

# Computer Science E-7

## Exposing Digital Photography

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Lecture 3: Exposure  
September 21, 2009

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1/1000s, ISO 400, f/5.6

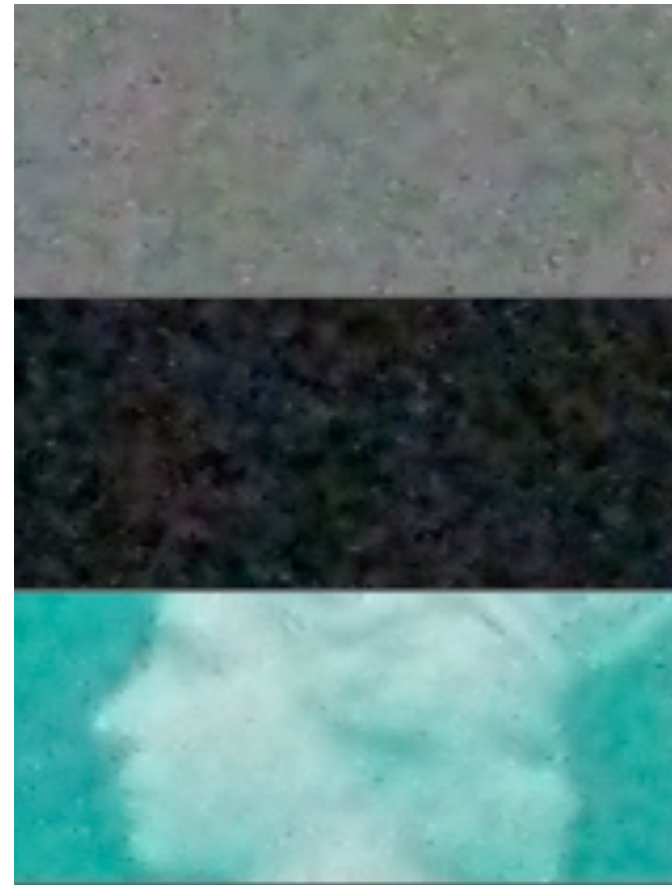
