

Computer Science E-7

Exposing Digital Photography

Lecture 11: Color
November 23, 2009

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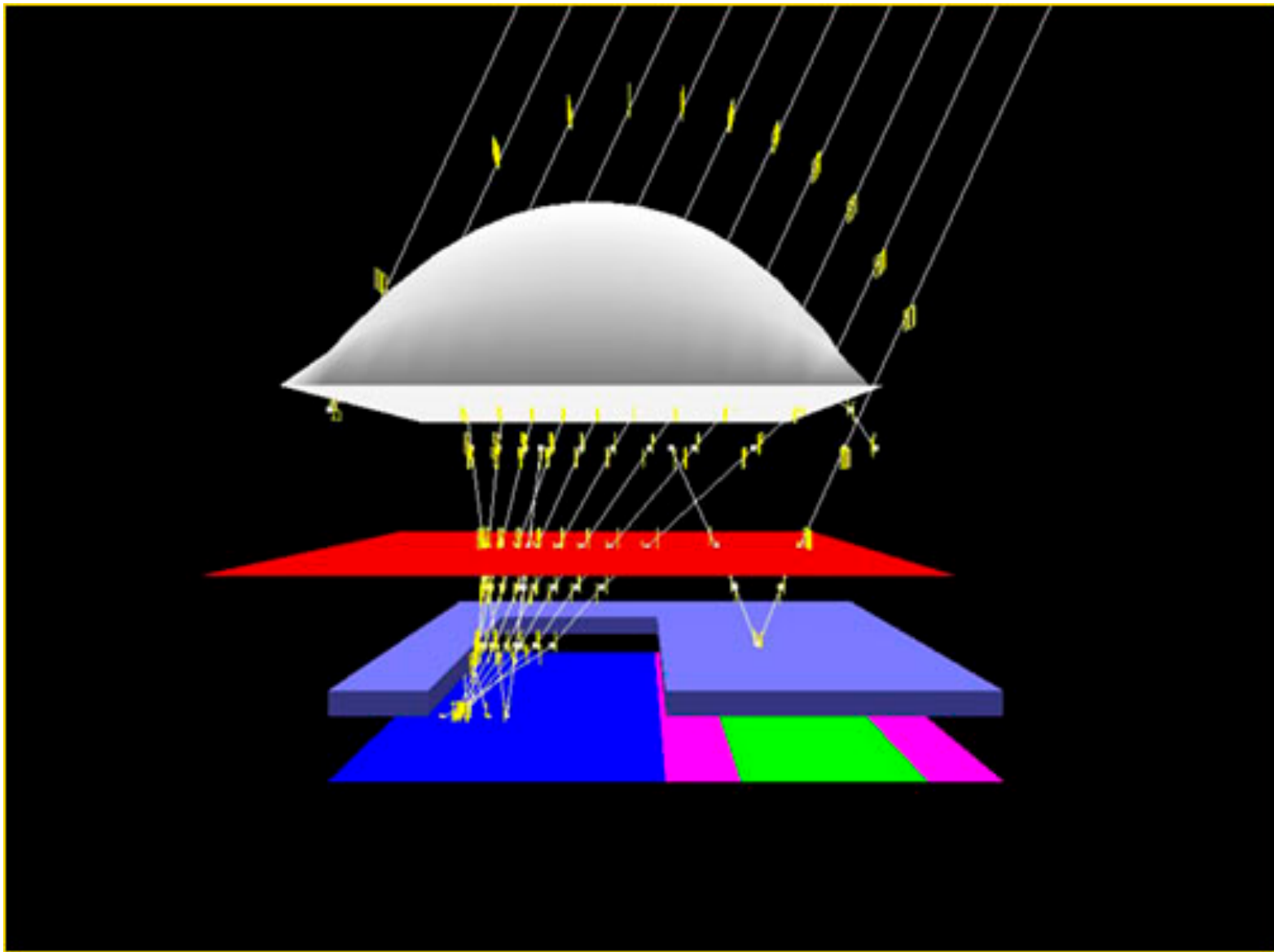


Image from Eastman Kodak, from <http://www.luminous-landscape.com/essays/kodak-iss.shtml>

Review

Pixel Construction

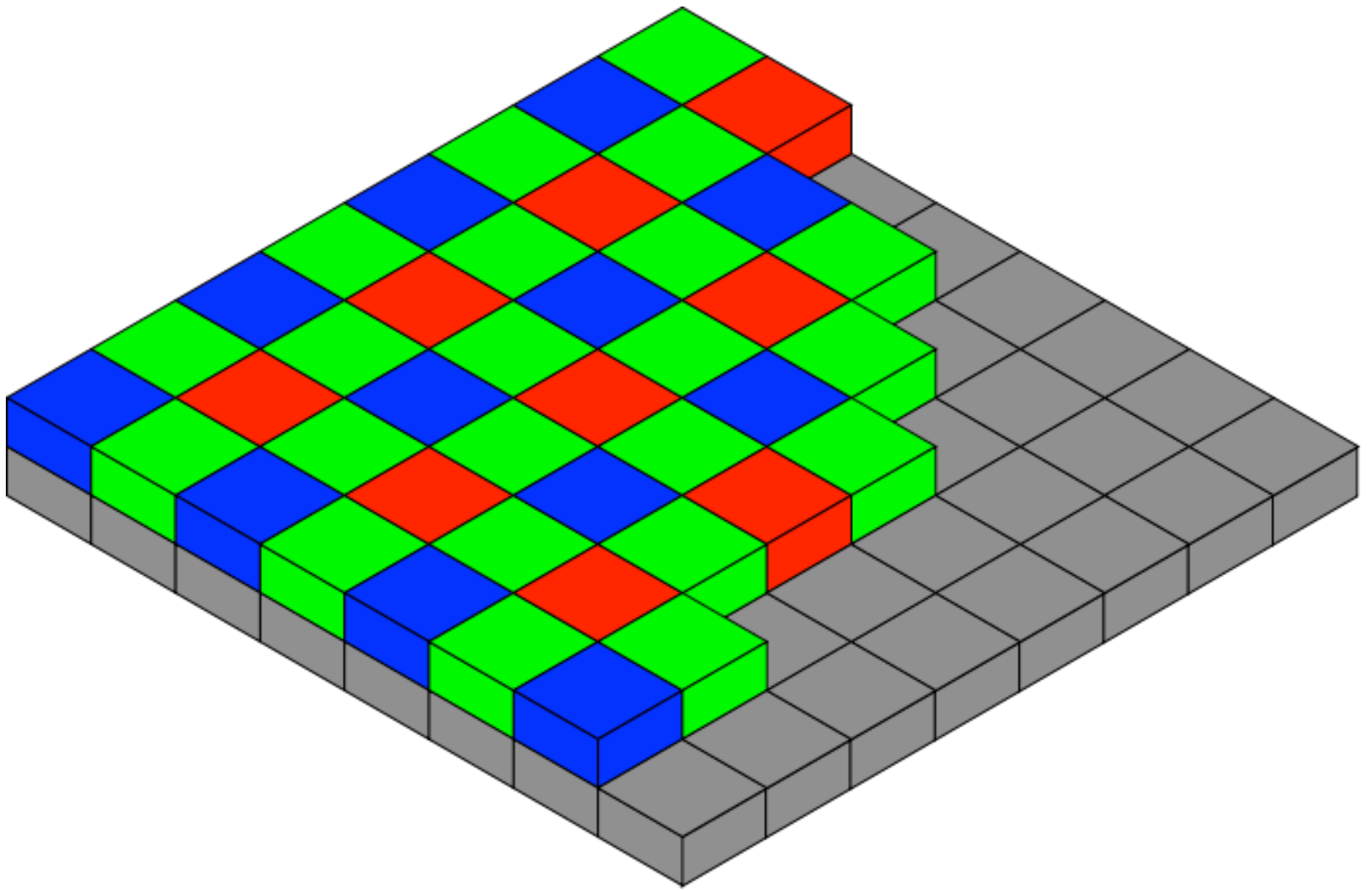


Image from http://en.wikipedia.org/wiki/Bayer_filter

Review

CFAs (Bayer Filter)

