

# Computer Science E-7

## Exposing Digital Photography

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Lecture 11: Color  
November 9, 2010

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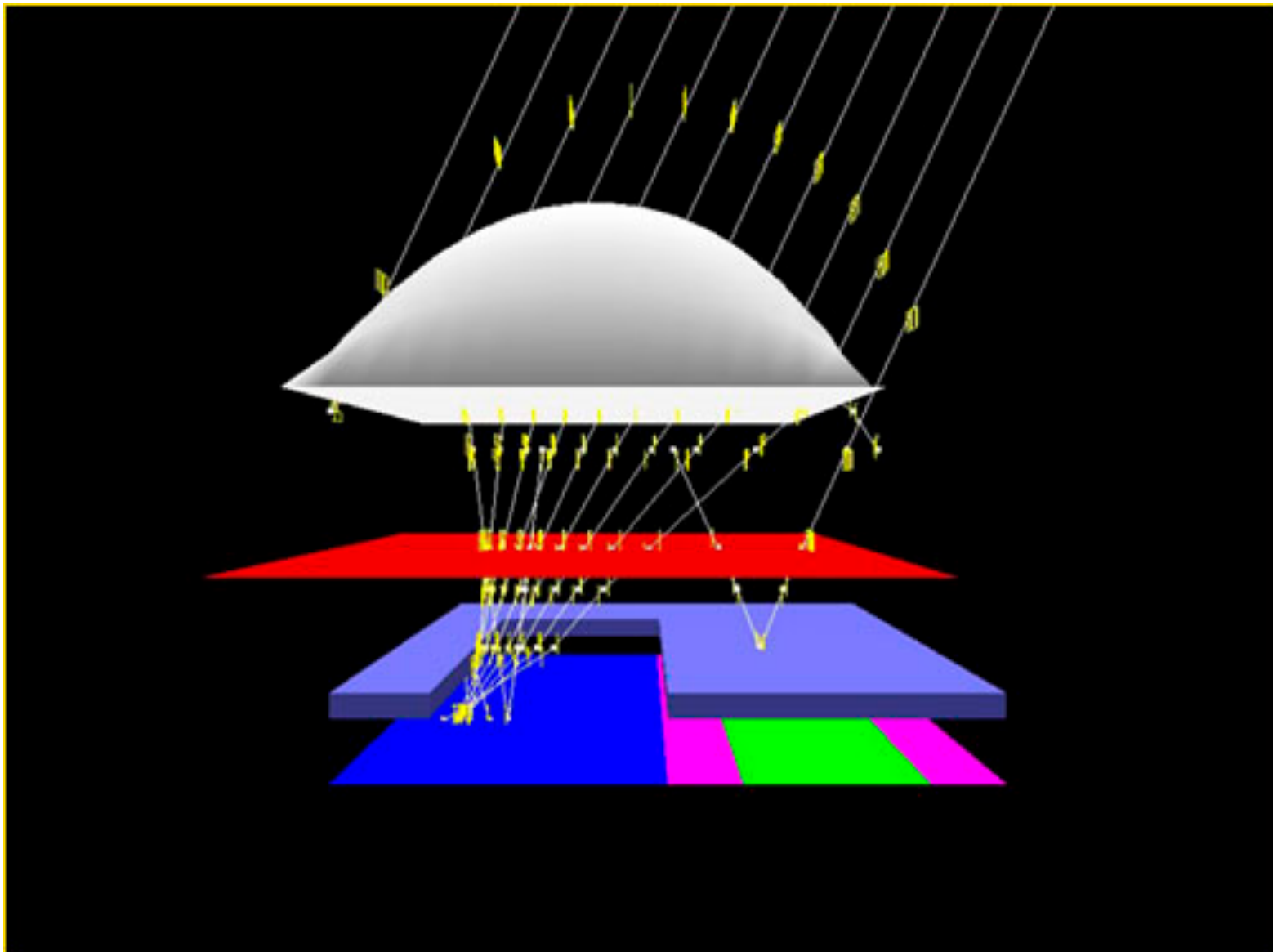


Image from Eastman Kodak, from <http://www.luminous-landscape.com/essays/kodak-iss.shtml>

Review

Pixel Construction

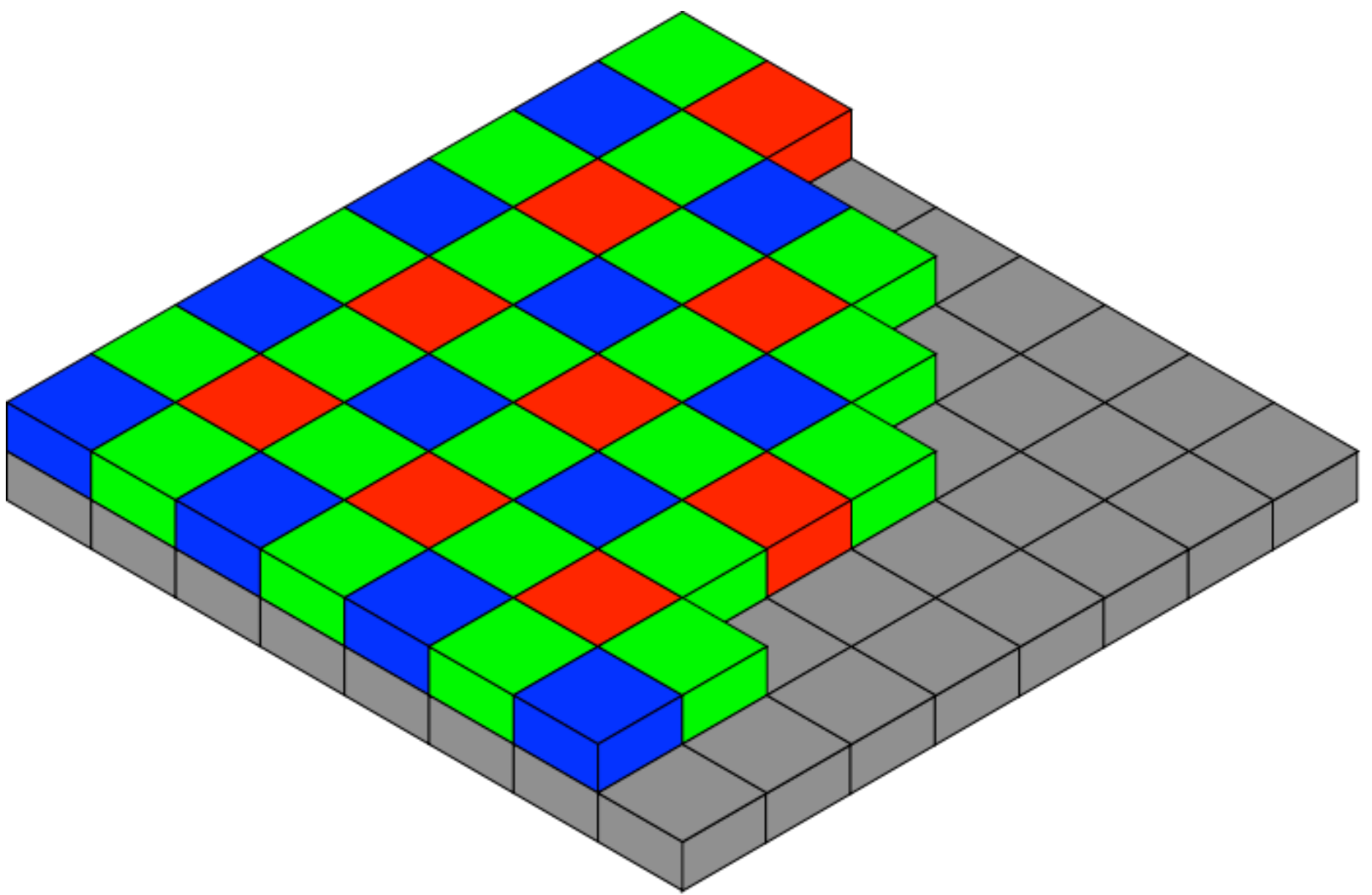


Image from [http://en.wikipedia.org/wiki/Bayer\\_filter](http://en.wikipedia.org/wiki/Bayer_filter)

Review

CFAs (Bayer Filter)