Photo by Dan Armendariz, 2007

Shutter Speed

Stopping motion



ISO 100



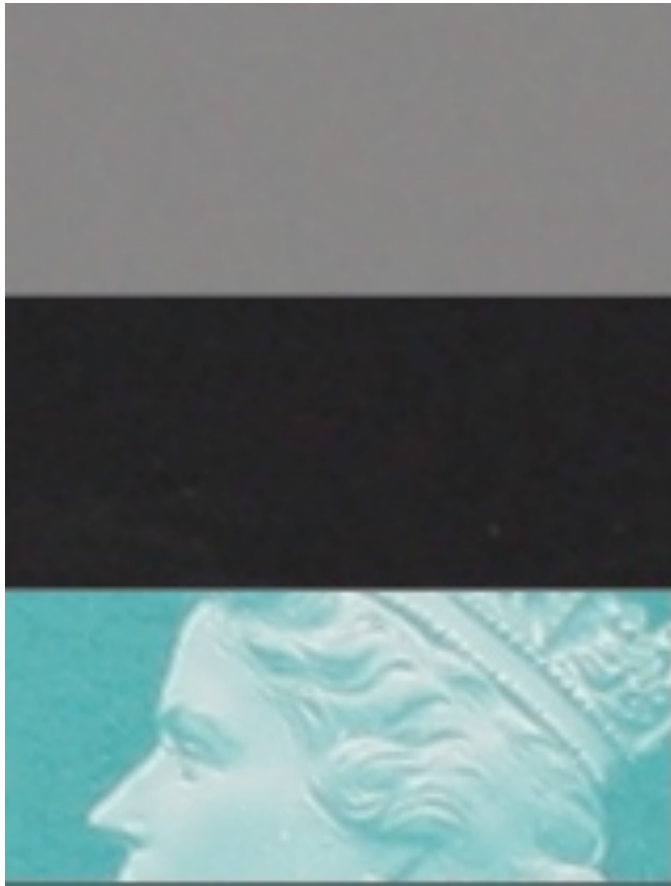
ISO 1600

Images from <http://www.dpreview.com/reviews/canonsx100is/page6.asp>

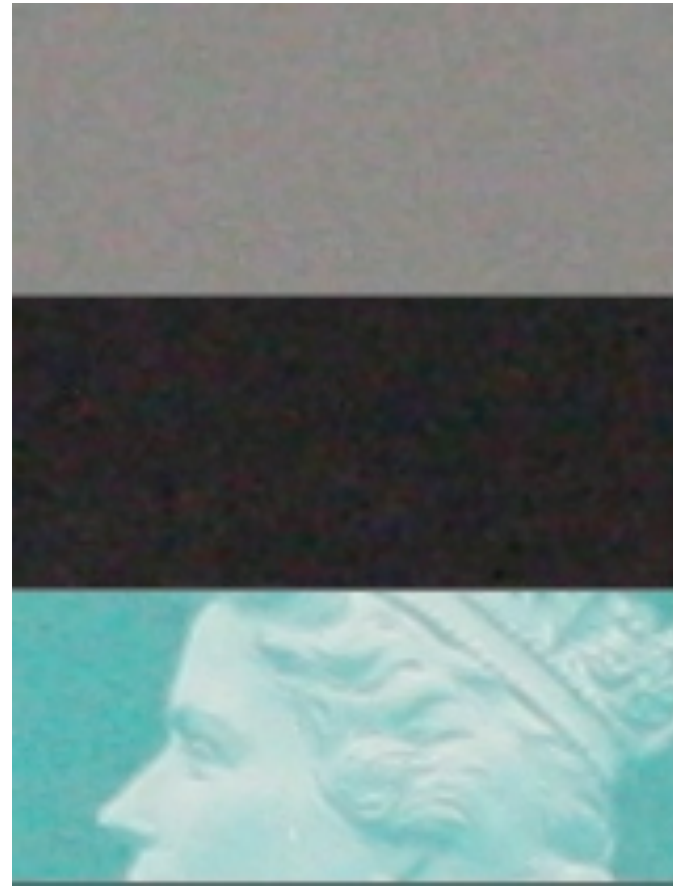
Sensitivity (ISO)

