Chapter 6: Vision

General Principles of Sensory Processing

The Visual Stimulus

The Anatomy of the Visual System

Coding of Light and Dark

Coding of Color

The Primary Visual Cortex

Perception of Visual Information

Coding of Color

Cones and Color Vision.

- B/W vision adequate for most purposes
- color vision is important in identifying ripeness, counteracting camouflage...
- humans, old world monkeys and apes have
  3 types of cones (3 iodopsins) providing elaborate color vision

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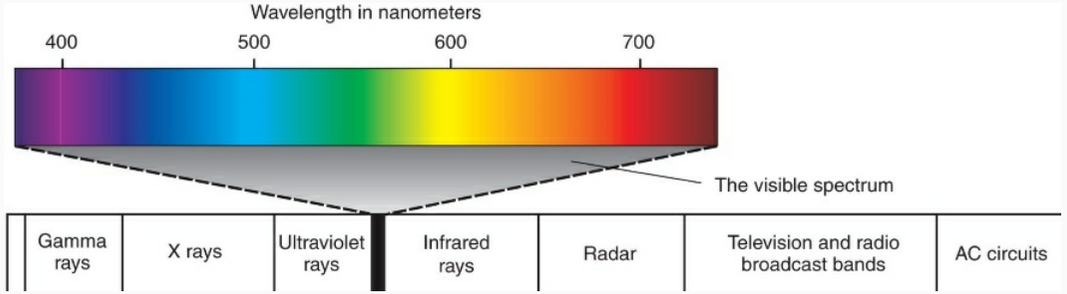
Coding of Color

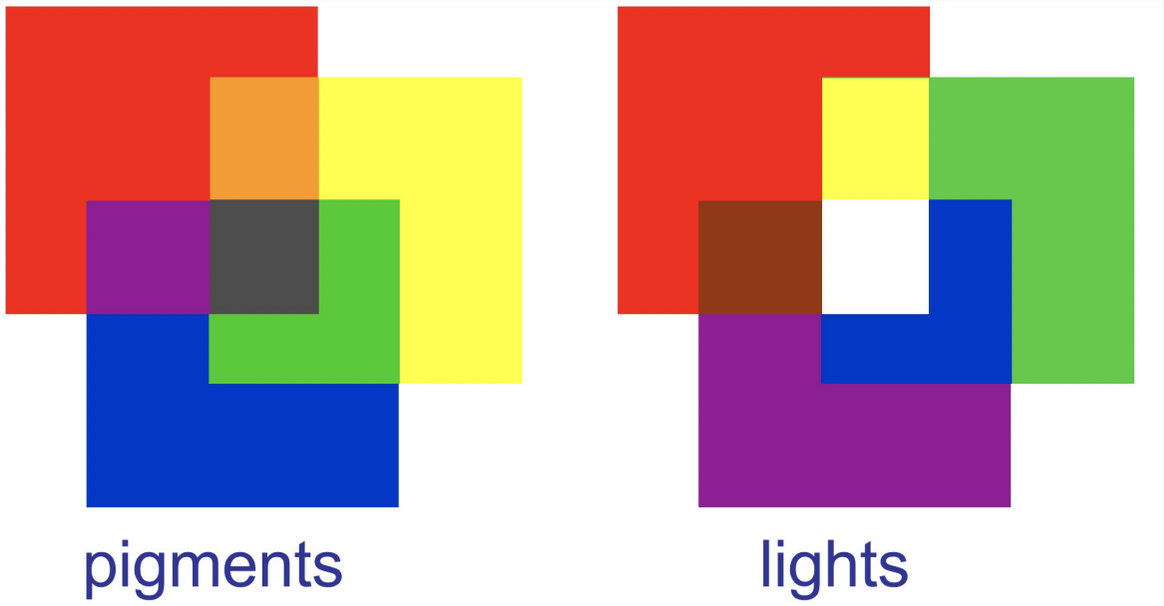
Cones and Color Vision.

- mixing of colored light differs from pigment mixing
- red+yellow+blue = muddy gray pigment
- red+yellow+blue = white light



Trichromatic (Young-Helmholtz) Theory of Color Vision.

