

# Today: Color Theory

Emily Sciulli & Sam Ventura  
36-315

Department of Statistics  
Carnegie Mellon University

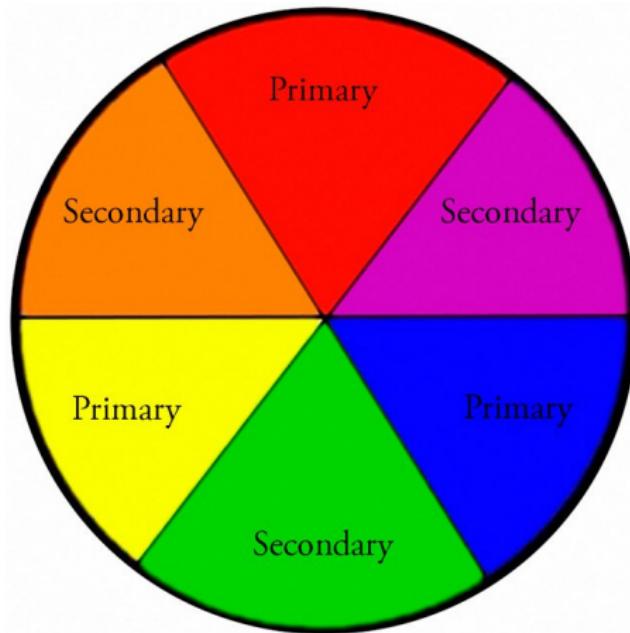
March 22, 2017

# The Color Wheel

**Hue:** The name of the color

**Primary Colors:** Red, Yellow, Blue

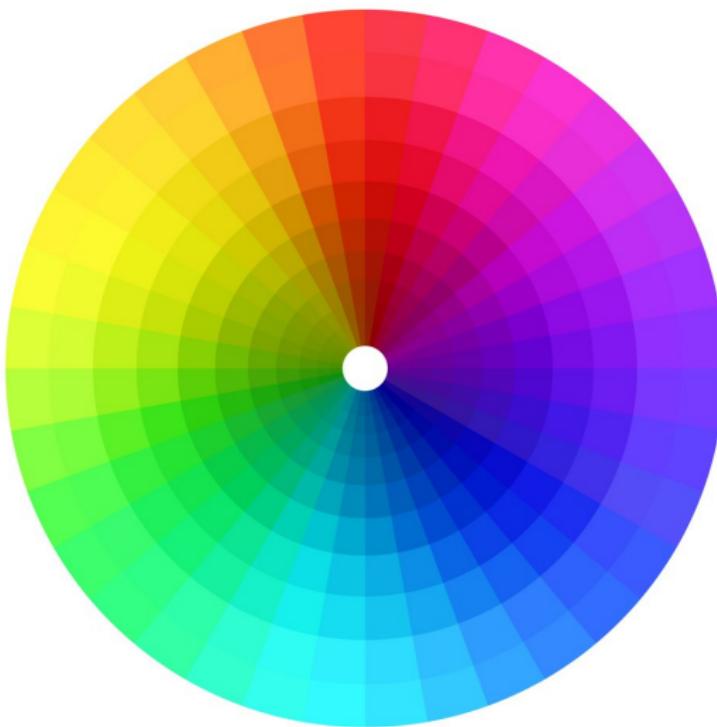
**Secondary Colors:** Orange, Green, Violet



