SC 332 Lecture 12

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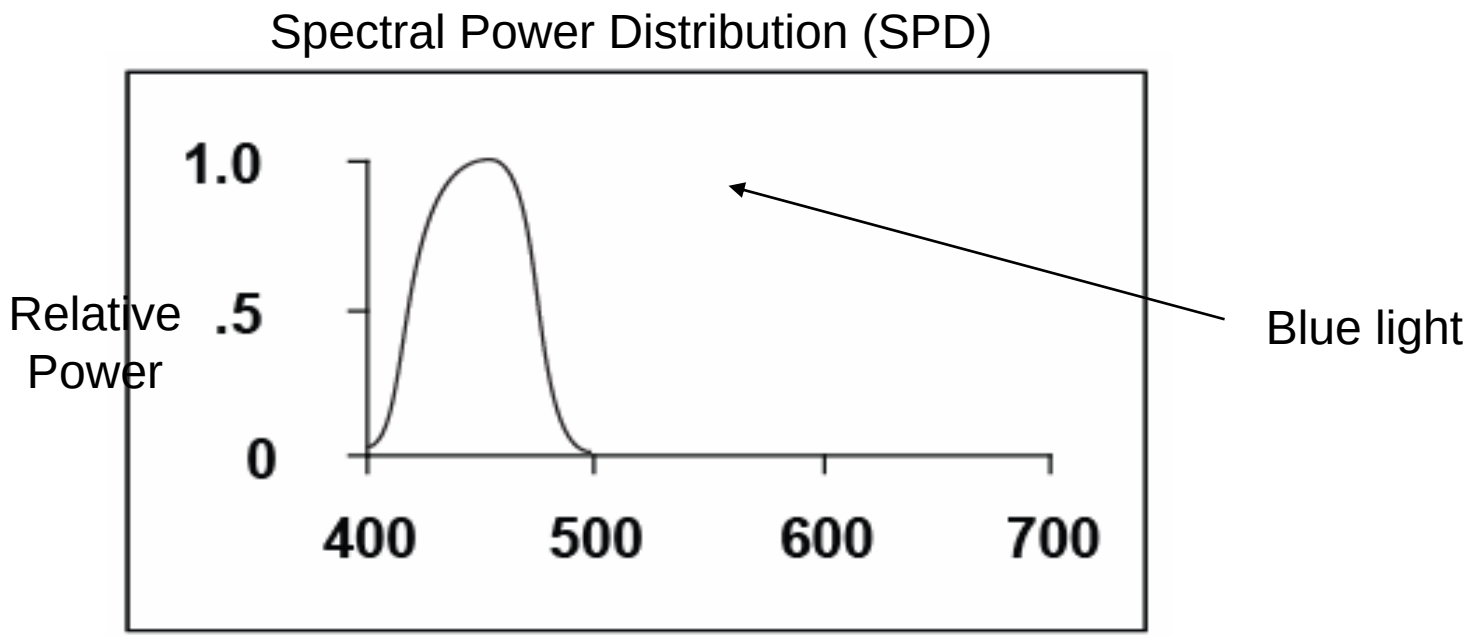
FIT Fall 2006