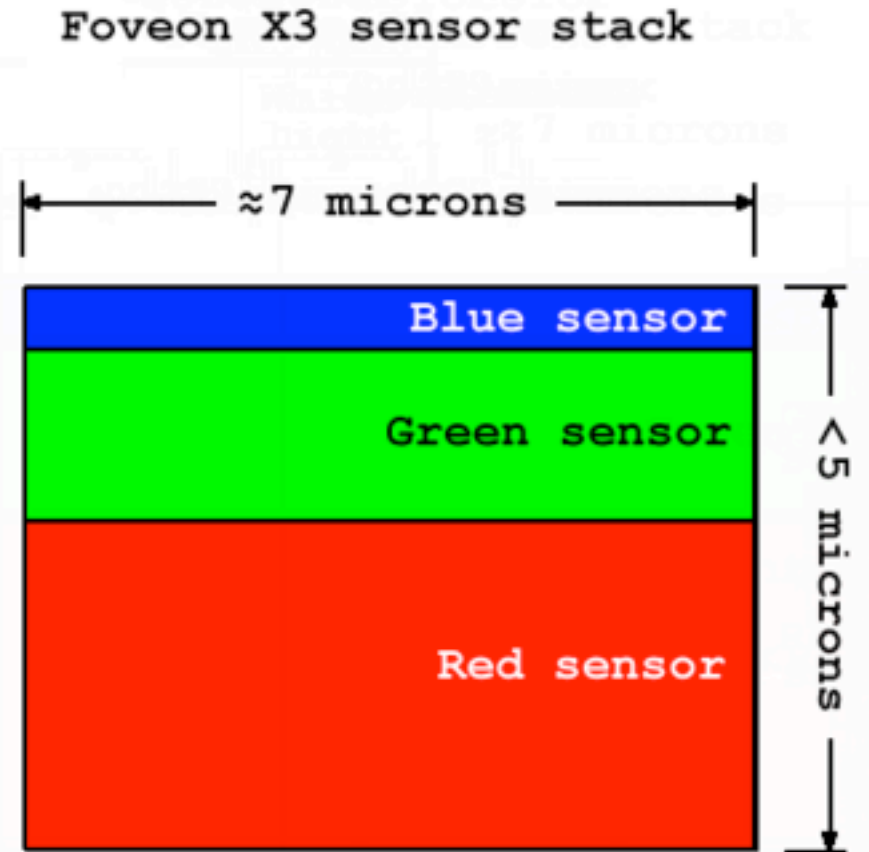
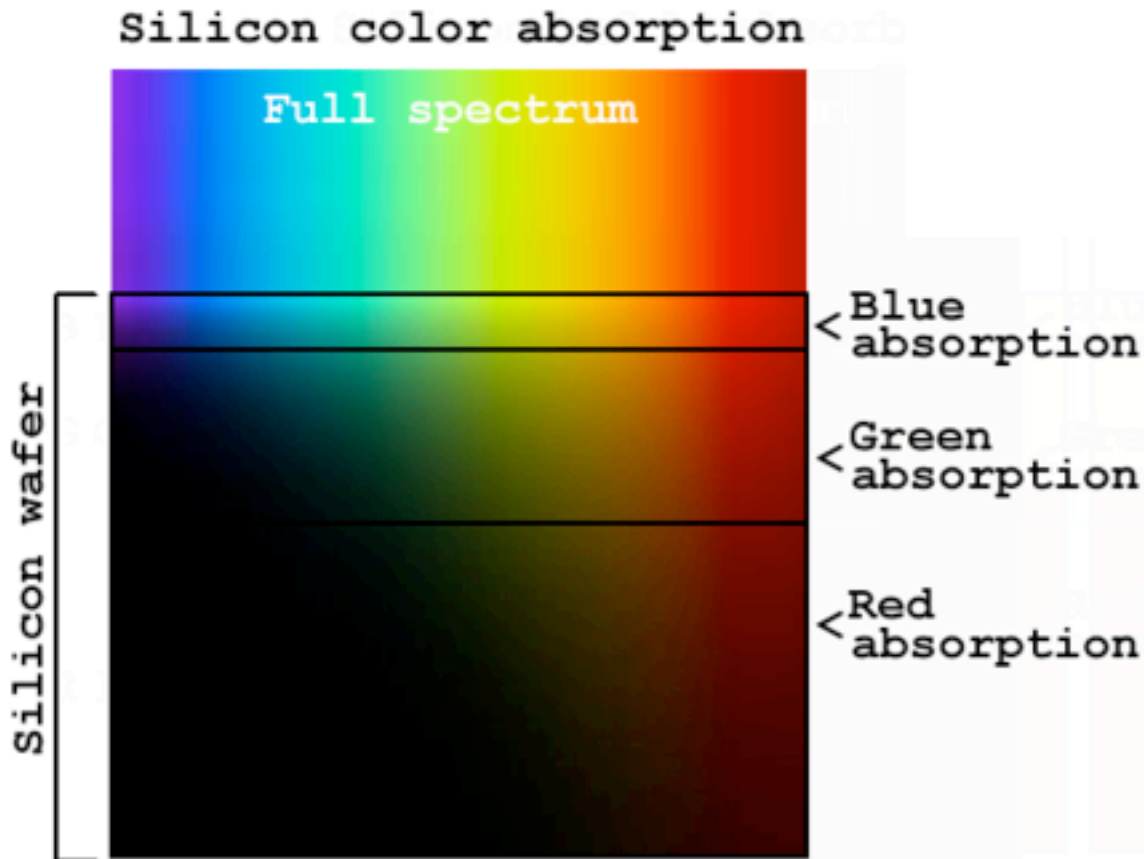


Image from [http://en.wikipedia.org/wiki/Foveon\\_X3\\_sensor](http://en.wikipedia.org/wiki/Foveon_X3_sensor)

