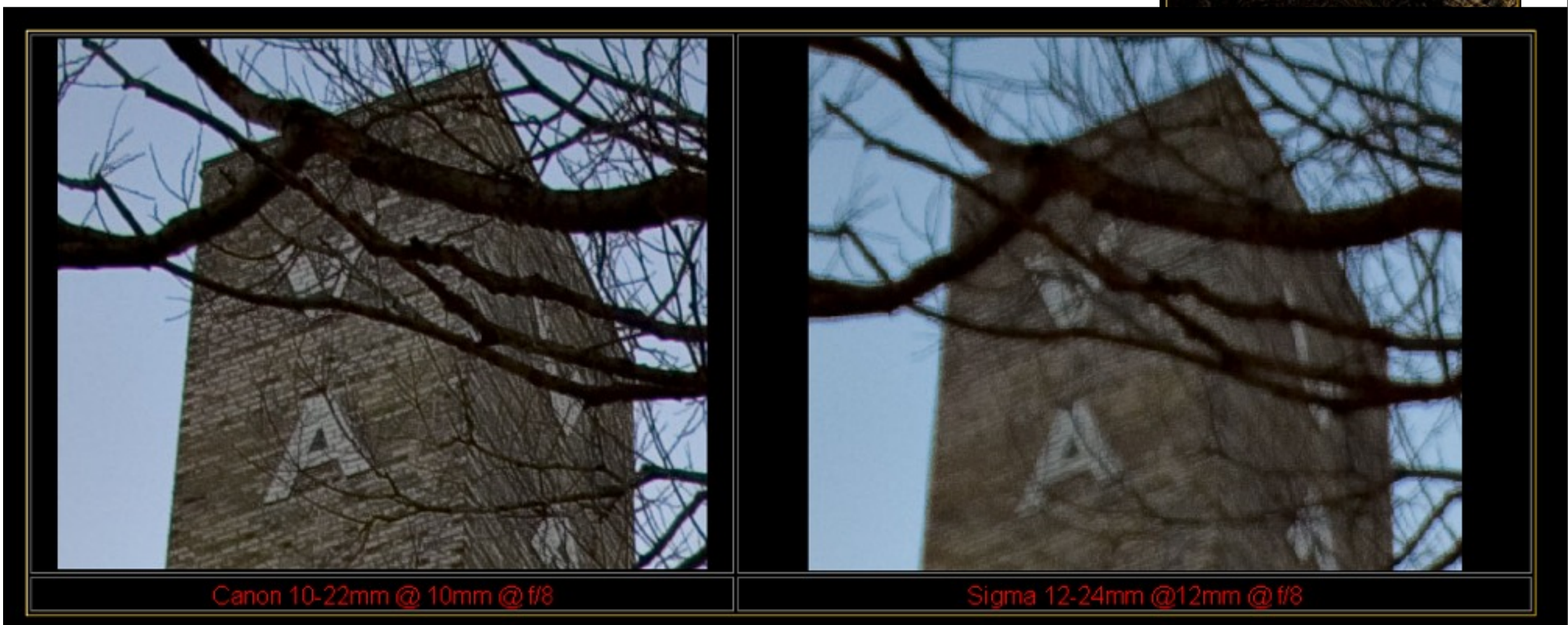
Choosing a camera

- If you can afford it, get an SLR
  - bigger sensor = less noise in low light
  - bigger sensor = shallower depth of field
  - faster autofocus
  - more lens choice, higher optical quality
- Do not worry about
  - megapixels - 6 is way enough
  - brand - they're all good enough
  - body - they all have the same image quality
- Worry about lenses
- Worry about lighting gear (cheap and effective)

Lens quality varies!





source: the luminous landscape

Zoom vs. prime

- The left image is with an expensive zoom
- Still softer than the prime on the right

source: the luminous landscape

Online reviews

- **http://www.slrgear.com/reviews/index.php**
- **http://www.dpreview.com/lensreviews/**
-

Equipment

- **Do get an SLR or mirrorless, compacts are too limited**
- **Don't worry about brand (with a bias for Nikon/Canon/Sony)**
- **Don't worry about the body, get the cheapest one**
- **Worry about lenses**
  - Zooms are convenient but quality can be a problem
    - Avoid large range (e.g. 18-200) they're not bad when stopped down, but quality isn't great at full aperture
    - Maximum aperture matters (the smaller the number, the better)
  - Get a prime in the 35-85mm range (cheap, high quality, wide aperture) 50mm f/1.8
- **Count $500 to 1k for basic configuration**

Equipment: accessories

- **Good flash photography is very difficult!**
  - Because you typically deal with 2 sources of light: flash and ambient
  - You need to get the exposure right for both!
  - You need to get the white balance right for both!
- **Get an external flash if you want to take "event" pictures**
  - The built-in flash is only good for fill flash (in bright sunlight)
  - Use external flash, orient towards (white) wall/ceiling
  - Get a diffuser (omnibounce)
  - Get yellow gel (or diffuser) to match indoor lighting
- **Get a tripod**
  - important for landscape, cityscape
  - get a good one: stability is important

Nikon

Tends to be a tad cheaper

- **D3100 & D5100are good. D7000 if you want to be more serious**
- **18-70 or 17-55 f/2.8**
- **55-200 is surprisingly not so bad and super cheap**
- **Get the new 50mm f/1.8 (the old one won't focus)**

Canon

- **Rebel T3 or T3i for cheap options, 7D if your bank account permits**
- **If you get the kit lens, get IS**
- **17-85 or 17-55 f/2.8**
- **70-200 f/4.0 (amazing lens)**
- **50mm f/1.8**
- **100mm f/2.8 macro (great also for portraits)**

Mirrorless systems

- **e.g. micro 4/3, Sony Alpha Nex**
- **Smaller**
- **Autofocus not as good (contrast detection, not stereo)**
- **Sensor not quite as good yet (smaller)**
- **More depth of field**
- **No optical viewfinder**
- **Recommendation:**
  - Sony Nex3 or 5
  - Panasonic GF2

Other brands

Not as big a range, future not always clear (see Minolta), have been slower to get to digital SLR

- **Olympus**
  - Good system, but smaller sensor
- **Pentax**
  - Good entry camera
- **Sigma**
  - Intriguing sensor (Foveon), limited system, noise is an issue
- **Fuji**
  - One-trick pony (the sensor)
  - Nikon body
- **Sony**
  - Pretty good.
  - Lens selection not as good as Nikon/Canon

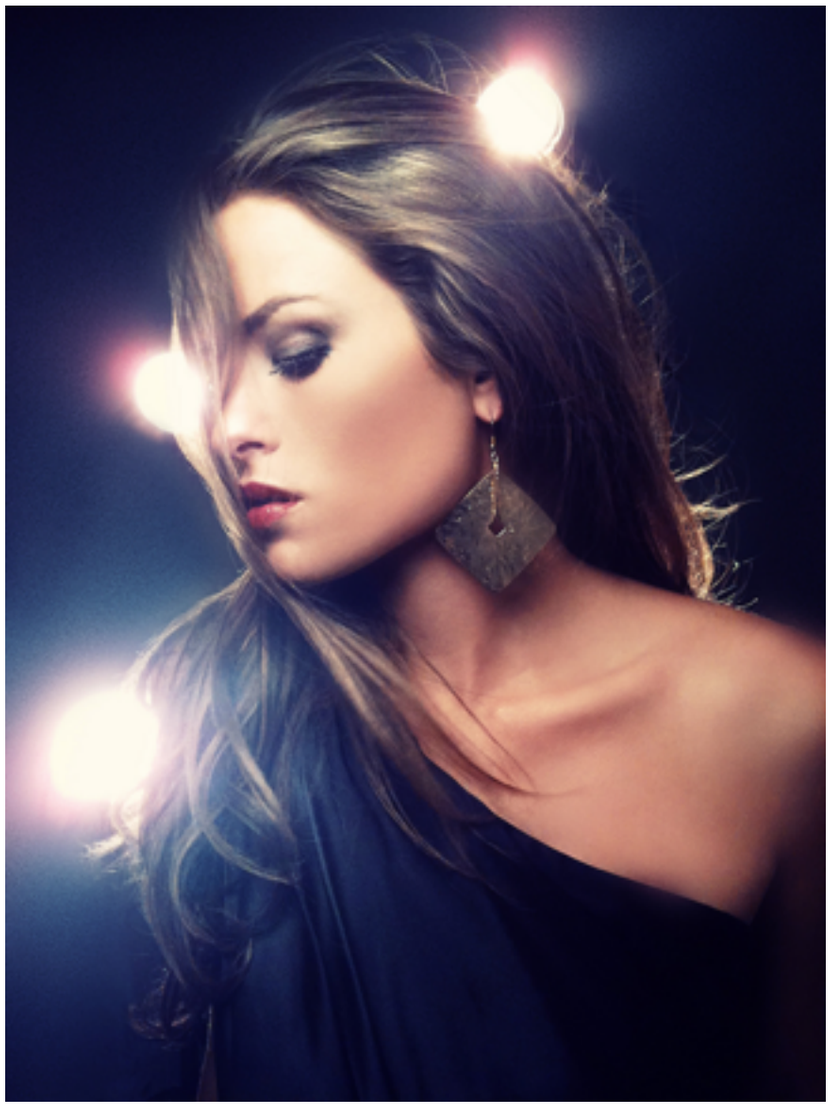
Lighting

- **Cheapest way to improve your photo**
- **http://strobist.blogspot.com/2006/03/lighting-101.html**

It's the light that counts

- **http://fstoppers.com/iphone**
- **Photos taken with an iphone 3GS**
  - –and a lot of lighting equipment





See also http://www.youtube.com/watch?v=o063wC_SNxo&feature=player_embedded

Cheap lighting-based setup

- **Cheap compact with a flash hotshoe**
  - –and a manual mode
- **Cheap lighting equipment (manual flashes)**
- **DYI diffusers and reflectors**

- **Good for**
  - –Portraits
  - –Macro
- **See**
  - –http://www.diyphotography.net/
  - –http://strobist.blogspot.com/

Type of photo

Portrait

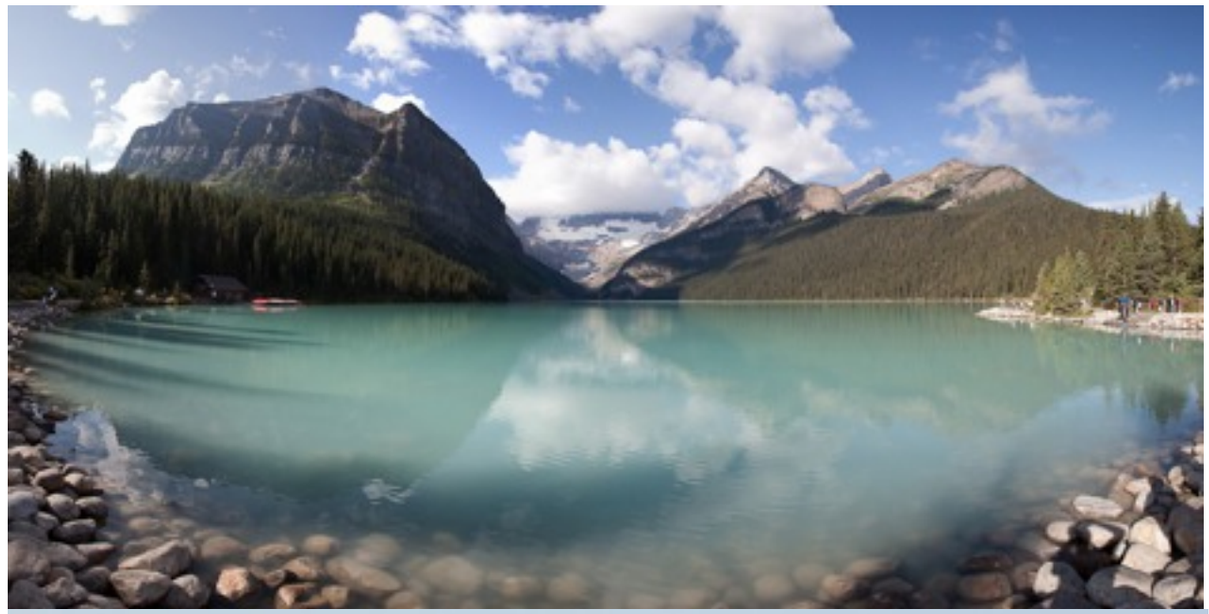
- **Cheap body**
- **Wide aperture often matters (f/2.8 and below)**
- **50mm f/1.8 is a must**
- **Invest in an external flash and lighting**
  - reflector
- **Depends on perspective you like:**
  - 17-55 f/2.8
  - 50mm f/1.8
  - 70-200mm (f/2.8 if you can afford it)