Today’s topics

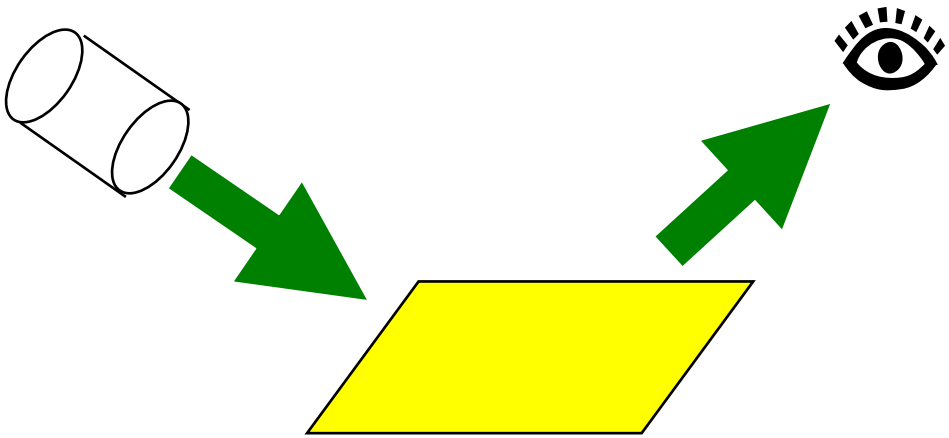
- Lights and Spectral Curves
- Will the real object color please stand up?

Spectral Curves for Lights

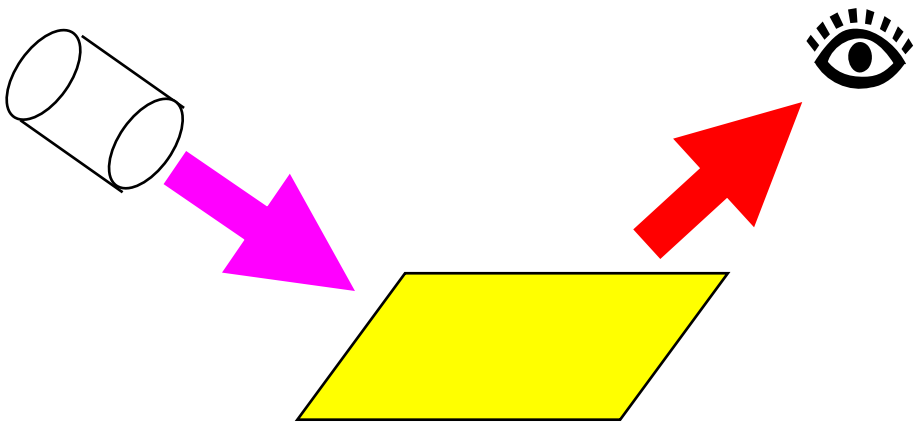
- Spectral power distribution (SPD) describes the color of the light source



Reflected Color We See Depends on the Illuminant



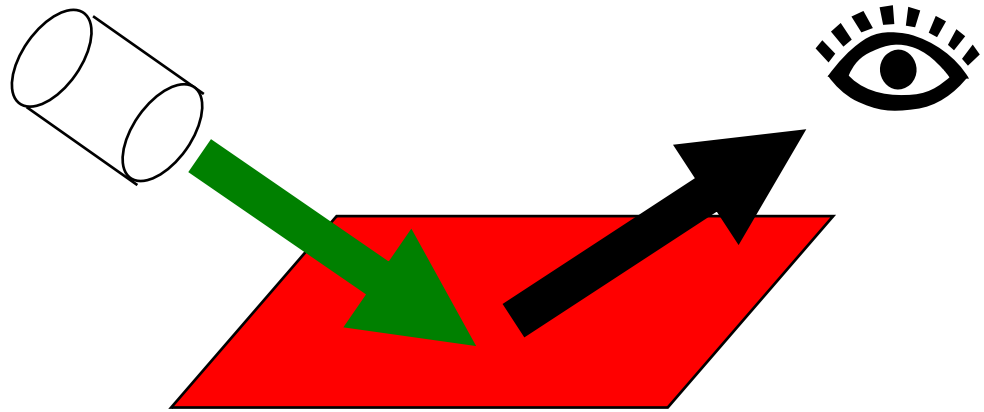
Green light on yellow object looks green



