MIT Student Art Association  Spring 2011

Digital Photography
Color
color reproduction
color perception
color profiles
pigments
structural colors
the list goes on...
(a little) color theory
+ color temperature
Color Theory
3 Parameters:
Hue
Saturation
Brightness
Hue.
Hue.
primary hues
RYK
RGB
complementary colors: color contrast
Saturation.
Saturation.
Brightness.
yellow

starts to become some other color
blue

100%  90%  80%  70%  60%  50%  40%  30%  20%
green

100%  90%  80%  70%  60%  50%  40%  30%  20%
Advancing and receding colors.
Combining colors.
“color intensity”
thinking about color temperature...

light sources
indoor
fluorescent light
incandescent light
candlelight
window light

outdoor
sunlight
street lights
building lights
moonlight
fluorescent light
natural light (super complex)
clouds
haze
temperature
season
time of day
and more...
Color Temperature (K)
<table>
<thead>
<tr>
<th>Condition</th>
<th>Temperature (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Sky</td>
<td>10 000 K</td>
</tr>
<tr>
<td>Partly Cloudy</td>
<td>9 000 K</td>
</tr>
<tr>
<td>Overcast / Haze</td>
<td>8 000 K</td>
</tr>
<tr>
<td>Noon Daylight</td>
<td>7 000 K</td>
</tr>
<tr>
<td>Direct Sun</td>
<td>6 000 K</td>
</tr>
<tr>
<td>Late Sunrise</td>
<td>5 000 K</td>
</tr>
<tr>
<td>Early Sunset</td>
<td>4 000 K</td>
</tr>
<tr>
<td>Early Sunrise</td>
<td>3 000 K</td>
</tr>
<tr>
<td>Late Sunset</td>
<td>2 000 K</td>
</tr>
<tr>
<td>Early Sunrise</td>
<td>1 000 K</td>
</tr>
</tbody>
</table>

The colors range from cooler (blue) to warmer (red) based on the temperature.
camera vs. eye
Tungsten (Incandescent)

- 10 000 K: cooler
- 9 000 K
- 8 000 K
- 7 000 K
- 6 000 K
- 5 000 K
- 4 000 K
- 3 000 K
- 2 000 K
- 1 000 K: warmer
Fluorescent

- 10 000 K
- 9 000 K
- 8 000 K
- 7 000 K
- 6 000 K
- 5 000 K
- 4 000 K
- 3 000 K
- 2 000 K
- 1 000 K

cooler

warmer
Sodium Lights
(street lamps)

- 10000 K: cooler
- 9000 K
- 8000 K
- 7000 K
- 6000 K
- 5000 K
- 4000 K
- 3000 K
- 2000 K
- 1000 K: warmer
what to do with multiple sources?
let’s change our white balance!
- AUTO: camera sets white balance
- DAYLIGHT: camera adds warm tones
- CLOUDY: camera adds warm tones
- SHADE: camera adds warm tones
- TUNGSTEN: camera adds cool tones
- FLUORESCENT: camera adds warm (red) tones
- FLASH: camera adds warm tones
- CUSTOM: photographer sets white balance
Color and Gamut
(a.k.a. reproducing color is hard)