Colorimetry

Part 1 of 2

Agenda
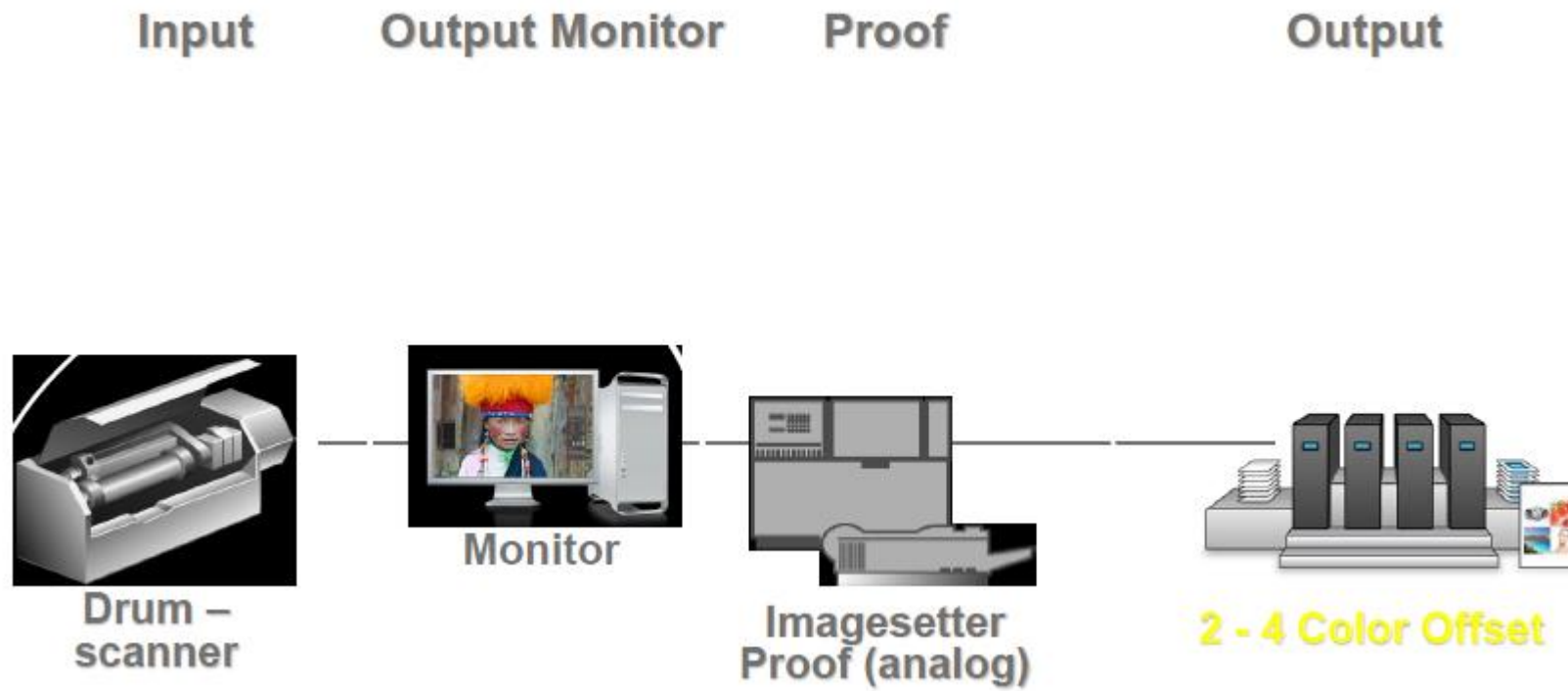
- Raster Image Processors RIP
- Colorimetry
  - Basic
  - Test prints
  - DE Discussion
- Color management
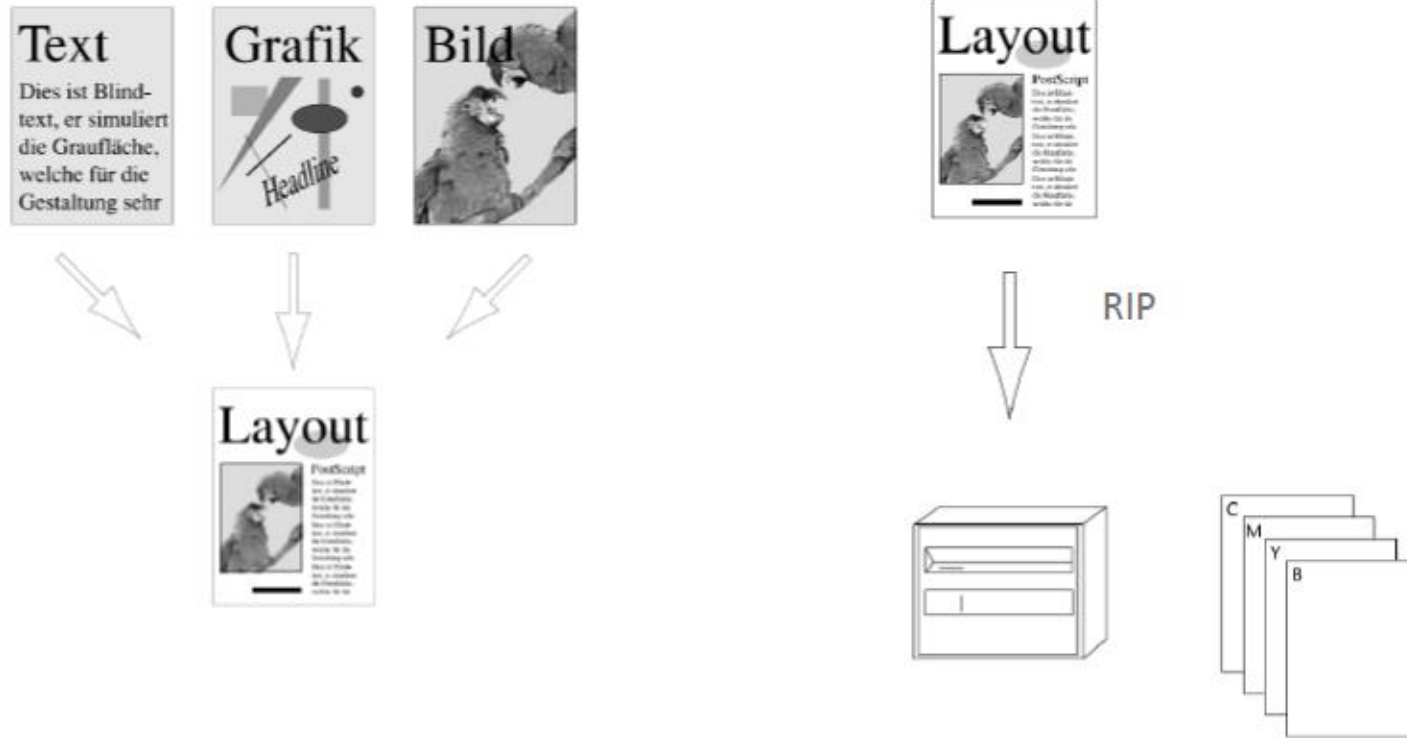- Data Format
- Basic Functions of RIP's