- based upon observation that any color of light can be obtaining by mixing various amounts of red, yellow, blue
- proposed that humans have 3 kinds of photoreceptors that work together to give perception of color



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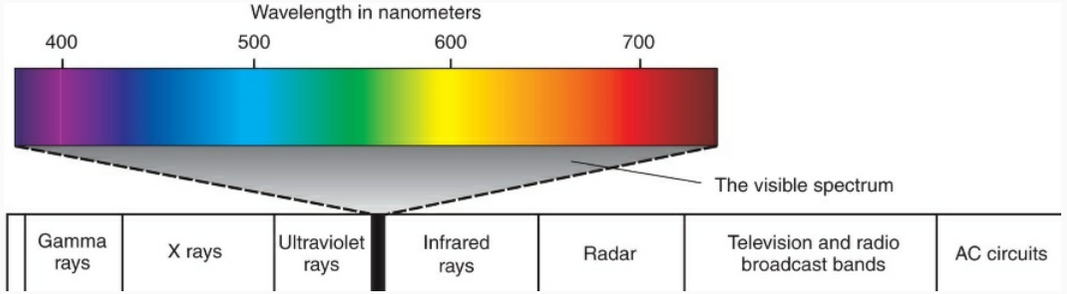

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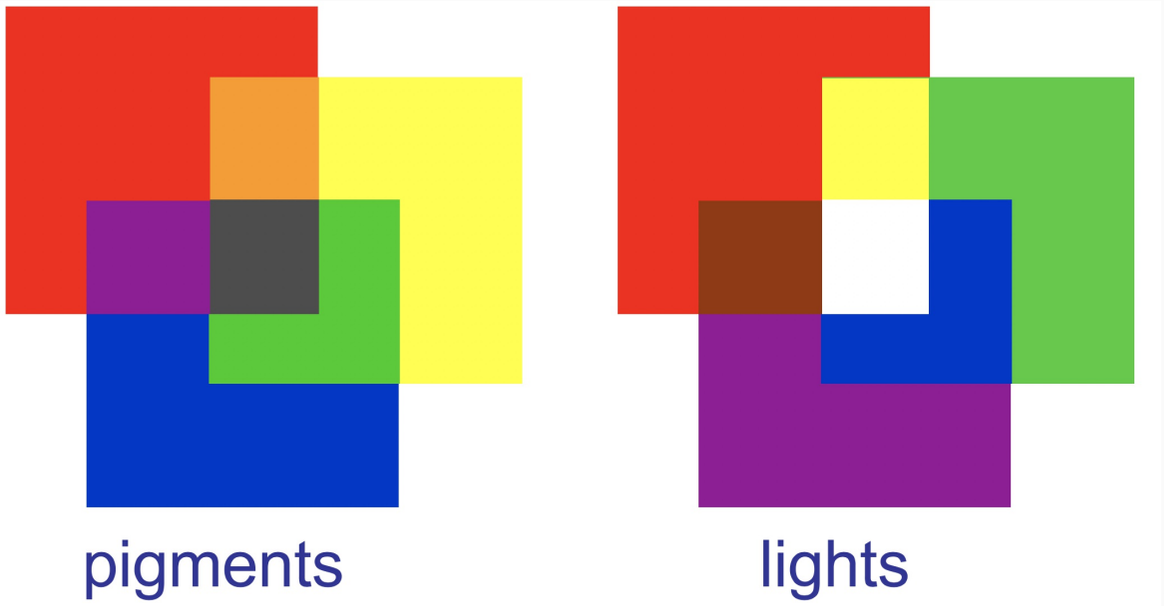
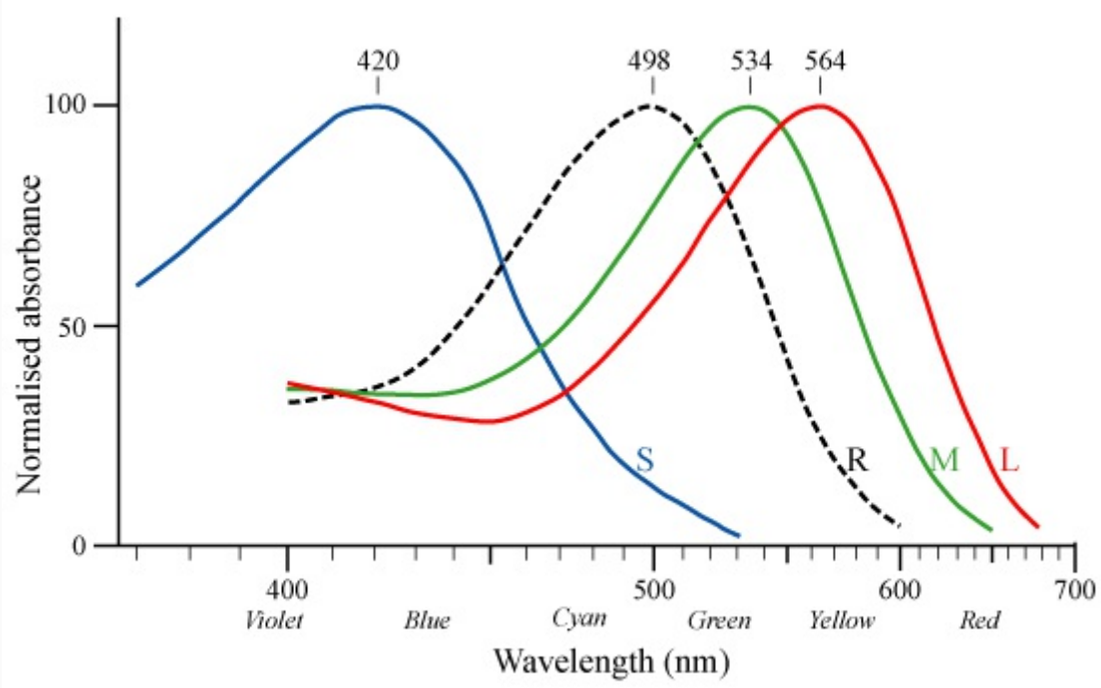


Coding of Color

Cones and Color Vision.