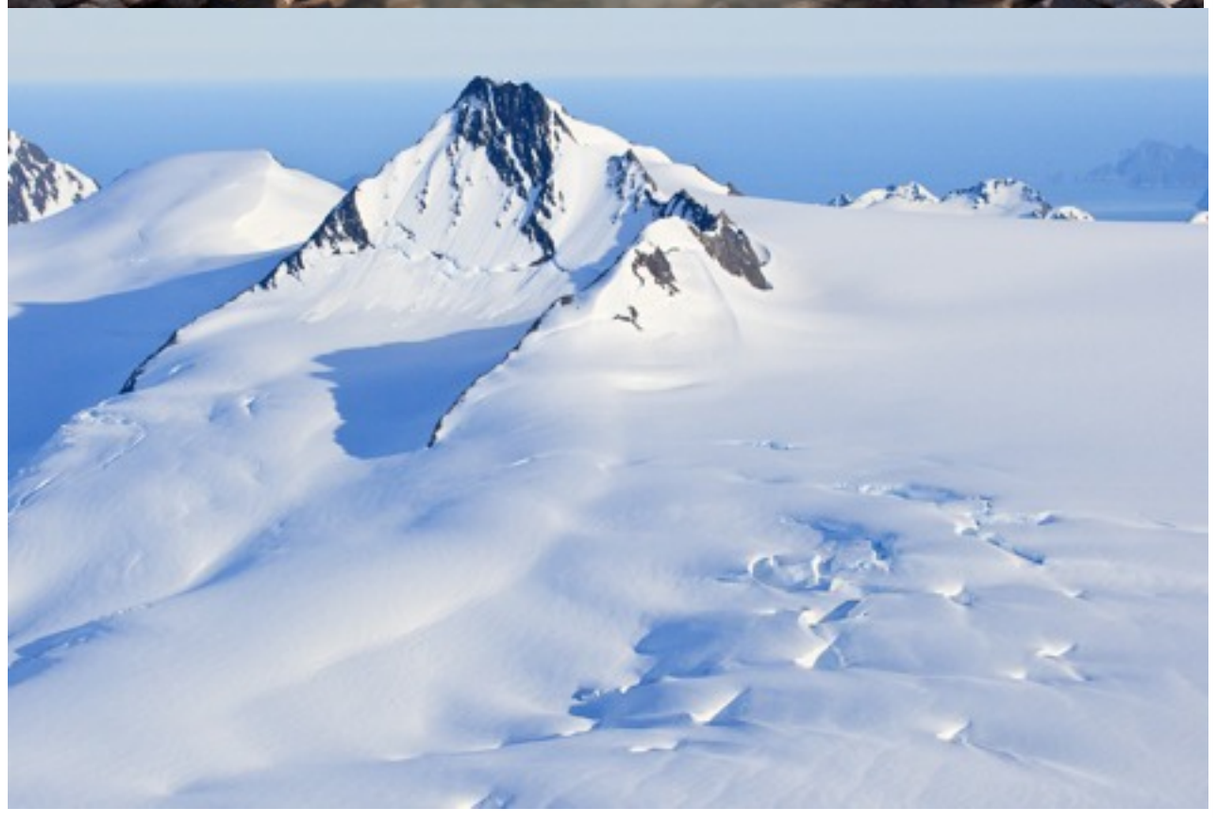
Kids / action

- **Good Autofocus matters. Get a slightly more expensive body**
- **Fast lens (wide aperture)**
  - 17-55 f/2.8
  - 50mm f/1.8 (for kids)
  - 70-200 f/.8
- **External flash for kids.**

Landscape

- **Get a cheap body**
- **Good tripod + remote trigger**
- **Polarizing filter**
- **lenses:**
  - Large aperture does not matter.
    You want large depth of field
  - main one: 17-85 or 17-70
  - depending on style:
    - wider angle, e.g. 10-22 but include a foreground element
    - telephoto, surprisingly useful, e.g. 75-300



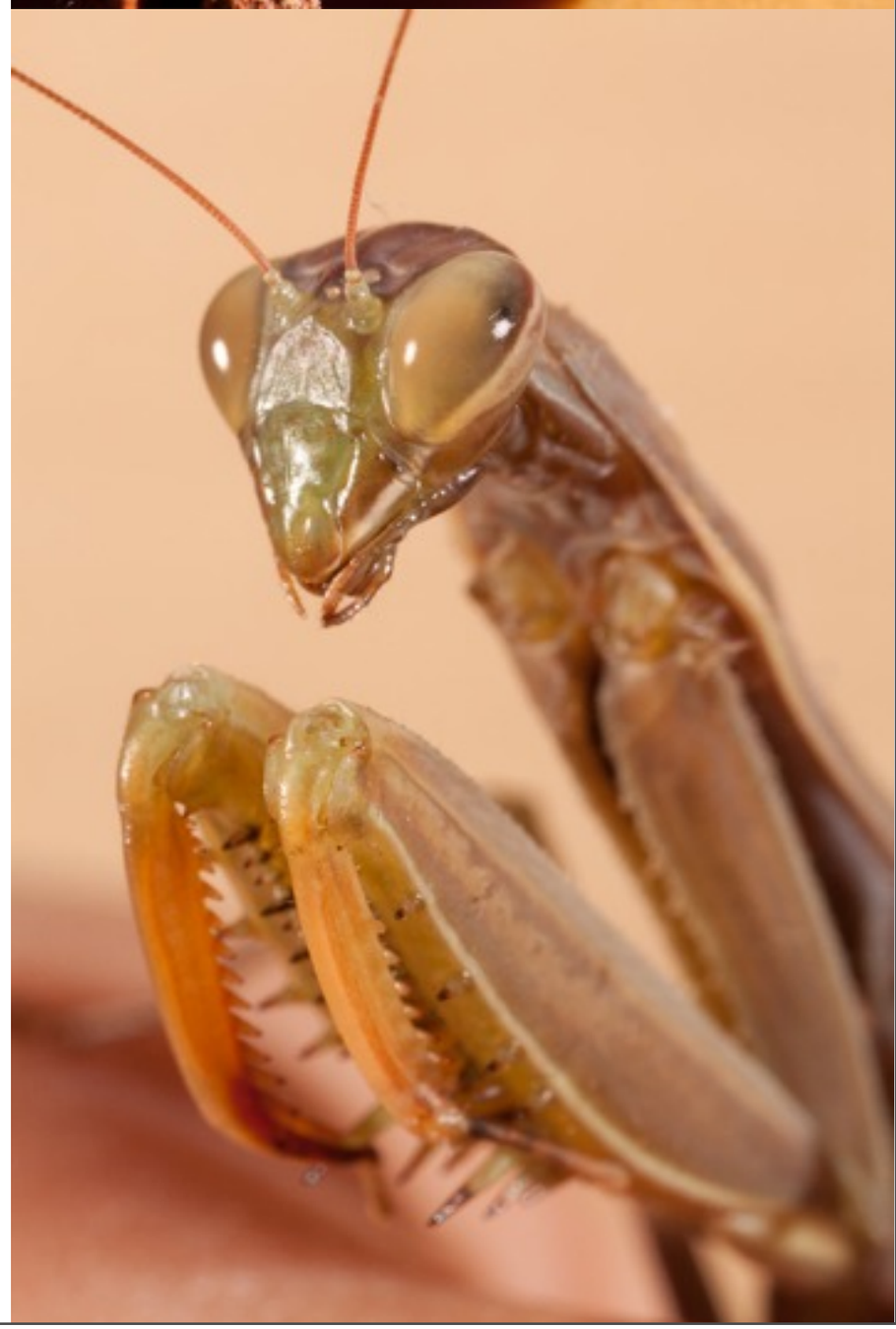


Wildlife

- **Expensive!**
- **Need good autofocus and long lenses**
- **At least 300mm on small sensor**
- **A flash and a better beamer**

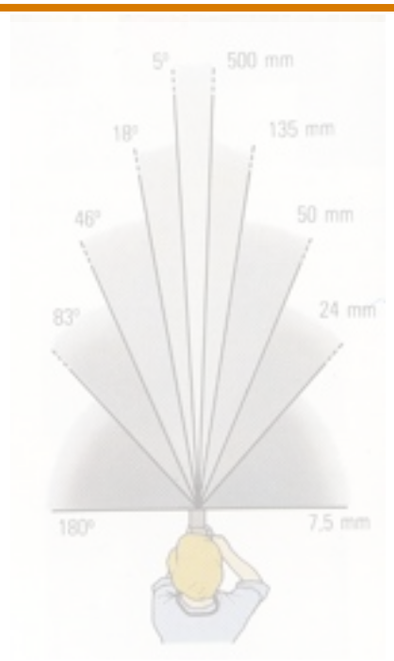
Macro

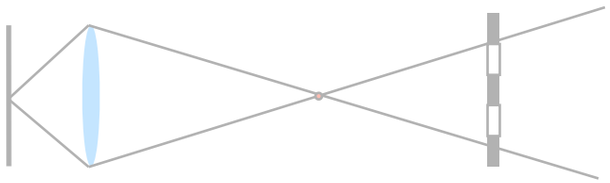
- **Easier with a smaller sensor**
  - –more depth of field
- **100mm macro or 60mm macro lens (1:1 magnification)**
- **Sturdy tripod + remote trigger**
- **Lighting equipment**
  - –reflector / diffuser (DIY)
  - –flash or some external light
  - –lots of DIY options

