

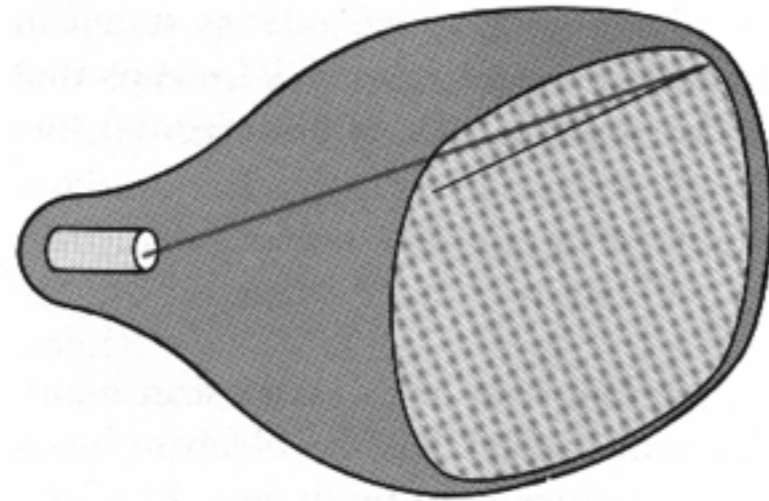
# Raster Devices and Images

(Slides courtesy of Tamar Shinar)