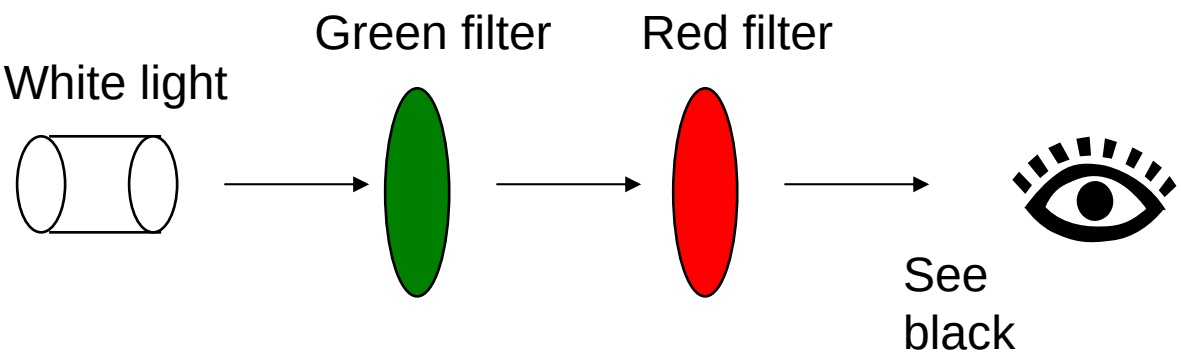
Magenta light on yellow object looks red

Does this look familiar?