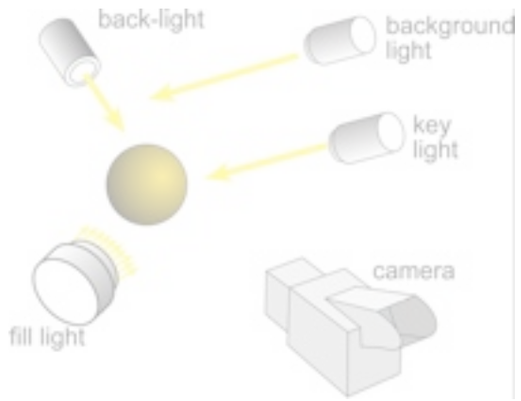


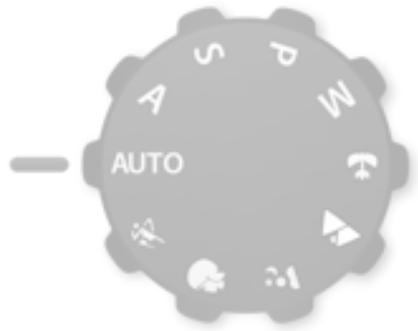
Plan

- **Imaging parameters**
  - Camera
  - Lighting
  - Software



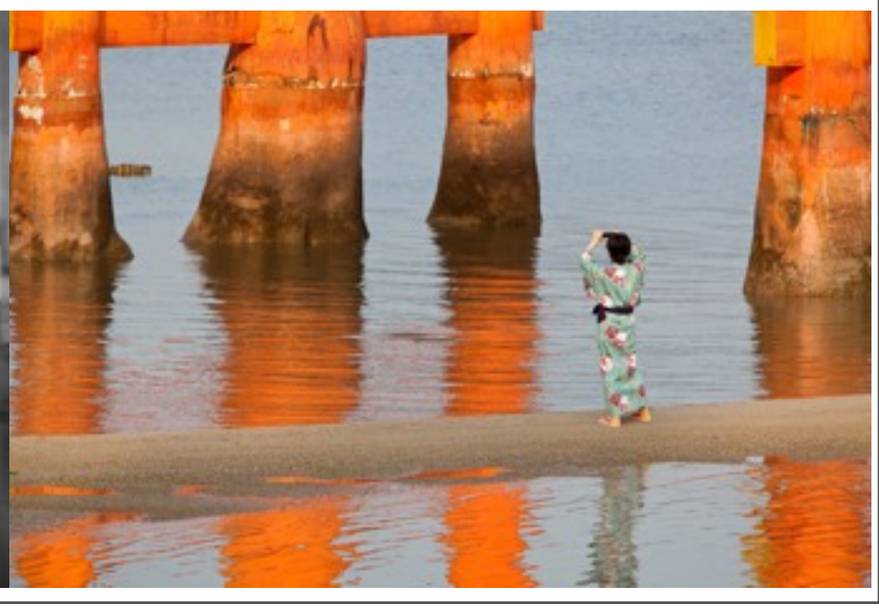






- **Equipment**

- **Improving your pictures**



Improving your pictures

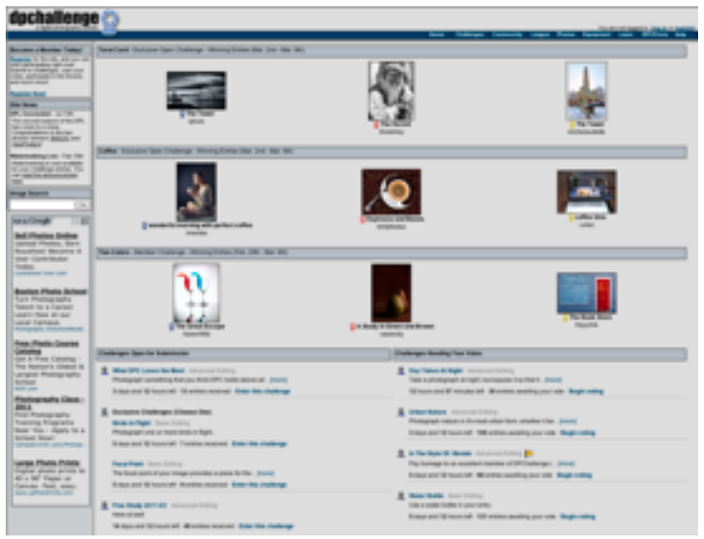
Fredo Durand
MIT CSAIL

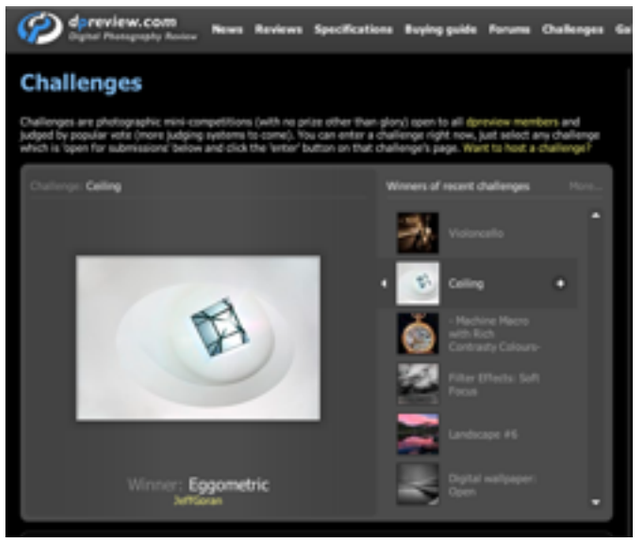
Not a creativity session

- **For those of us who are NOT talented photographers**
- **Heuristics, issues, that help get better photographs. Maybe not great photographs, but better**
- **If you are talented, good for you. Forget those “rules”, keep taking good photos.**

Take pictures, critique your pictures

- **And get them critiqued (friends, internet)**
- **Give yourself a theme, constraints**
- **Look at contests online:**
  - You don't need to enter the contest, but use the theme
  - http://www.dpreview.com/challenges/
  - http://www.dpchallenge.com/
  - http://www.fredmiranda.com/forum/
  - http://gizmodo.com/#!shooting-challenge





Advice overview

- **Simplify, avoid cluttered background**
- **Don’t center things**
- **Avoid harsh light**
- **White balance**
- **Portraits are all about the eyes**
- **Follow rules or really break them. No middle ground.**

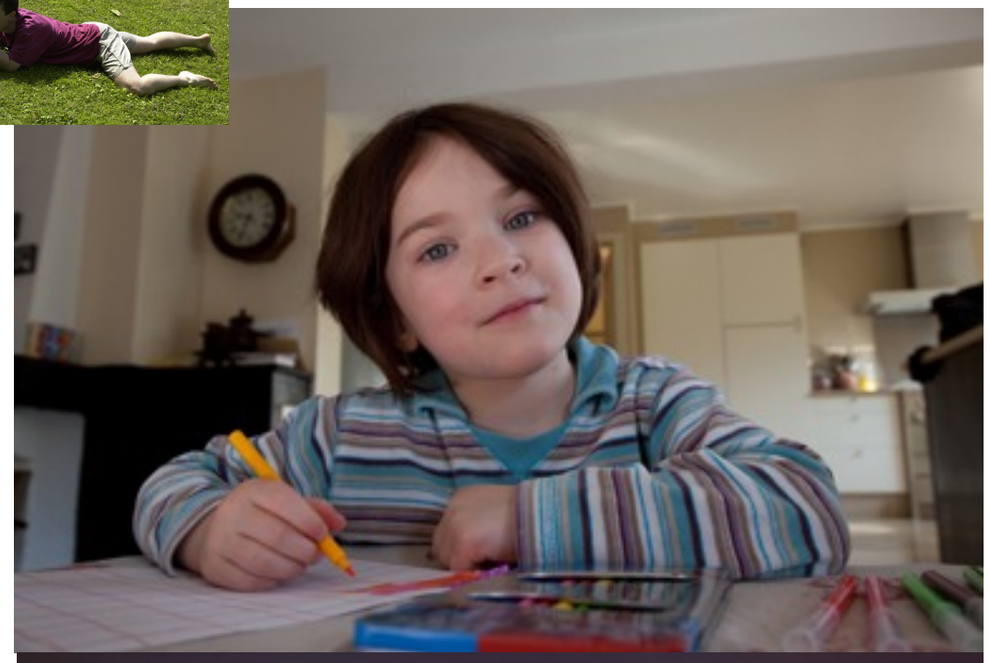
Fixing a cluttered background

- Change viewpoint
- Shallow depth of field
- Frame tighter
- Modify scene (move objects, add backdrop)
- Retouch (blur, desaturate, darken)




Composition/viewpoint

- **Get low**
  - –at eye level of subject
- **Avoid centering subject**
  - –rule of the third
- **Keep horizon horizontal**



Light & color

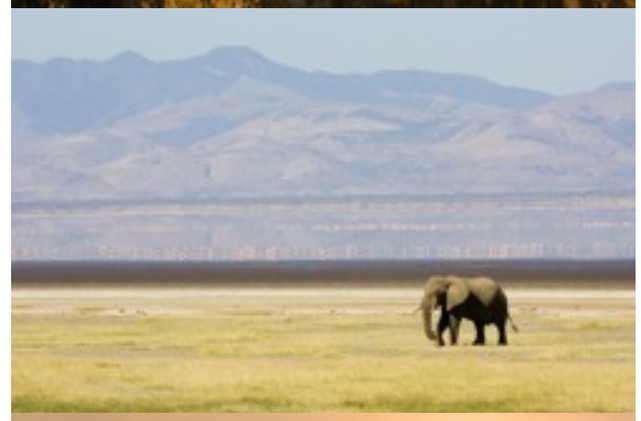
- **Avoid harsh light…**
  unless you want to play with shadows
- **Sunrise & sunset are best**
- **Cloudy days are great as long as the sky is not in the picture**
- **For sunny days, shade areas are best**
- **Avoid direct flash**
- **HDR, tone map**

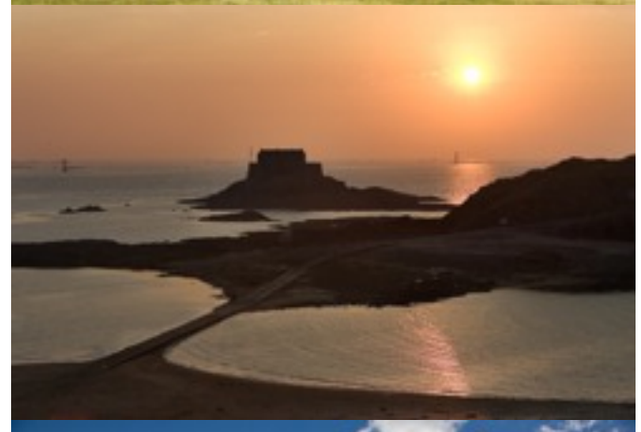
Portraits: It's all about the eyes

- Eyes should be sharp & shiny
- Be at eye level
- Make sure lighting is not harsh
- Shallow depth of field can help
- Add vignetting to focus attention
- Get the white balance right (maybe a little warm)
- Try Black and white
- Telephoto: isolate the subject
- Wide angle: approachable and include surrounding
- Don't hesitate to over-shoot: bits are cheap

Landscape / architecture

- **Get a foreground element**
  - rock, tree, flower
- **Rule of the thirds, diagonals**
  - in particular for the horizon
- **Don't hesitate to zoom in**
- **Manage dynamic range**
  - sky is always too bright
  - graduated neutral density, HDR
  - golden hours or right after sunset
- **Use a polarizer**
  - darkens the sky, make colors stand out
- **Alignments**
  - Keep horizon straight
  - For architecture, correct verticals
- **Don't be deterred by stormy weather**
- **Slow shutter speed for water**





Background

Cluttered backgrounds are bad

Distracting background

Model: Rob Wang

Move your feet! (1 meter away)

Model: Rob Wang

Distracting background

50mm f/8

Model: Rob Wang

Shallower depth of field

50mm f/1.8

Model: Rob Wang

Shallower depth of field

85mm f/1.2

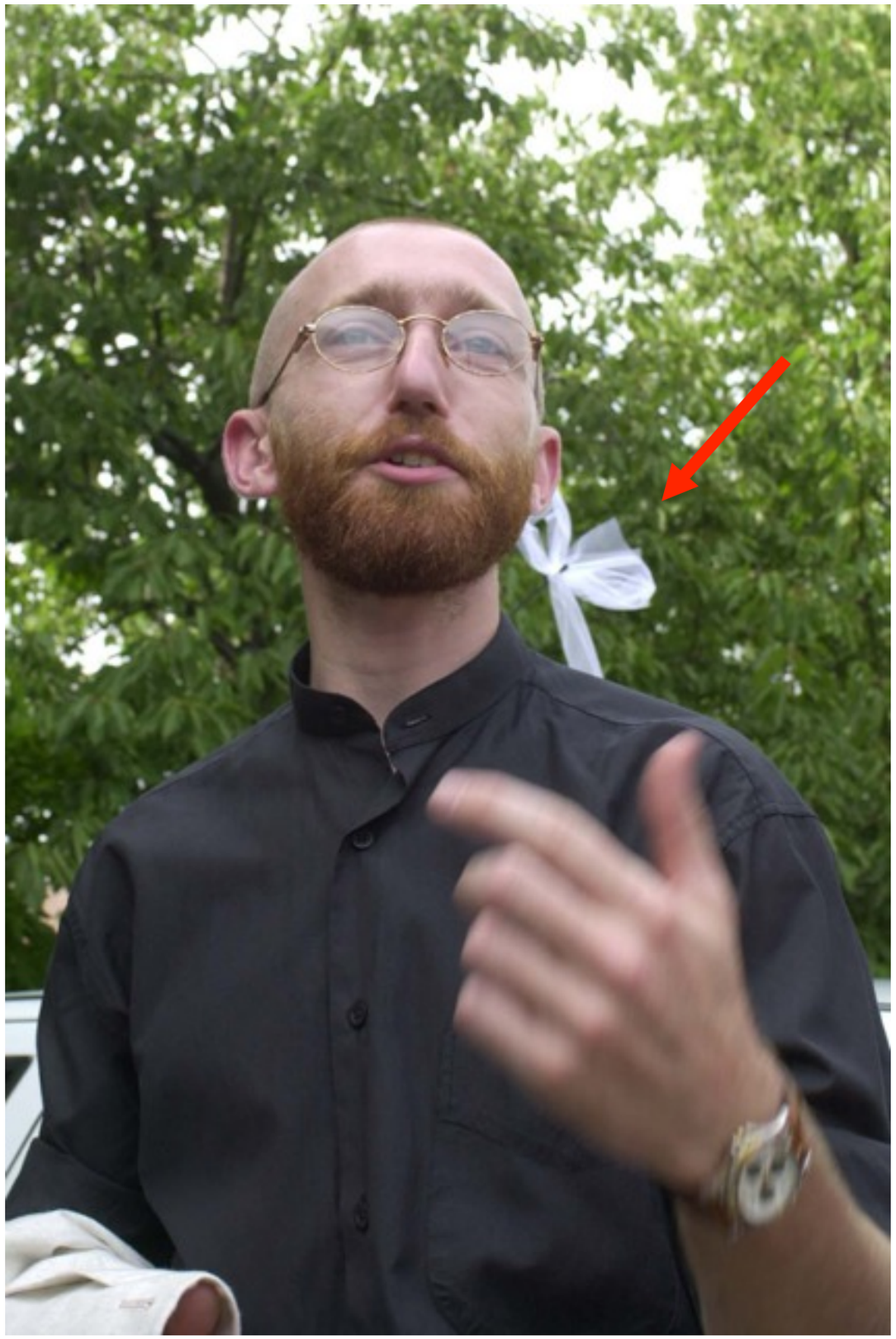
Model: Rob Wang

Crop

Isolate using blur (Photoshop, layering)