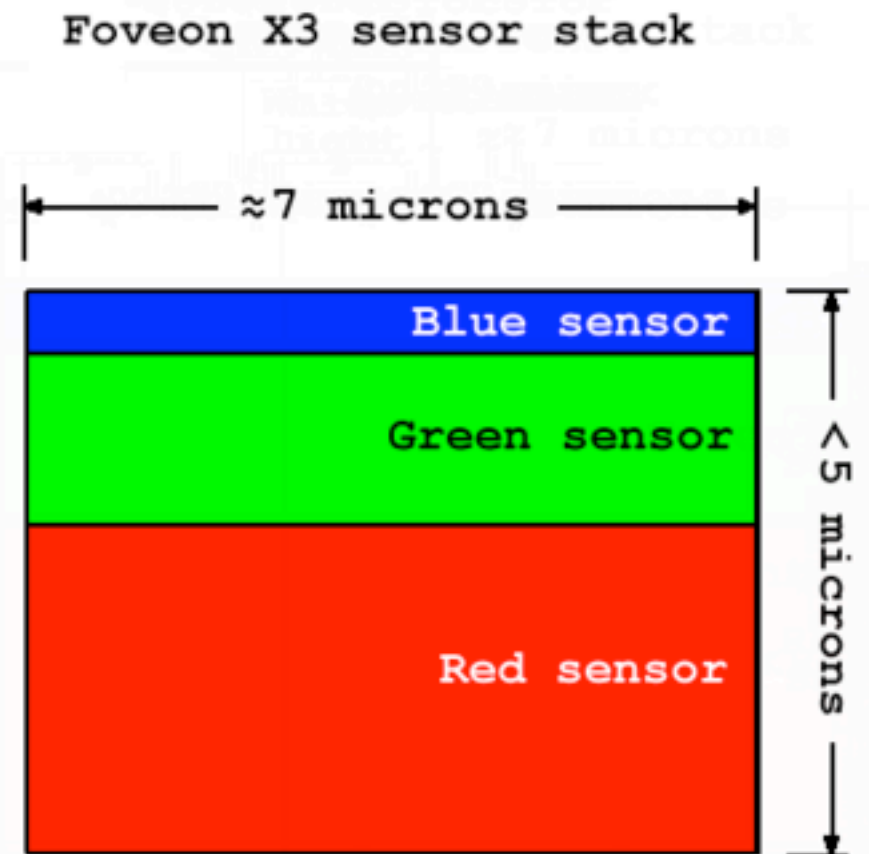
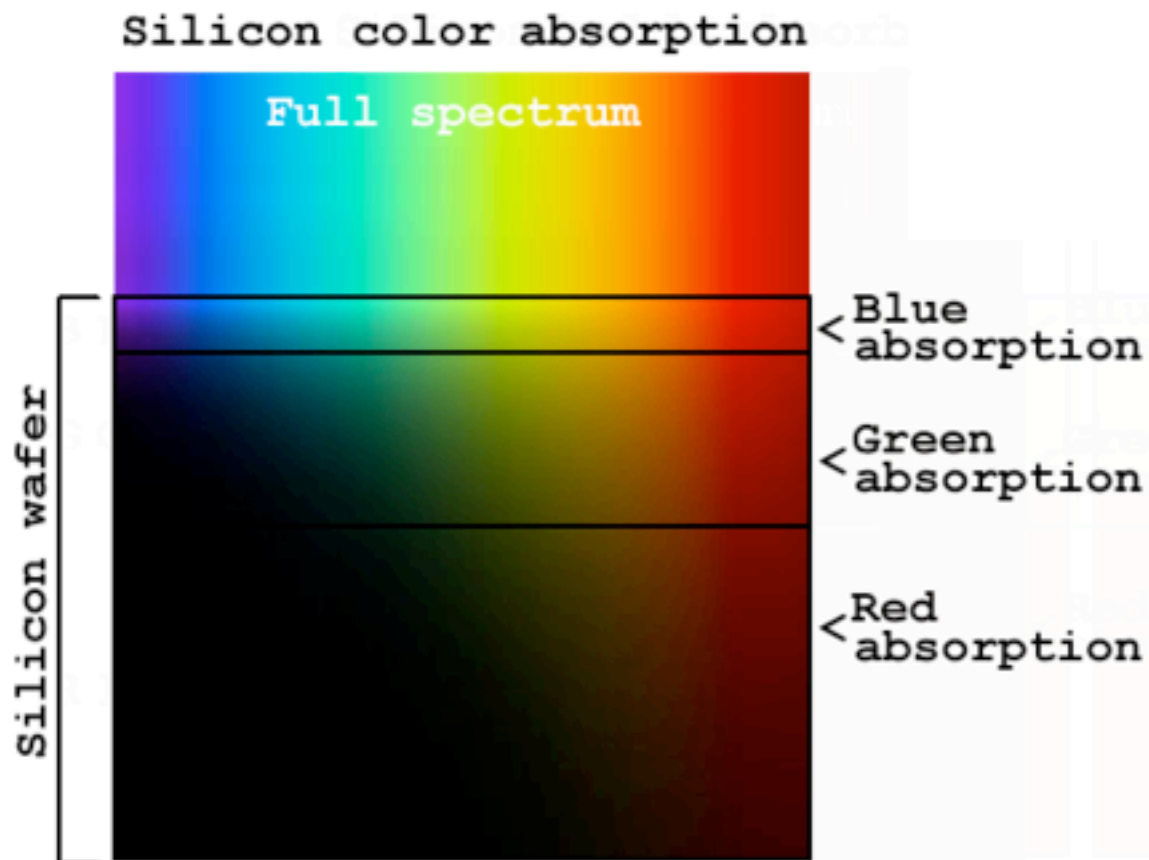


Image from http://en.wikipedia.org/wiki/Foveon_X3_sensor

Review

Foveon X3



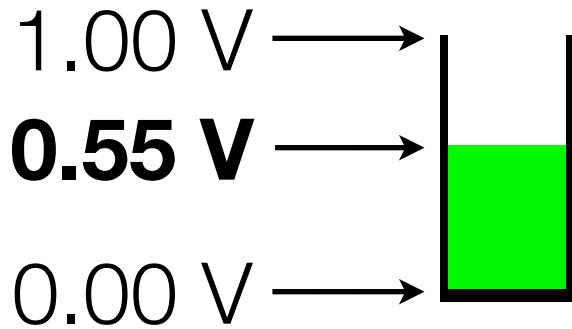
611s, ISO 100

Photo by Dan Armendariz, 2008

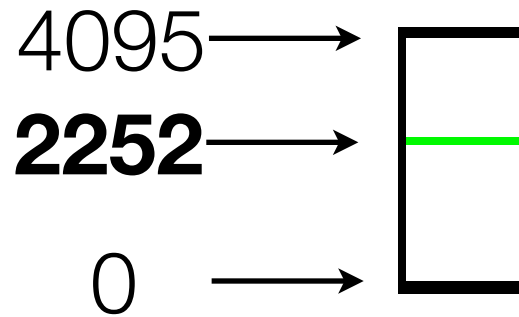
Review

Dynamic Range

Analog Sensor



12-bit Sampling

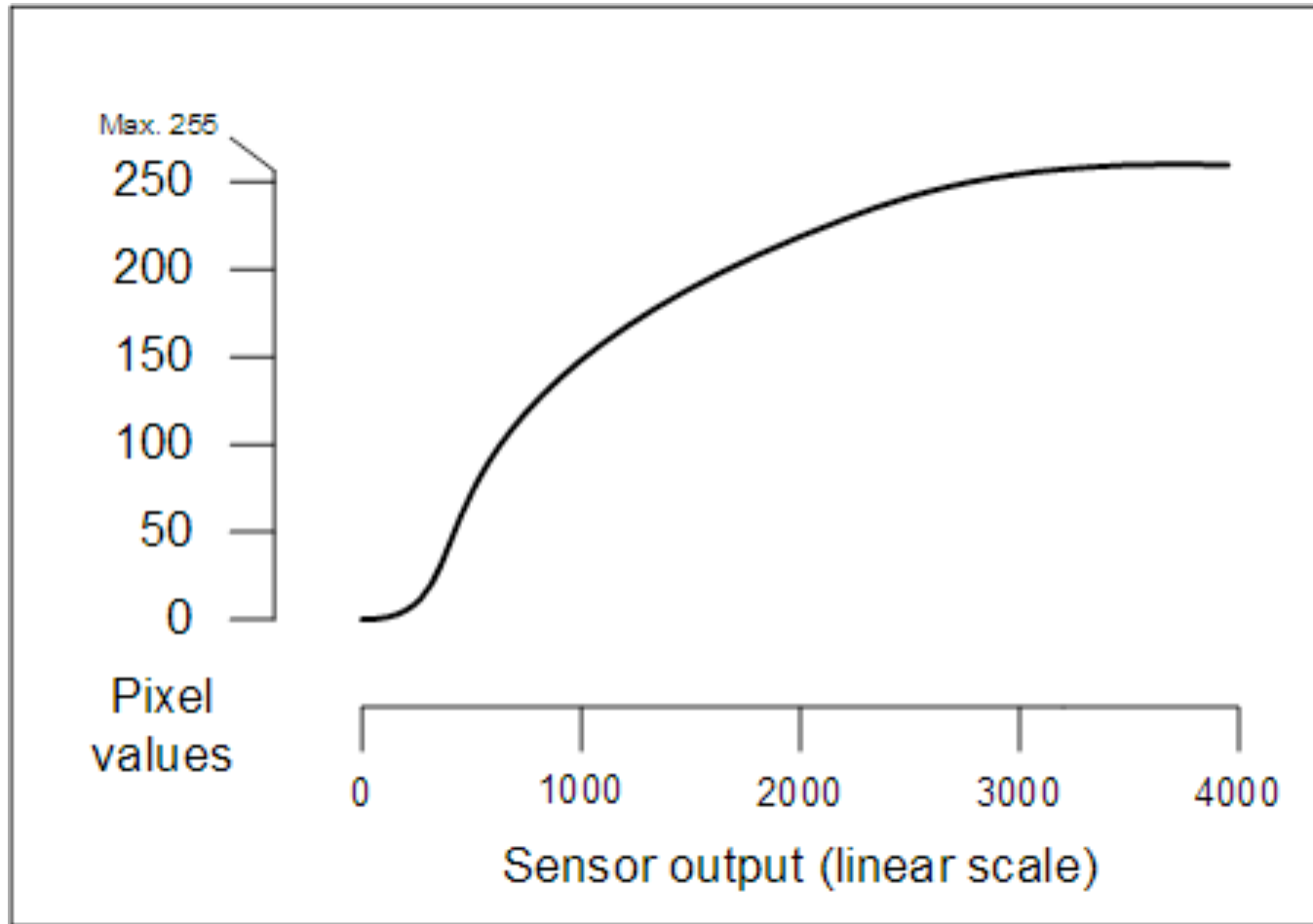


Digital Output

100011001100

Review

Analog to Digital Converter (ADC)