Review

Foveon X3



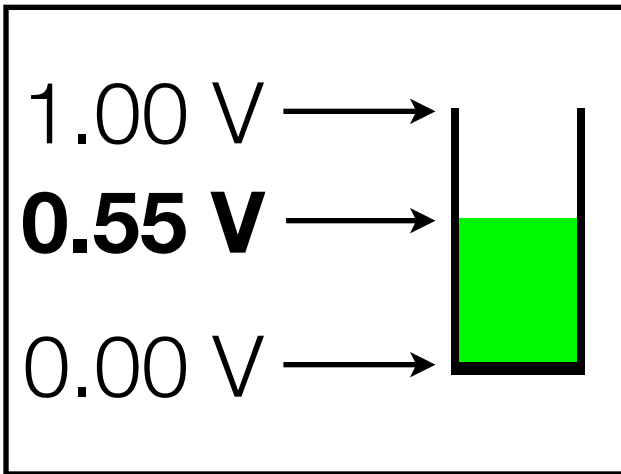
611s, ISO 100

Photo by Dan Armendariz, 2008

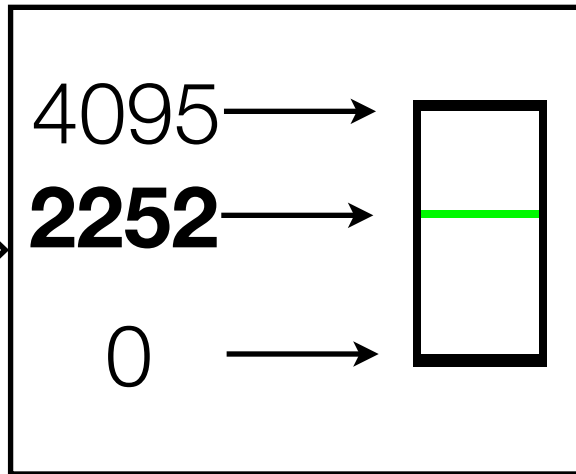
Review

Dynamic Range

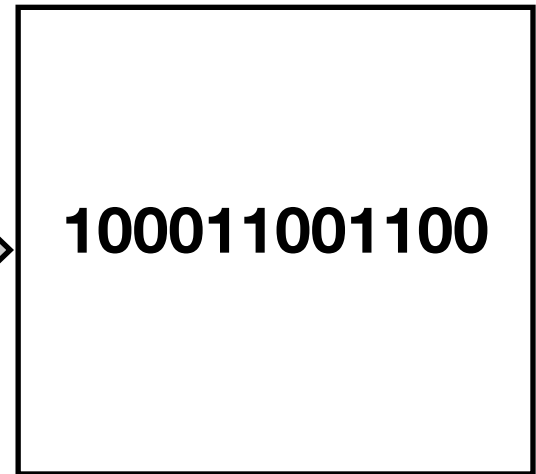
## Analog Sensor



## 12-bit Sampling

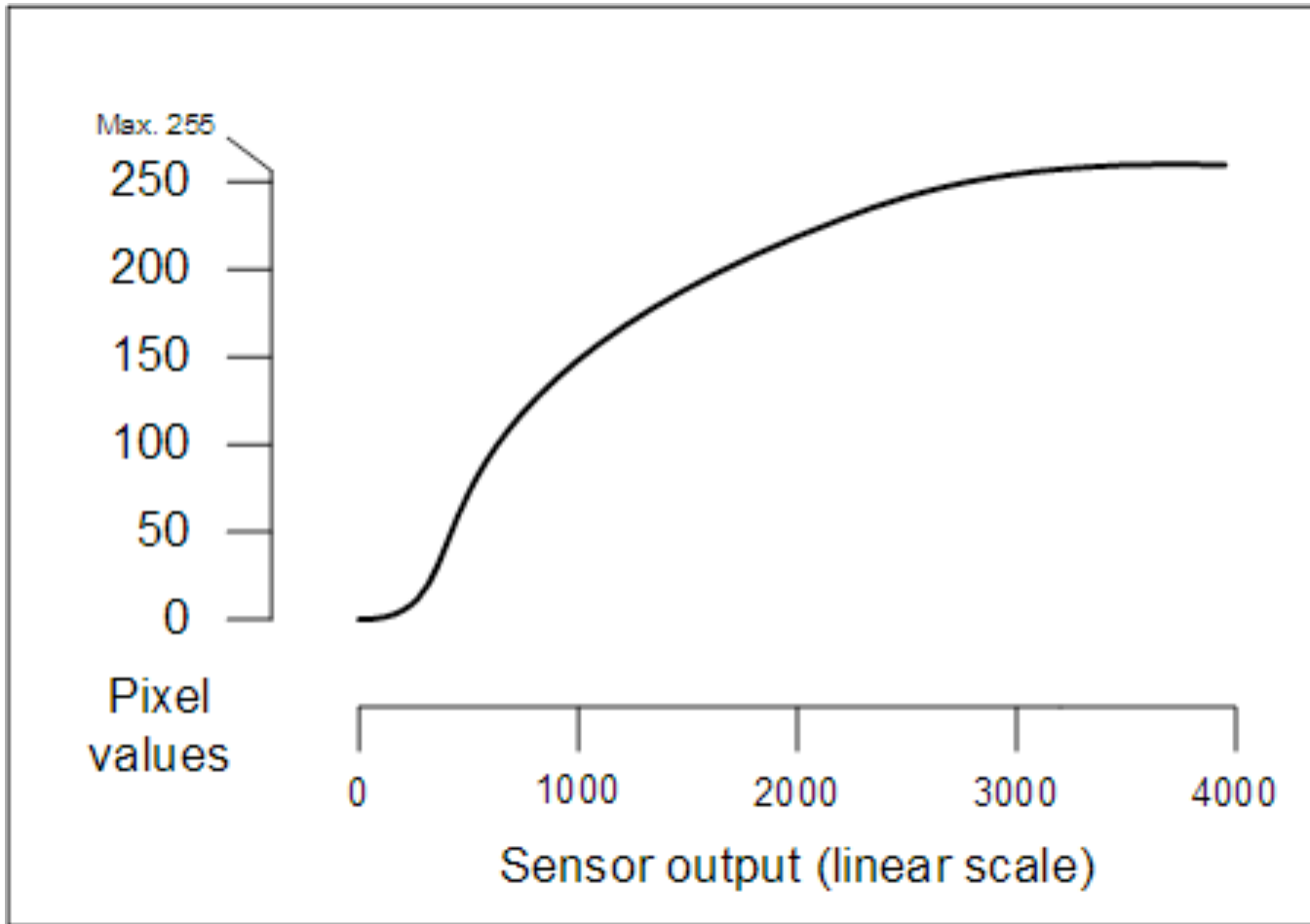


## Digital Output



Review

Analog to Digital Converter (ADC)



Images from <http://www.covingtoninnovations.com/dslr/Curves.html>

Review

Tonal Curve

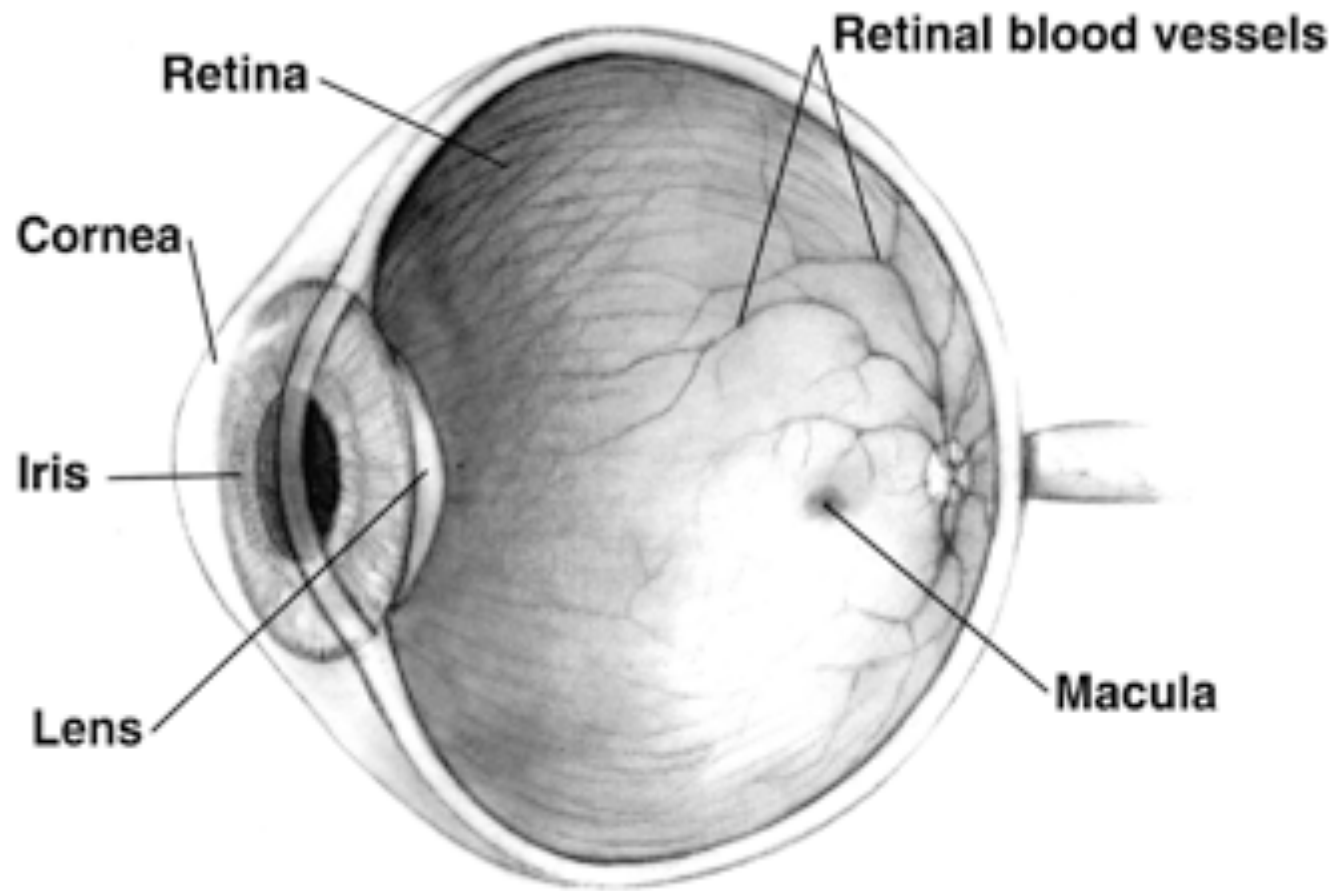


Image from <http://en.wikipedia.org/wiki/Eye>

The Eye

In a nutshell



<b>Rods</b>	<b>Cones</b>
Night vision	Day vision
More sensitive to light	Less sensitive to light
Not in fovea	Concentrated in fovea
22 times as many rods than cones in retina	
Monochromatic stimulus	Trichromatic (color) stimulus
Preference to detect motion	Preference to detect detail

