WHAT COLOR IS WHITE LIGHT?

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Available Light

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Striking a Balance
Building Blocks of a Lighting Design

- **CONTRAST**: Creating visual interest
- **RHYTHM**: Defining attitude and space
- **LAYERS & ACCENTING**: Composition / Leading the eye
- **DYNAMIC**: Angle / Change over time
Contrast... Contrast... Contrast!
What is White Light?
Visible Continuous Spectrum

X-Rays | Ultra Violet | Violet | Blue | Cyan | Green | Yellow | Amber | Red | Infra Red | Radar

350 nm | 400 nm | 450 nm | 500 nm | 550 nm | 600 nm | 650 nm | 700 nm | 750 nm | 800 nm
LIGHT
Additive Color Mixing

PIGMENT
Subtractive Color Mixing
Color Perception—What’s at Play?

Light Source \(\rightarrow\) Object \(\rightarrow\) Observer

Looks delicious!

Spectral Power Distribution (SPD)

\[\text{Object} \times \text{Spectral Reflectance Distribution (SRD)} = \text{Reflected Spectrum}\]

Thanks to Kevin Houser & Tony Esposito, Penn State University
Chromaticity Chart

CIE 1931

Primary Illuminants (x, y)

Red: 0.694, 0.313
Green: 0.300, 0.600
Blue: 0.150, 0.050

White point (X, Y) = 0.3127, 0.3141

The values around the CIE locus are the wavelengths in nm.
The path line within the chromatic diagram shows the color temperature in Kelvin.
The effect a light source has on the color appearance of objects by conscious or subconscious comparison with their color appearance under a reference light source. (CIE)
80 CRI - Desaturated
80 CRI - Saturated
Theoretical Example

Original
CRI = 95
$R_f = 93$
$R_g = 100$

Desaturated
CRI = 80
$R_f = 78$
$R_g = 90$

Red-Enhanced
CRI = 80
$R_f = 78$
$R_g = 110$

$R_f$ - Fidelity (how well a color is rendered)
$R_g$ - Gamut (saturation, above or below the black body radiator)
The Emotional Quality of Light
What is White?
Layering & Accenting (Color Contrast = Interest)
Layers of Light (& Color Temperature)

White House Visitor’s Center • Available Light
Color Contrast = Depth

Turandot at the Met, Design by Franco Zeffirelli
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Color is important when being true to nature.
Want drama? Color still matters.
Sometimes it’s fun to play with color.
Too bright?
Lessons Learned

• LED technology is still developing.
• Test drive a variety of color temperatures.
• Not all fixtures have an LED equivalent (yet).
• Teamwork
• Record everything.
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Hardware Demonstration

Come'on Down!