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

Review

Tonal Curve

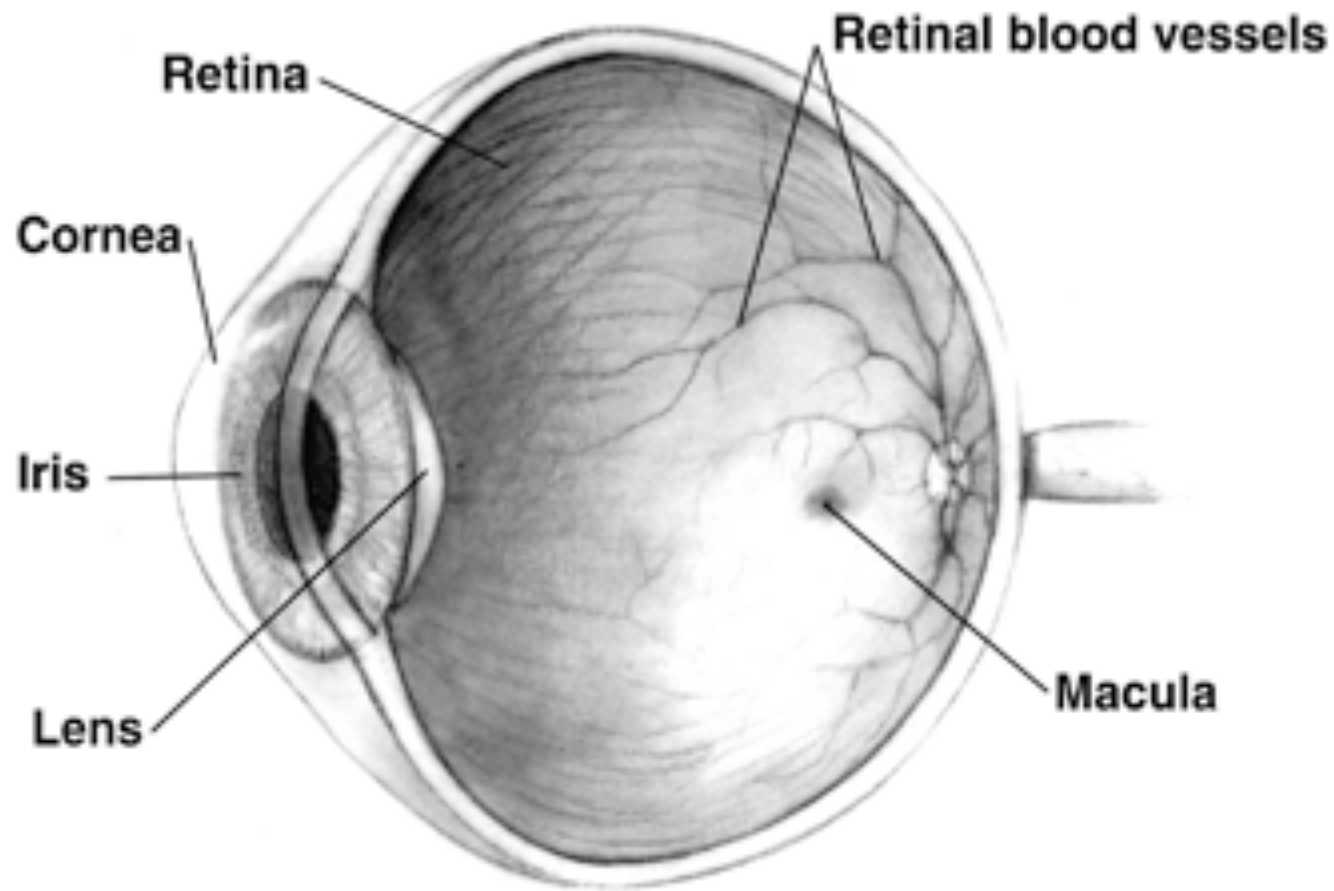


Image from <http://en.wikipedia.org/wiki/Eye>

The Eye

In a nutshell

Rods	Cones
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

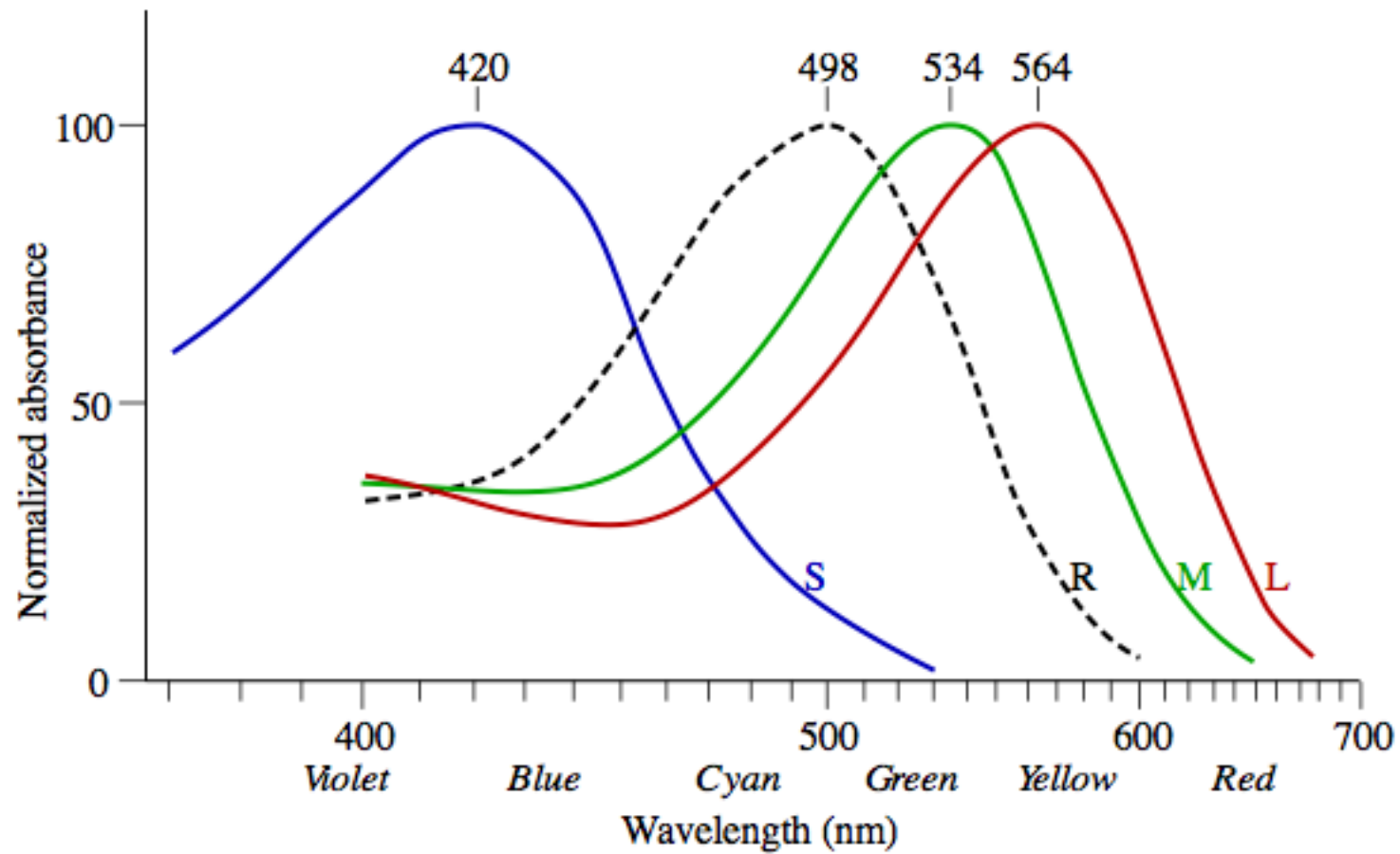