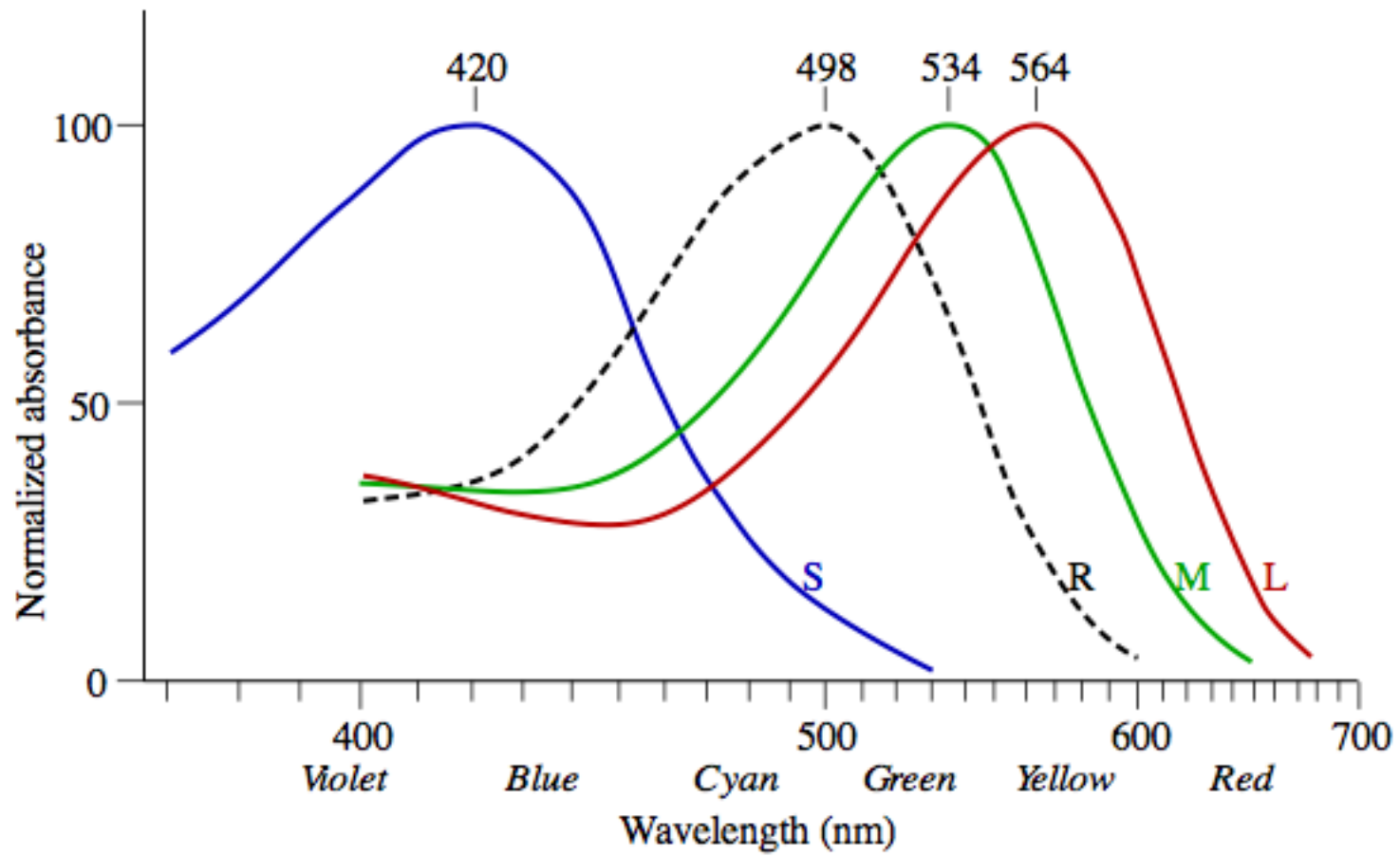


Image from <http://en.wikipedia.org/wiki/Trichromacy>

The Eye

Rods & Cones

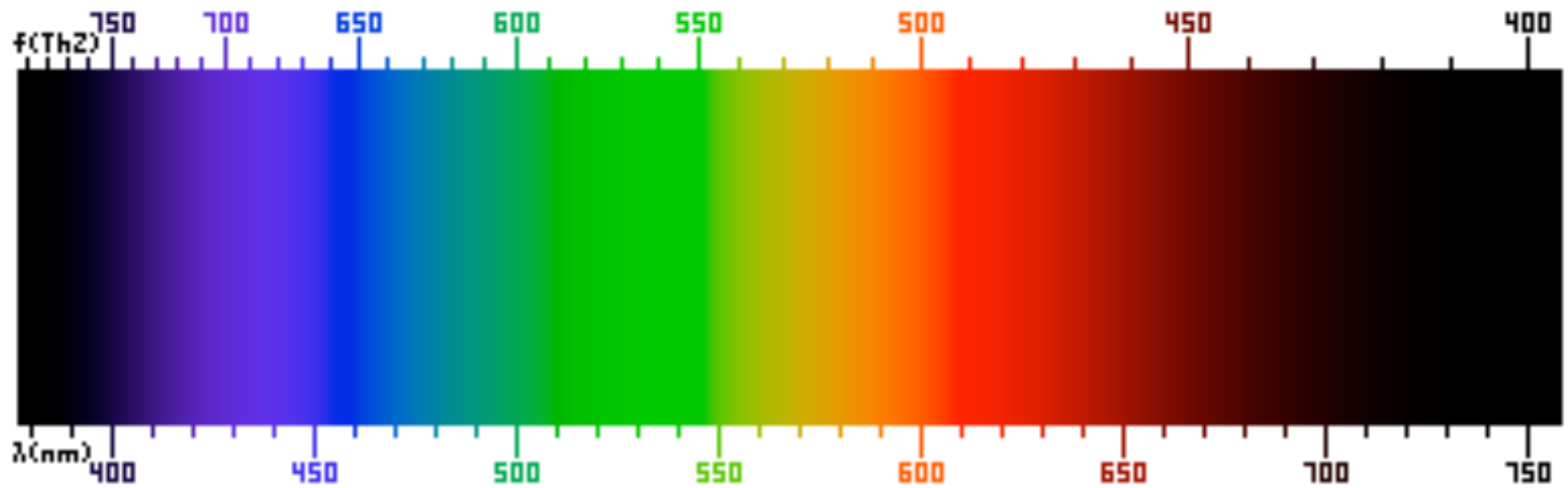


Image from [http://en.wikipedia.org/wiki/Visible\\_spectrum](http://en.wikipedia.org/wiki/Visible_spectrum)

The Eye

Visible Spectrum

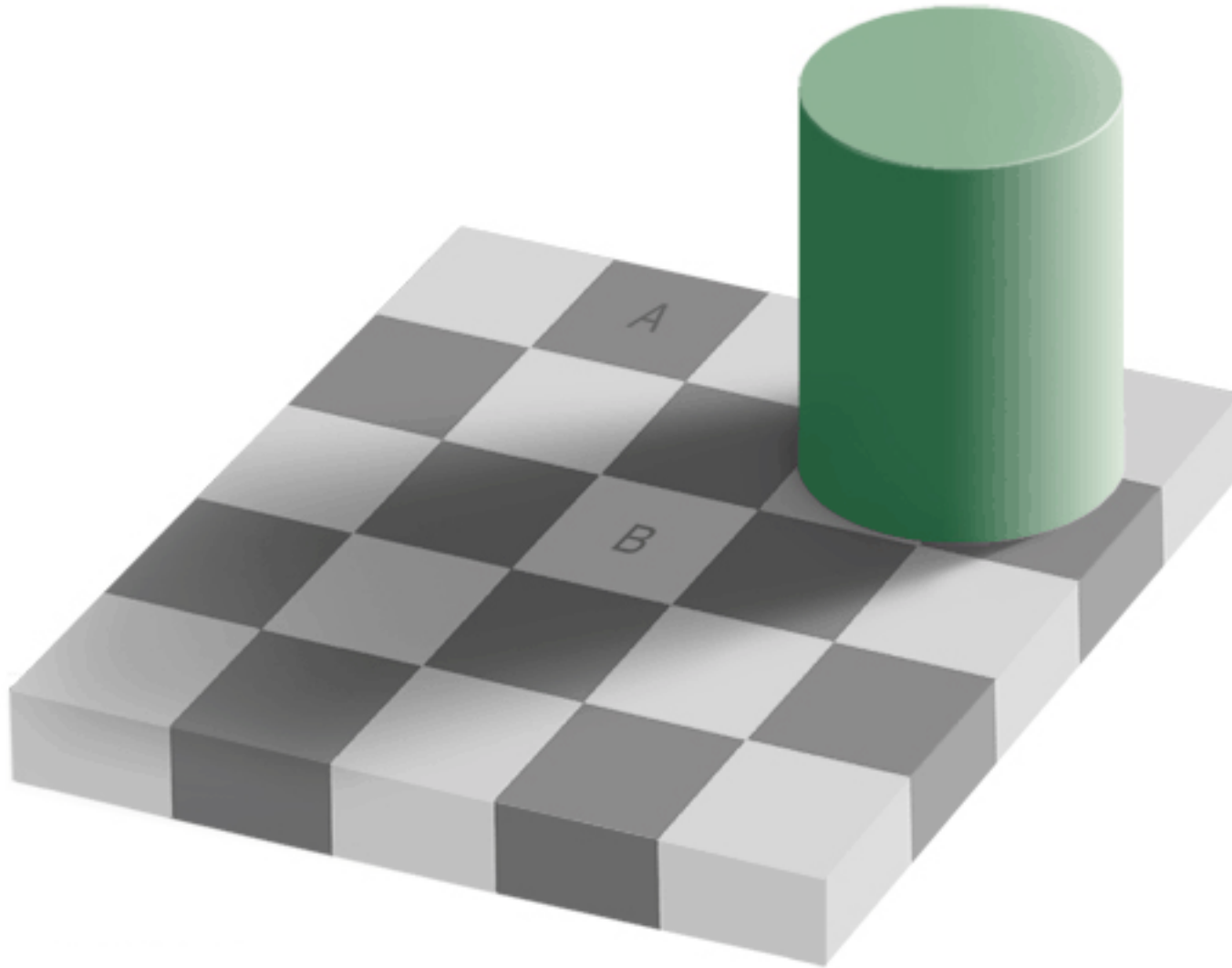
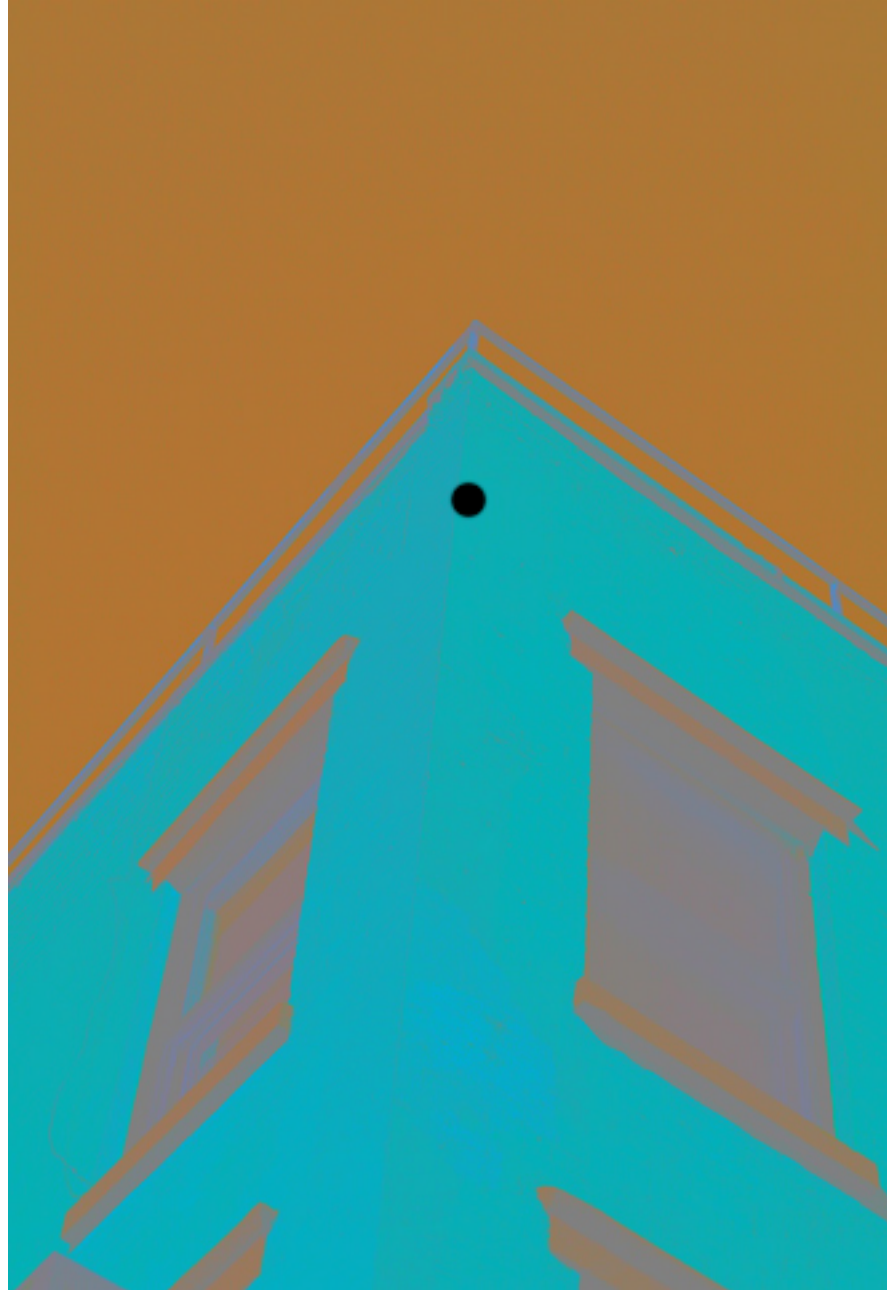