Light and object



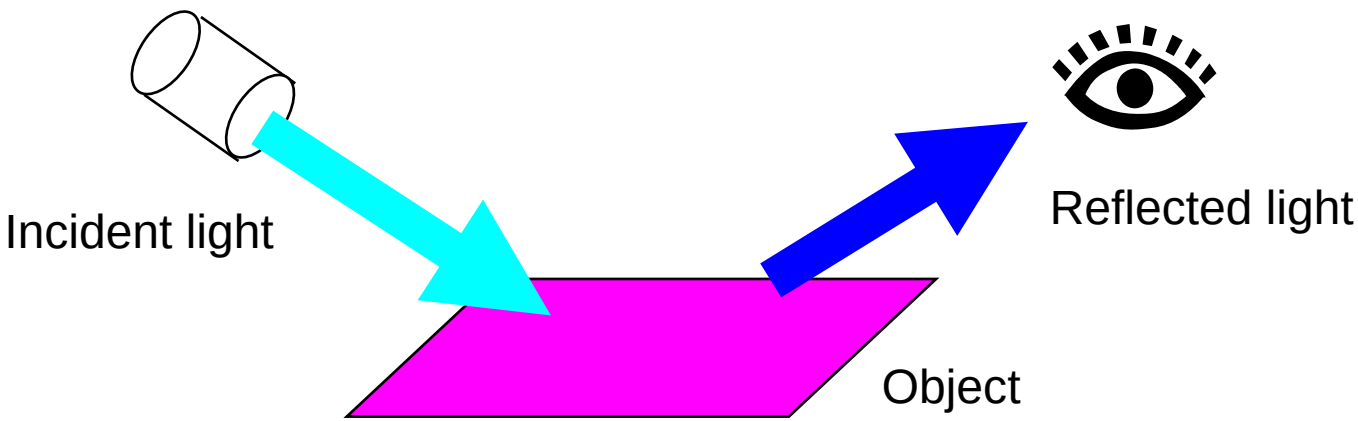
Simple subtractive mixing



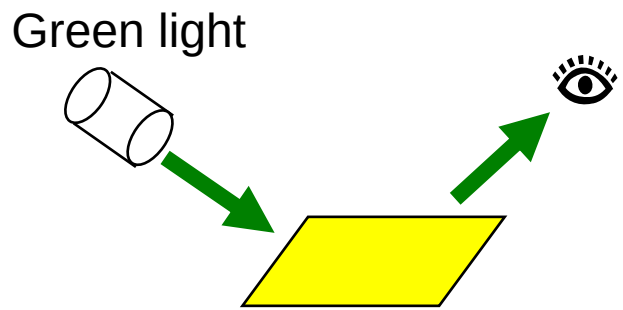
Spectral Curves for Reflected Light

- Spectral curves of the light and object are multiplied together

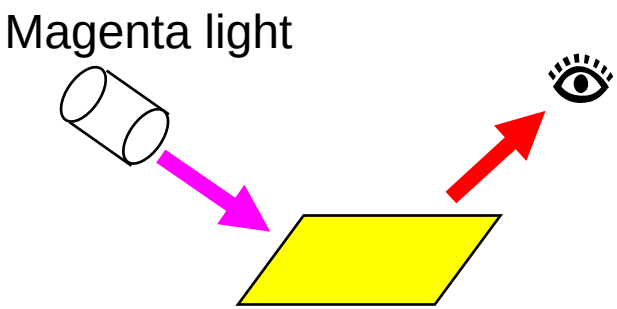
$$SPD_{reflected} = SPD_{incident} \cdot SRC_{object}$$



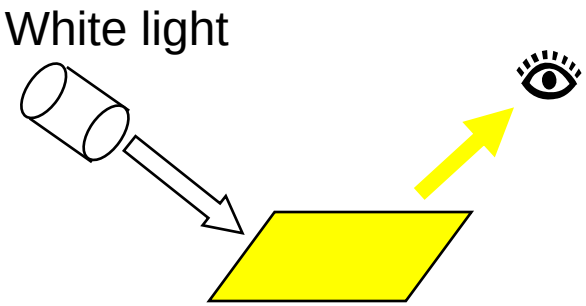
What is the Real Color of the Object?



Object looks green

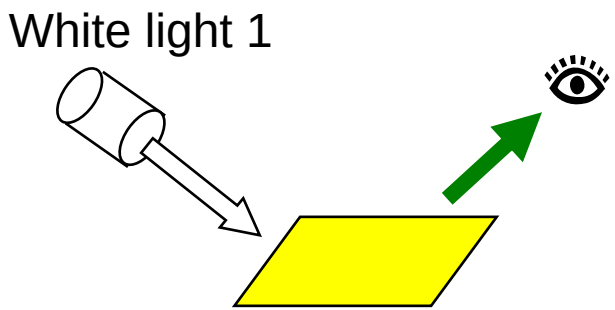


Object looks red

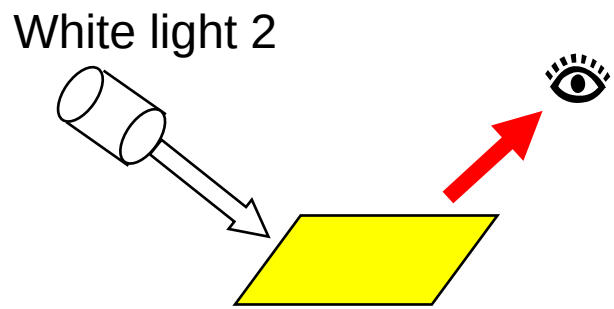


Object looks yellow

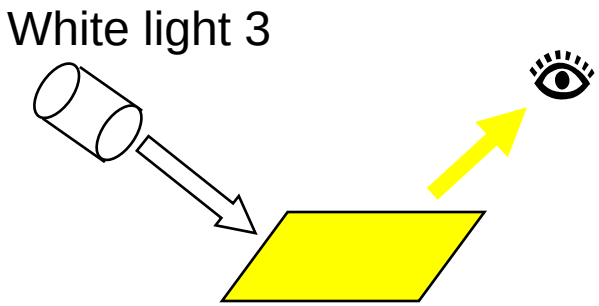
All White is Not Created Equal



Object looks green



Object looks red



Object looks yellow

Two White Lights That Look Exactly the Same To The Eye

Objects under light 1

Same Objects under light 2

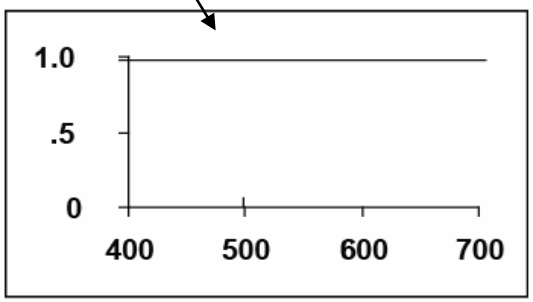
These lights appear the same when viewed alone