- **But maybe don't over-do it**

Clone brush/Poisson cleaning



Desaturate, darken

From Digital Photographer's Handbook

Compositing & matting

© Laurie Thompson, Imagination Studios

figure 7.17

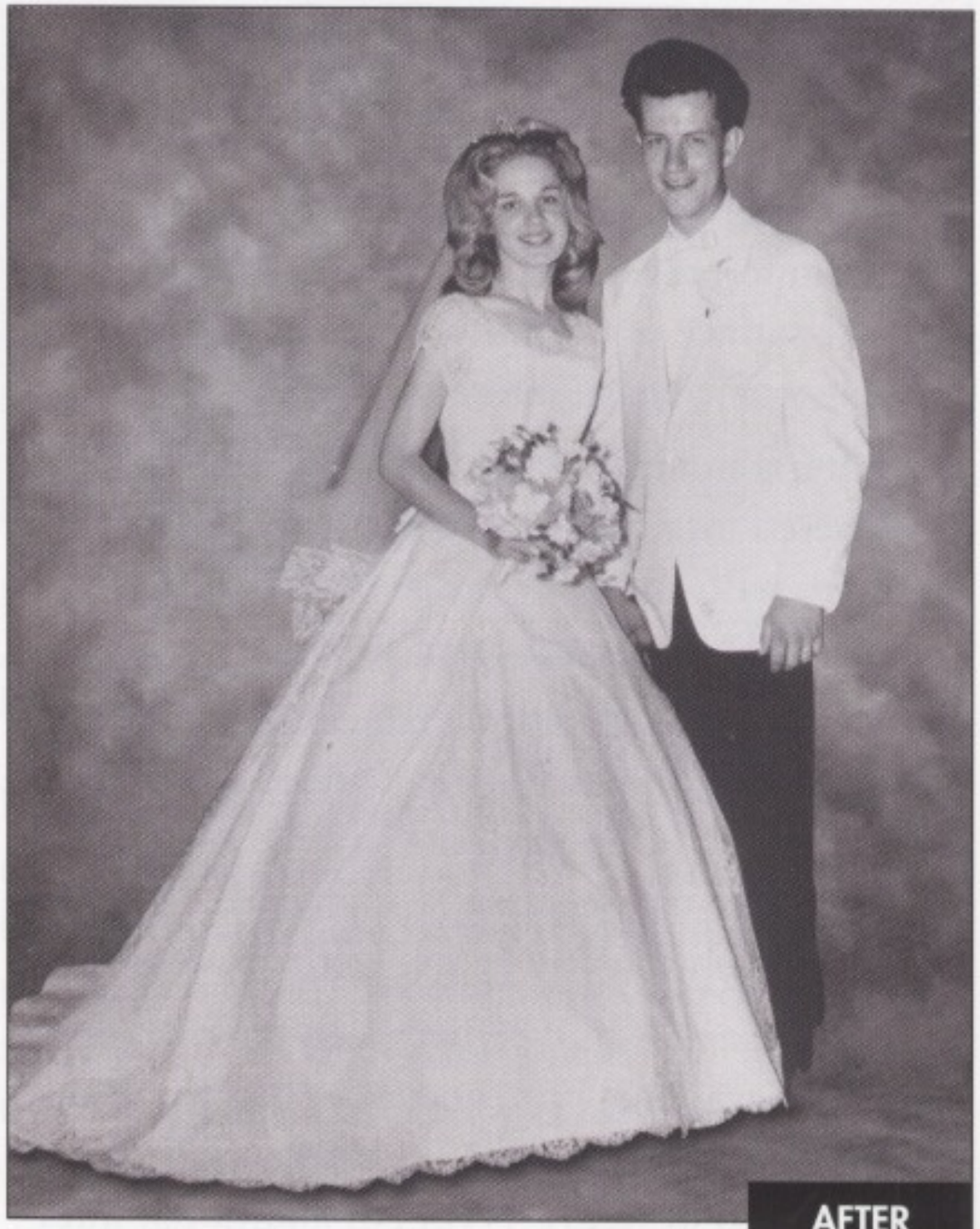


figure 7.18

Fixing a cluttered background

- Change viewpoint
- Shallow depth of field
- Frame tighter
- Modify scene (move objects, add backdrop)
- Retouch (blur, desaturate, darken)




Question?

- **Recap: avoid distracting background**
- **Simplify, get close**

Composition

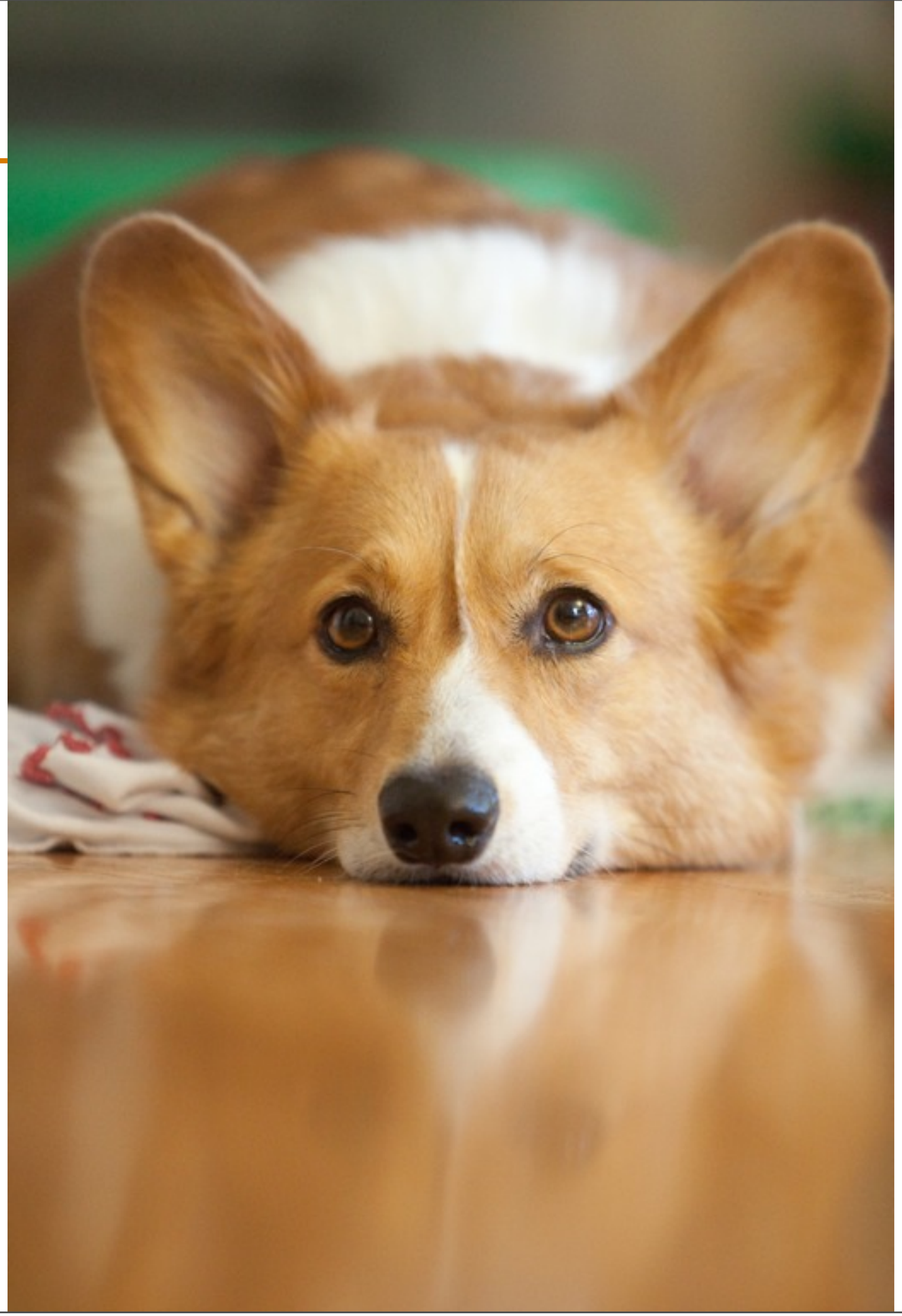
Get low

- **Try to be at eye level**

Bad

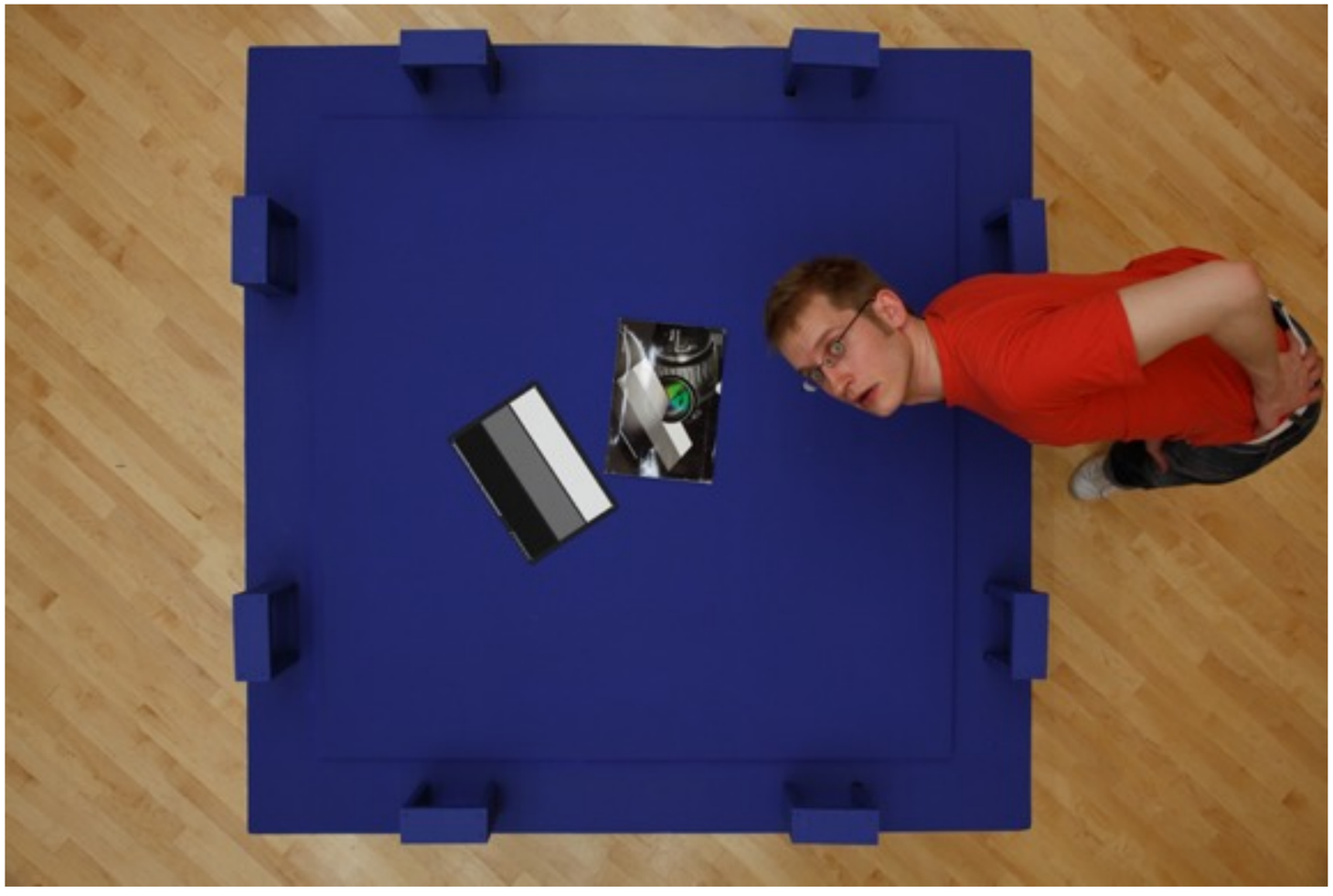
Better

Eye level



Or really get high

- **As usual, follow a rule or really break it.**



Rule of the thirds

Susie Post

The rule of thirds is a guideline developed by artists centuries ago. When the subject—or its most important element—is placed near one of the intersecting points of an imaginary grid, the viewer's eye is led through the frame. The result is an aesthetically strong image.