Image from <http://en.wikipedia.org/wiki/Trichromacy>

The Eye

Rods & Cones

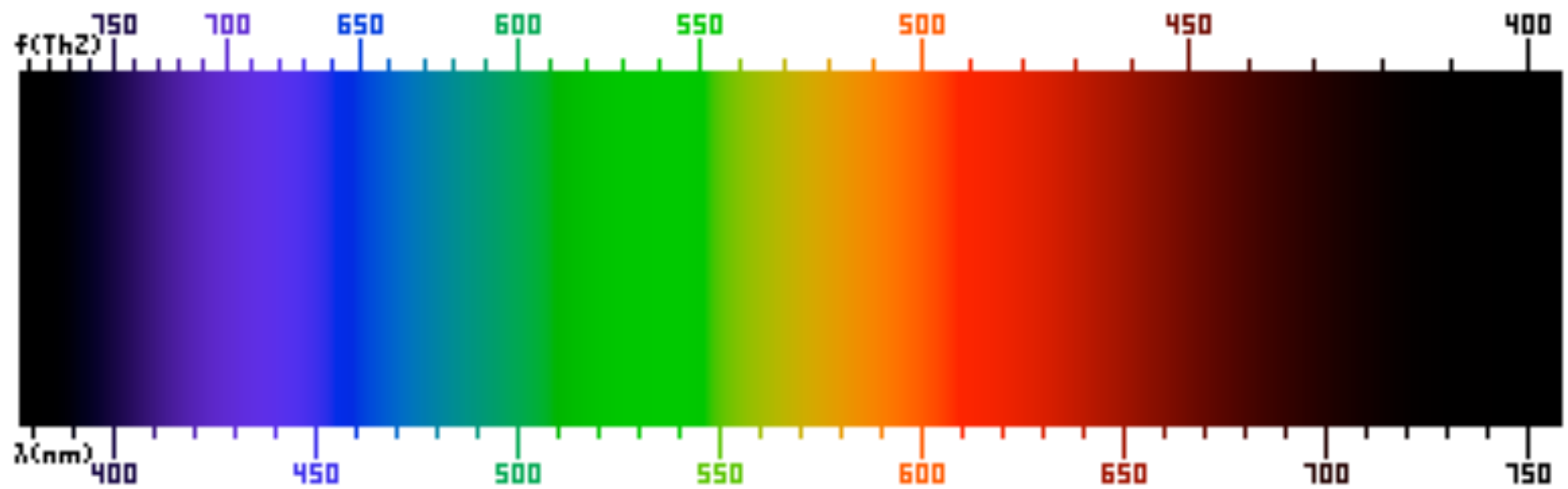


Image from http://en.wikipedia.org/wiki/Visible_spectrum

The Eye

Visible Spectrum

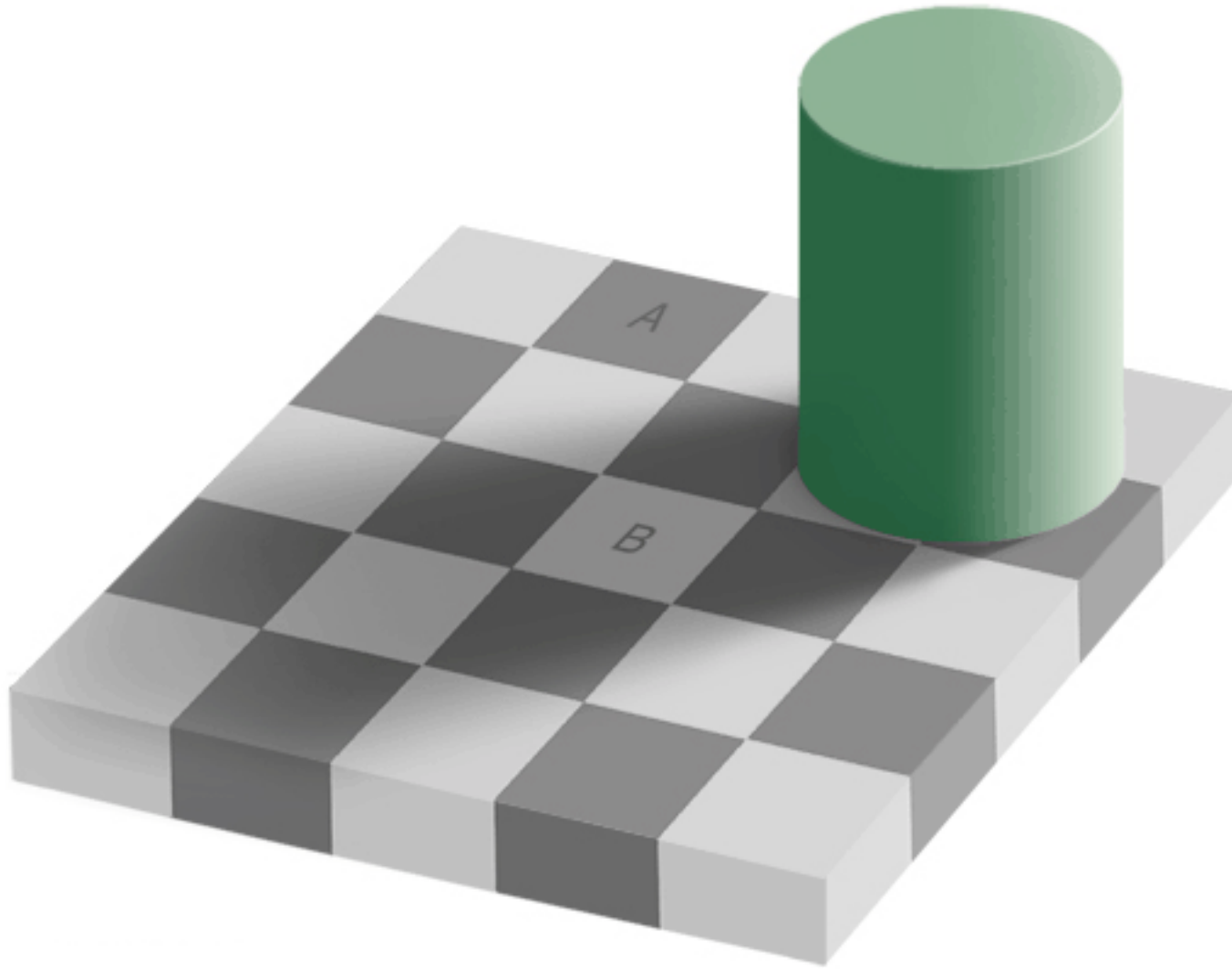
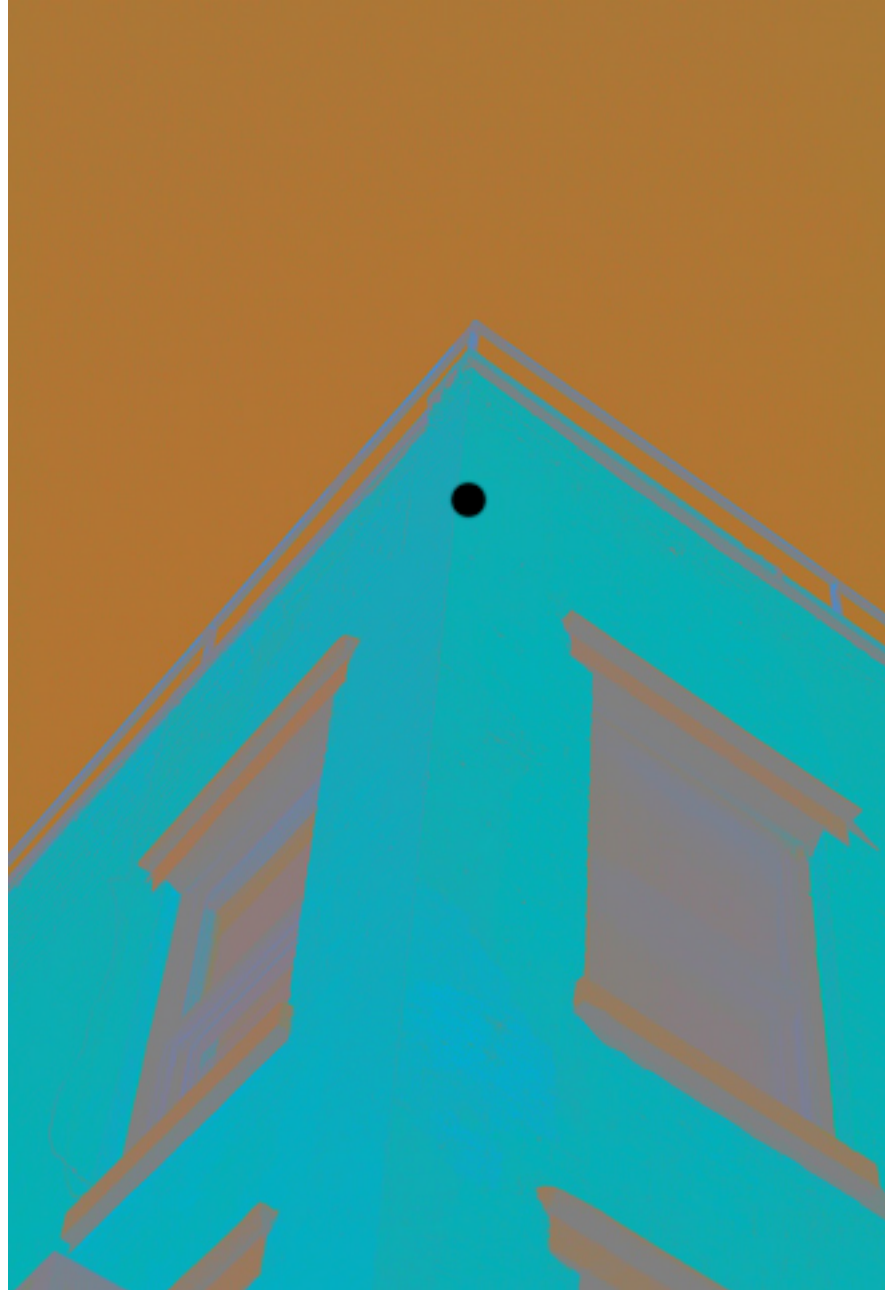