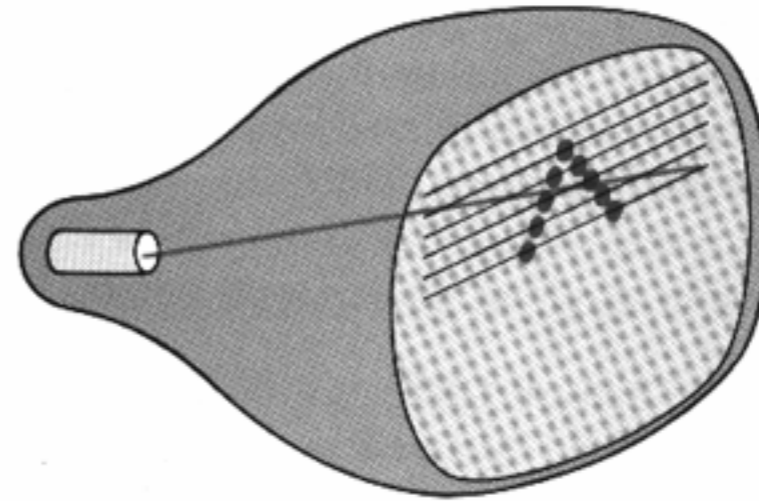
# Raster Devices



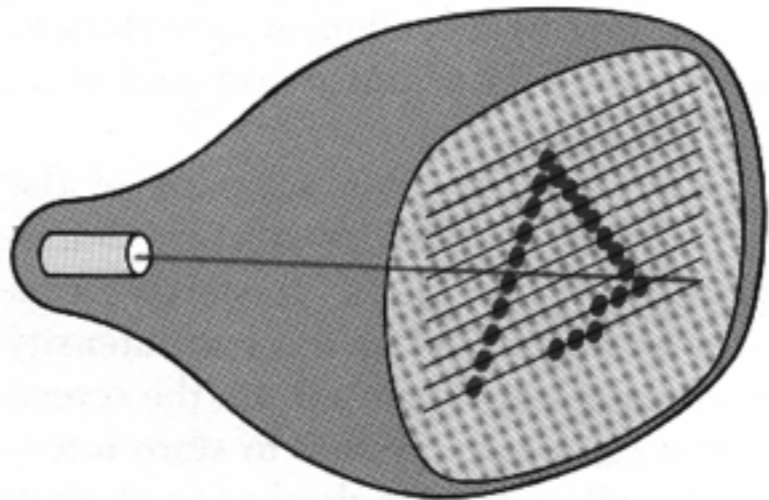
# Raster Display



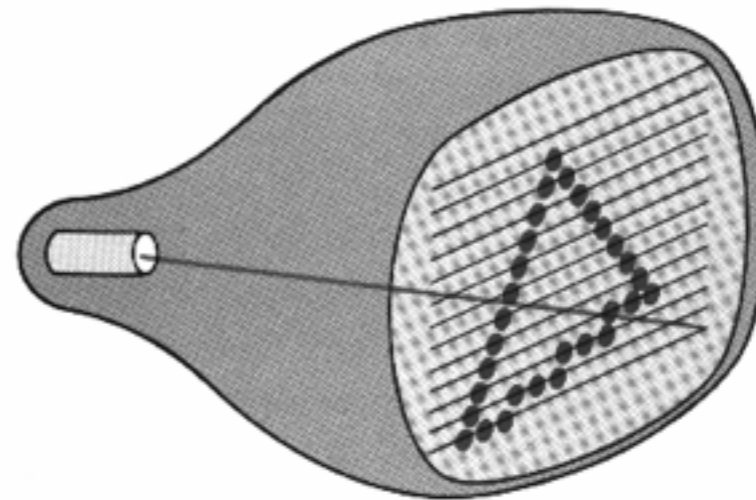
(a)



(b)

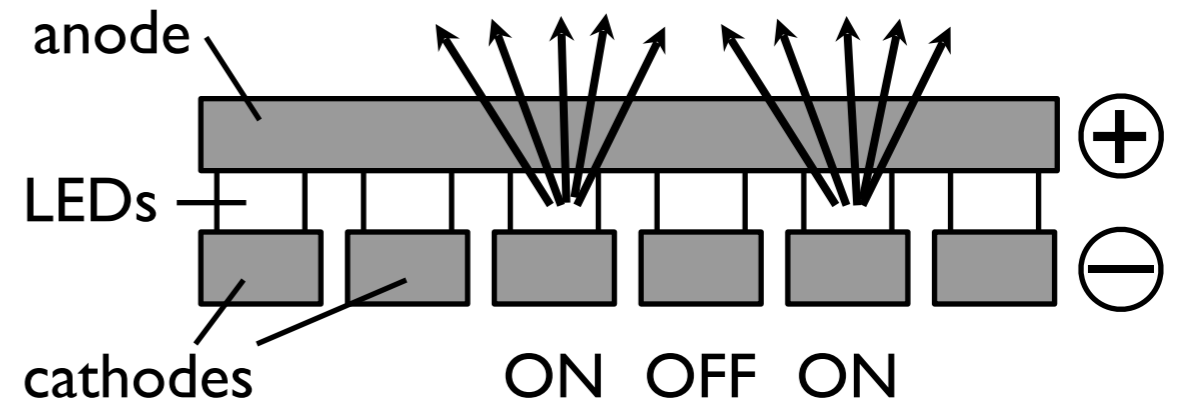
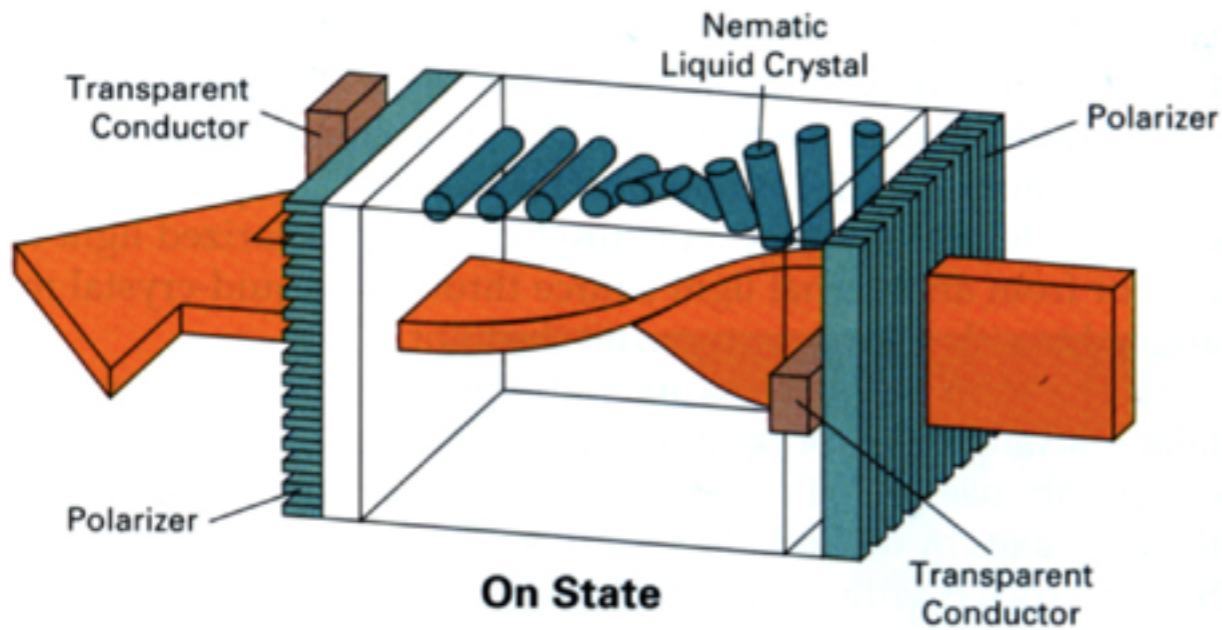