National Geographic Photography field guide

Rule of the thirds

Rule of the Third

Variations of the rule of the thirds

- **Golden ratio**
  - Very questionable superstition
  - http://plus.maths.org/issue22/features/golden/
- **Rule of the fifth**
- **...**

- **Only one thing matters: don't center!**

Don’t center, especially for motion

Don’t center, especially for motion

Don’t center, especially for motion

... or do center

Question

- **Recap:**
  - avoid distracting background
  - be at eye level, get low
  - avoid centering subject

Build on diagonal lines

Warning: near-parallelism

- **In particular, keep horizon level**
- **Use crop with rotation to fix this**

Don't let lines unintentionally throw your photo off balance. When you shoot the horizon or a building, keep the straight lines level—unless you're shooting at a dramatic, intentional angle.

Keep the horizon level

http://www.fotofinish.com/resources/centers/photo/takingpictures.htm

- **or use bubble level on flash hot shoe**

Correct perspective (perspective crop)

+ you control reflection and perspective independently

Try unusual angles

- **Do or don't:**
  Either perfectly vertical or at least 30 degrees

Try Unusual Angles
Be bold! Try turning your camera to 45 degrees before snapping a picture. Or instead of snapping it from eye level, kneel down or lie on the ground to get a more interesting shot.

Take a picture from an unusual angle

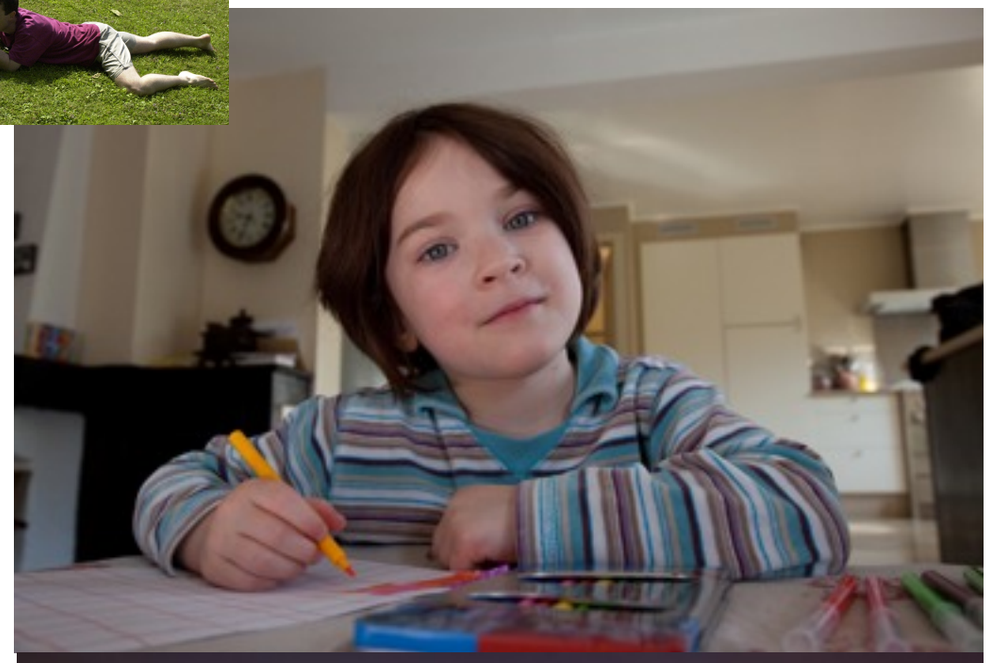
http://www.fotofinish.com/resources/centers/photo/takingpictures.htm

Question

- **Recap:**
  - avoid distracting background
  - avoid centering subject
  - get low
  - careful with alignment/horizon

Composition/viewpoint

- **Get low**
  - –at eye level of subject
- **Avoid centering subject**
  - –rule of the third
- **Keep horizon horizontal**



Light

Bottom line

- **Don't get married on a sunny day!**

Go in the shade

- **Light is more diffuse**

Bad

Better

Overcast days are the best

- **Just don’t put the sky in the frame**

The weather conditions

The pictures

Other overcast-day pictures

Best time of day: sunset & sunrise

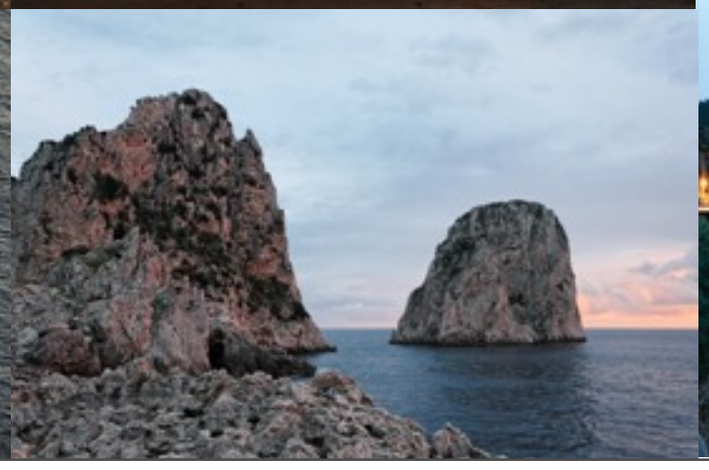
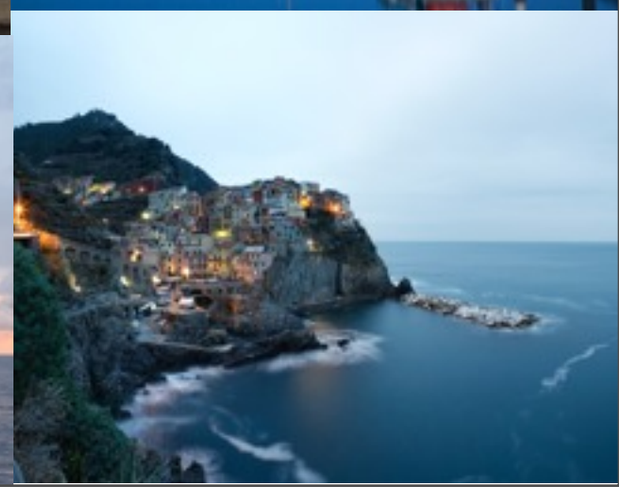
- **+/- 1 hour**
- **“Golden hours”**
- **Night photography: always near sunset/sunrise**
  - because of nice diffuse light

Mid day: often not great	less than 1 hour after sunrise/ before sunset	During sunset or sunrise	After sunset





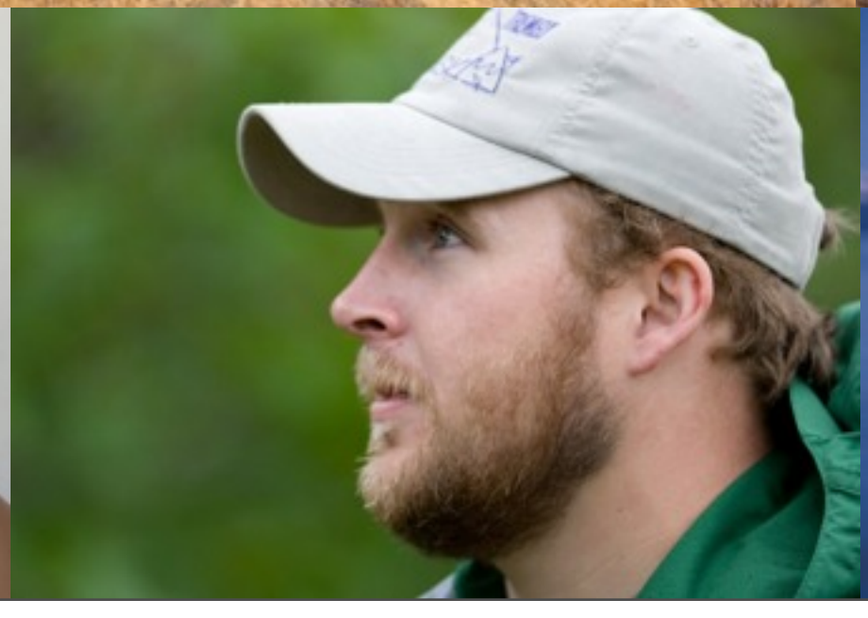


less than 1 hour after sunrise

During sunset/sunrise

After sunset



- **10 minutes after sunset**

Add fill flash

- **For harsh lighting conditions**
- **Illuminate shadows with flash to reduce dynamic range**
- **But set the flash to -1.5 or -2 EV**
  (3 to 4 times darker than existing lighting)

3 Use flash outdoors

Bright sun can create unattractive deep facial shadows. Eliminate the shadows by using your flash to lighten the face. When taking people pictures on sunny days, turn your flash on. You may have a choice of fill-flash mode or full-flash mode. If the person is within five feet, use the fill-flash mode; beyond five feet, the full-power mode may be required. With a digital camera, use the picture display panel to review the results.

On cloudy days, use the camera's fill-flash mode if it has one. The flash will brighten up people's faces and make them stand out. Also take a picture without the flash, because the soft light of overcast days sometimes gives quite pleasing results by itself.