Image from http://en.wikipedia.org/wiki/Visible_spectrum

The Eye

Optical Illusions



The Eye

Optical Illusions



The Eye

Optical Illusions

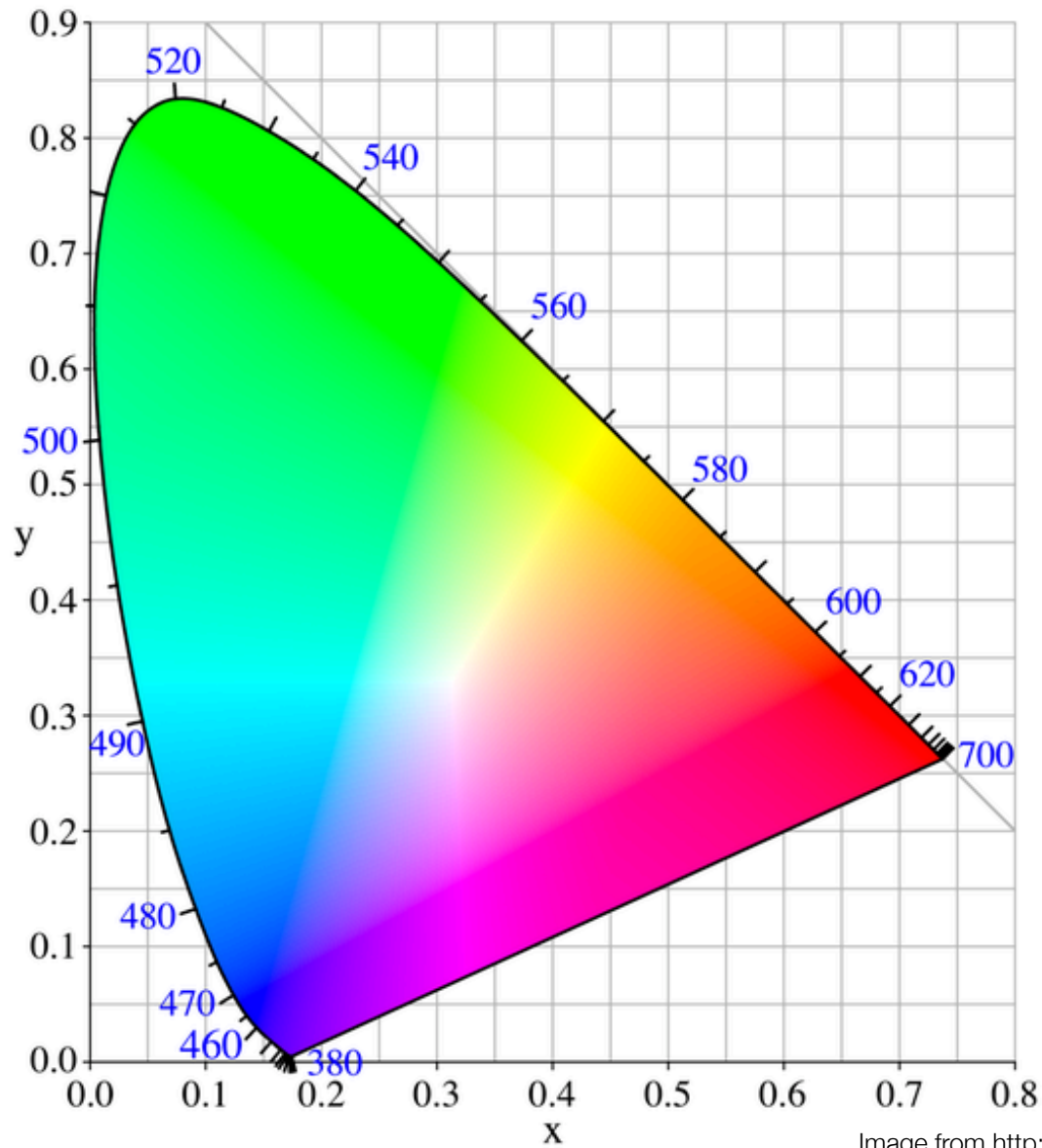


Image from <http://en.wikipedia.org/wiki/Color>

Color

Color Space

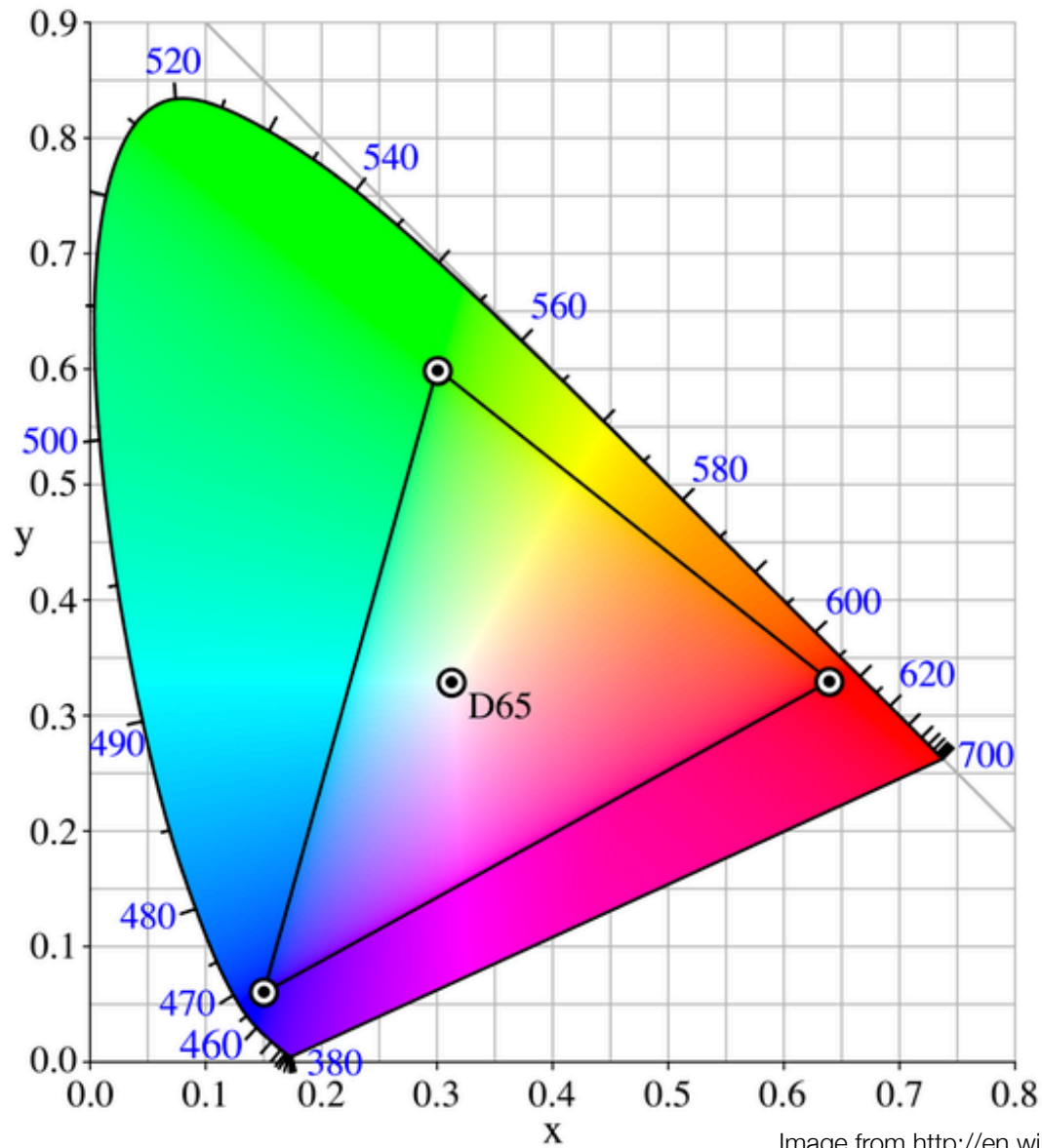


Image from http://en.wikipedia.org/wiki/SRGB_color_space