(c)



(d)

# Transmissive vs. Emissive Display



On State

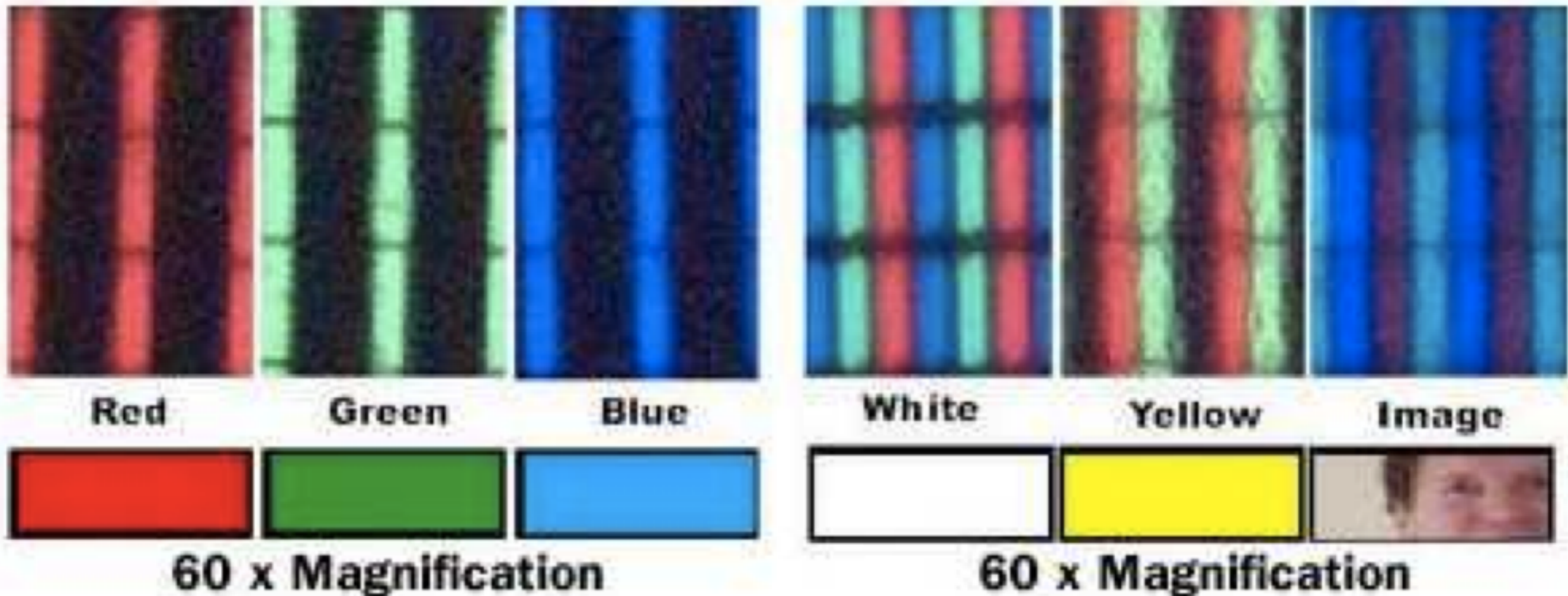
Off State

LCD

LED

[H&B, Fig. 2-16]

