

MAGIC & SCIENCE

STORYTELLING WITH LIGHT

If you want to create stories with light at home or in the theatre, here are some reminders of what you learned and some experiments you can do. Enjoy!

Designer Tools

Angle What angle is the light source lighting the object from?

Top Light

Side Light

Back Light

Front Light

uplight (source is low with light pointing straight up)

Color - what color is the light?

Primary colors in light are: Red, Blue & Green

Secondary colors in light are: Cyan, Magenta, Yellow

Duration - length of time for light to come to full or to diminish to blackness

Intensity - how bright or dim the light

Pattern And Contrast - light and shadow; in theatrical lighting, patterns that go in lights are called gobos

More On Color

How the Eye Sees in Color

The retina contains cells called rods and cones that are sensitive to different colors of light.

LENS changes shape to allow the eye to focus light

RETINA light-sensitive lining of the eye

PUPIL opening that allows light into the eye

IRIS controls the size of the pupil and the amount of light entering the eye

RAY OF LIGHT

OPTIC NERVE carries signals to the brain

PHOTOSENSORS

CONE CELLS function best in bright light, are concentrated in center of retina

CELL STRUCTURE OF RETINA

ROD CELLS more sensitive than the cones to dim light

Why Bananas Appear Yellow

The full spectrum of light falls on the bananas, but only light with wavelengths of 570 to 580 nanometers, in other words "yellow" light, is bounced off. (A nanometer is one billionth of a meter.)

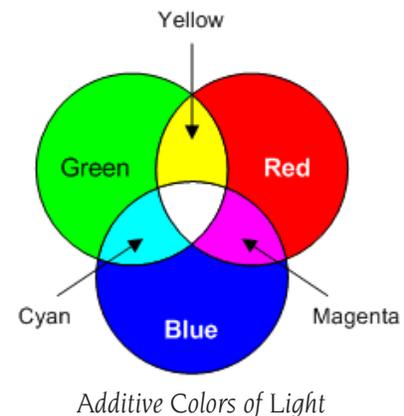
VISIBLE COLOR WAVELENGTHS

ultraviolet (invisible short wavelengths) 400 nm 500 600 700 infrared (invisible long wavelengths)

570-580 nanometers

Yellow light reflected from the bananas stimulates the eye's cone cells to varying degrees. Nerve signals from the cones travel to the optical cortex of the brain for decoding.

The eye interprets color through the Rods (greyscale) and Cones (Red, Green & Blue)



If you want to learn more about mixing colors, this site has color mixers you can play with: LSquaredMath.us/colorPrimaries

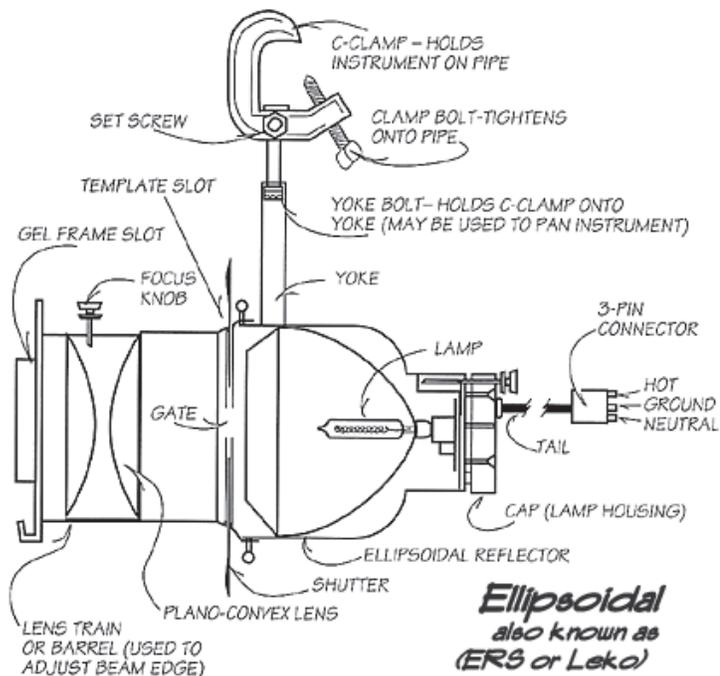
Types of Lights

The Ellipsoidal Reflector Spot (ERS) is a common type of light we use in theater. It has the advantage of being the only type where you are able to shape the beam either with shutters or with gobos (also called templates).

ERS's are commonly call them **Leko's** for their inventors Joseph Levy and Edward F. Kook, or **Source Fours'**, the name of the most commonly found type of ERS made by Electronic Theatre Controls (ETC).

The Leko has four main parts: The Reflector, Lamp, Lenses and Shutters.

Can you find all of these in the drawing below?



<http://www.fas.harvard.edu/~loebinfo/loebinfo/lighting/lighting.html>

LED's (Light Emmiting Diodes) are a new generation of lighting. They operate by using different gases in tiny tubes to create separate colors that merge in the eye to create new colors. They are additive color at the most flexible. Wikipedia has a great list of what gases produce what colors.



Other Projects

- **Make Gobos** Create patterns of light and shadow for your room by making patterns/gobos for flashlights & clip lights

SAFETY TIP: DO NOT ALLOW FOIL TO TOUCH A HOT BULB!!!

- **Color your flashlight** Using pieces of gel from your swatch book
- **Color your lamp** in your room by using a colored light bulb
- **Make a color wheel** with gel from your swatchbook
- **Flashlight Swords** Have a "lightsaber" match outside on a foggy night with flashlights.
- **Keep a light journal** Look at light in different environments and at different times of day. Keep a journal of what you observe. Record the quality of light, how the light makes you feel, where the source is coming from, color, pattern, intensity, and if the light dims, whether it gets brighter or stays constant.

Resources

Lighting Unit Diagrams

www.fas.harvard.edu/~loebinfo/loebinfo/lighting/lighting.html

Stage Lighting for Students

www.stagelightingprimer.com/index.html?slfs-color.html&2

Color Theory

www.gamonline.com/catalog/colortheory

How We See Color

ed.ted.com/lessons/how-we-see-color-colm-kelleher