RIP

- Raster Image Processor

Workflow

Input   Output Monitor   Proof   Output

Drum – scanner   Monitor   Imagesetter Proof (analog)   2 - 4 Color Offset
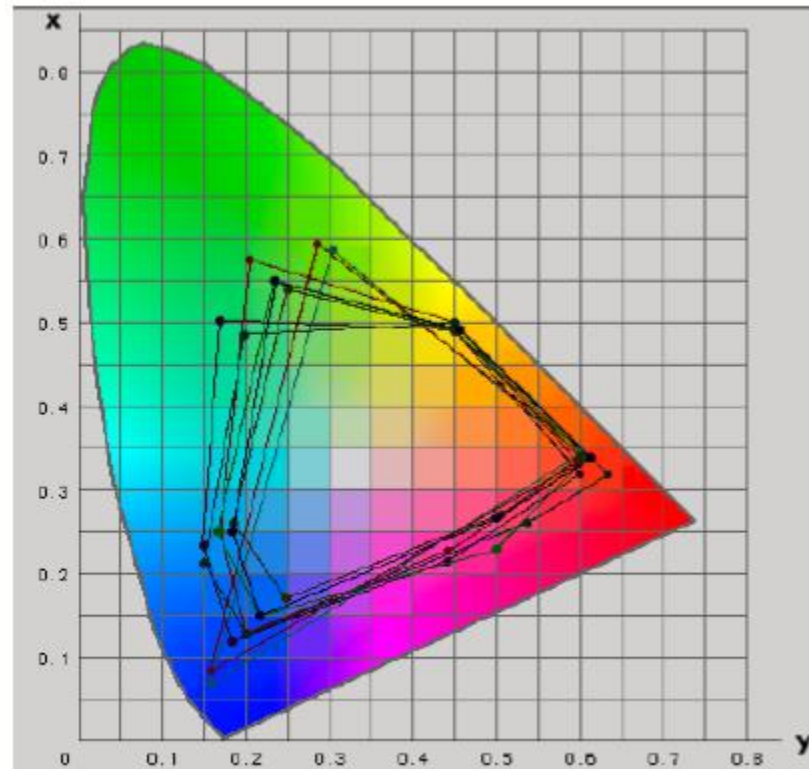
Workflow Continued

RIP

- An essential control system for all variables in digital printing

What are the variables of digital print?
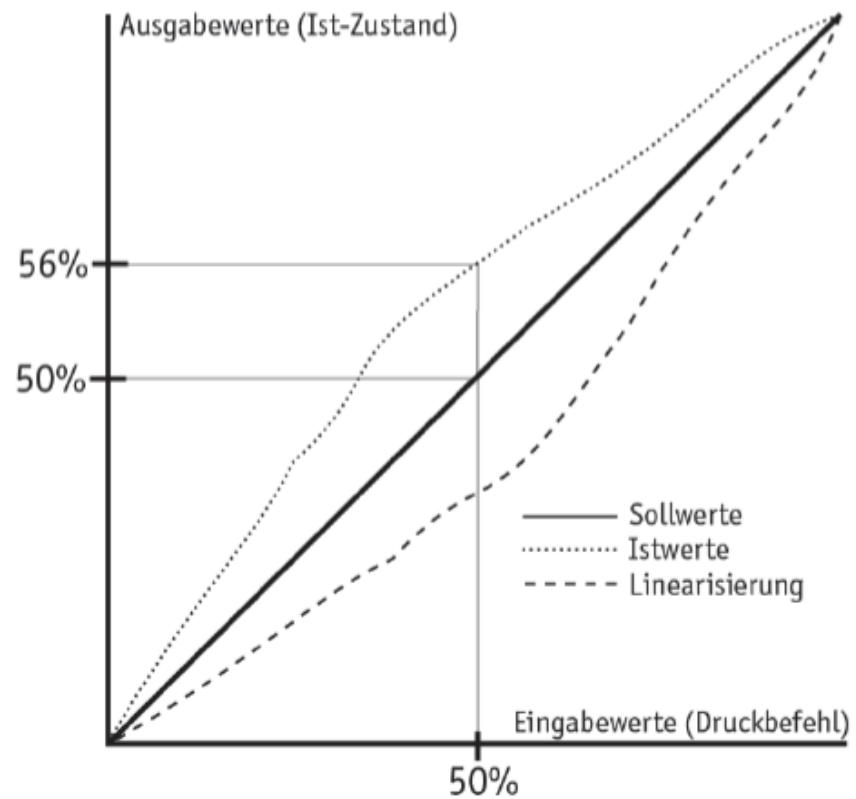
- Media or Substrate
- Color or Ink
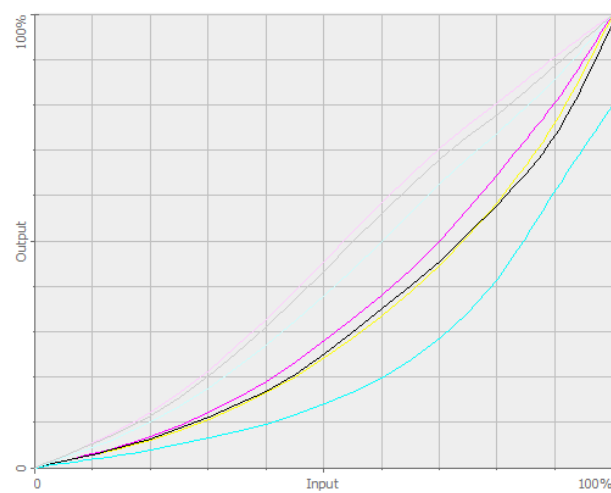- Resolution
- Print Mode