# Raster Display



red, green, blue subpixels

# What is an image?

## Continuous image

$$I : R \rightarrow V$$

$$R \subset \mathbb{R}^2$$

$$V = \mathbb{R}^+ \quad (\text{grayscale})$$

$$V = (\mathbb{R}^+)^3 \quad (\text{color})$$



# What is an image?

## Sampled image

$$I : R \rightarrow V$$

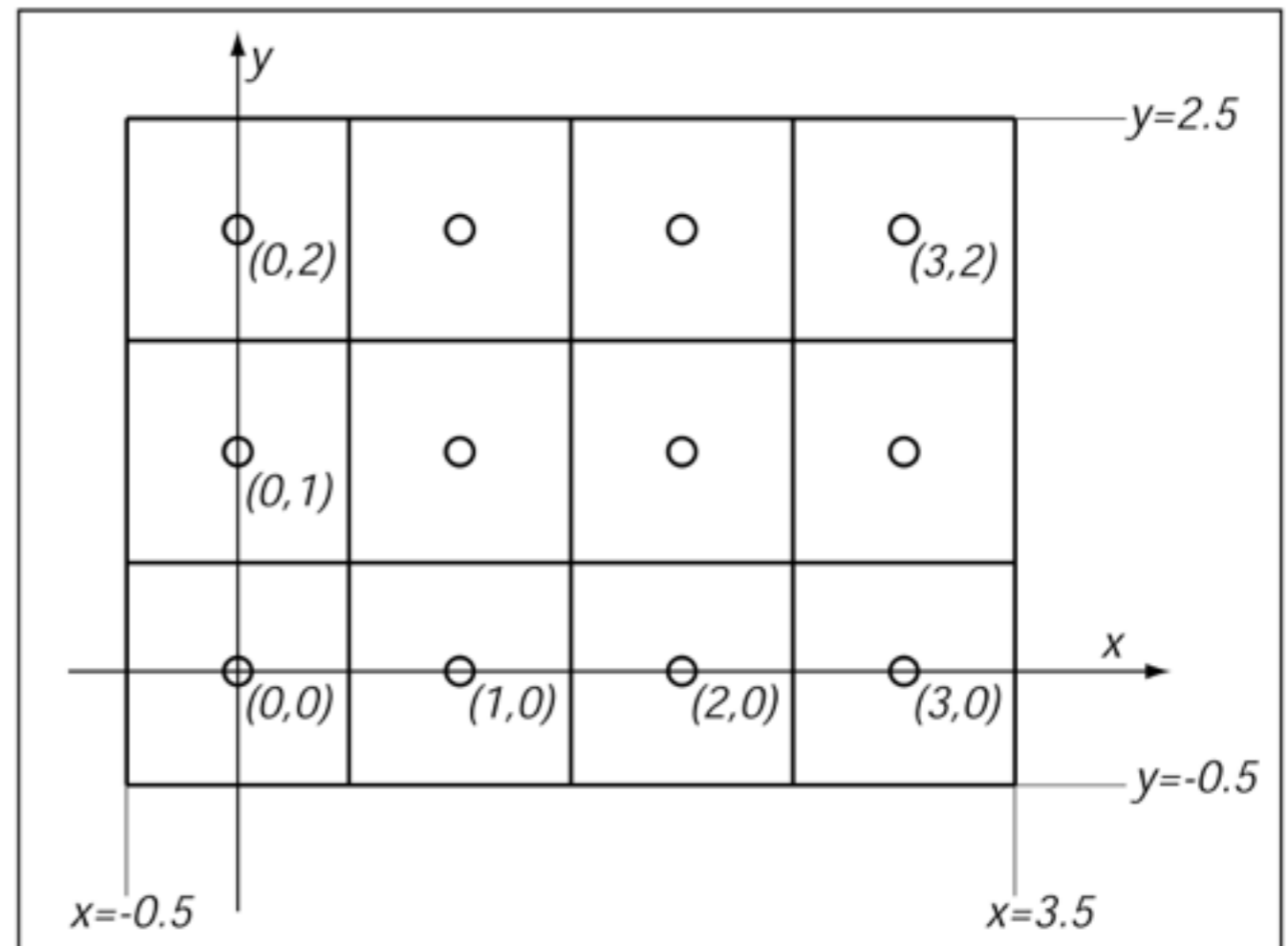
$$R \subset \mathbb{Z}^2$$

$$V = [0, 1] \quad (\text{grayscale})$$

$$V = [0, 1]^3 \quad (\text{color})$$

$n_x$  = number of columns

$n_y$  = number of rows



$$[-0.5, n_x - 0.5] \times [-0.5, n_y - 0.5]$$