Color Spaces

sRGB

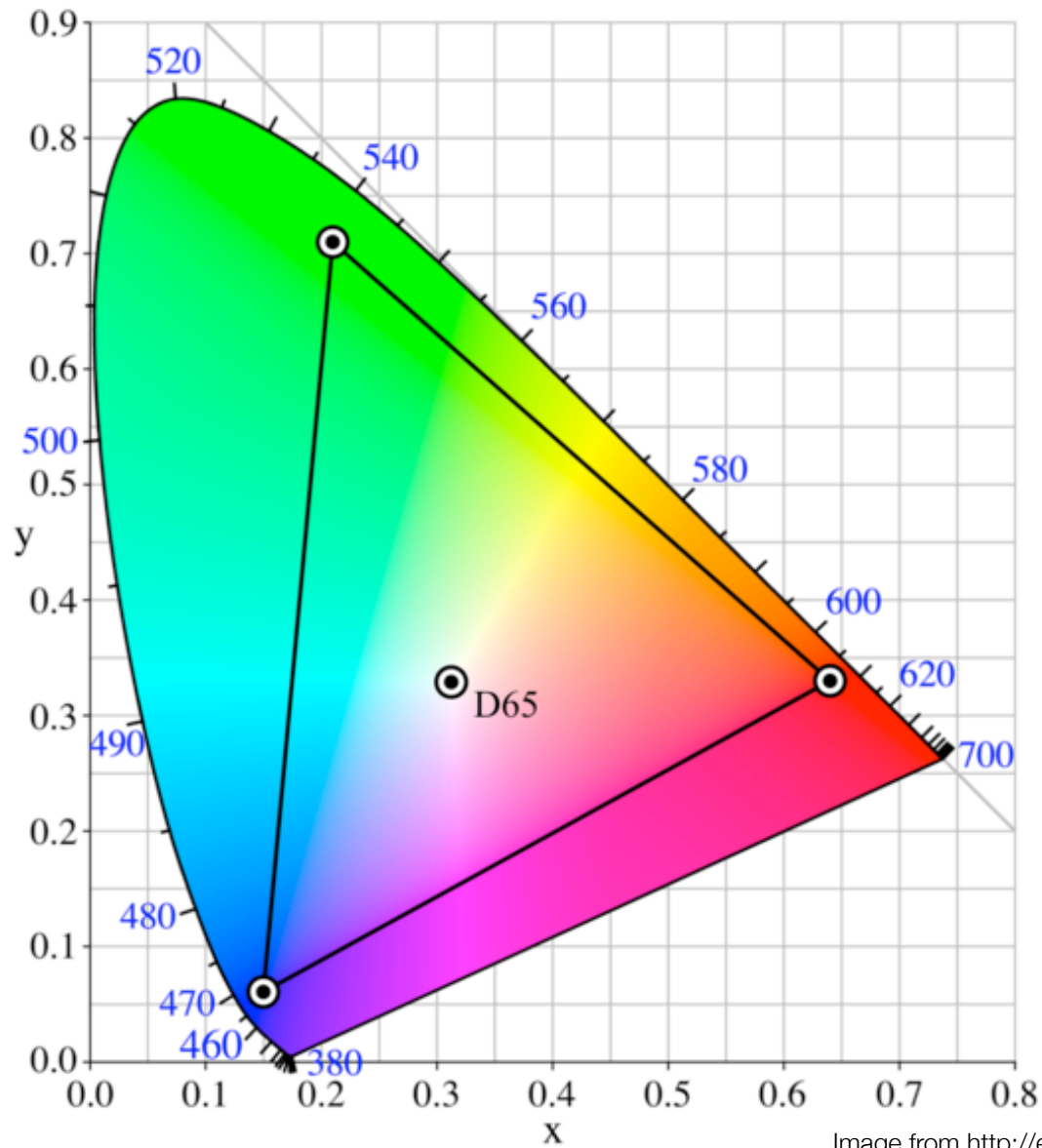


Image from <http://en.wikipedia.org/wiki/AdobeRGB>

Color Spaces

AdobeRGB

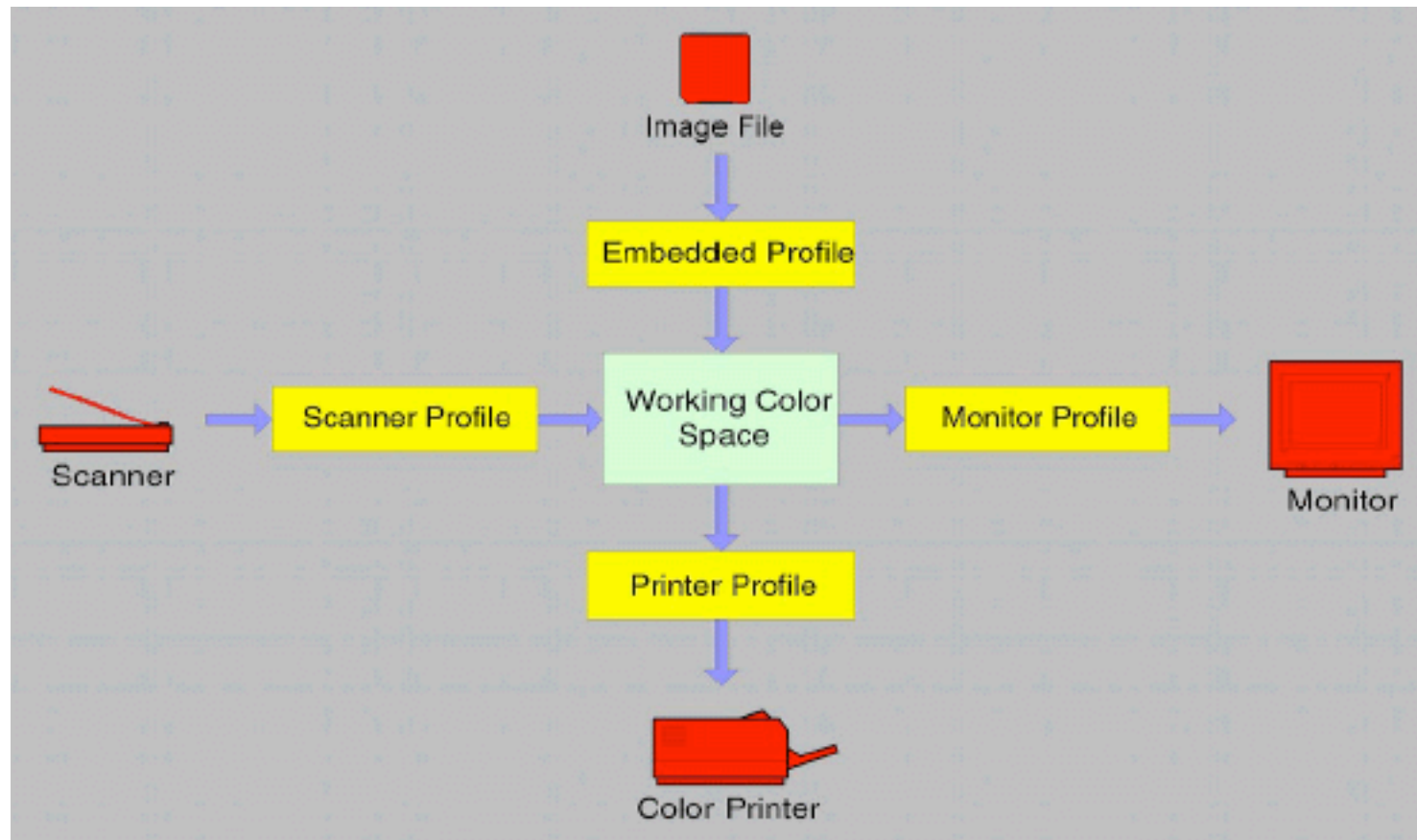


Image from http://www.normankoren.com/color_management.html

Color

Color Management

Gamut mapping

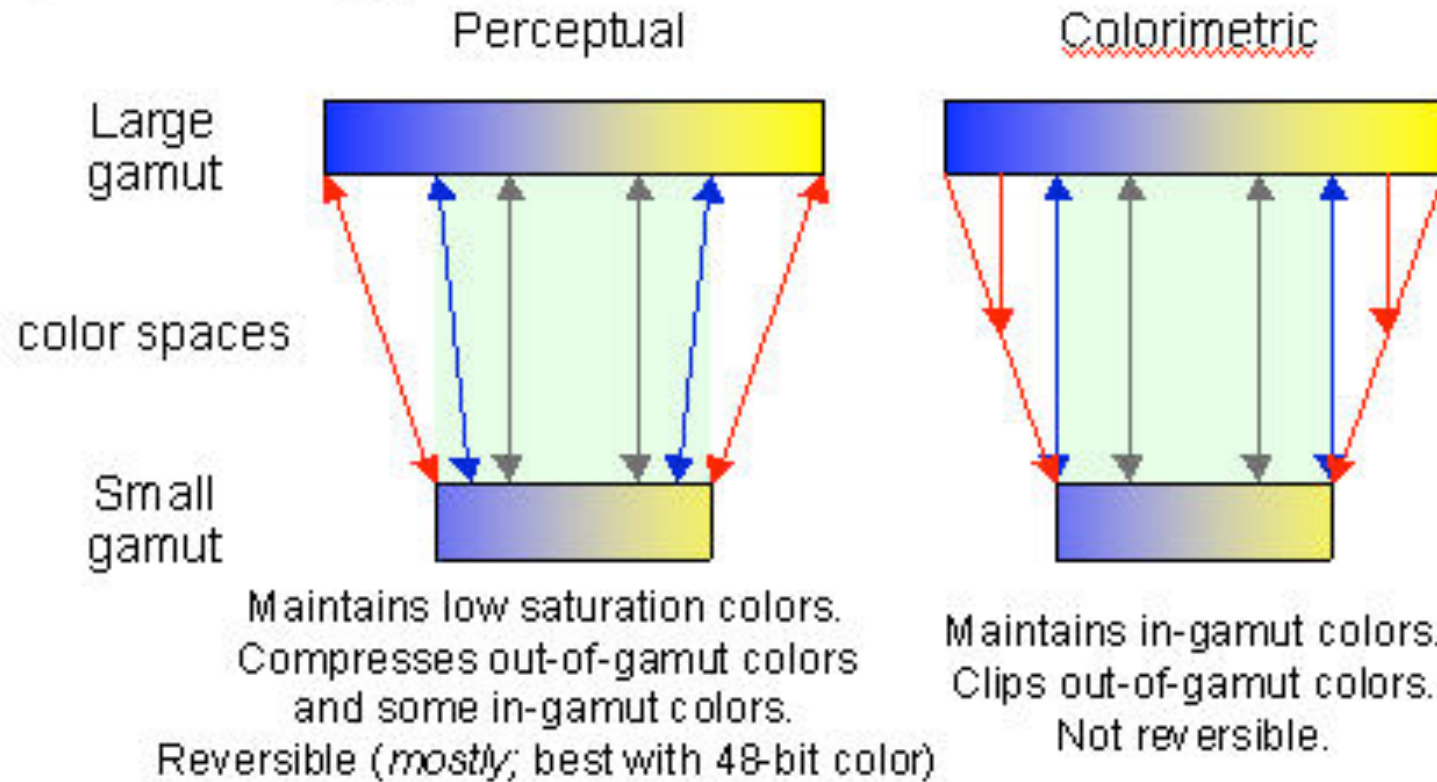


Image from http://www.normankoren.com/color_management.html