## Tertiary Colors: E.g., red-orange, blue-green, etc

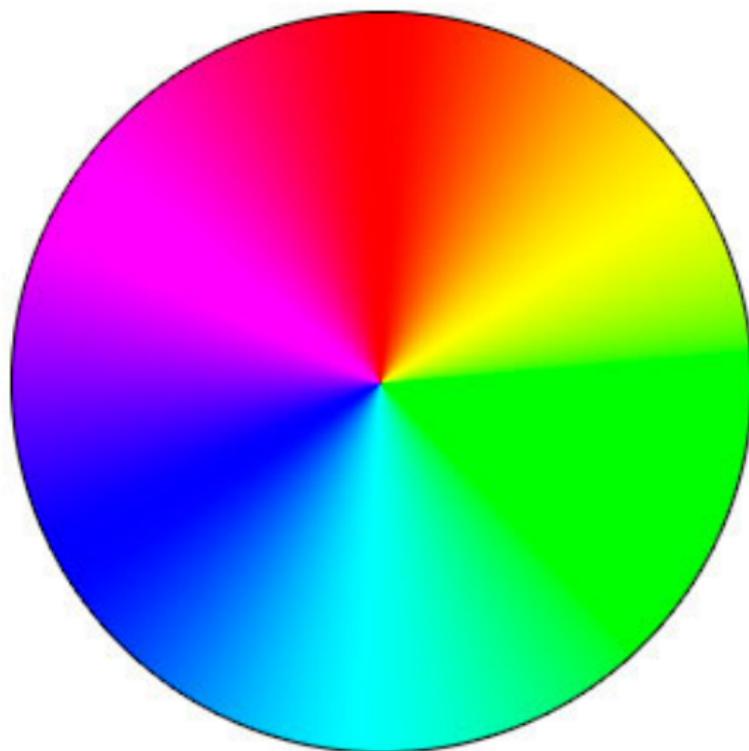


# Beyond Tertiary Colors in the Color Wheel



Resolution: 3000x4000 px  
Print: 300x300 mm  
www.psdgraphics.com

Color varies on a continuous – not a discrete – scale

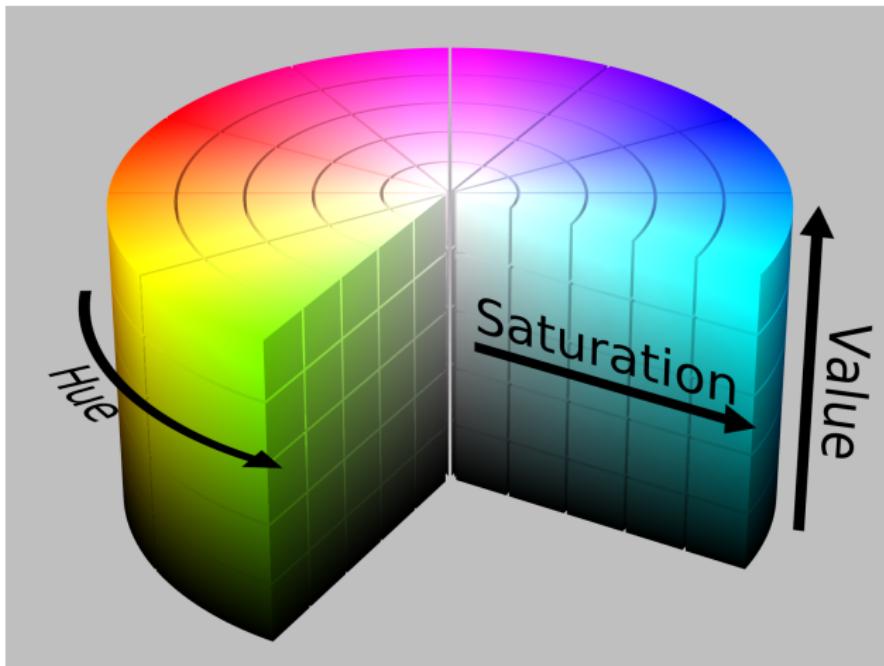


# Hue vs. Value vs. Saturation/Intensity

**Hue:** Name of the color

**Value:** How much white (tint)? How much black (shading)?

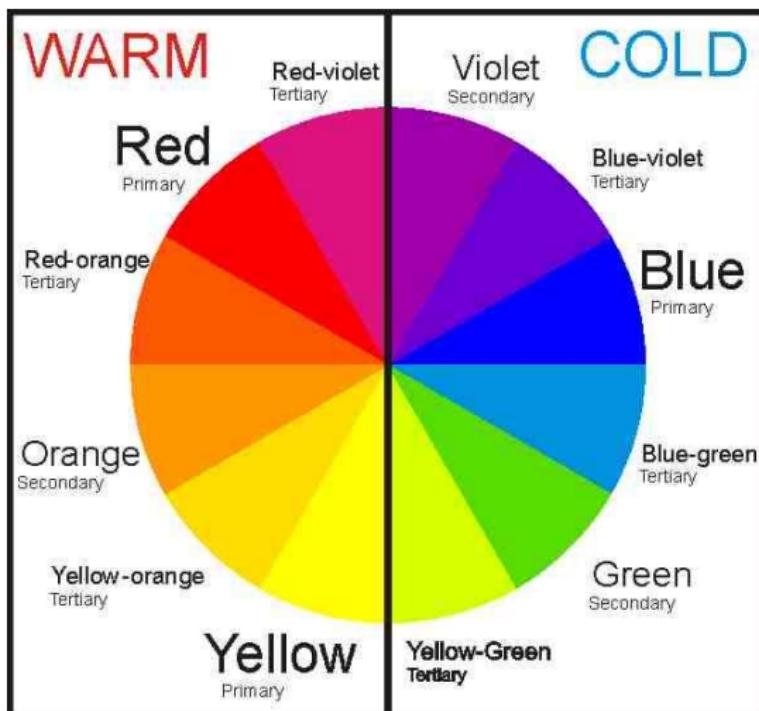