# Bit depth - defined by device standards

---

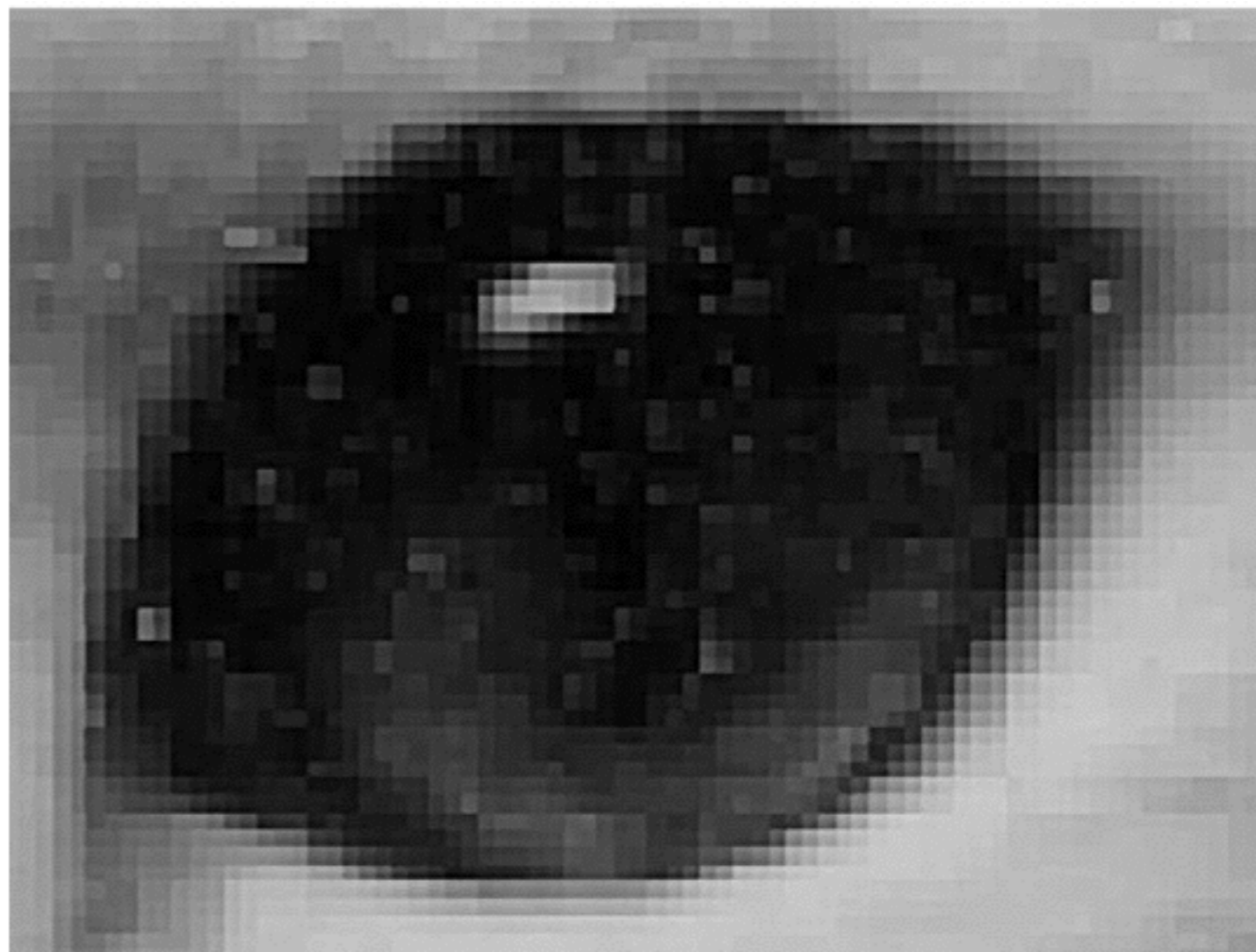
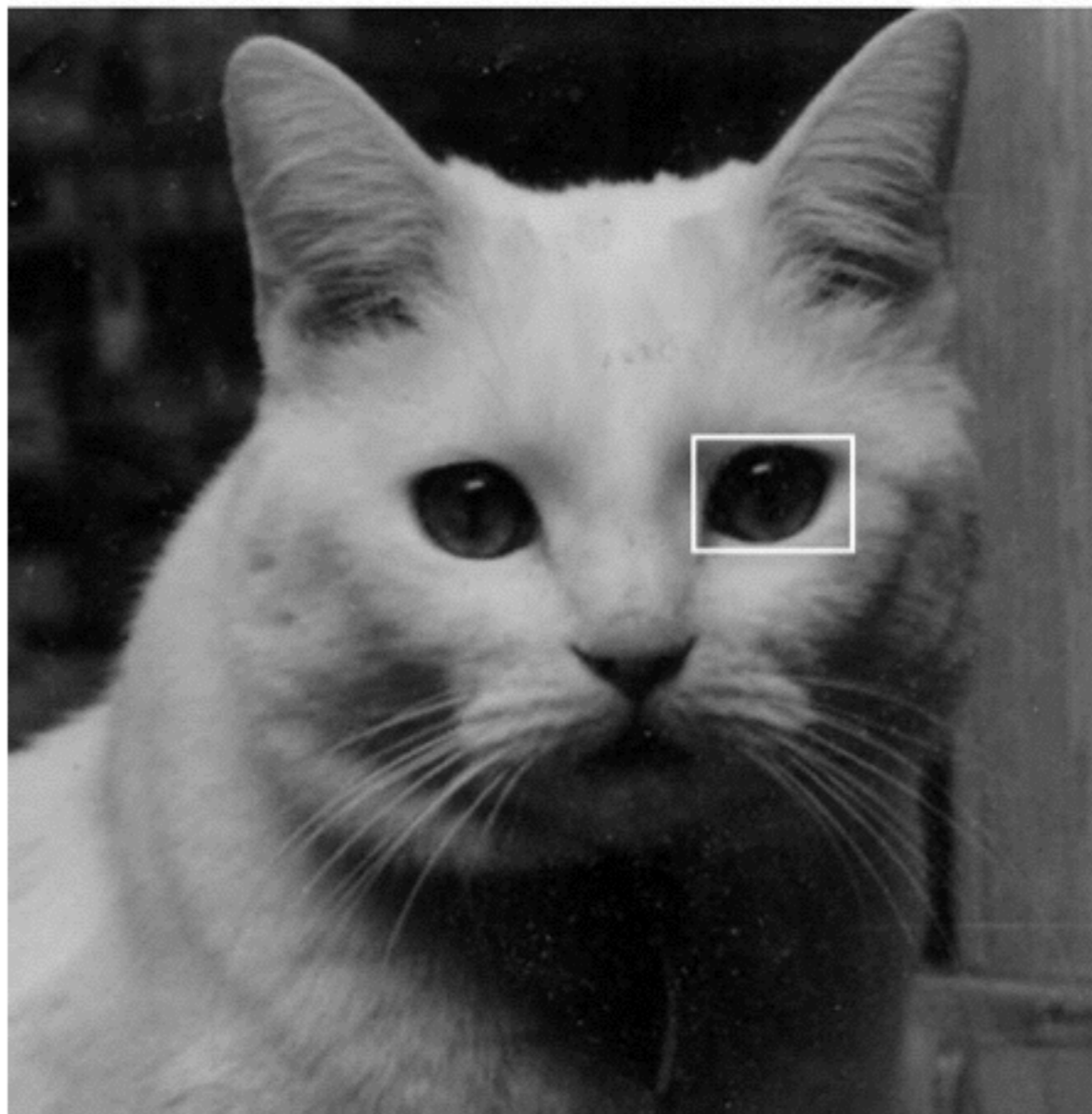
Bit-Depth	Number of Colors
1	2 (monochrome)
2	4 (CGA)
4	16 (EGA)
8	256 (VGA)
16	65,536 (High Color, XGA)
24	16,777,216 (True Color, SVGA)
32	16,777,216 (True Color + Alpha Channel)