Compact cameras





ISO 100



ISO 1600

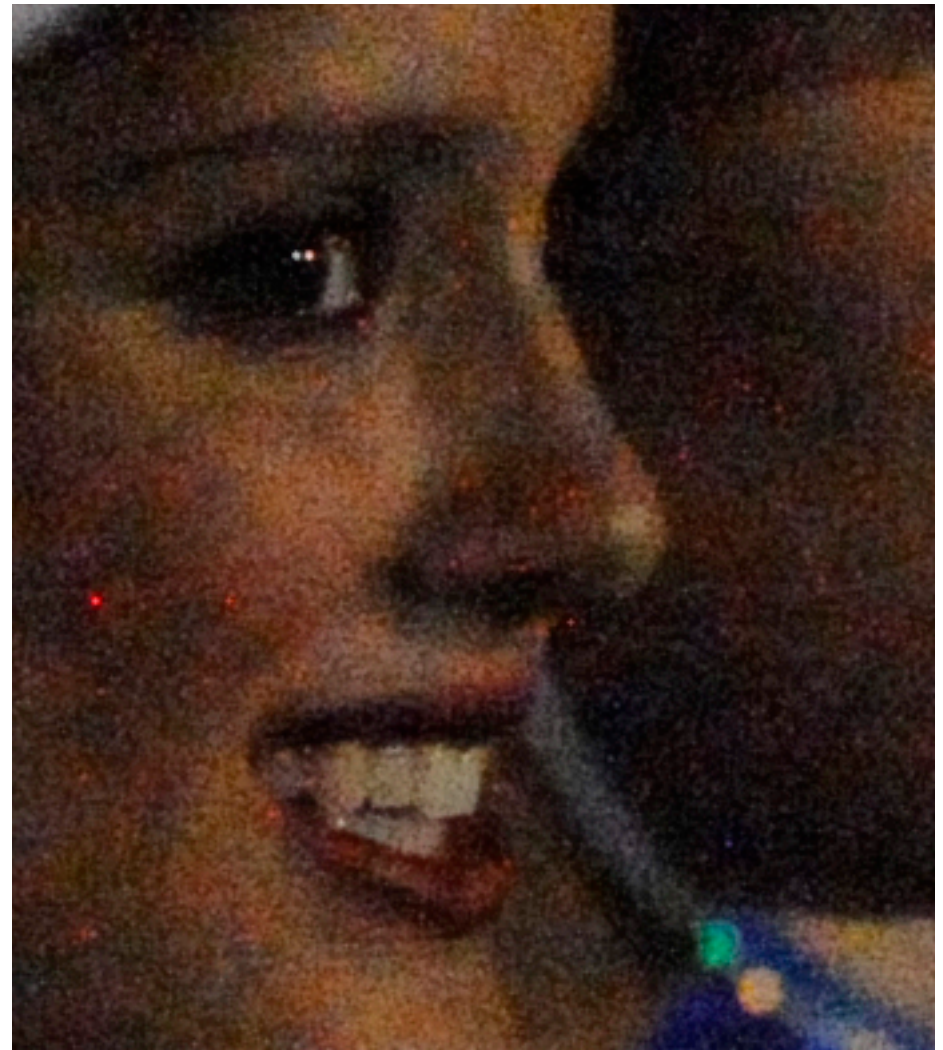
Images from <http://www.dpreview.com/reviews/canoneos40d/page18.asp>

Sensitivity (ISO)

Digital SLRs



ISO 1600 (film)



ISO 25600 (Nikon D3)

Images from [http://en.wikipedia.org/wiki/Film\\_speed](http://en.wikipedia.org/wiki/Film_speed) and [http://www.robgalbraith.com/bins/multi\\_page.asp?cid=7-8745-9153](http://www.robgalbraith.com/bins/multi_page.asp?cid=7-8745-9153)

Sensitivity (ISO)

Film vs Digital



846s, ISO 400, f/8

Photo by Dan Armendariz, 2007

Sensitivity (ISO)

Combined with Shutter Speed





336s, ISO 800, f/8 (left) 846s, ISO 400, f/8 (right)



Photos by Dan Armendariz, 2007

Sensitivity (ISO)