Controlling Variables of Digital Printing
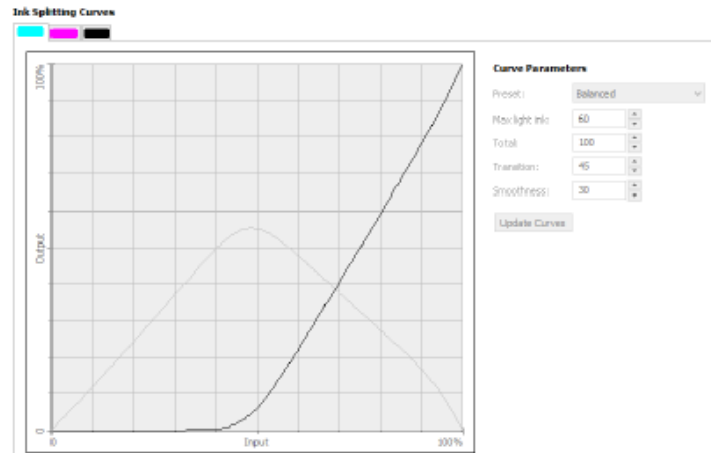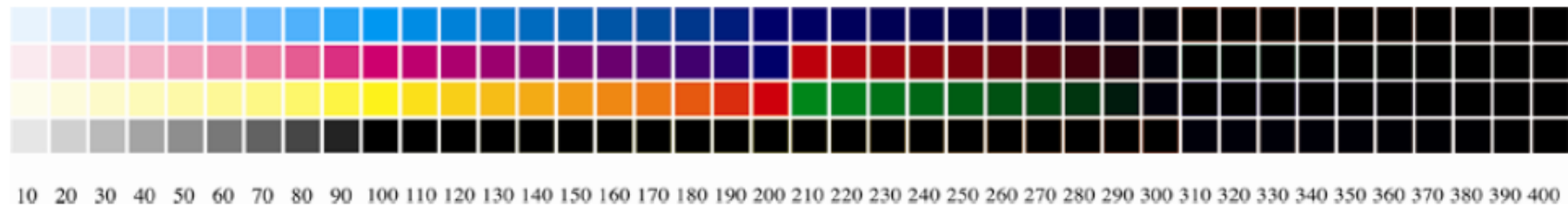
- ▶ RIP with those parameters
- ▶ Linearization

Linearization Demonstrated

Linearization of all Basic Colors

Ink Limit Targets

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400

Ink Splitting Curves

Curve Parameters

Preset:	Balanced
Max light ink:	60
Total	100
Transition:	45
Smoothness:	30

Update Curves

- Ink Splitting

Profiling

- Excurision Color Management
- Why Color Management?
  - "True colors" from input through output

Input   Monitor Softproof   Proof   output

Introduction to Colorimetry
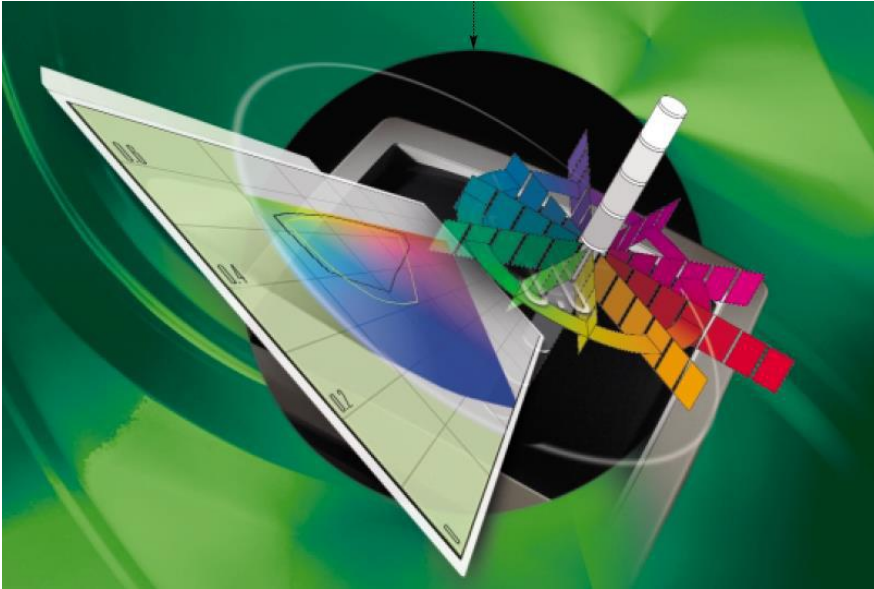
► "Color was an art long before it was a science, and consequently the language of color is poetic rather than factual."

J.A.C. Yule, Principles of Color reproduction, 1967

What is Color?

- Speaking scientifically about color there are four different approaches that help to categorize and understand the different motivations and circumstances:

- •To study the anatomy, physiology and diseases of the eye (Ophthalmology). In other words the psychophysical relationship of the human visual system with respect to color vision e. g. Color deficiency or color blindness.

- •To study the physical mixing of colorant objects to generate a required coloration e. g. ink formulation.

- •To study the pleasing affective response (harmony) of colors interacting with each other

- •To study the perception of the colors as to how the human visual system reacts to a given physical

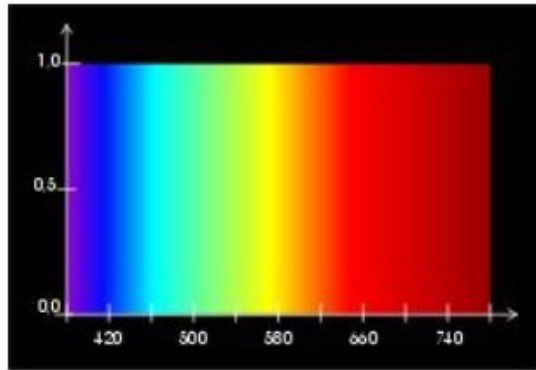(Basic and higher colorimetry)