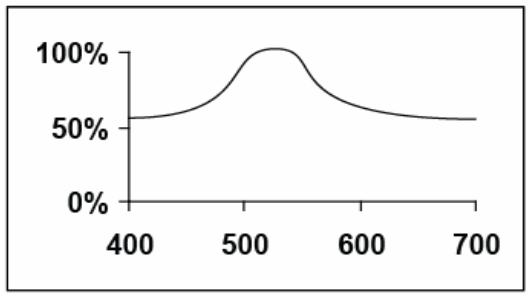
But have a very different effect on objects

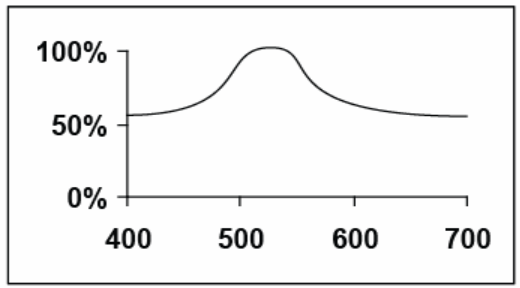
Why Tri-Phosphor lights are illegal

$$SPD_{incident} \times SRC_{object} = SPD_{reflected}$$

A simple white light



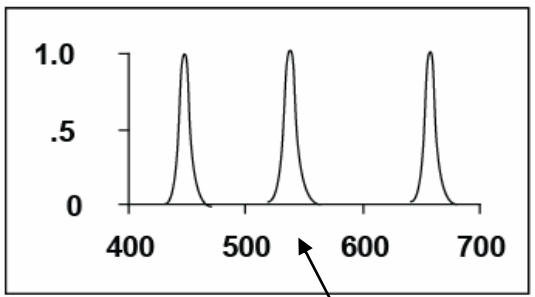


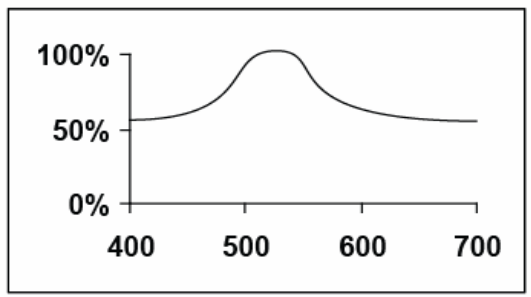


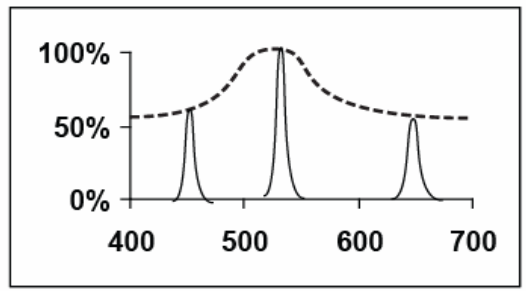