Combined with Shutter Speed

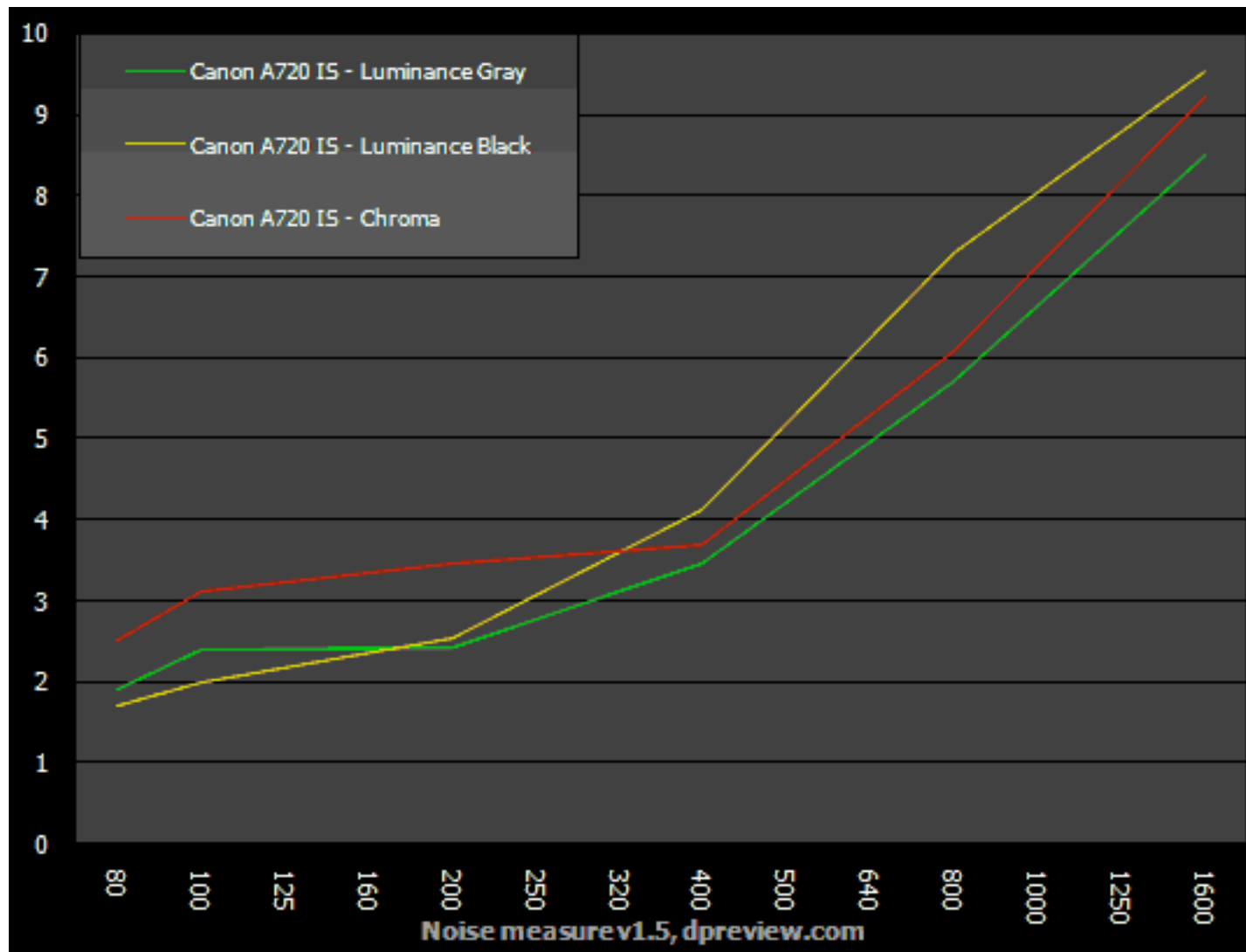


Image from <http://www.dpreview.com/reviews/canona720is/page4.asp>

Sensitivity (ISO)