*(Note alpha)*

(Humans can perceive ~10,000,000 colors)



# Raster Image

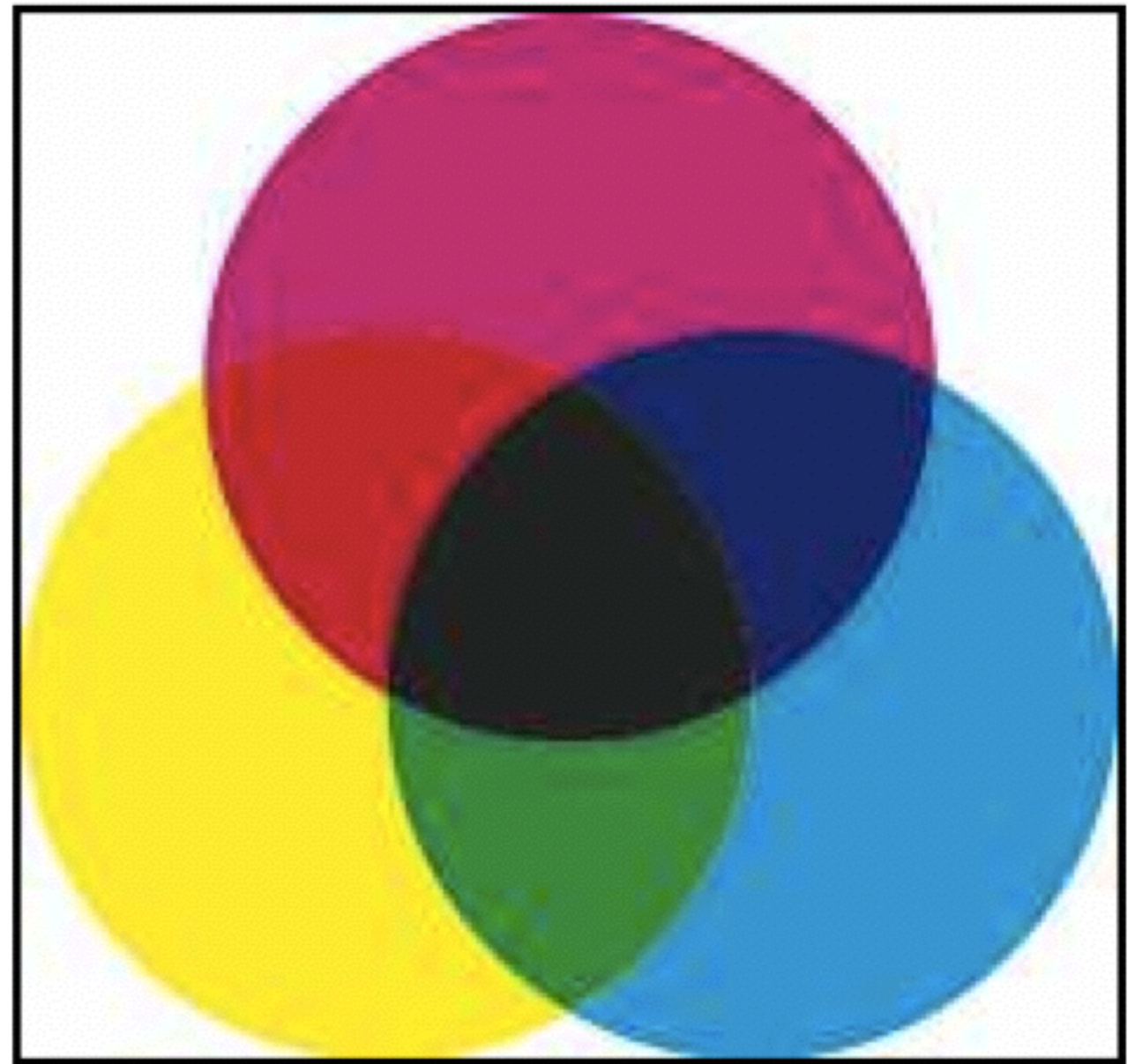


# Color representation

---



*additive*



*subtractive*

# Alpha Channel

$$\mathbf{c} = \alpha \mathbf{c}_f + (1 - \alpha) \mathbf{c}_b$$