**Saturation/Intensity:** The “purity” of the hue



# Using Color to Represent Ideas in Data: Warm vs. Cool

**Warm:** appear more active; arouse/stimulate the viewer

**Cool:** tend to recede; calm/relax the viewer



# Using Color Schemes to Represent Ideas in Data: Analogous Colors

**Analogous Colors:** Appear next to each other on the color wheel



**Use analogous colors to represent similar groups**  
(e.g. "Strongly agree" vs. "Agree")

# Using Color Schemes to Represent Ideas in Data: Complementary Colors

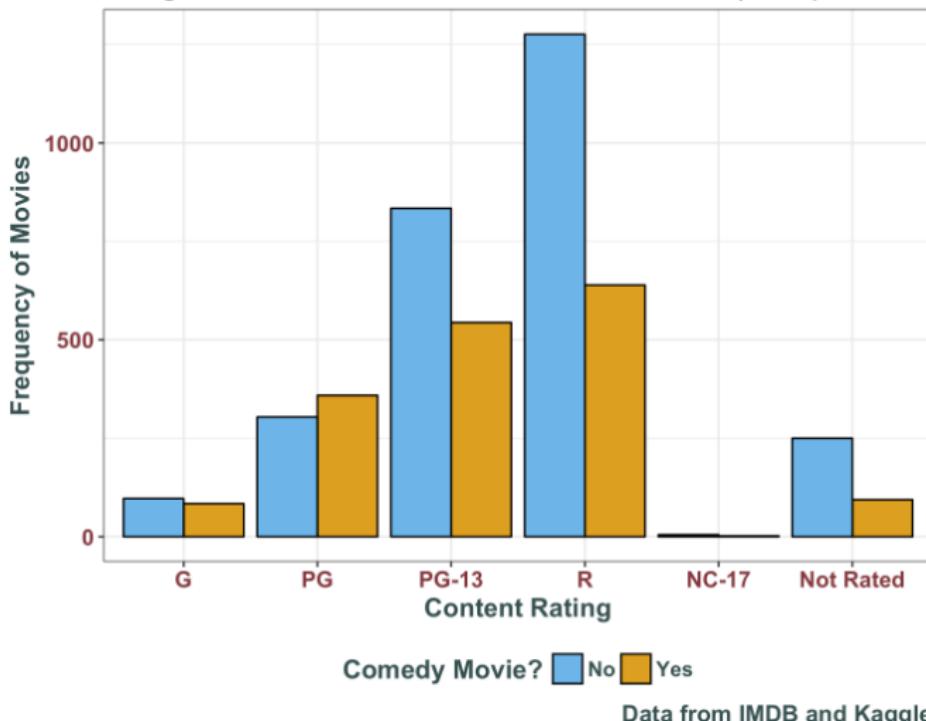
**Complementary Colors:** Appear across from each other