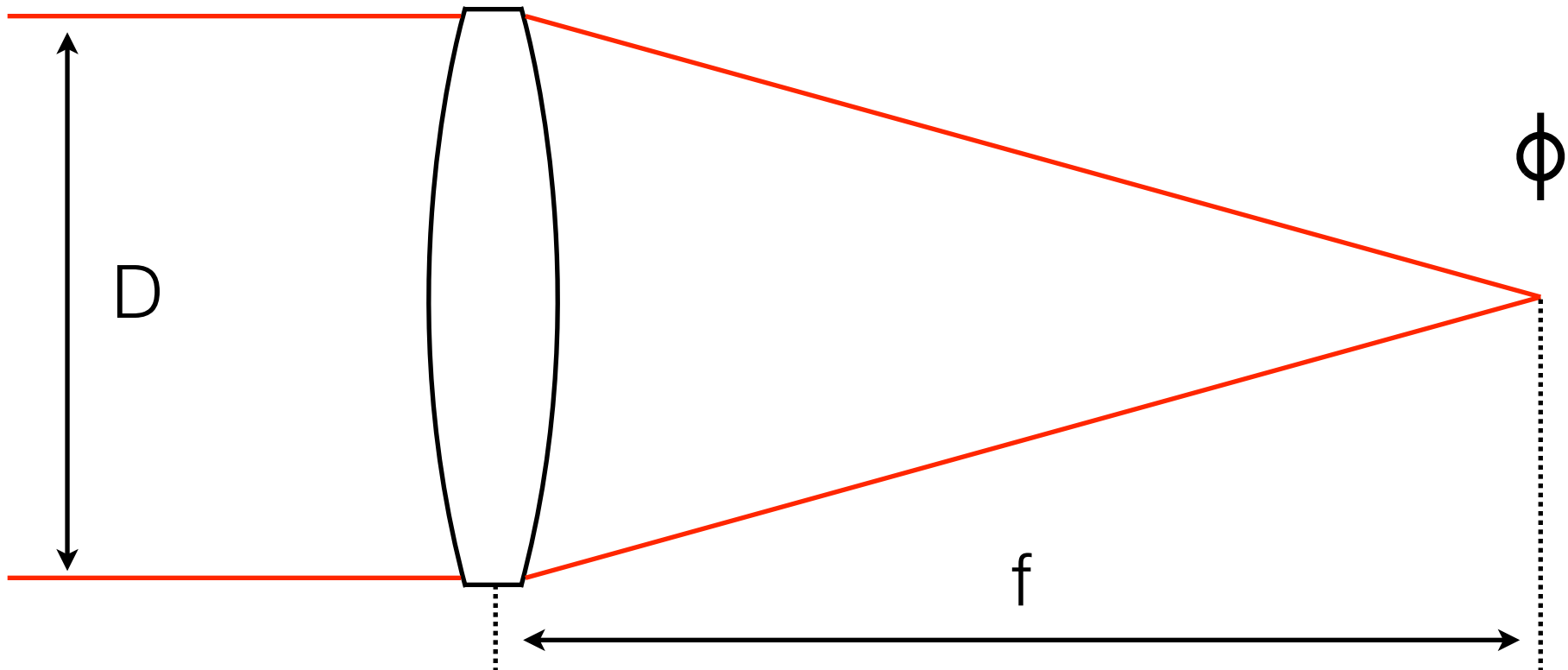
Noise measurements





Exposure

Aperture



Aperture

F-number =  $f/D$



1/6s, ISO 100, f/16

Photo by Dan Armendariz, 2005

Aperture

Don't worry!





Aperture

Pinhole math

# Aperture

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Background blur



Photo by Dan Armendariz, 2004  
1/1250s, ISO 200, f/2.8





10s, ISO 100, f/8

Photo by Dan Armendariz, 2004

# Aperture

Making everything sharp



- Amount of available light
- Shutter speed
- Sensitivity (ISO)
- Aperture

Exposure

The Big 4

Bright Sunny Day:  
Shutter Speed: 1/100s  
Sensitivity: ISO 100  
Aperture:  $f/16$

