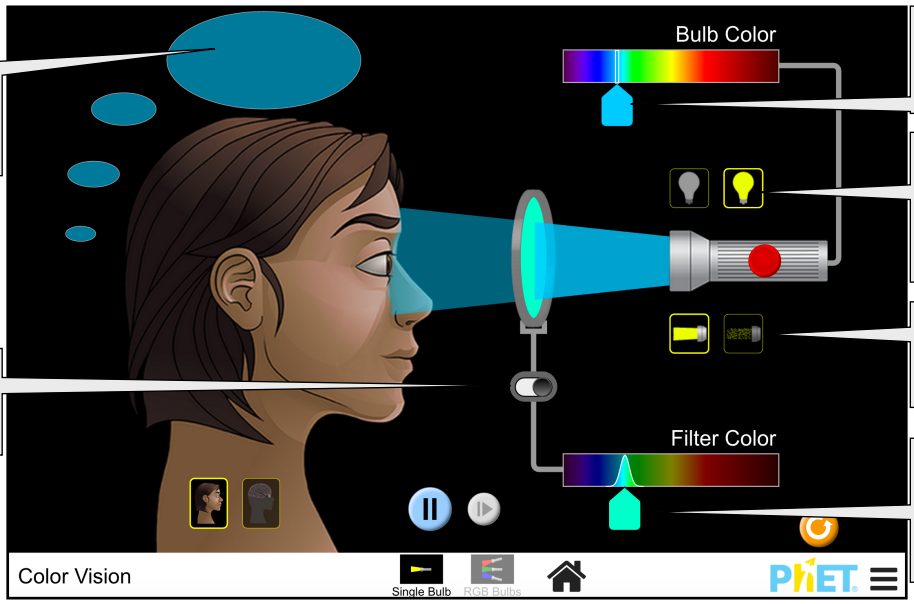
PhET Tips for Teachers

Color Vision

Single Bulb Screen

In this screen, students investigate color perception and color subtraction.



SEE the color perceived

REMOVE the filter

ADJUST the color of the bulb

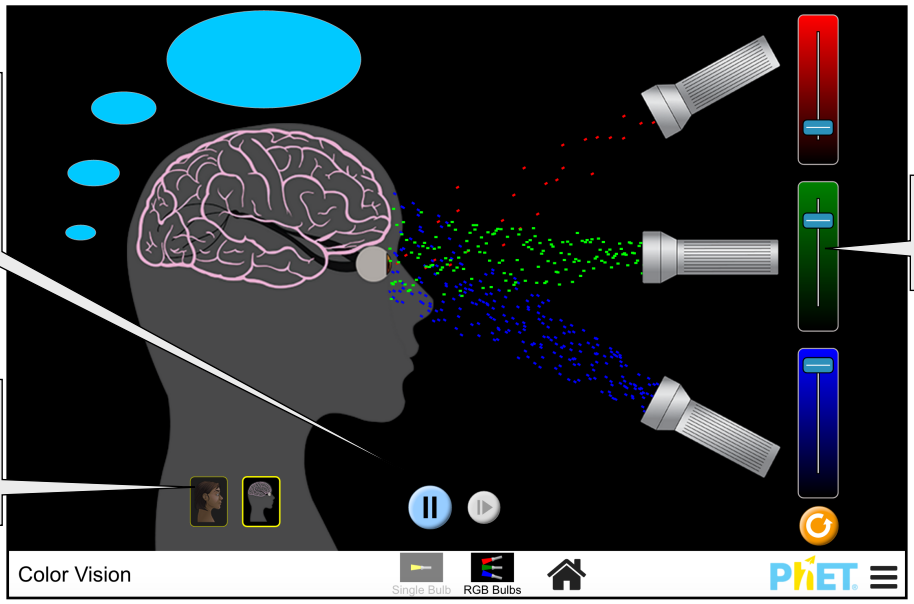
EXPLORE monochromatic or white light

VIEW beam or photons

ADJUST the bandwidth of the filter

RGB Bulbs Screen

Students can explore color addition with red, green, and blue light.



PAUSE and step through the motion of the photons

OBSERVE the brain and optic nerve

MIX red, green, and blue photons

Rouinfar, August 2023

Model Simplifications

- Each pixel photon represents many photons in the model. At times, color may still be perceived even when a pixel photon does not precisely hit the eye because the underlying model assumes there is a beam of photons present.
- Some photons will appear purple due to the algorithm used to map colors to RGB. However, purple is not attributable to a single pure wavelength, but rather a mixture. All purple photons present in the simulation should be assumed to be violet.
- The light source in the Single Bulb screen is modeled like a tunable laser, and the filters are modeled as optical bandpass filters. The goal of these filters is to get students to realize that a filter is subtractive not additive.

Customization Options

Query parameters allow for customization of the simulation, and can be added by appending a '`?`' to the sim URL, and separating each query parameter with a '`&`'. The general URL pattern is:
`…html?queryParameter1&queryParameter2&queryParameter3`

For example, in Color Vision, if you want to change the screen order (`screens=2,1`), with the 2nd screen open by default (`initialScreen=2`) use:
https://phet.colorado.edu/sims/html/color-vision/latest/color-vision_all.html?screens=2,1&initialScreen=2

To run this in Spanish (`locale=es`), the URL would become:
https://phet.colorado.edu/sims/html/color-vision/latest/color-vision_all.html?locale=es&screens=2,1&initialScreen=2

Query Parameter and Description	Example Links

`screens` - specifies which screens are included in the sim and their order. Each screen should be separated by a comma. For more information, visit the Help Center.	`screens=1`
	
	`screens=2,1`

`initialScreen` - opens the sim directly to the specified screen, bypassing the home screen.	`initialScreen=1` `initialScreen=2`
`locale` - specify the language of the simulation using ISO 639-1 codes. Available locales can be found on the simulation page on the Translations tab. Note: this only works if the simulation URL ends in "_all.html".	`locale=es` (Spanish) `locale=fr` (French)
`allowLinks` - when `false`, disables links that take students to an external URL. Default is `true`.	`allowLinks=false`

Suggestions for Use

Challenge Prompts

- Describe what happens to white light when it passes through a filter. Are filters additive or subtractive?

- Explain what happens when the filter and bulb have similar colors. Is the light filtered out completely, or does some of it get through?
- How is white light created? Is white a color? Explain.
- What are the secondary colors of light? Explain how they are created.
- Use the RGB sliders to produce orange, purple, brown, and gray. How much red, green, and blue is needed to produce each of these colors?

See all published activities for Color Vision here.
For more tips on using PhET sims with your students, see Tips for Using PhET.

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