Lights look the same

Same object

Appears different

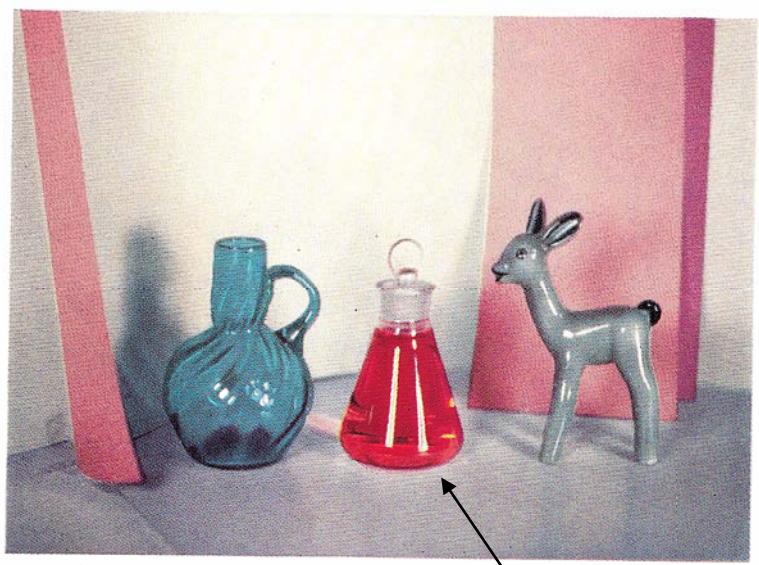






A tri-phosphor light

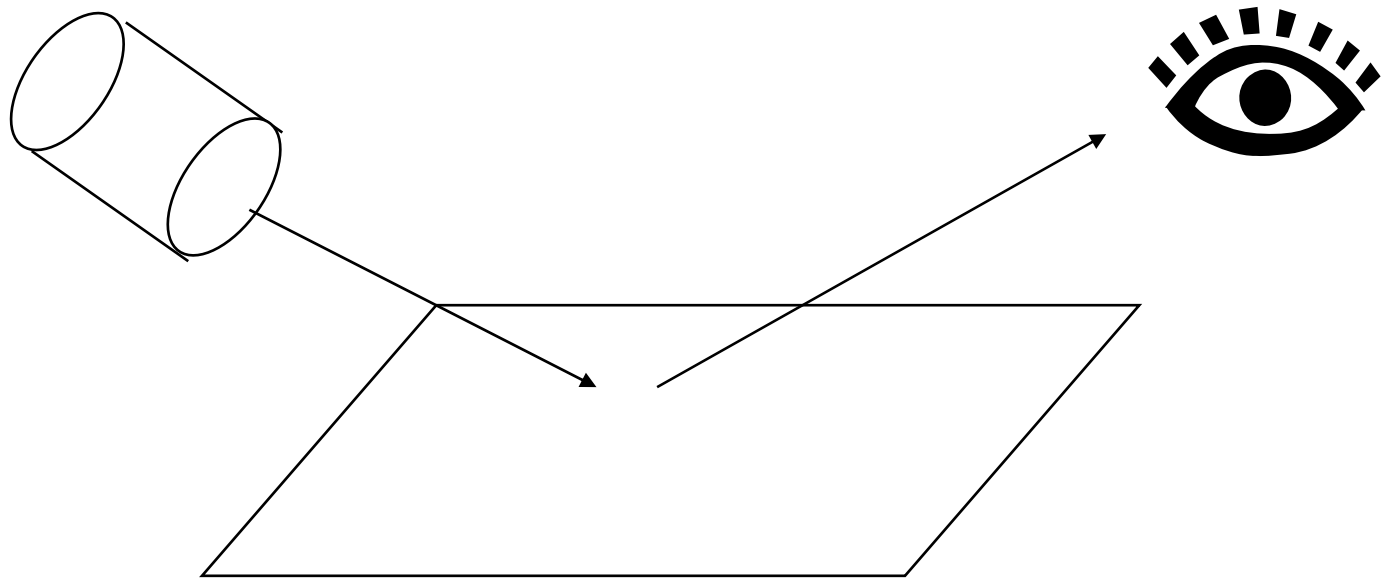
Is Everything We Thought We Knew About Color Wrong?



Is the liquid red or yellow?

Do objects have a color?

Color Depends on Three Things



- **Light Source**
- **Object**
- **Observer**