

Notes on Color

Tyler Neylon

352.2024

[Formats: [html](#) | [pdf](#)]

This post captures my own notes about color, categorized according to some key questions I had when I began.

I have a daydream of one day writing up something like an engineer's guide to color that is at once engaging, well-designed, educational, and a pleasure to read. For now I'm just aiming for educational.

1 The nature of human vision

- How do we know that color is a 3-dimensional thing?
 - Related: If we have 3 types of cones plus rods, why isn't color 4-dimensional?
- Why are red, green, and blue special?
- How do we know humans have 3 types of cones?
- How do rods and cones perceive color?
 - Related: What is a mathematical model for how light in the world is translated into signals in the brain?
- How do we know the actual cone sensitivities?
- What do negative coefficients mean in color matching experiments, and how can I think about those?
- Why do the ends of the rainbow meet up so nicely?
 - Related: Are all the colors we see based on physically real colors?
- Why do we see the light spectrum that we do?
- Why is the chromaticity diagram the shape that it is?
- Are there colors we could theoretically perceive, but can't exist in reality?
- How can I model, with mathematical precision, the common types of color blindness?

2 Questions about light and color itself

- How do blacklights work?
- How does infrared light interact with heat?

3 Reproducing colors

- How do monitors and printers reproduce any color?
- Why can't a monitor display all possible colors?
- What are color spaces?
- What are the HSL and HSV color spaces, and how do they differ?
- What's the difference between chroma and saturation?
- What are the formulas for switching between RGB, HSL, and HSV?
- What does the name sRGB indicate?