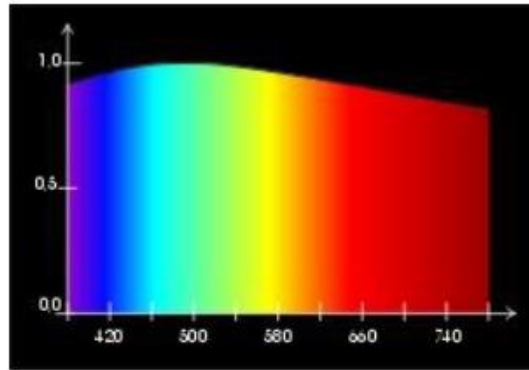# To Measure Color

CIE Light Spectrum
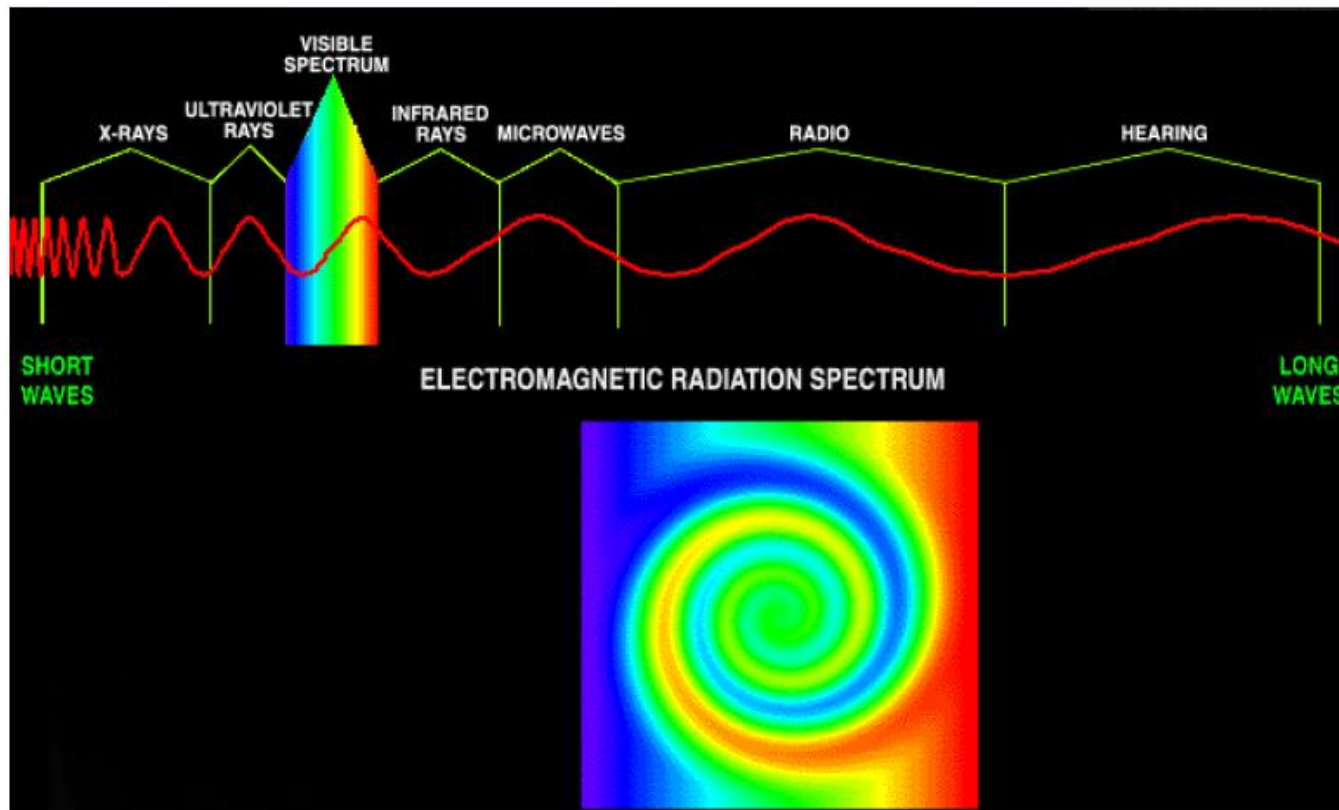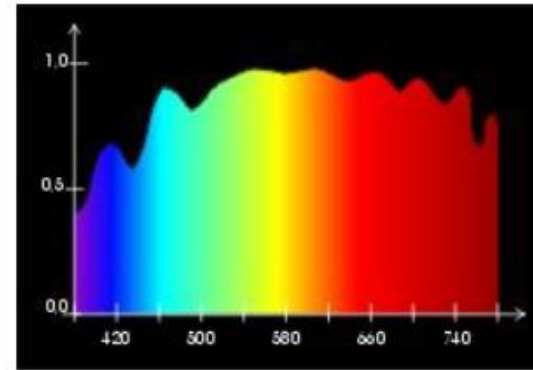
Light Source
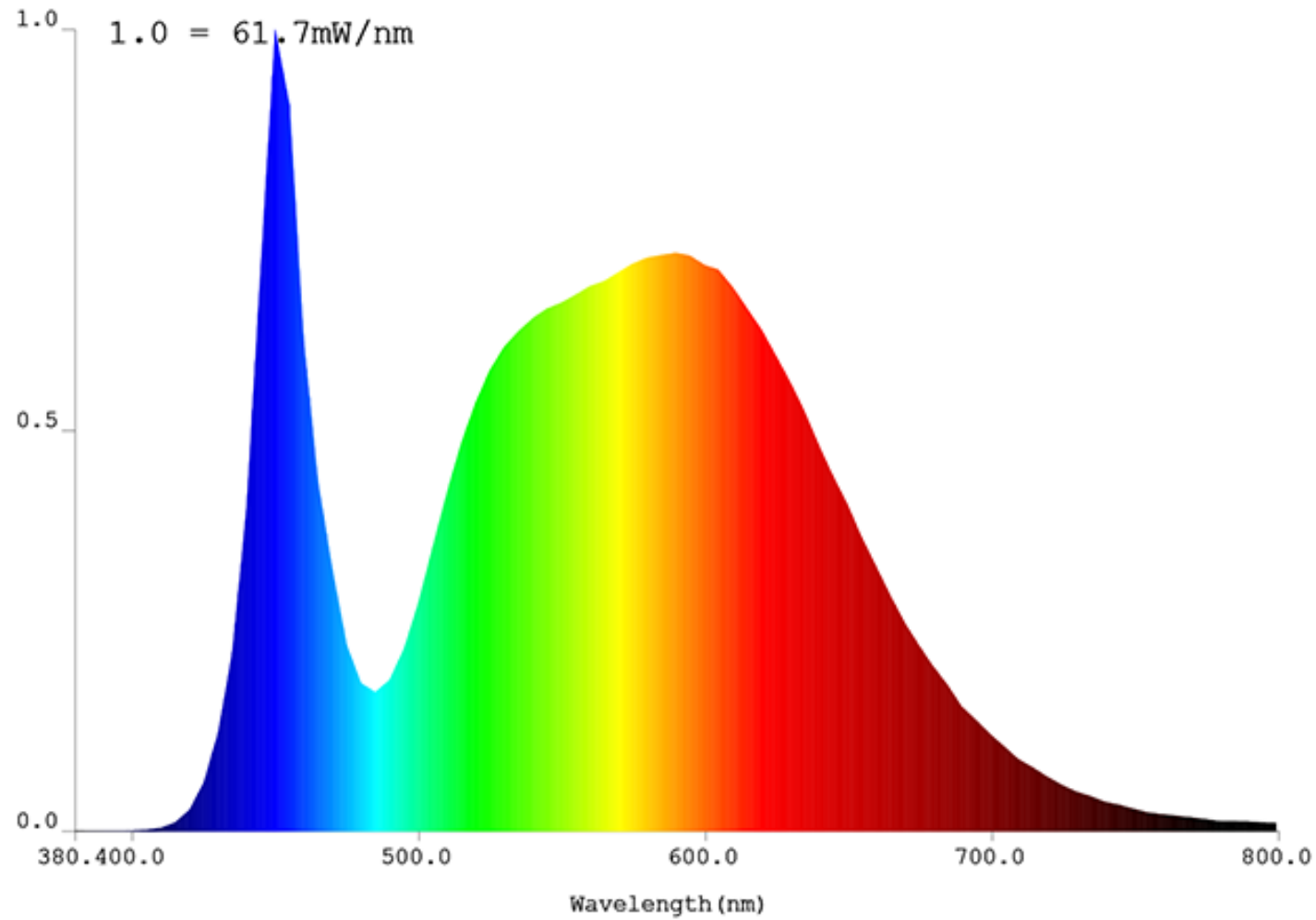
Common Light Sources