Color Management

Gamut Mapping

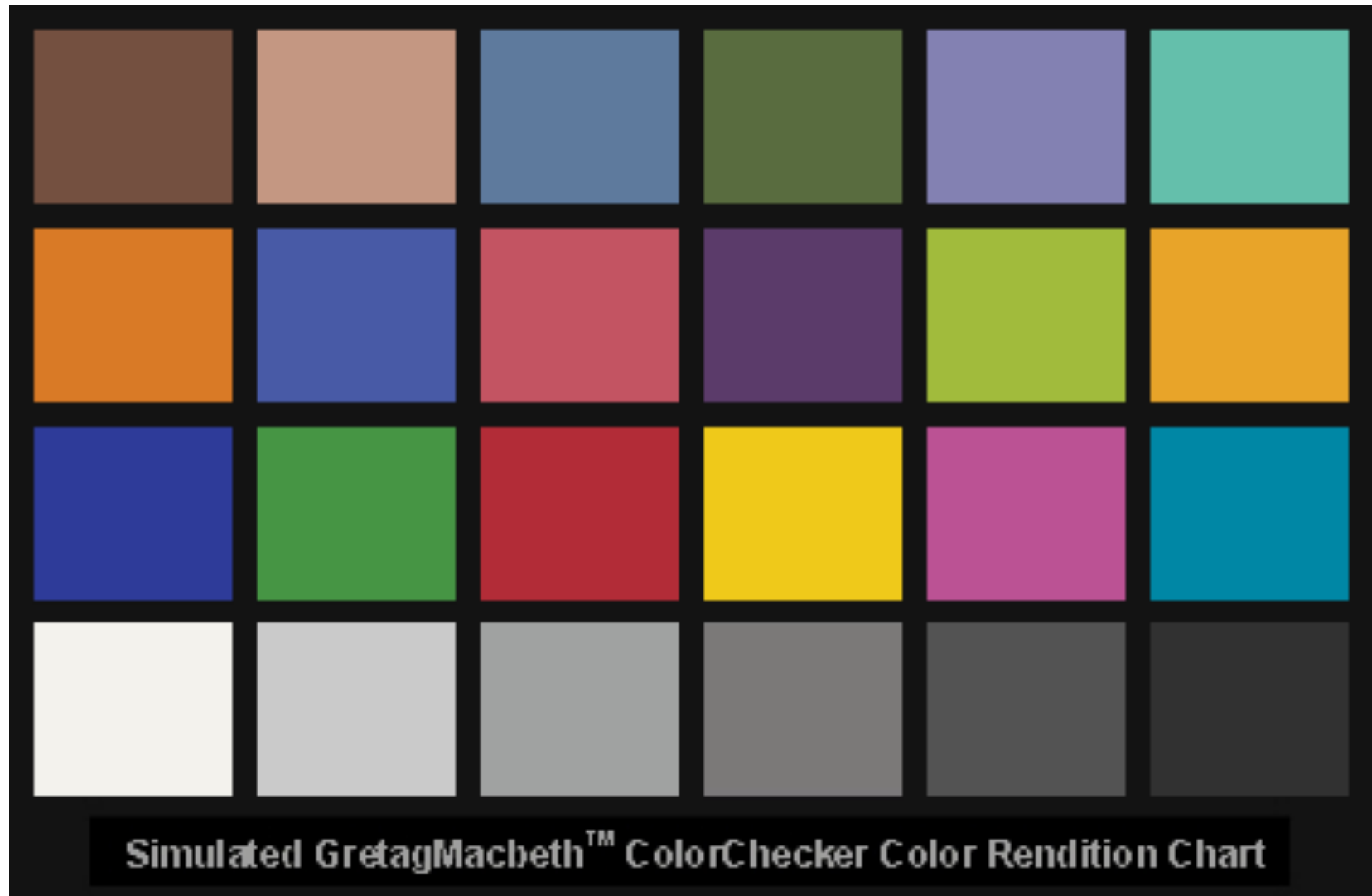


Image from http://www.normankoren.com/color_management_2A.html

Color Management

Monitor Profiling

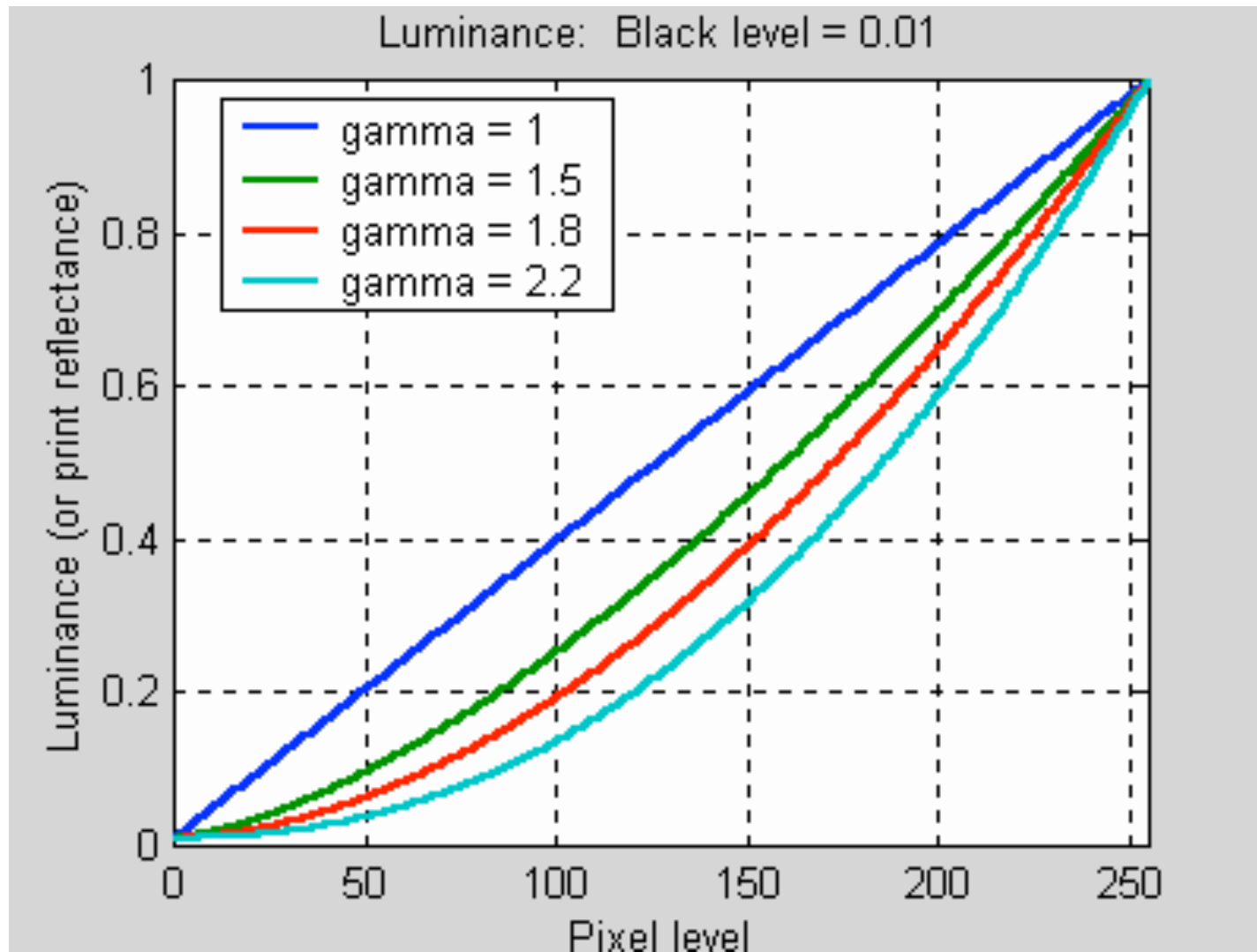


Image from http://www.normankoren.com/color_management_2A.html

Color Management

Gamma

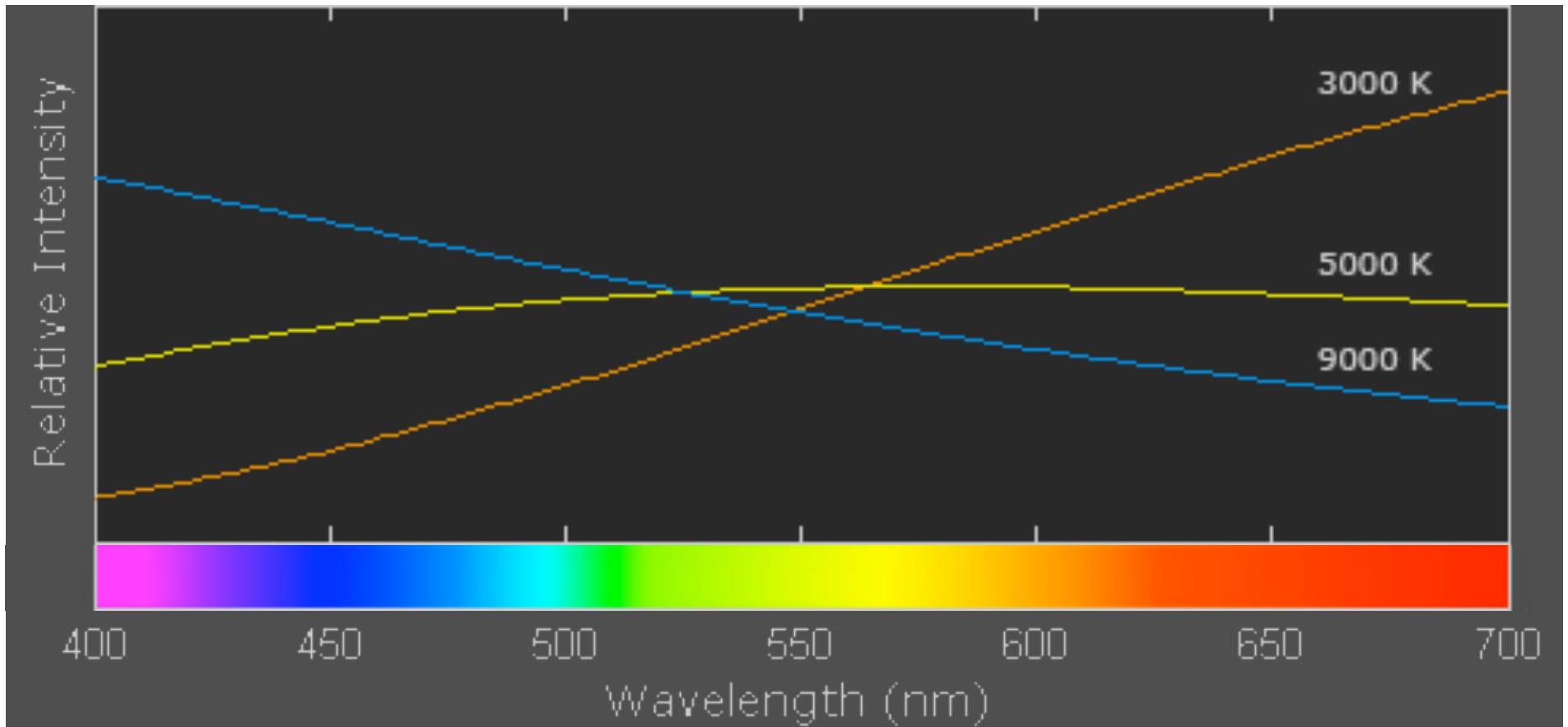