Exposure

Sunny 16 Rule

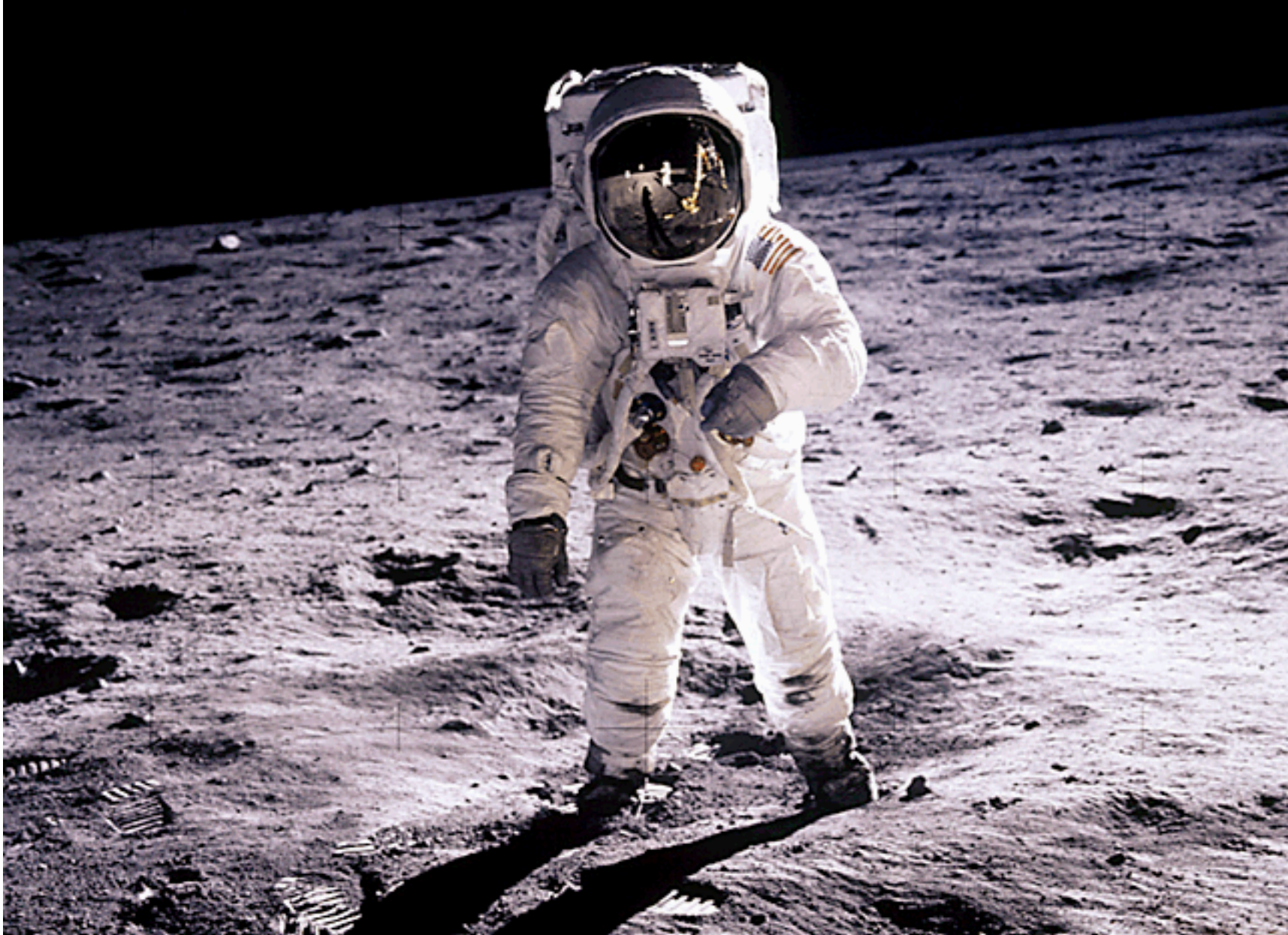


Image from [http://nssdc.gsfc.nasa.gov/imgcat/html/object\\_page/a11\\_h\\_40\\_5903.html](http://nssdc.gsfc.nasa.gov/imgcat/html/object_page/a11_h_40_5903.html)

Exposure

Moon landings





Image from [http://www.jaxa.jp/press/2007/11/20071113\\_kaguya\\_e.html](http://www.jaxa.jp/press/2007/11/20071113_kaguya_e.html)

Exposure

Moon landings

# Exposure

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Over-exposure



Photo by Dan Armendariz, 2004  
1/40s, ISO 200, f/2.8





1/1000s, ISO 200, f/4.5

Photo by Dan Armendariz, 2006

Exposure

Under-exposure





1/80s, ISO 400, f/10

Photo by Dan Armendariz, 2006

# Exposure

Worse: Over- & Under-exposure

# Exposure

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Intentional under-exposure



Photo by Dan Armendariz, 2005  
8.0s, ISO 100, f/8

# Exposure

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Intentional over-exposure



Photo by Dan Armendariz, 2005  
15.0s, ISO 100, f/16

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