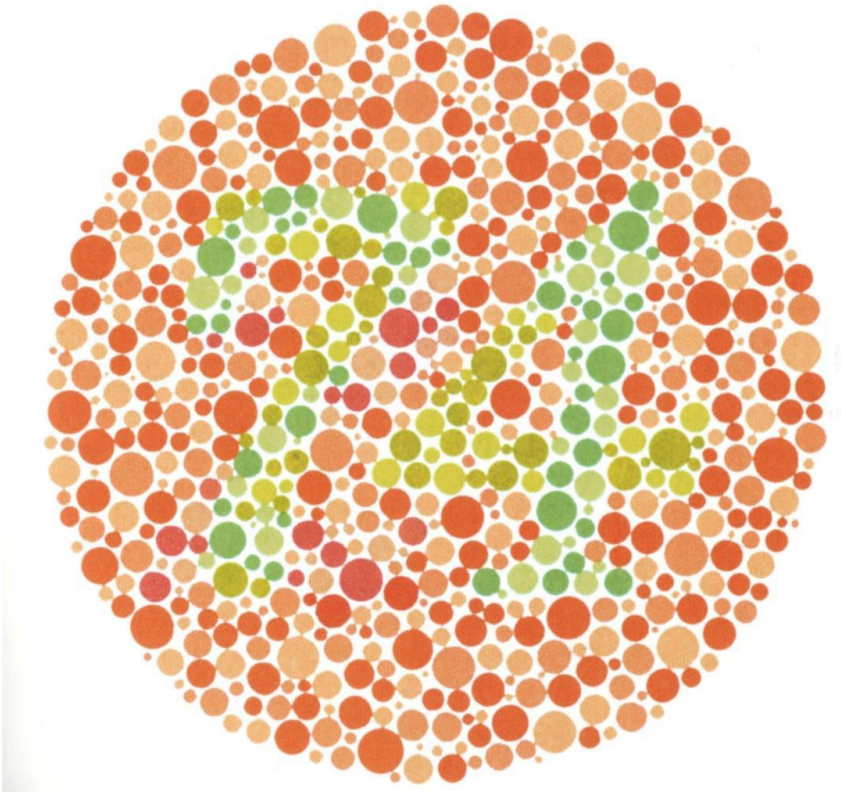white light theorie

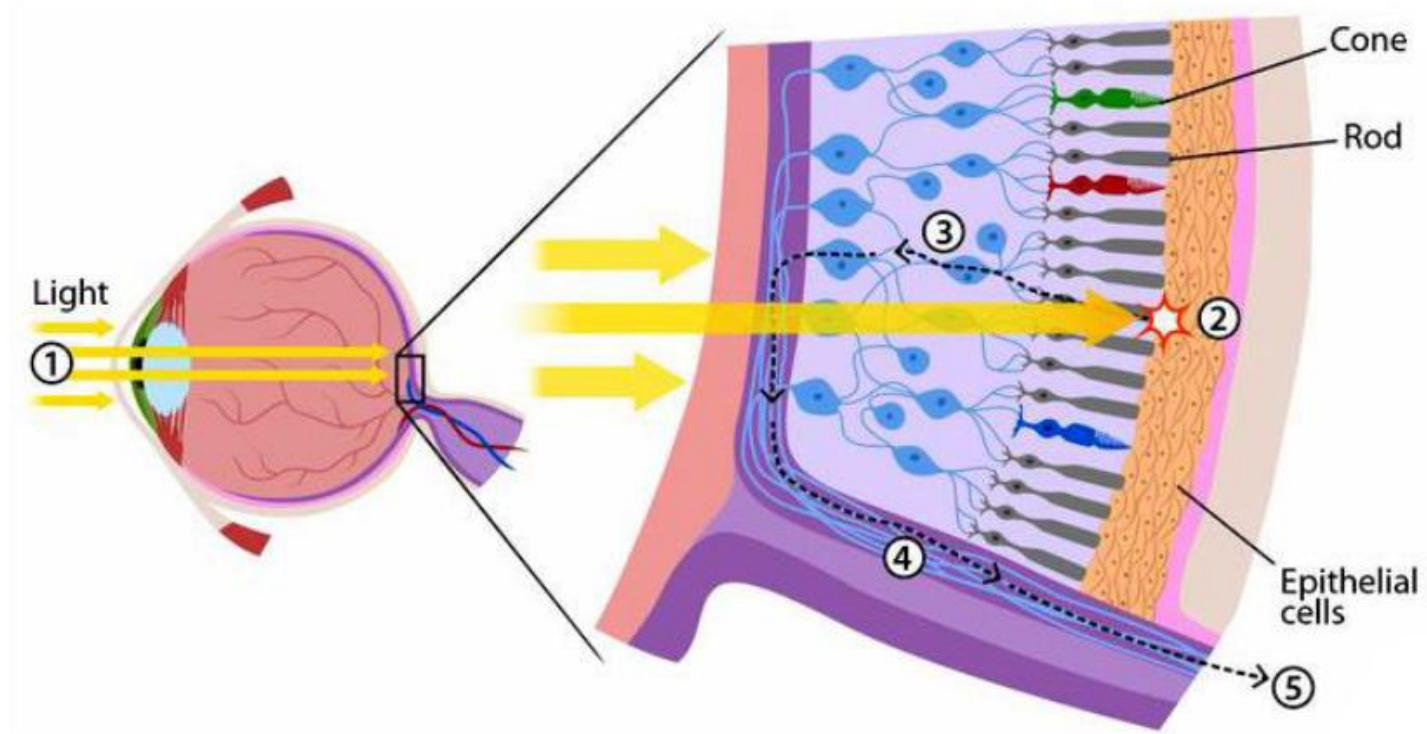Day light

Norm light D50

Effect of Light Source on Image

Eyes Perception of Color