Image from <http://www.cambridgeincolour.com/tutorials/white-balance.htm>

Color

White Balance

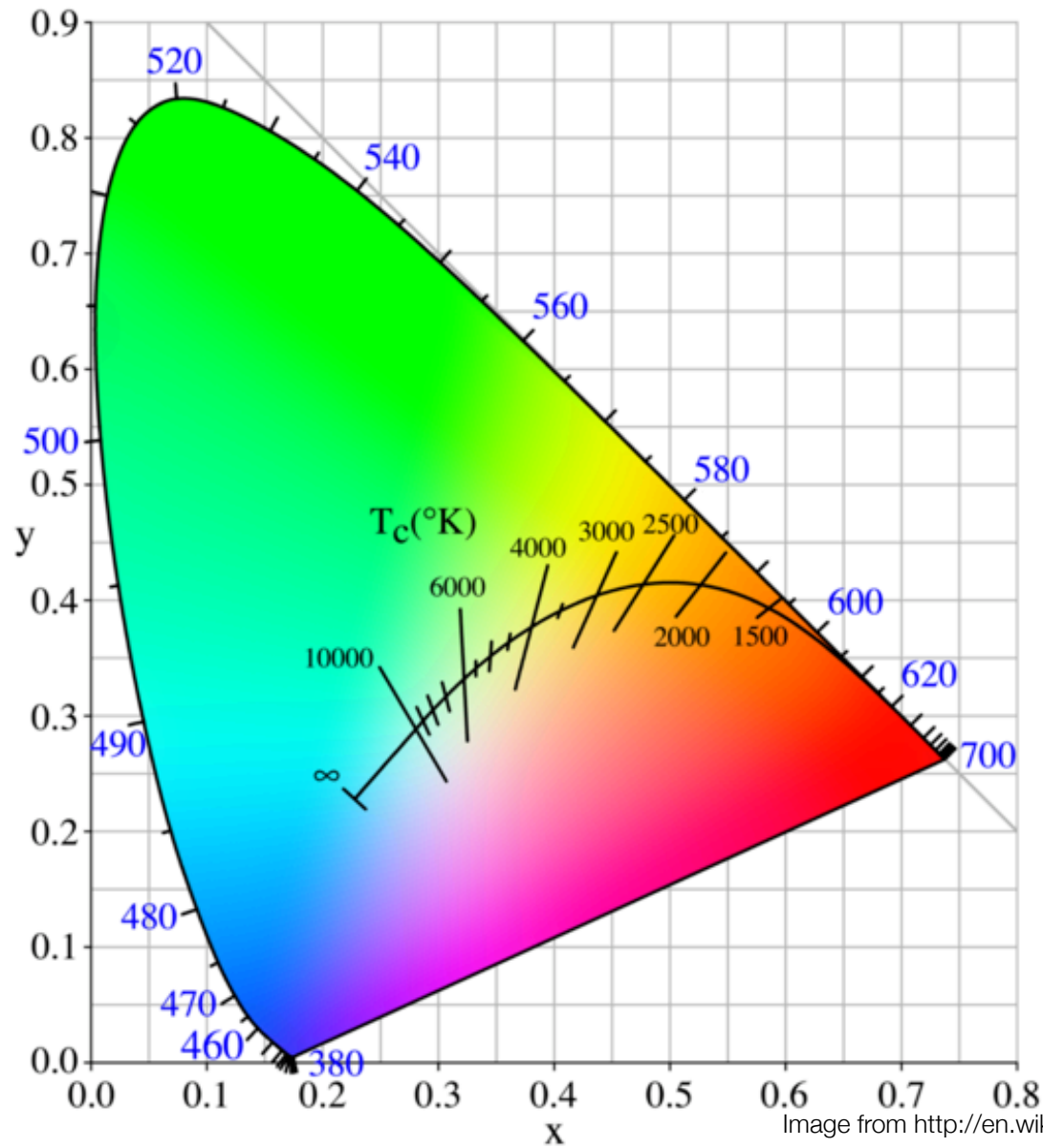


Image from http://en.wikipedia.org/wiki/Color_temperature

Color

White Balance

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

Digital Cameras

RAW vs JPEG!

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