▪ Learn more about composing people pictures

Subject is dark

After

http://www.kodak.com/eknec/PageQuerier.jhtml?pq-path=317&pq-locale=en_US

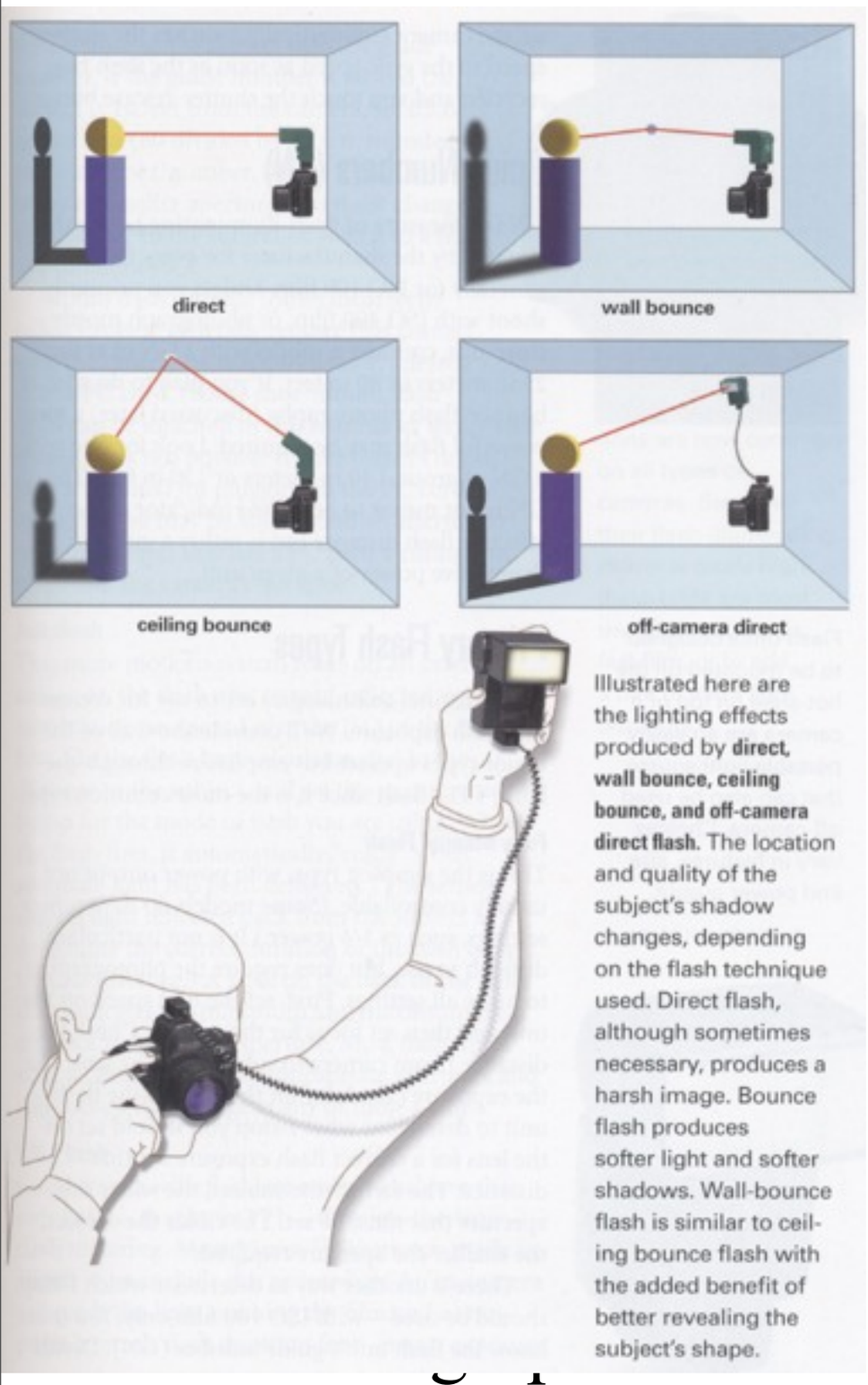
Without flash

With fill flash

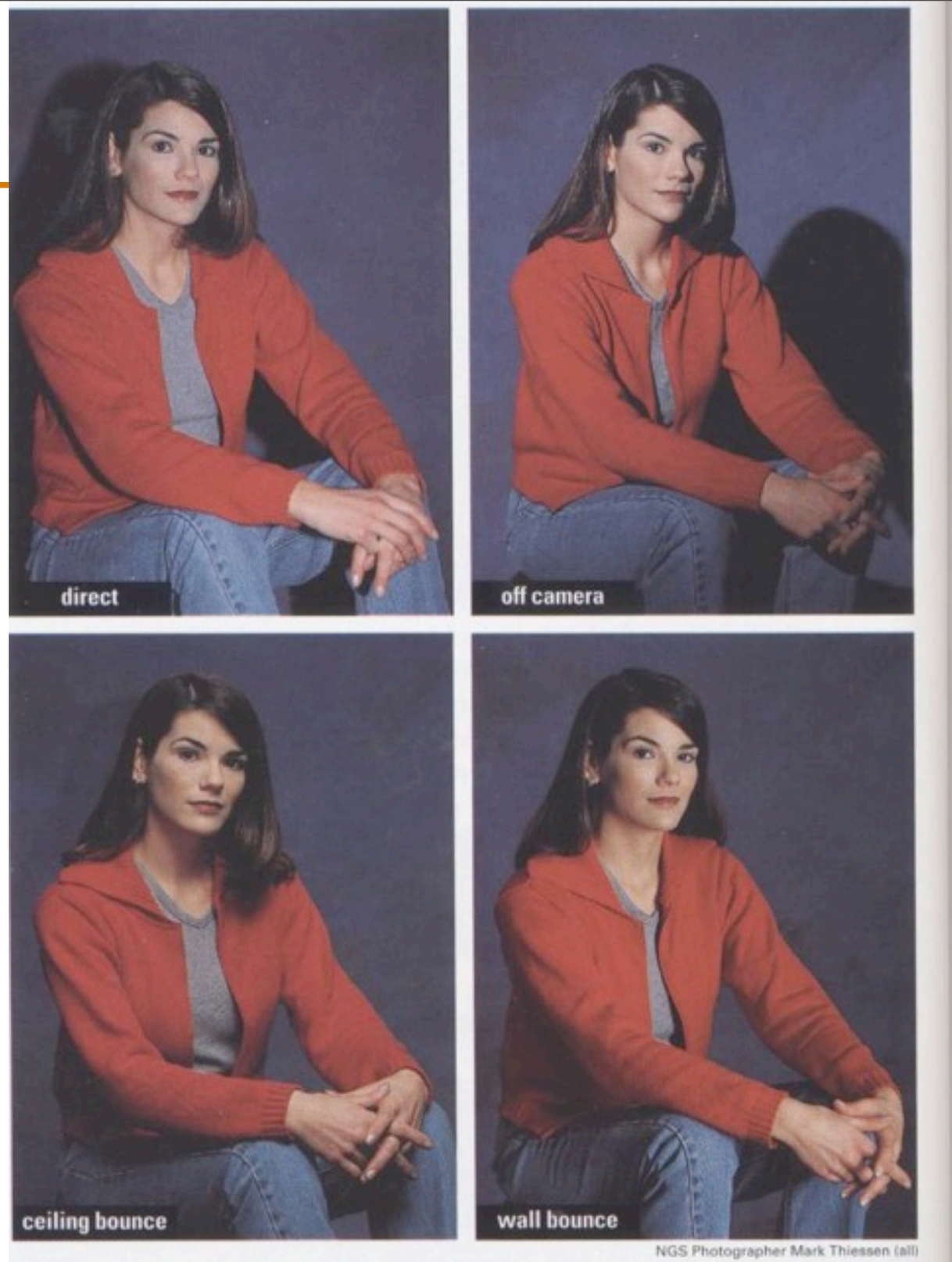
Add fill in light on faces: Photoshop

Add fill in light on faces

Flash photo



Illustrated here are the lighting effects produced by **direct, wall bounce, ceiling bounce, and off-camera direct flash.** The location and quality of the subject's shadow changes, depending on the flash technique used. Direct flash, although sometimes necessary, produces a harsh image. Bounce flash produces softer light and softer shadows. Wall-bounce flash is similar to ceiling bounce flash with the added benefit of better revealing the subject's shape.



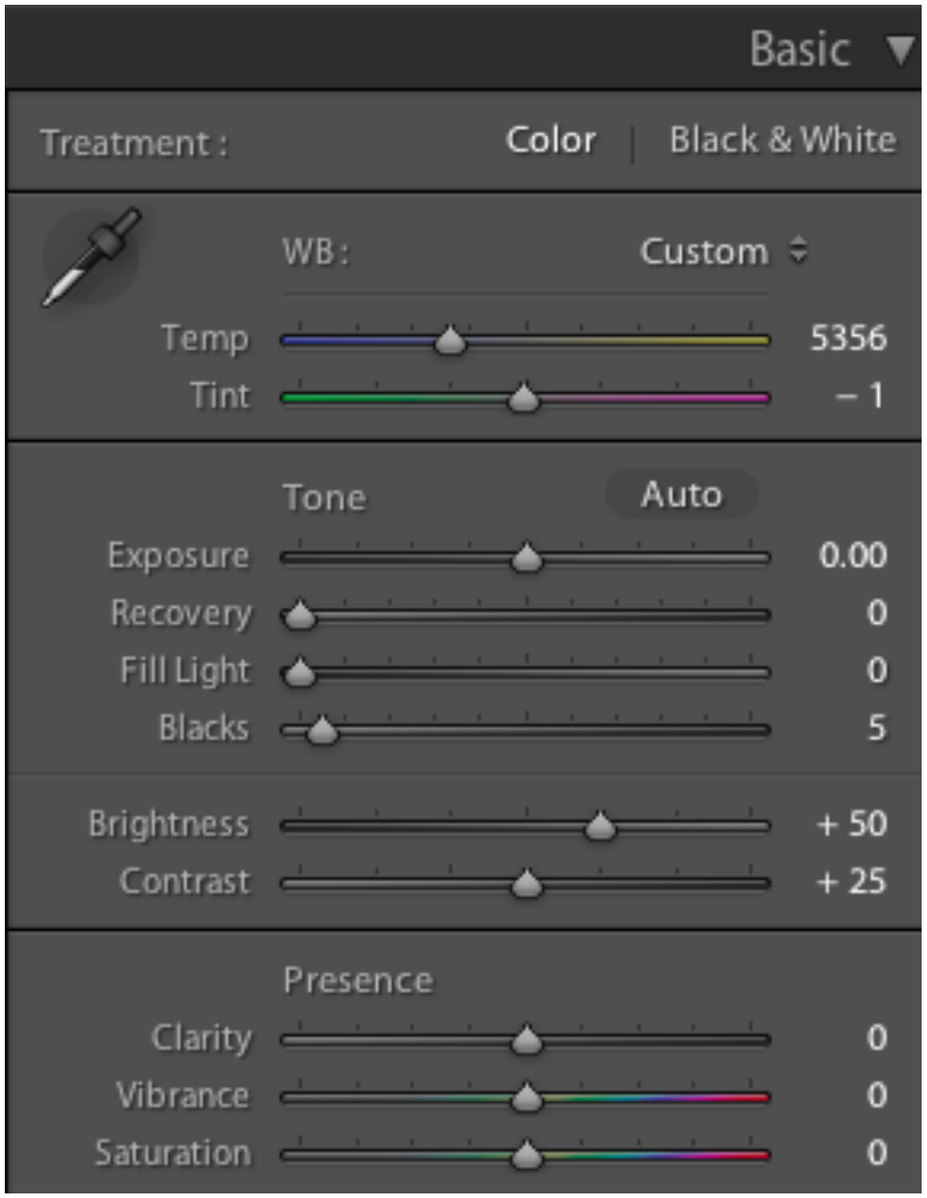
NGS Photographer Mark Thiessen (all)

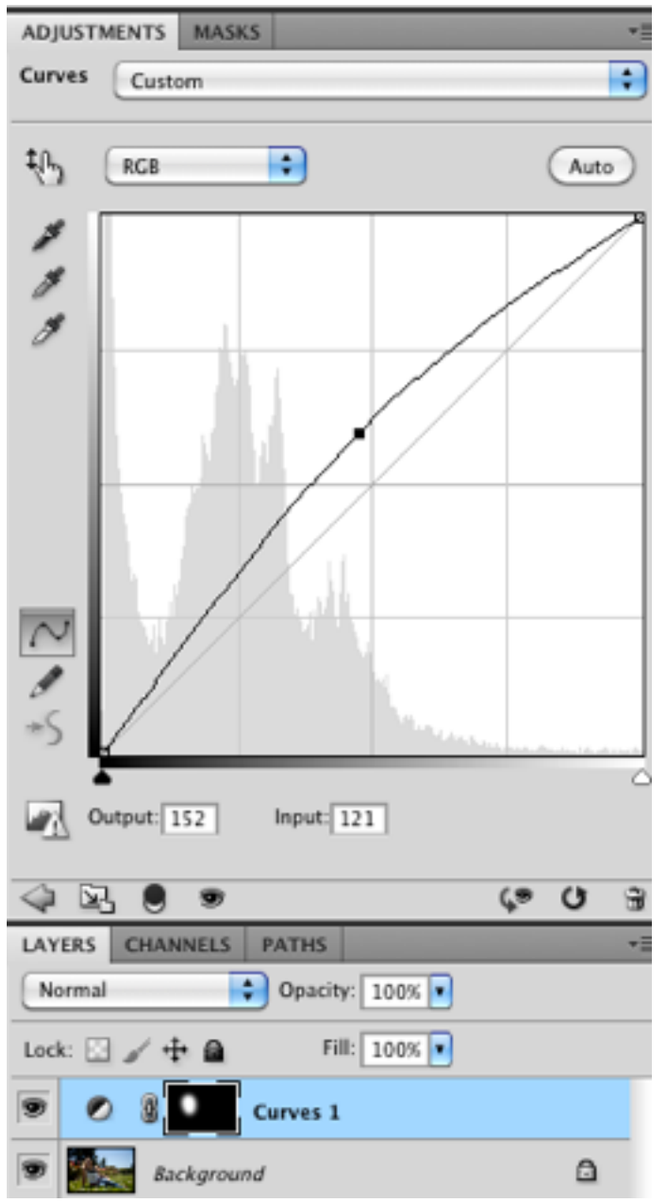
Direct, on-camera flash is harsh and unflattering. Removing the flash from the camera, or bouncing the flash light from a nearby surface produces different effects. Light bounced from a ceiling, although commonly used, causes dark shadows in the eye sockets and under the nose and chin. The most successful technique indoors is to bounce light from a nearby light-colored wall.