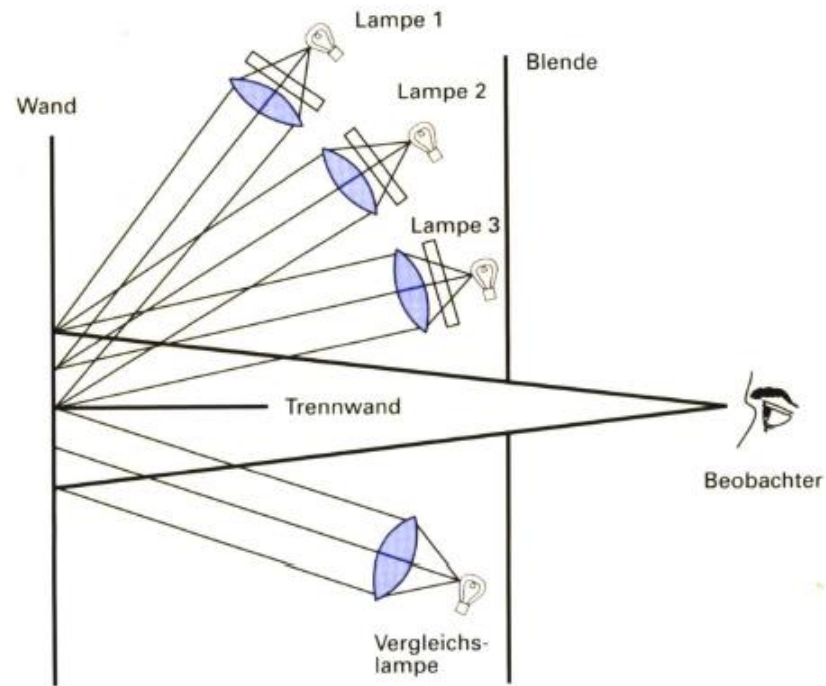- Ishihara color blindness test
- 74 or 21?

Eyes Perception of Color Continued
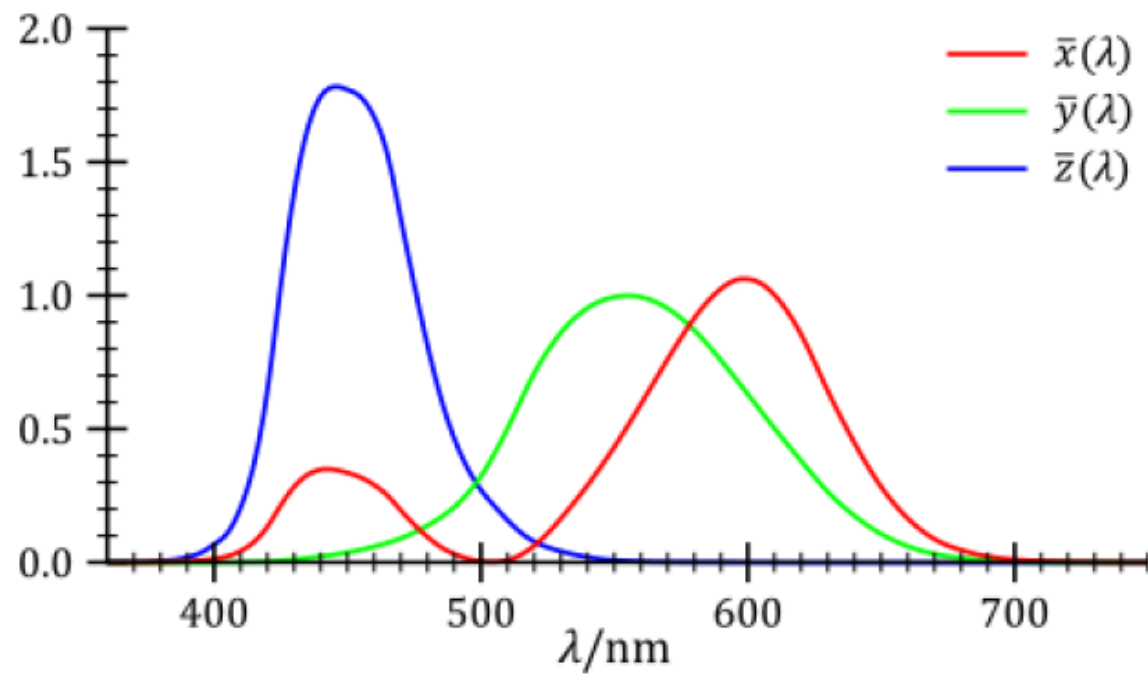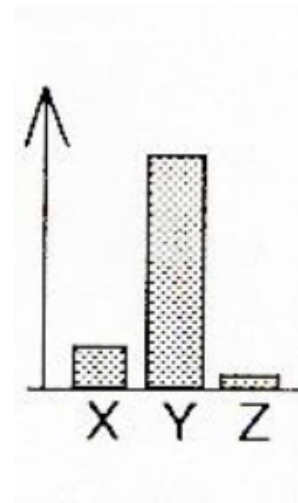
Measurement of Color