Image from [http://en.wikipedia.org/wiki/Visible\\_spectrum](http://en.wikipedia.org/wiki/Visible_spectrum)

The Eye

Optical Illusions



The Eye

Optical Illusions



The Eye

Optical Illusions

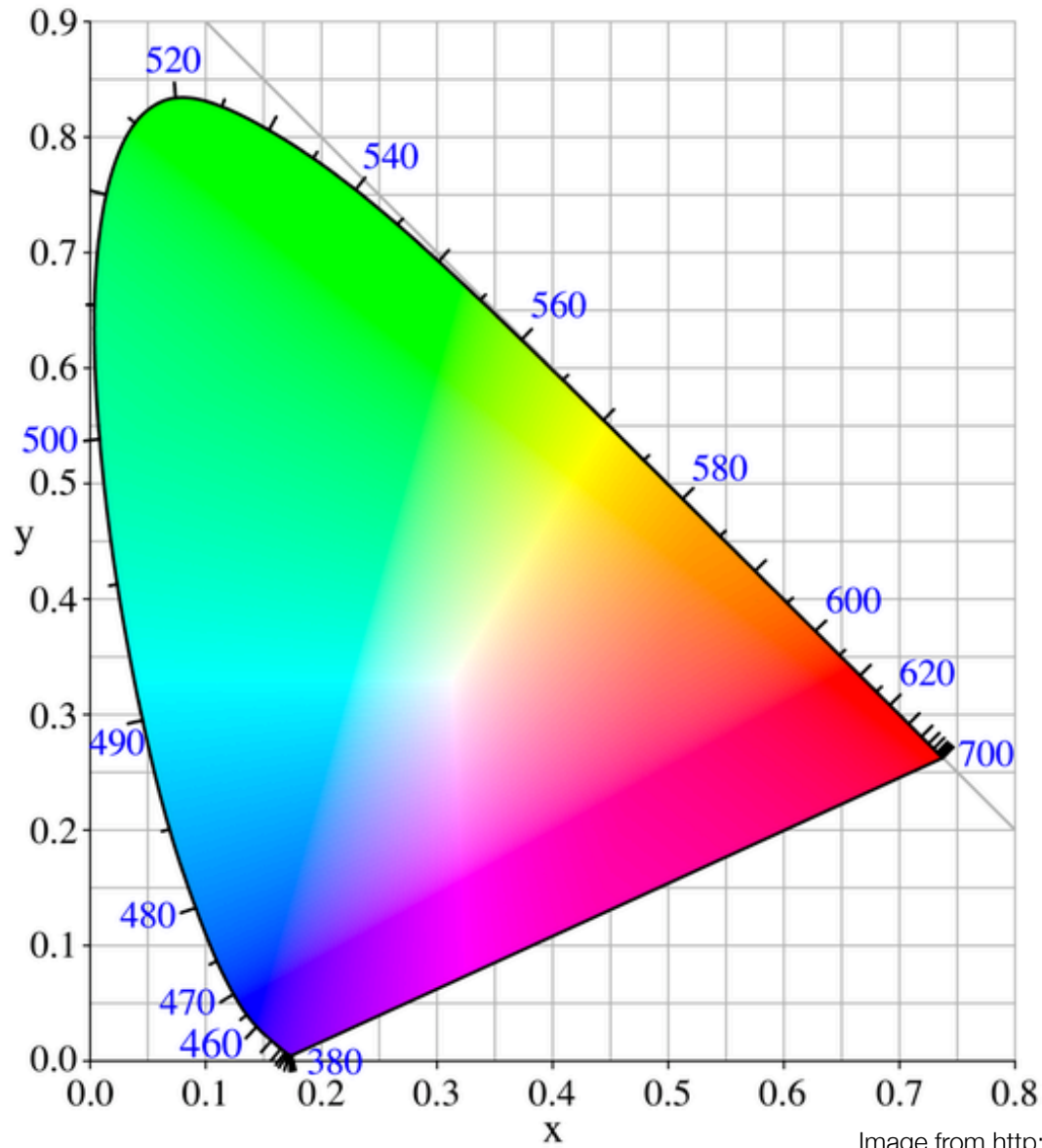


Image from <http://en.wikipedia.org/wiki/Color>

Color

Color Space

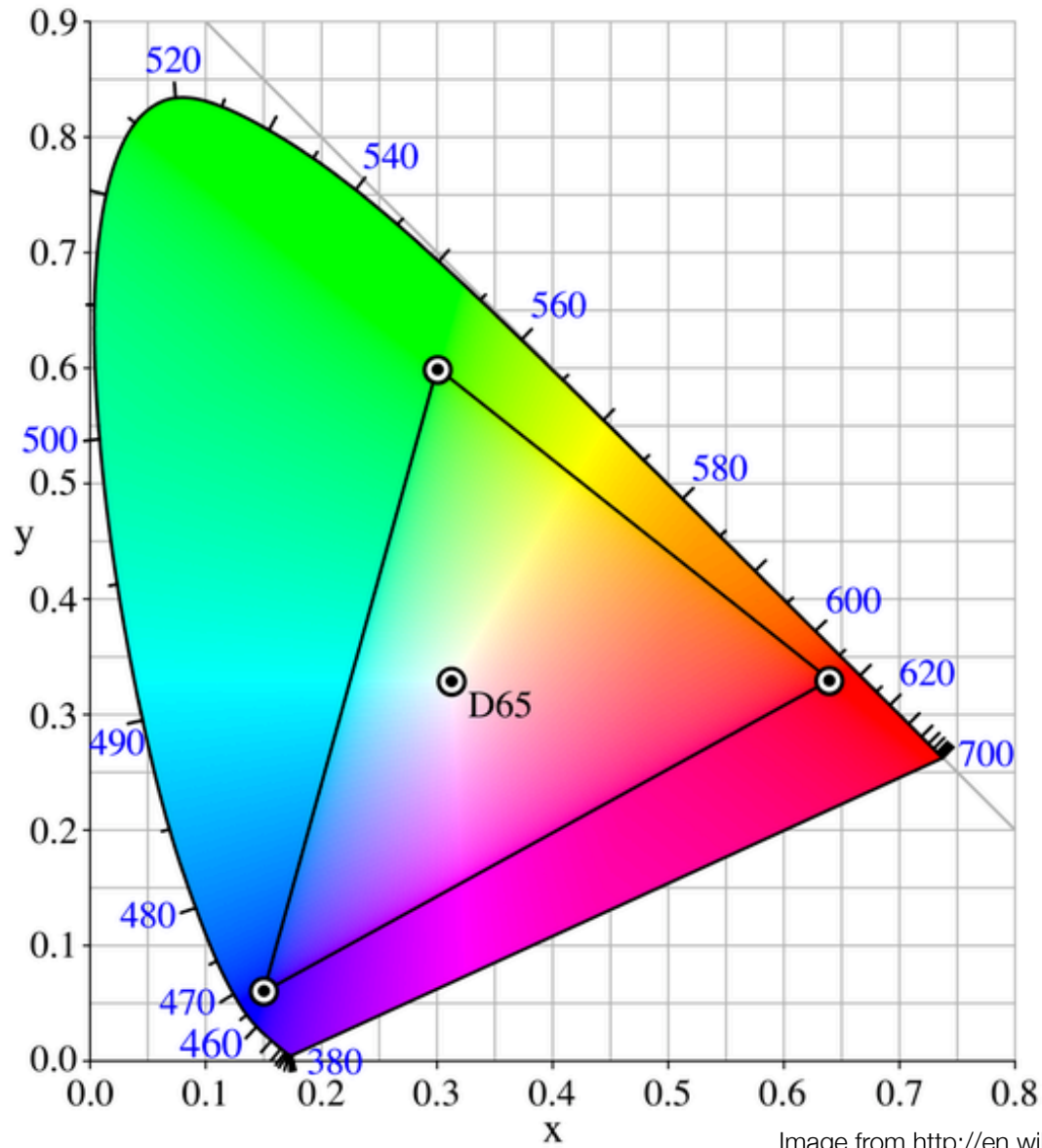


Image from [http://en.wikipedia.org/wiki/SRGB\\_color\\_space](http://en.wikipedia.org/wiki/SRGB_color_space)