Photography field guide

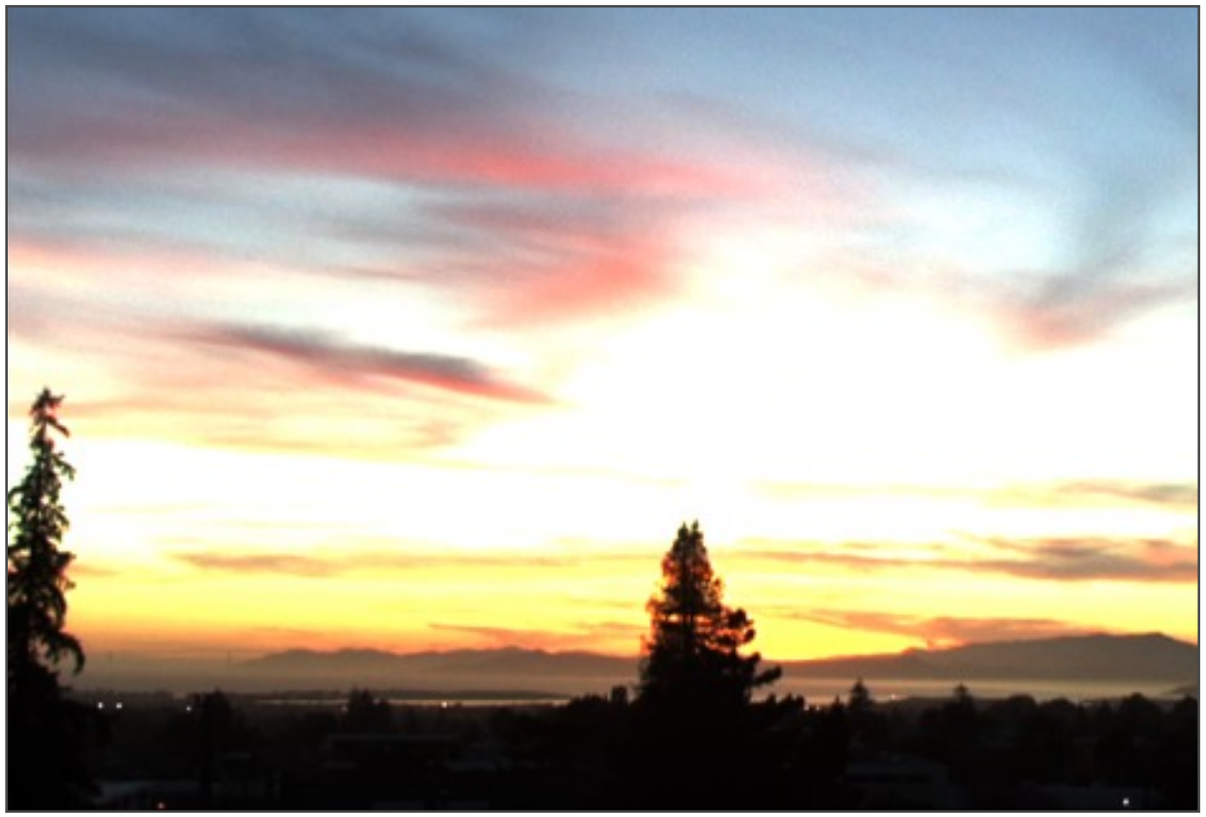
Options for digital fill light

- **Use the fill-in slider in Lightroom or camera raw**
- **Use an adjustment layer with a mask**
  - paint the mask white only in the area to brighten.





Landscape: HDR & Tone mapping



Light

- **Avoid harsh light…**
  unless you want
  to play with shadows
  - –Do or don't

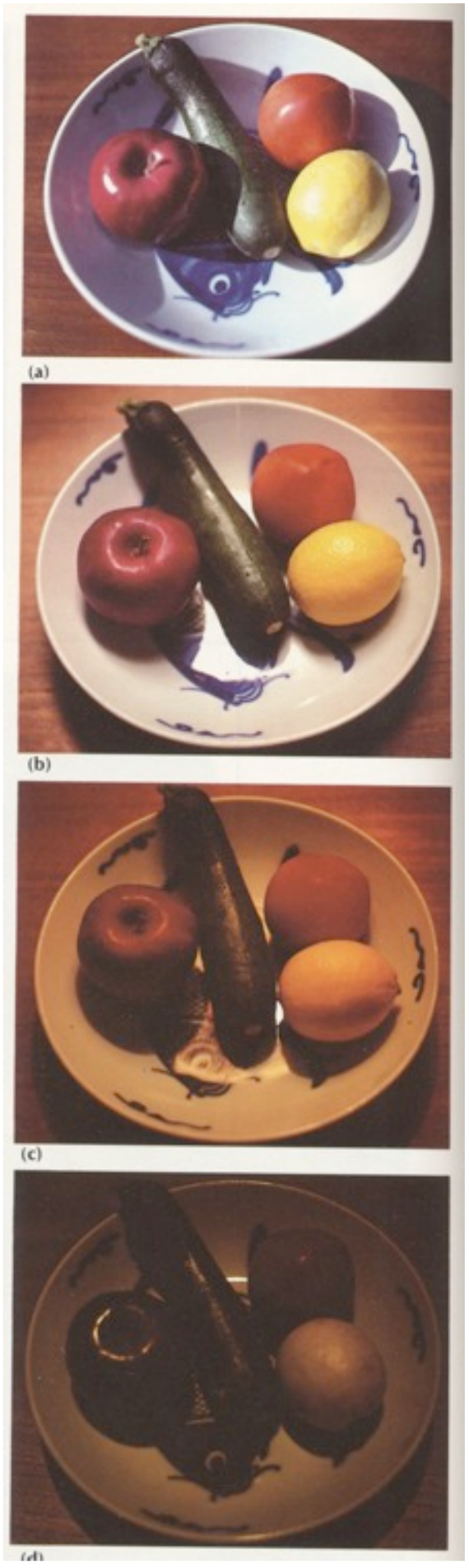
Light & color

- **Avoid harsh light…**
  unless you want to play with shadows
- **Sunrise & sunset are best**
- **Cloudy days are great as long as the sky is not in the picture**
- **For sunny days, shade areas are best**
- **Avoid direct flash**
- **HDR, tone map**

White balance

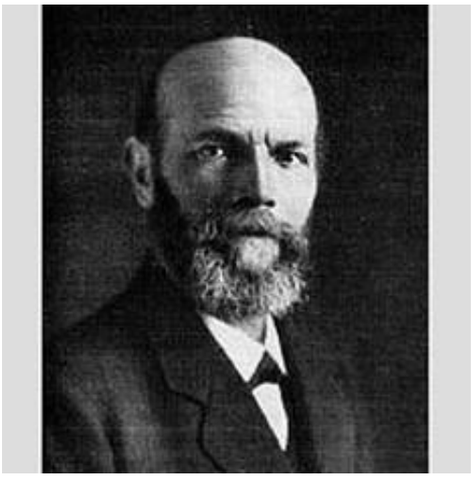
White balance problem

- When watching a picture on screen or print, we adapt to the illuminant of the room, not that of the scene in the picture
- The eye cares more about objects' intrinsic color, not the color of the light leaving the objects
- We need to discount the color of the light source



Same object, different illuminants

Von Kries adaptation

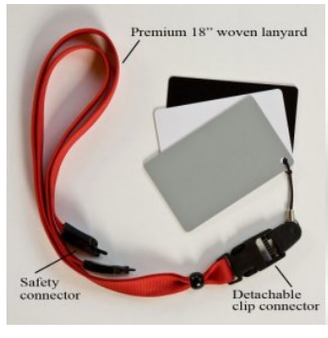


- Multiply each channel by a gain factor
- Note that the light source could have a more complex effect
  - Arbitrary 3x3 matrix
  - More complex spectrum transformation

http://www.cambridgeincolour.com/tutorials/white-balance.htm

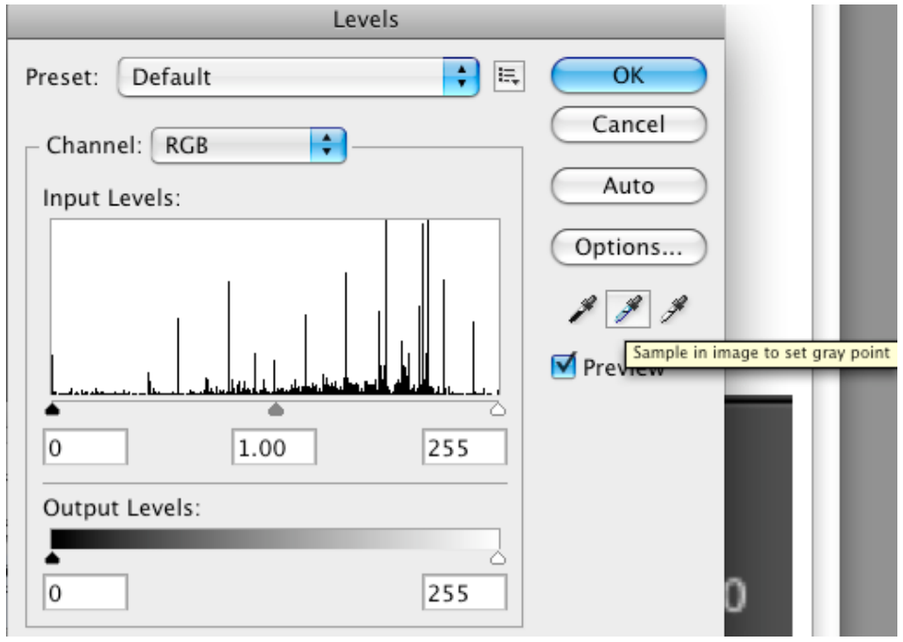
Best way to do white balance

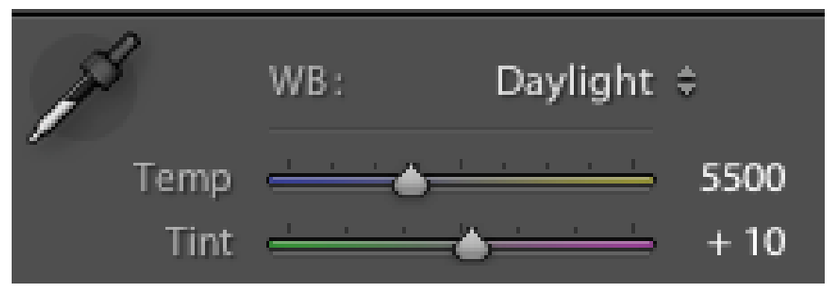
- Grey card:
- Take a picture of a neutral object (white or gray)
- Deduce the weight of each channel
- If the object is recoded as r_w, g_w, b_w use weights k/r_w, k/g_w, k/b_w where k controls the exposure

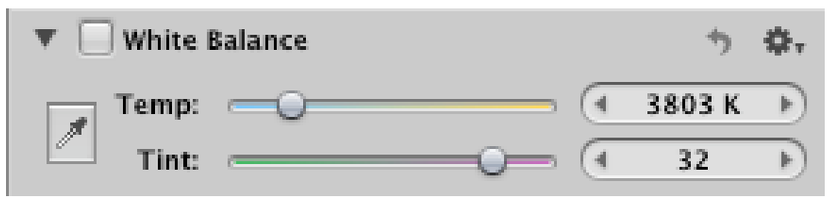


Lightroom demo

- Most photo editing software lets you click on a neutral object to achieve white balance
- In “Levels” in Photoshop
- In “basic” in Lightroom
- In Adjustments in Aperture
- You also often have presets such as daylight, tungsten







Party name tags

- Provide excellent white references!