Standard Spectral Value Curves

- $\lambda = 530\text{nm}$

CIE Chromaticity Diagram

$$y = \frac{Y}{(X + Y + Z)}$$

$$x = \frac{X}{(X + Y + Z)}$$
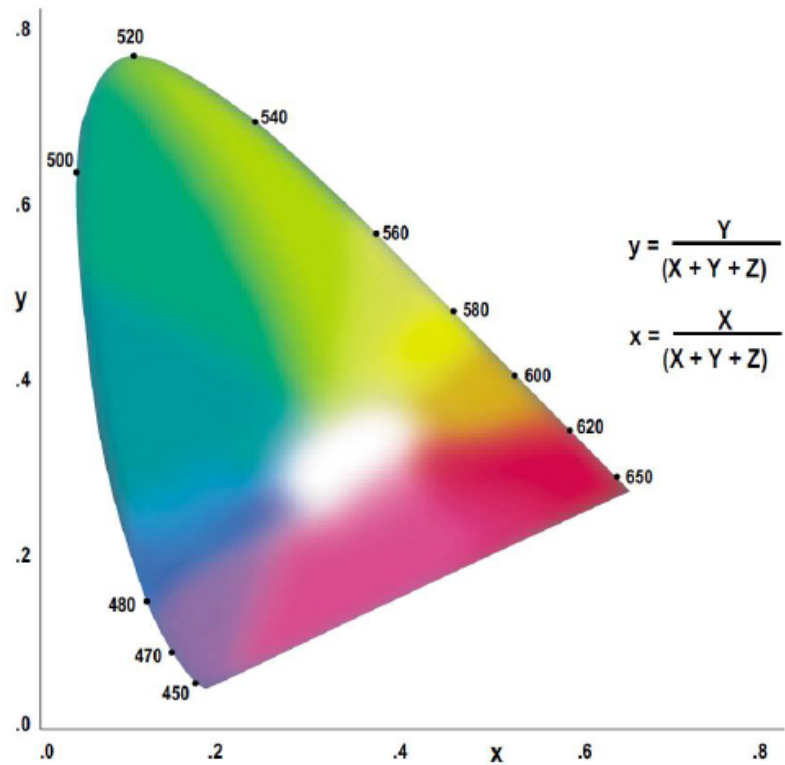
- X+Y+Z=1
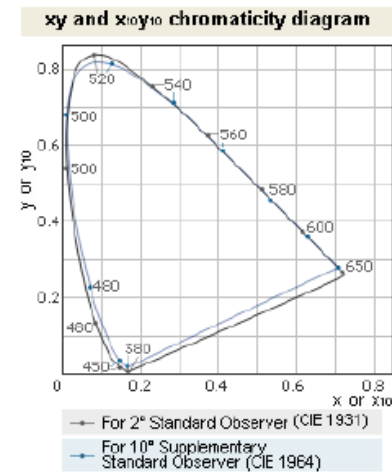
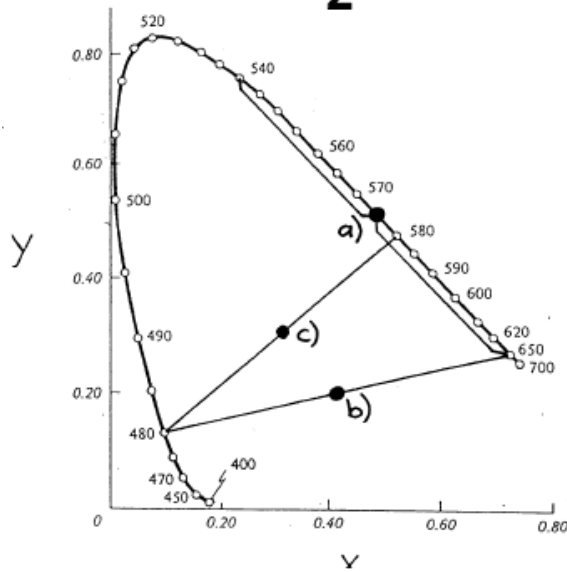# Mixing of Colors