# Color Spaces

sRGB



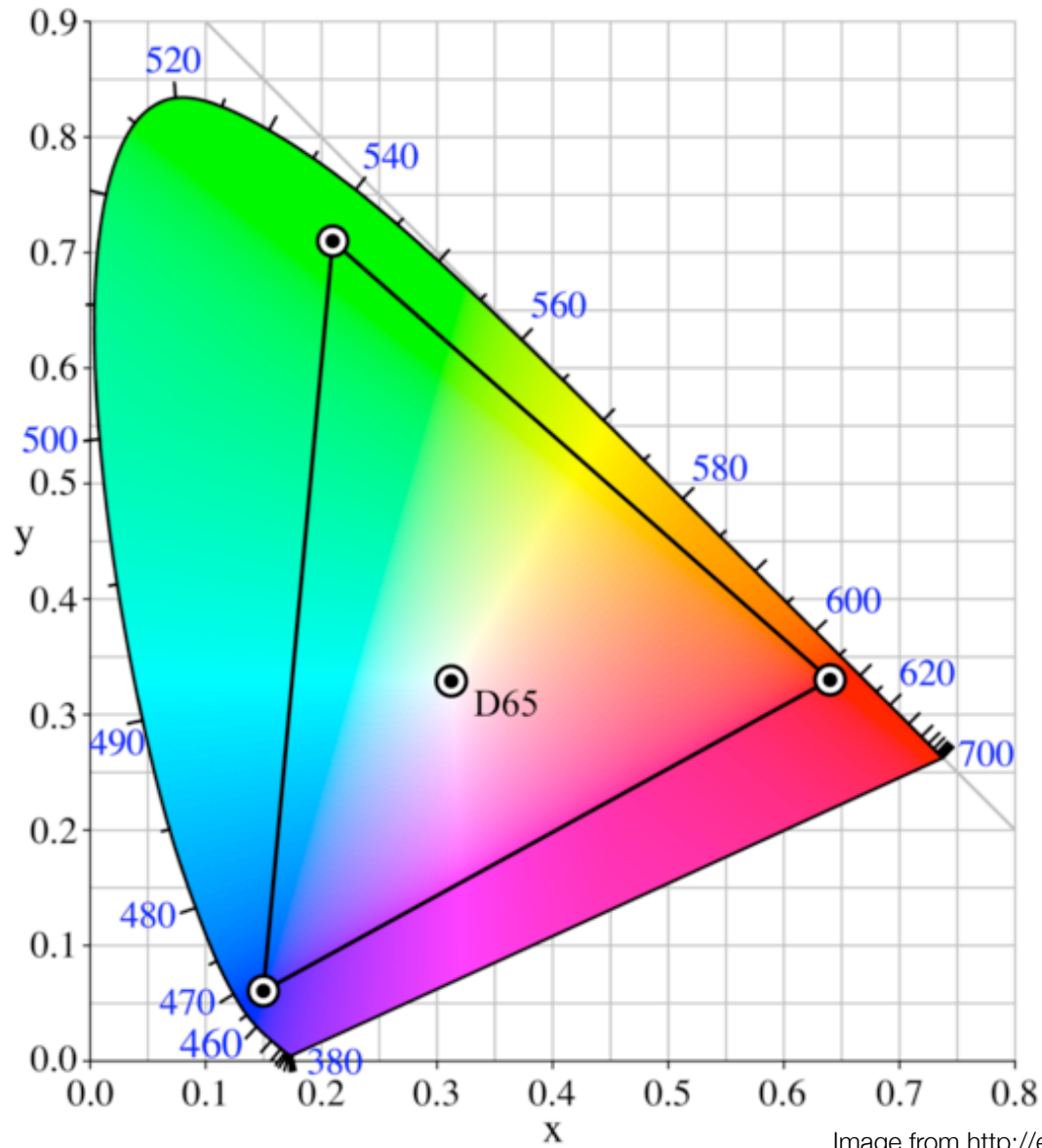


Image from <http://en.wikipedia.org/wiki/AdobeRGB>

Color Spaces

AdobeRGB

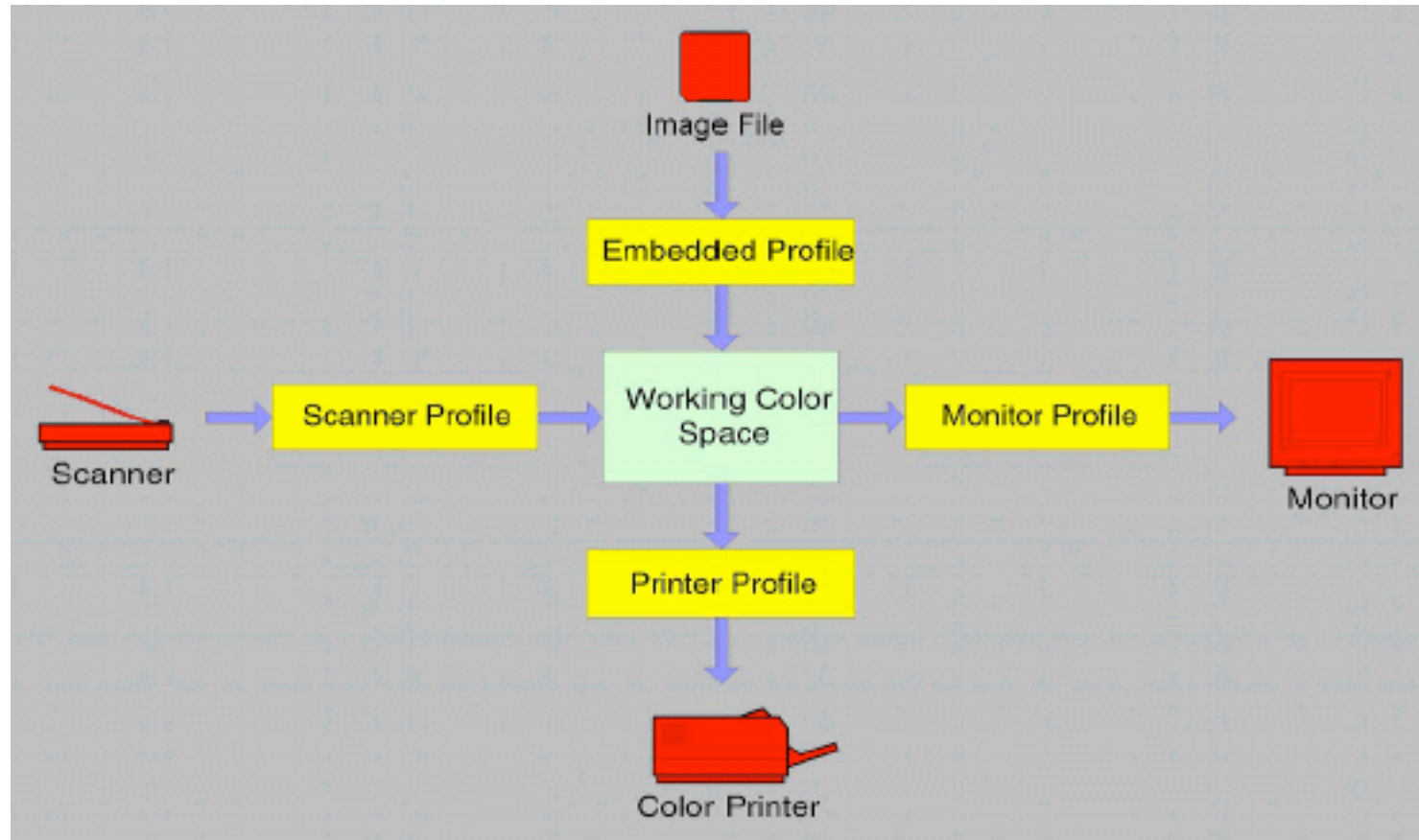


Image from [http://www.normankoren.com/color\\_management.html](http://www.normankoren.com/color_management.html)