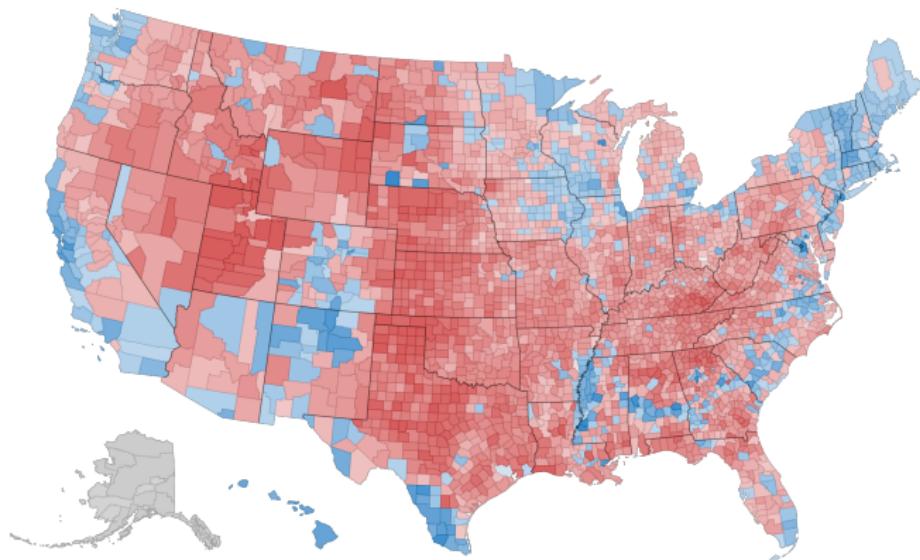
**Use complementary colors to represent differing groups**  
(e.g. men vs. women; “Agree” vs. “Disagree”, etc)

# Using Color Schemes to Represent Ideas in Data: Complementary Colors

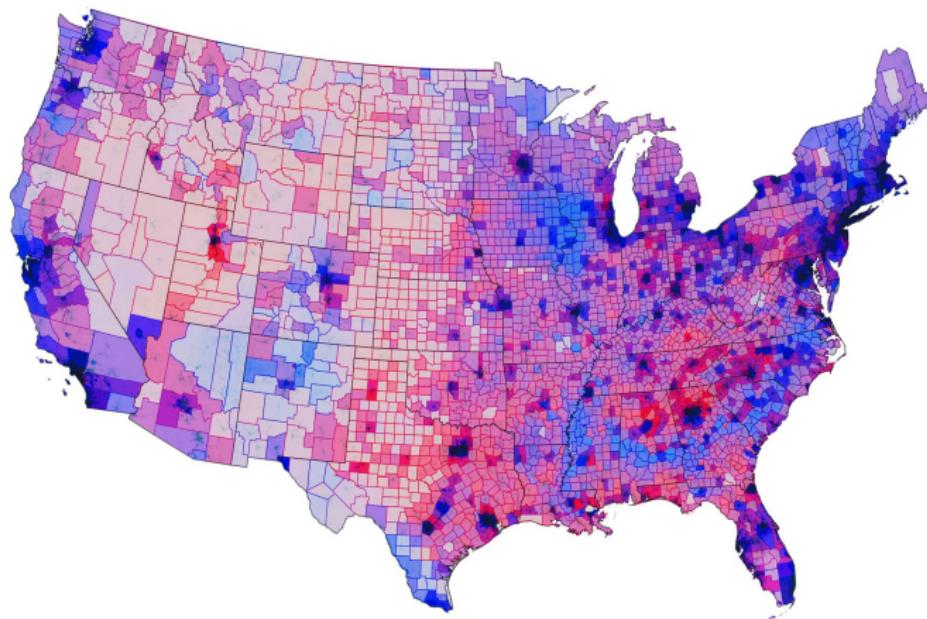
**Content Ratings of Comedy and Non-Comedy Movies**  
Ratings from the Motion Picture Association of America (MPAA)