$$X_{mix} = \frac{x_i + x_2}{2}$$

$$y_{mix} = \frac{y_i + y_2}{2}$$

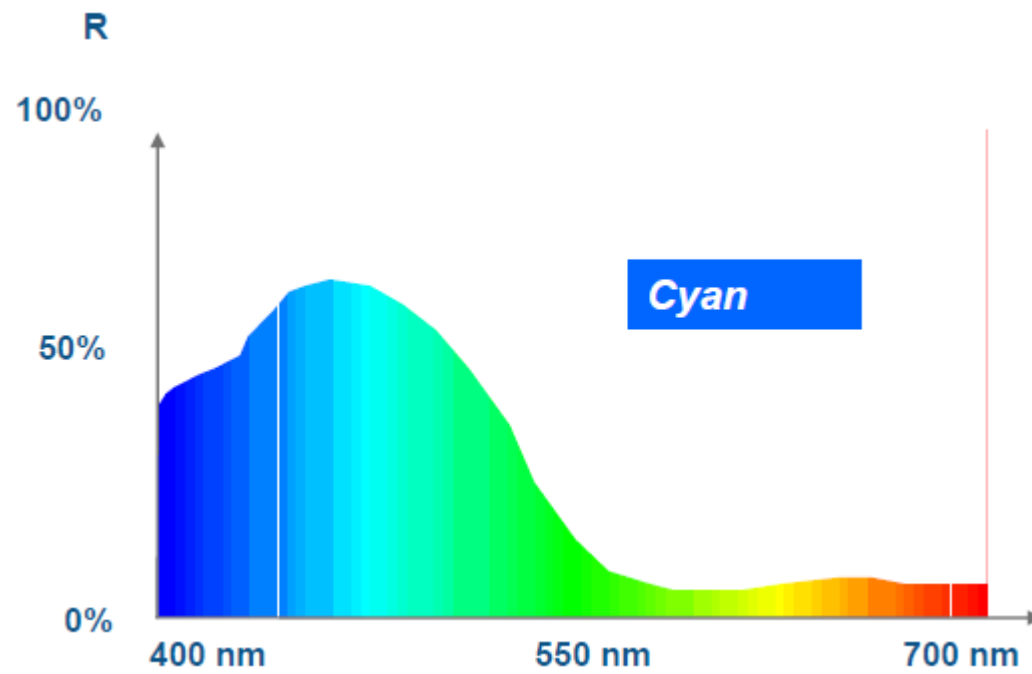$$z_{mix} = \frac{z_i + z_2}{2}$$

a) Light of 650 nm (red) and 540 nm (green) mixed, 575 nm (Yellow)
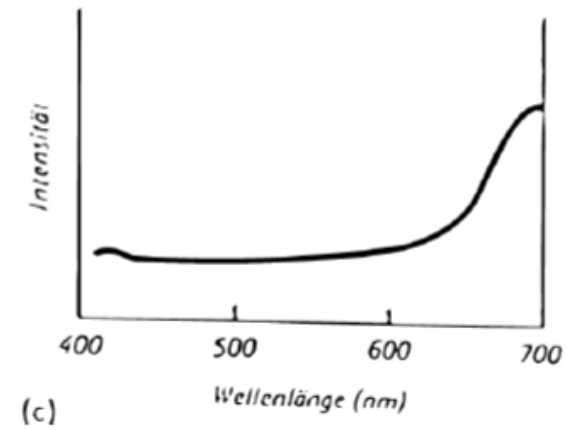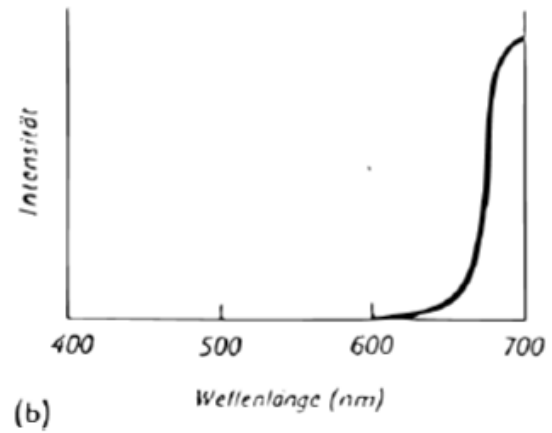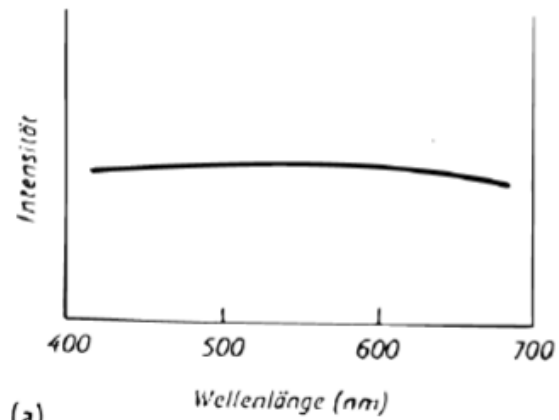b) Light of 650 nm (red) and 480 nm (blue), magenta
c) Light of 480 nm (blue) and 580 nm (yellow) white
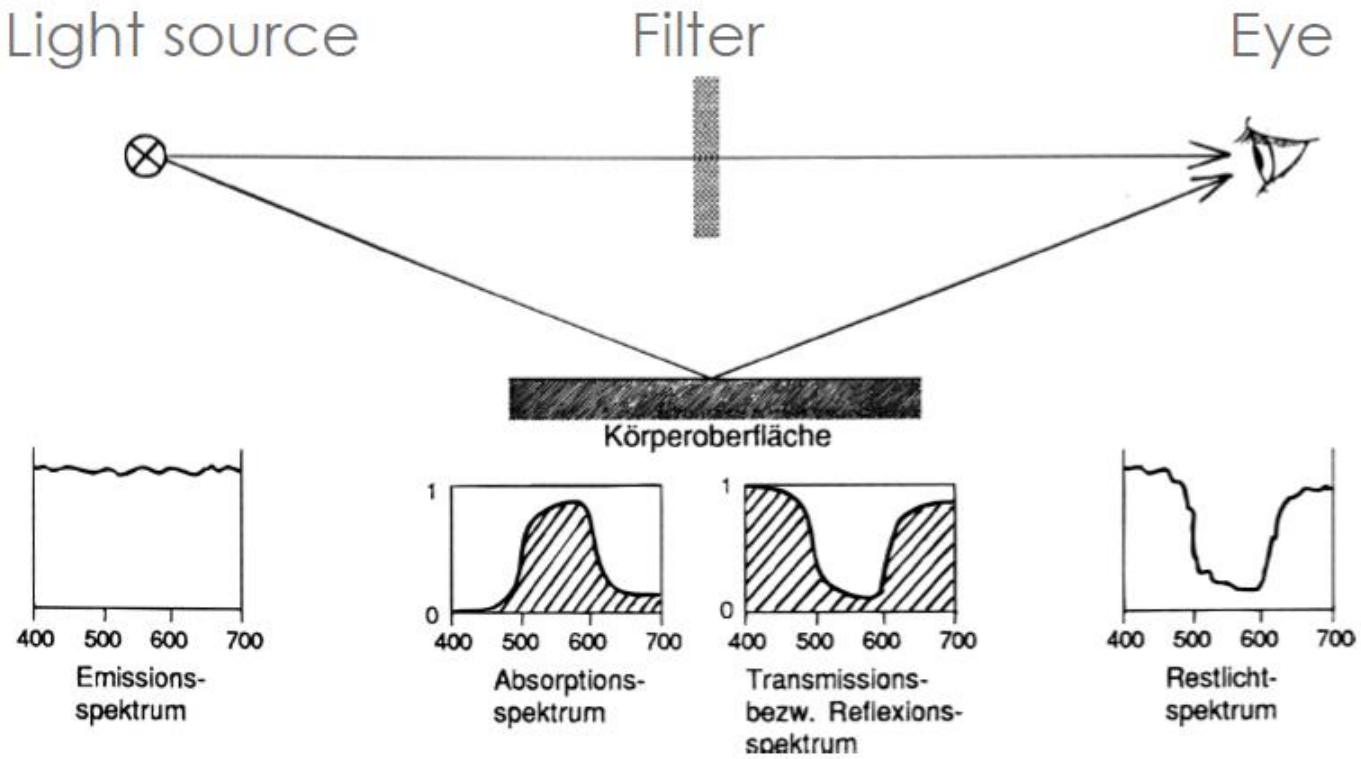White =   x = 0.33, y = 0.33, z = 0.33

Hue

Saturation

Ink

To Be Continued

- How can you manage the color space?

- How can you combine inks?

- What is the difference between colors?