# Color

# Color Management

# Gamut mapping

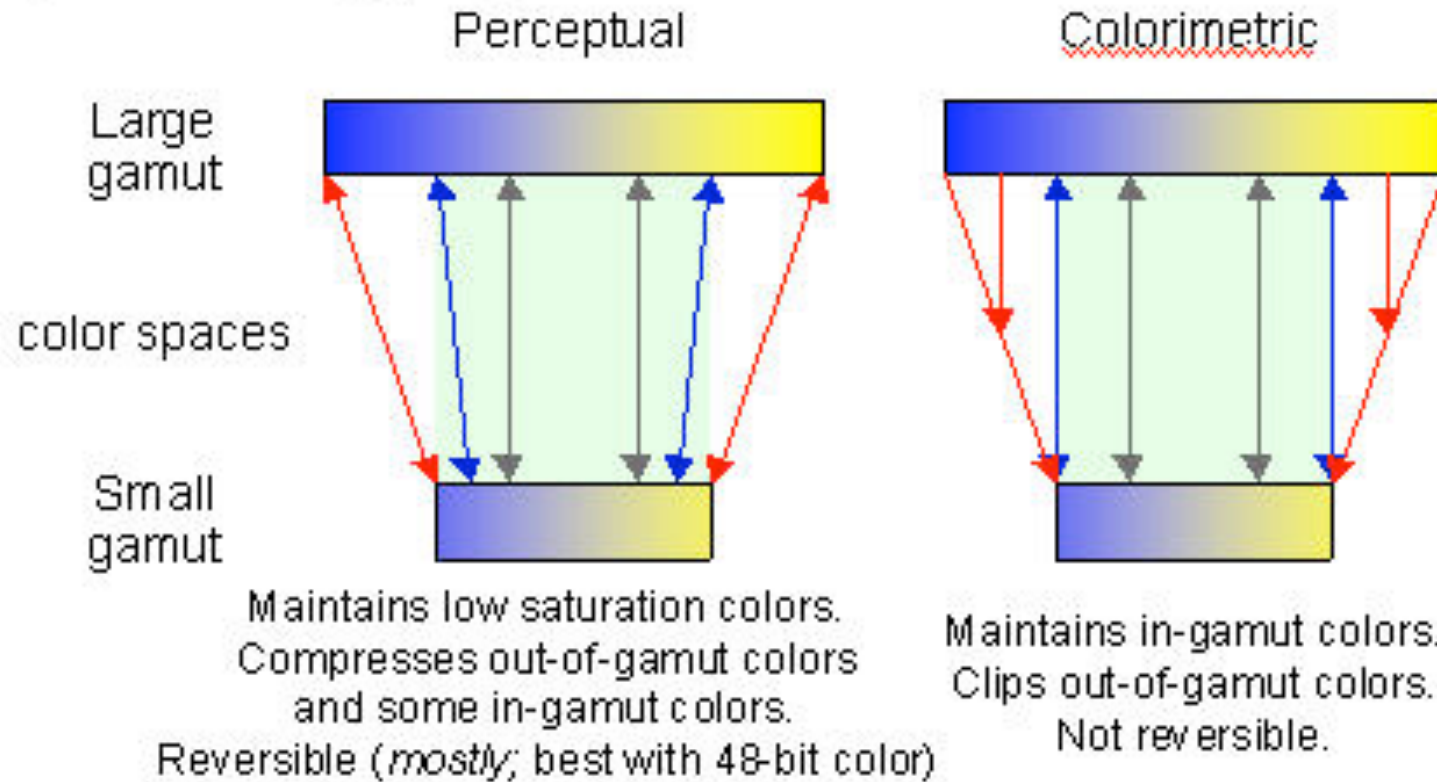


Image from [http://www.normankoren.com/color\\_management.html](http://www.normankoren.com/color_management.html)

Color Management

Gamut Mapping

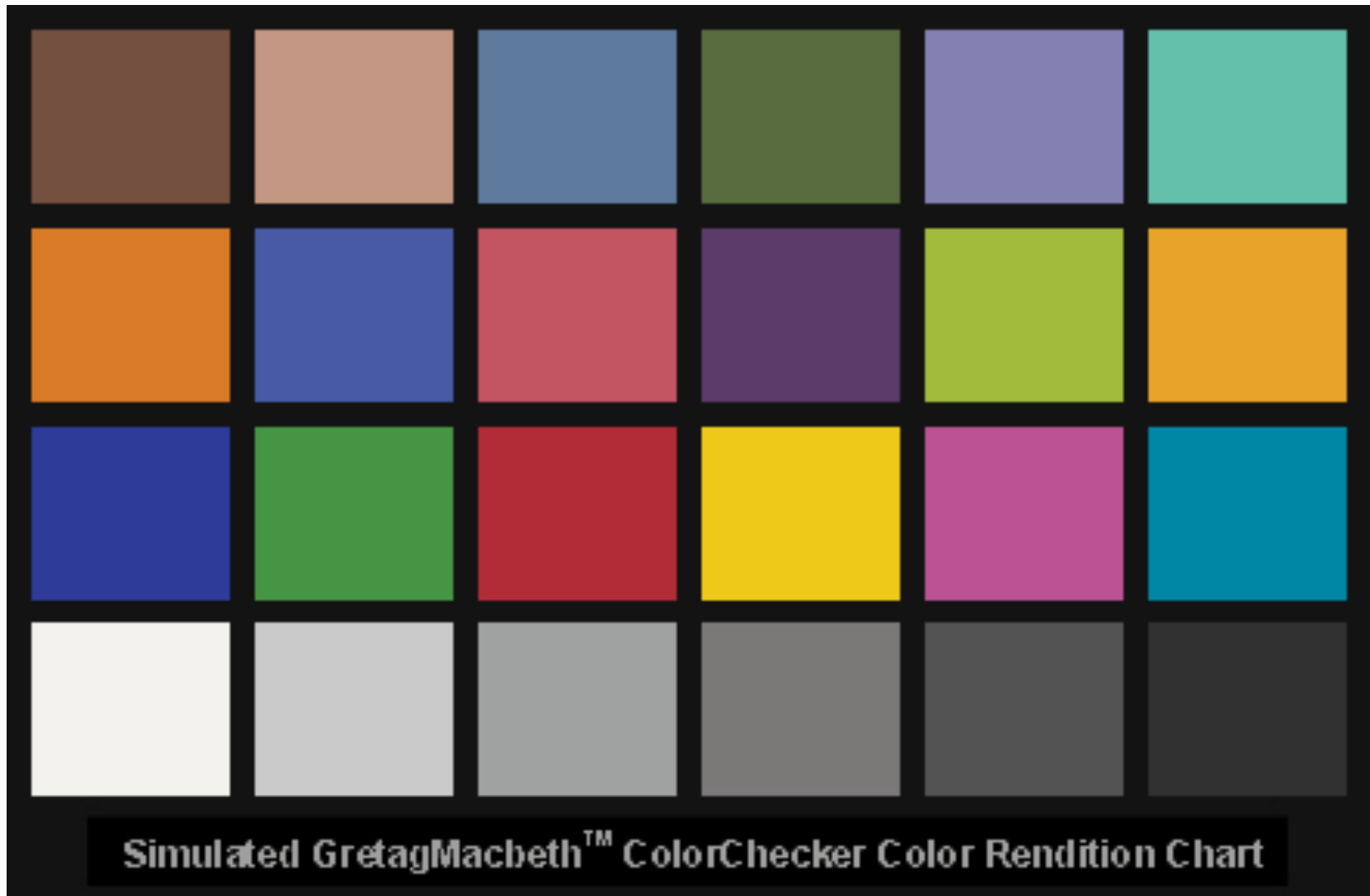


Image from [http://www.normankoren.com/color\\_management\\_2A.html](http://www.normankoren.com/color_management_2A.html)

Color Management

Monitor Profiling

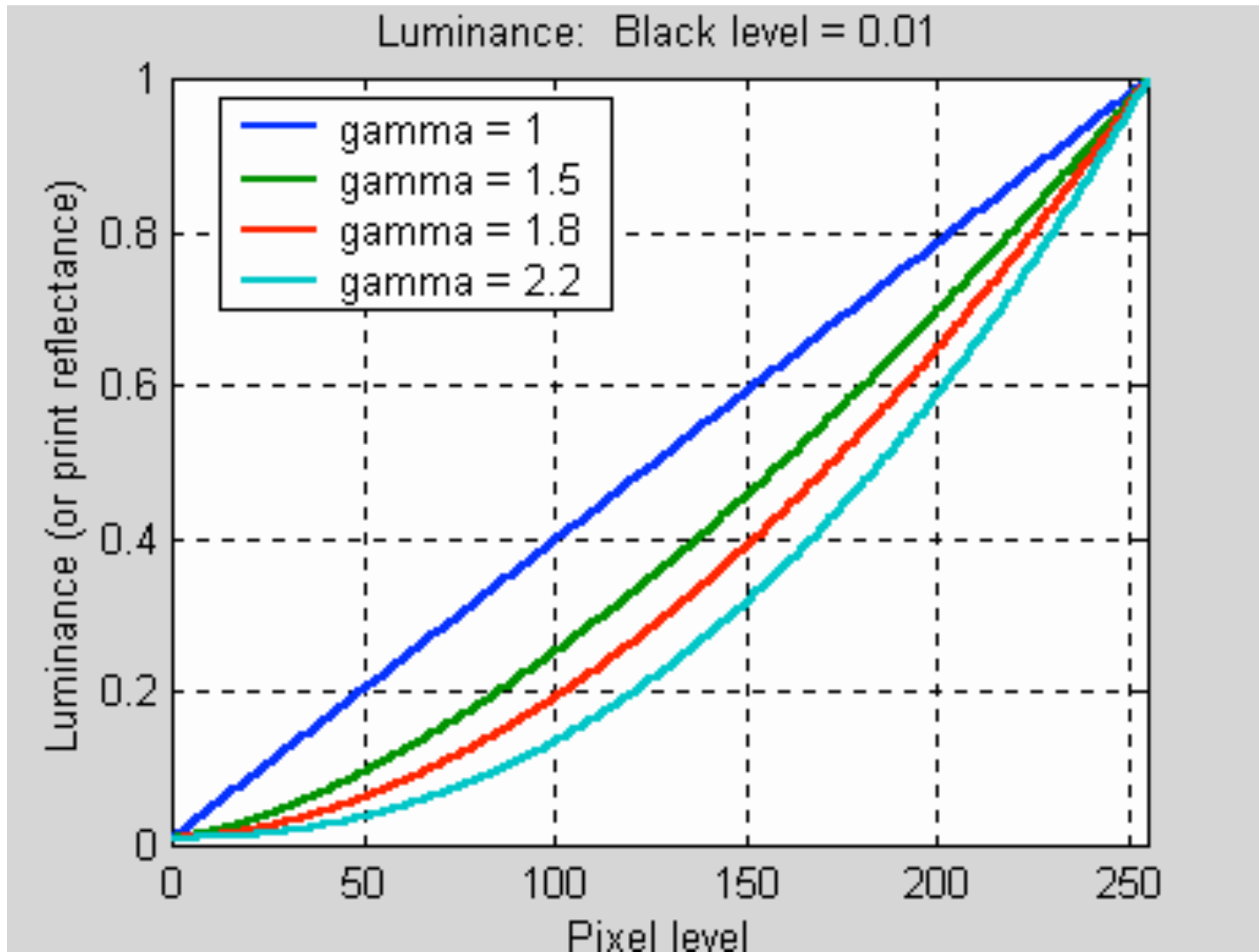


Image from [http://www.normankoren.com/color\\_management\\_2A.html](http://www.normankoren.com/color_management_2A.html)