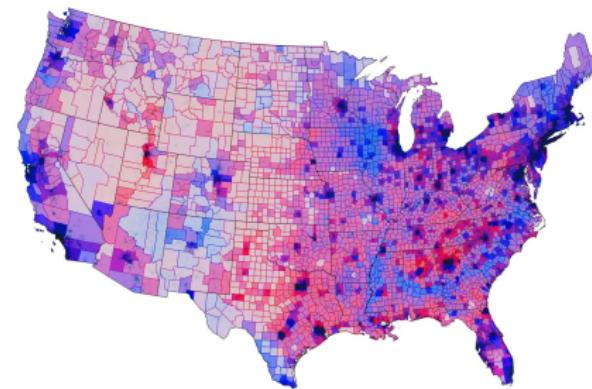
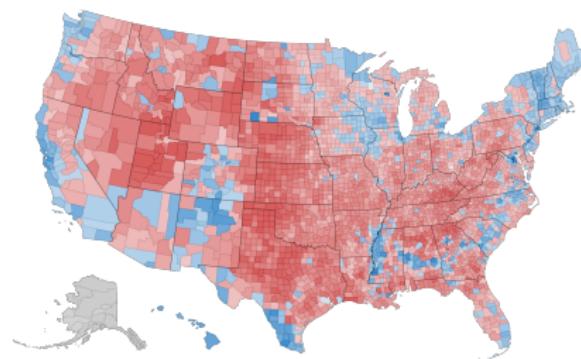
# Using Color Schemes to Represent Ideas in Data: Complementary Colors



# Using Color Schemes to Represent Ideas in Data: Complementary Colors



# Using Color Schemes to Represent Ideas in Data: Complementary Colors



# Using Color Schemes in Art: Analogous Colors

Vincent Van Gogh, *Wheat Fields After The Rain* (1890)



# Using Color Schemes in Art: Complementary Colors

Paul Signac, *Place des Lices, St. Tropez* (1893)



# Using Color Schemes in Art: Complementary Colors

Jasper Johns, *Flag* (1969)



# Color Blindness

**About 8% of men are color blind**

About 0.5% of women are color blind

Most common form of color blindness: Deuteranopia (“red-green”)



Normal Vision

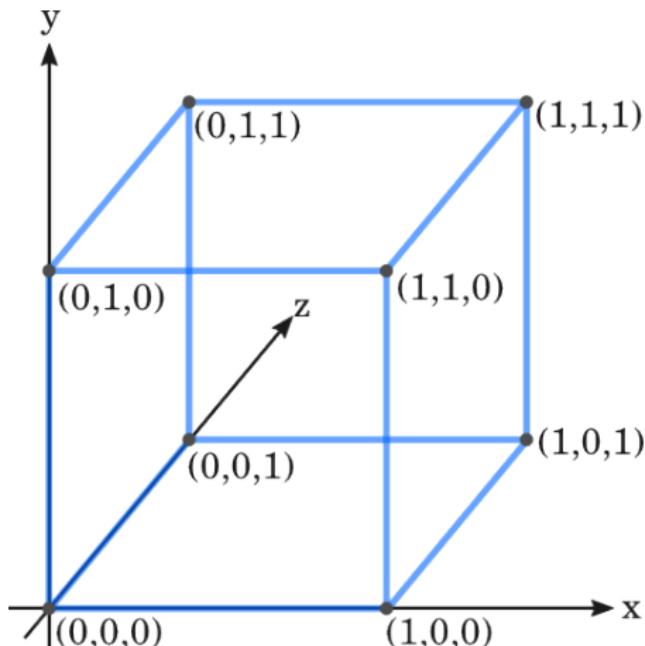


Deuteranopia

# RGB Colors

**RGB:** On computers, colors can be generated by varying the amount of red, green, and blue light

Represent RGB as 3-D space: Red  $\in [0, 1]$ , Green  $\in [0, 1]$ , Blue  $\in [0, 1]$



# The Color Cube

Represent RGB as 3-D space: Red  $\in [0, 1]$ , Green  $\in [0, 1]$ , Blue  $\in [0, 1]$