Challenge: mixed lighting

- **In particular, flash+ambient**
- **Solution: put yellowish gel on the flash**
- **Solution 2: http://people.csail.mit.edu/ehsu/work/sig08lme/**

Ultimate white balance solution

- **But note that white balance affects the tones you get**

Recap

- **Follow rules or really break them**
- **Simplify, avoid cluttered background**
  - move your viewpoint, frame tighter, shallow depth of field, desaturate
- **Don't center things**
  - rule of the third, leave space for gaze or motion
- **Avoid harsh light**
  - golden hours, overcast days, avoid direct sunlight, go in the shade, fill flash, bounce flash, post-processing
- **White balance**

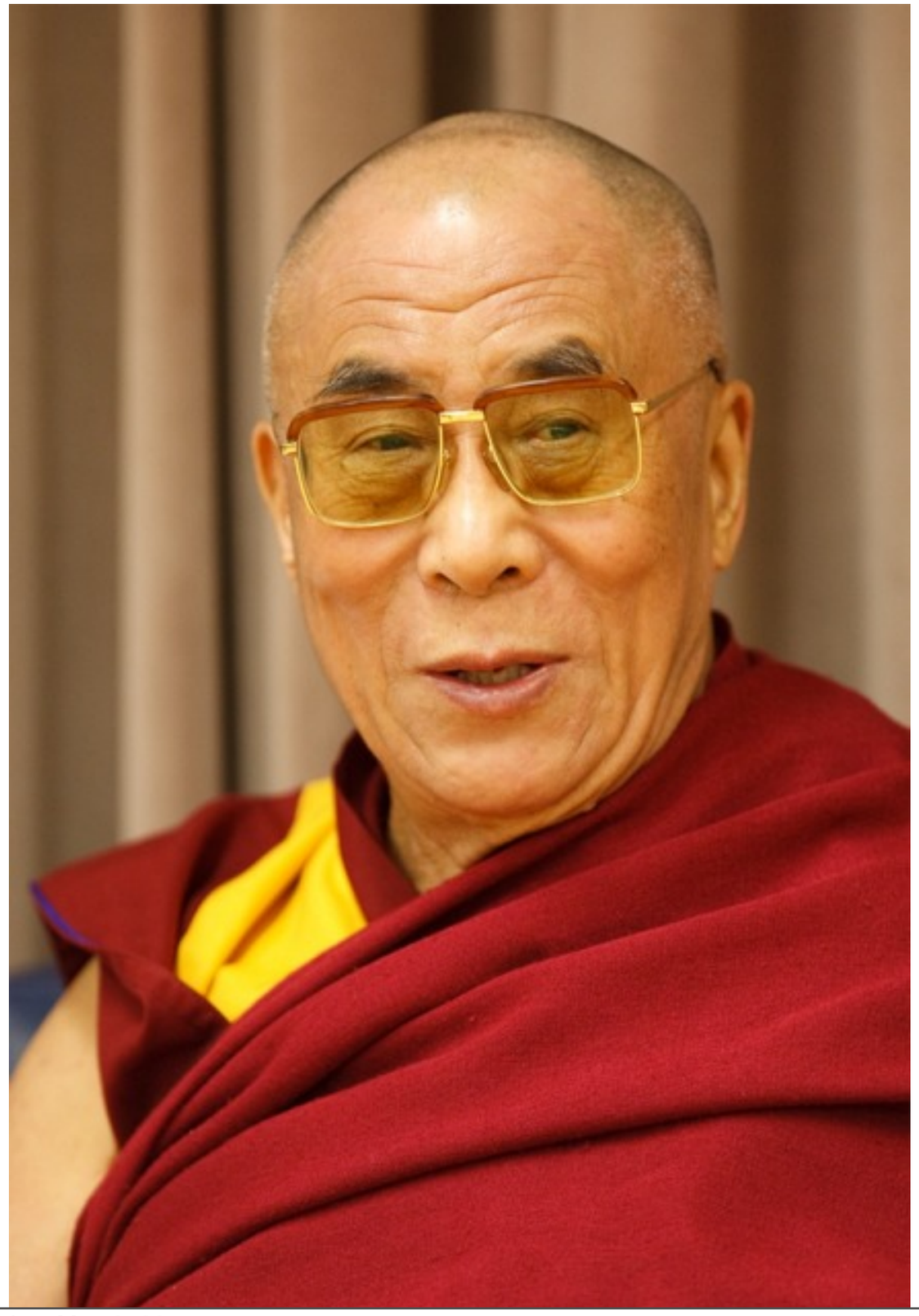
Portraits

Portraits: It's all about the eyes

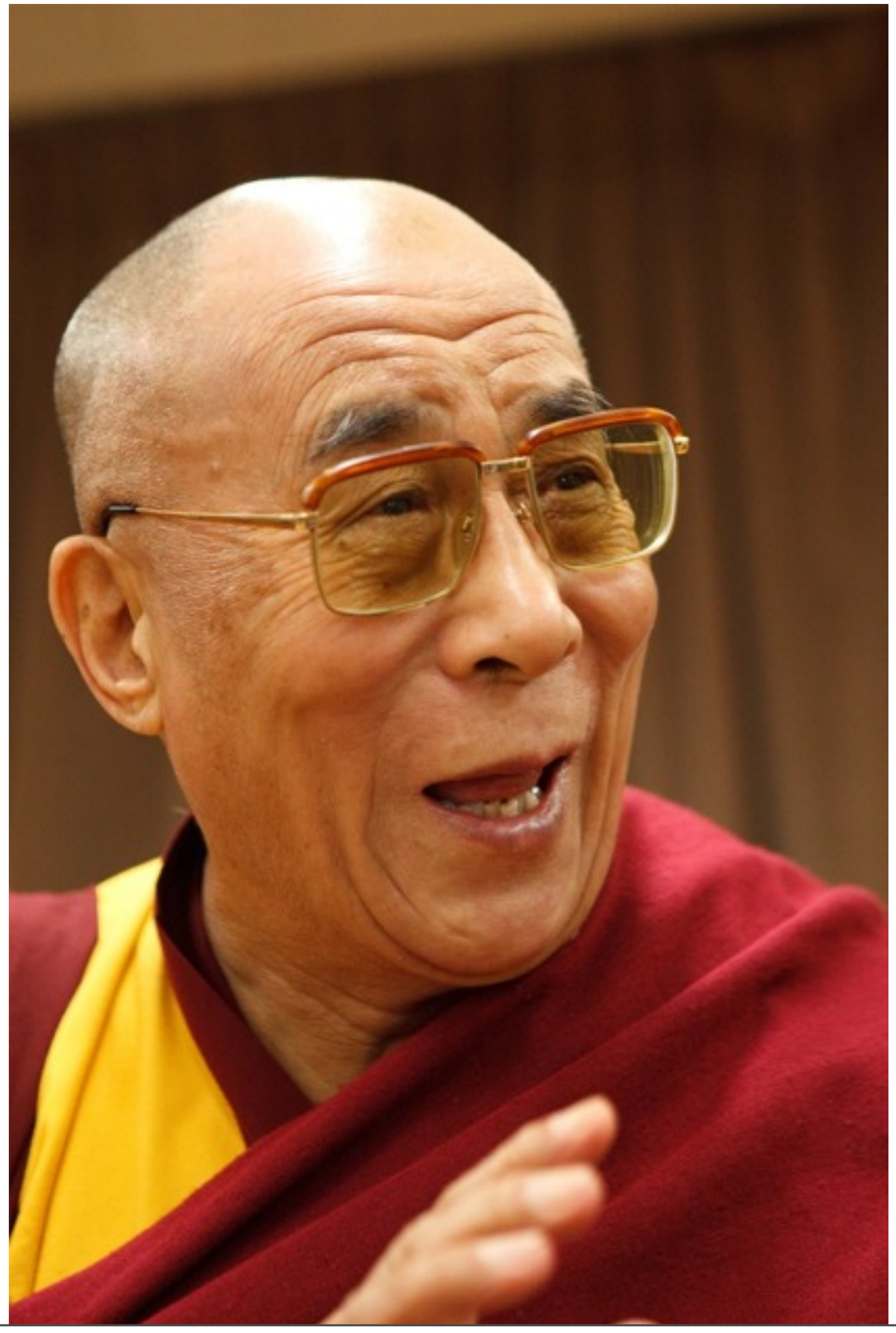
- Eyes should be sharp & shiny
- Be at eye level... or try unusual viewpoints
- Make sure lighting is not harsh
- Shallow depth of field can help
- Add vignetting to focus attention
- Get the white balance right (but maybe a little warm)
- Try to convert to Black and white
- Telephoto to isolate the subject (more formal)
- Wide angle to make him/her approachable and include surrounding
- Don't hesitate to over-shoot: bits are cheap

Telephoto vs. wide angle

300mm f/2.8



24-70



Tougher than portraits: 2 people

- **Focus is harder: both sets of eyes should be sharp**
  - –tradeoff between complex background
- **Hard to get both expressions right**
- **=> shoot like crazy**
- **=> use photomontage**

Not great (mother's eyes are out of focus)

Better

Interactive Digital Photomontage

- **Aseem Agarwala et al.**
  http://grail.cs.washington.edu/projects/photomontage/
- **Merge multiple images**
- **User puts strokes to select which image where**
- **Graph cut + Poisson reconstruction**

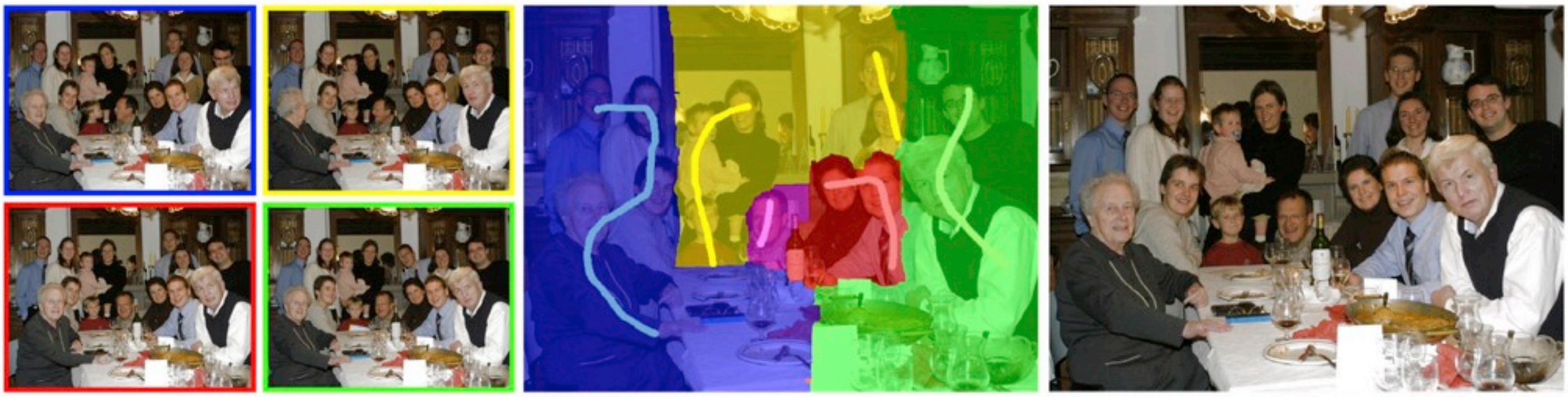
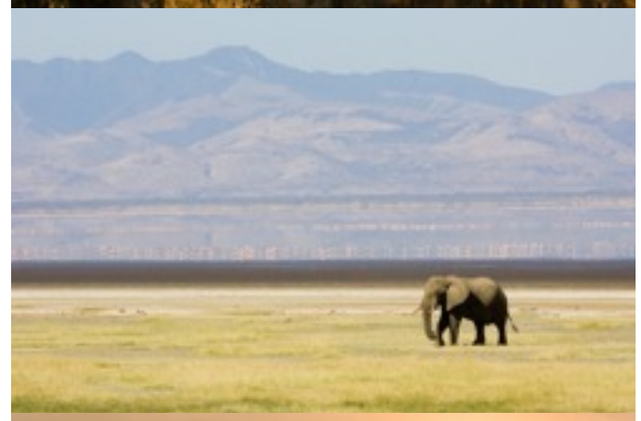


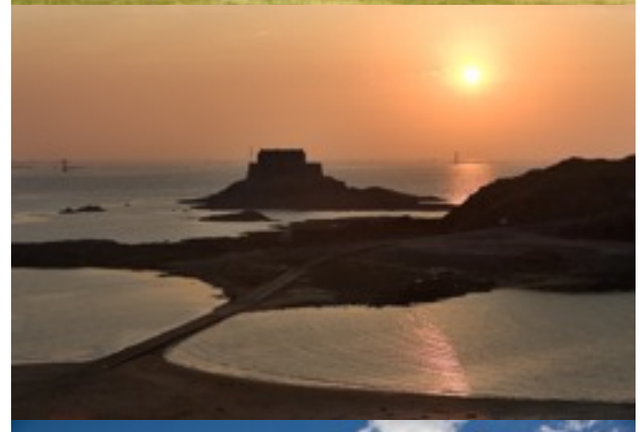
Figure 1 From a set of five source images (of which four are shown on the left), we quickly create a composite family portrait in which everyone is smiling and looking at the camera (right). We simply flip through the stack and coarsely draw strokes using the *designated source* image objective over the people we wish to add to the composite. The user-applied strokes and computed regions are color-coded by the borders of the source images on the left (middle).

Landscape

Landscape / architecture

- **Get a foreground element**
  - rock, tree, flower
- **Rule of the thirds, diagonals**
  - in particular for the horizon
- **Don't hesitate to zoom in**
- **Manage dynamic range**
  - sky is always too bright
  - graduated neutral density, HDR
  - golden hours or right after sunset
- **Use a polarizer**
  - darkens the sky, make colors stand out
- **Alignments**
  - Keep horizon straight
  - For architecture, correct verticals
- **Don't be deterred by stormy weather**
- **Slow shutter speed for water**





Foreground helps

Boring

More interesting (foreground)

Parallels: do or don’t

Ansel Adams

- Note foreground trees in lower right
- Sky has been darkened