Color Management

Gamma

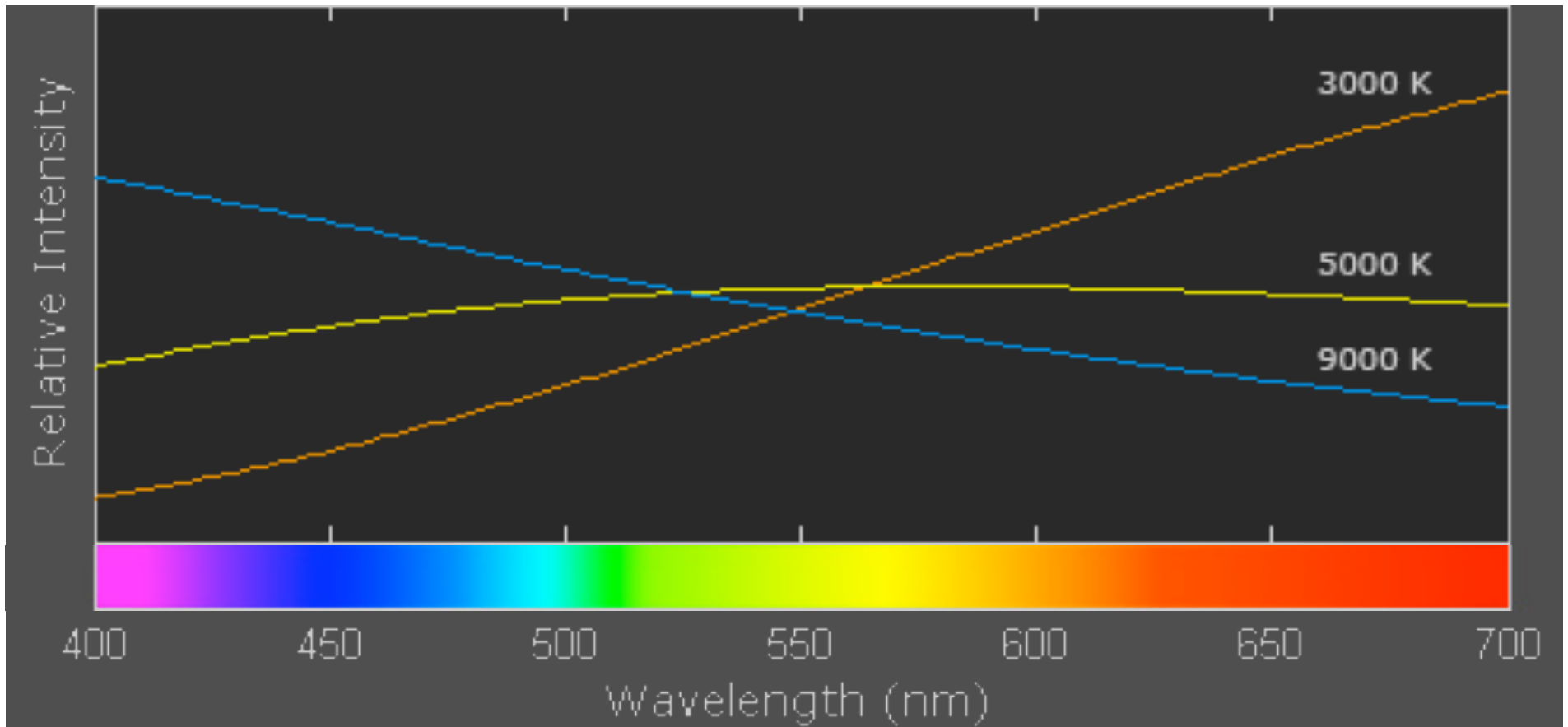
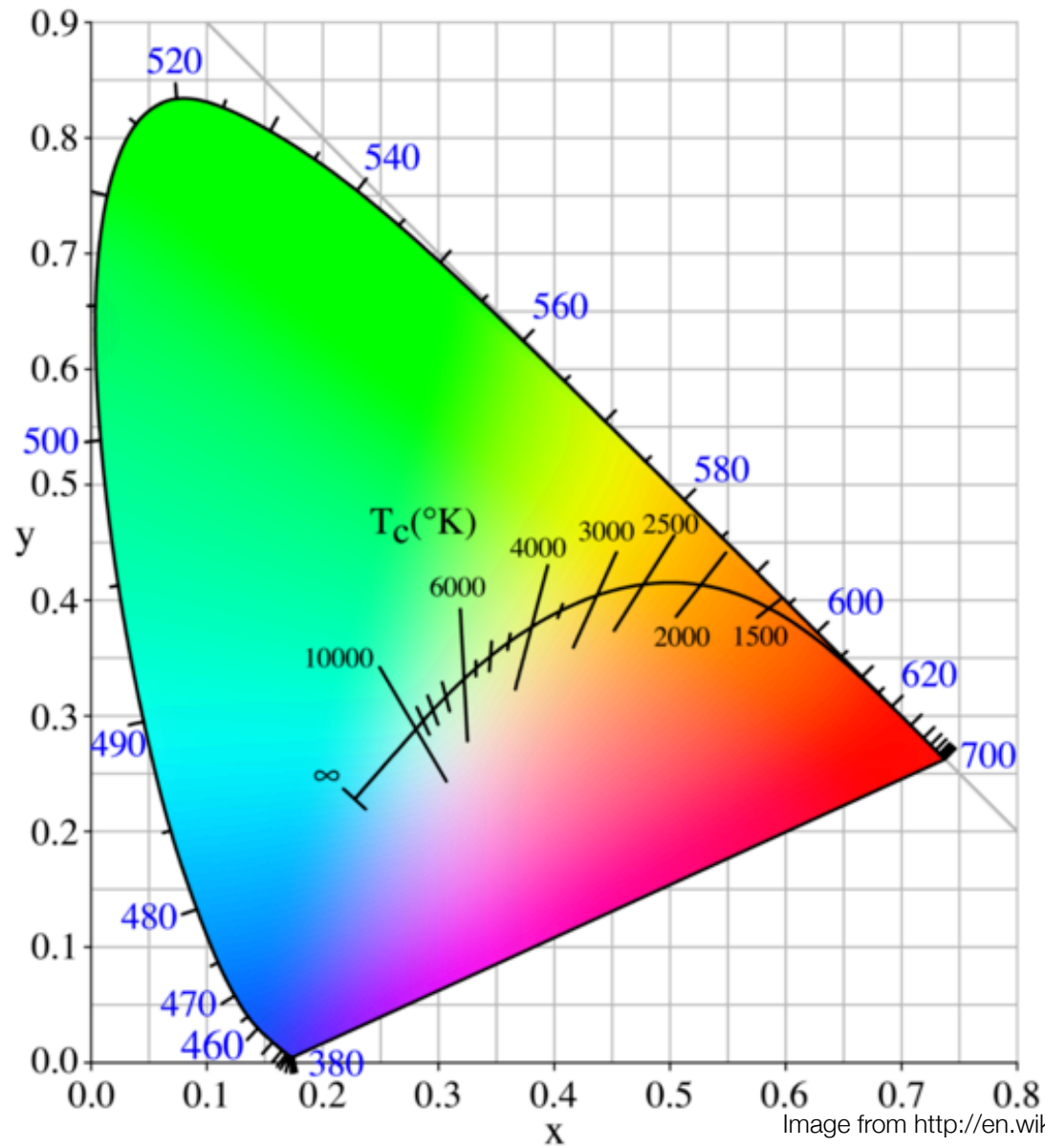


Image from <http://www.cambridgeincolour.com/tutorials/white-balance.htm>

Color

White Balance



Color

White Balance

	<b>RAW</b>	<b>JPEG</b>
<b>Bit depth</b>	10-, 12-, 14-bit	8-bit
<b>Tonal Curve</b>	Not applied	Applied
<b>White Balance</b>	Not set	Set
<b>Compression</b>	Lossless	Lossy
<b>Portability</b>	Nonstandard	Standard
<b>Post-Processing</b>	Required	Optional

Digital Cameras

RAW vs JPEG!



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