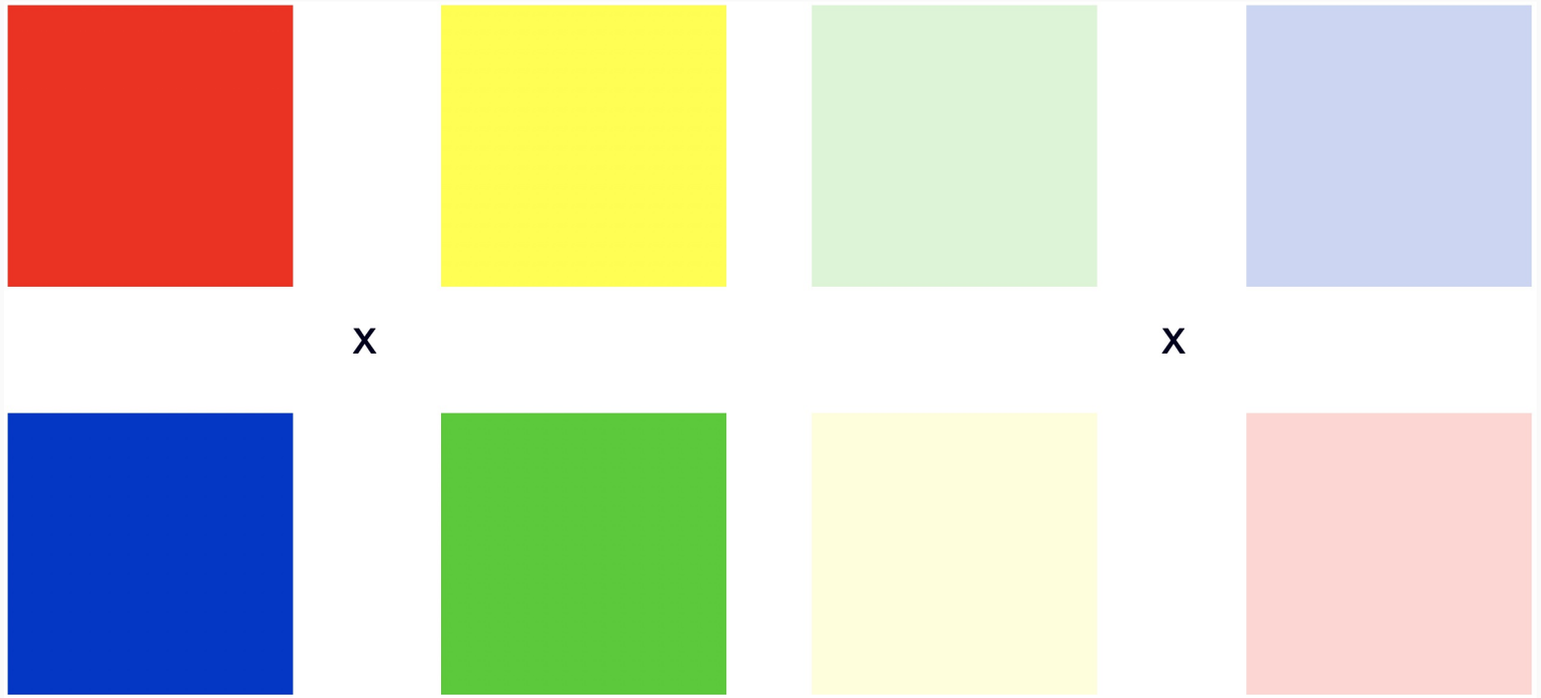
- cones exhibit maximal responses at 420 (short), 534 (medium), or 564 (long) nm
- determined by type of iodopsin in cone
- each cone responds over a range of wavelengths

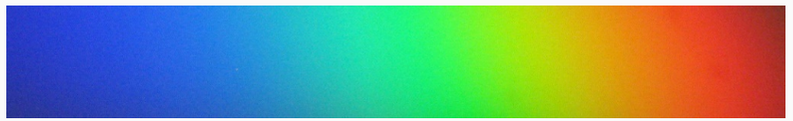


Coding of Color

Opponent Process Theory of Color Vision.

- based upon observation that some colors don’t blend
- based upon negative afterimages
- trichromatic theory cannot explain

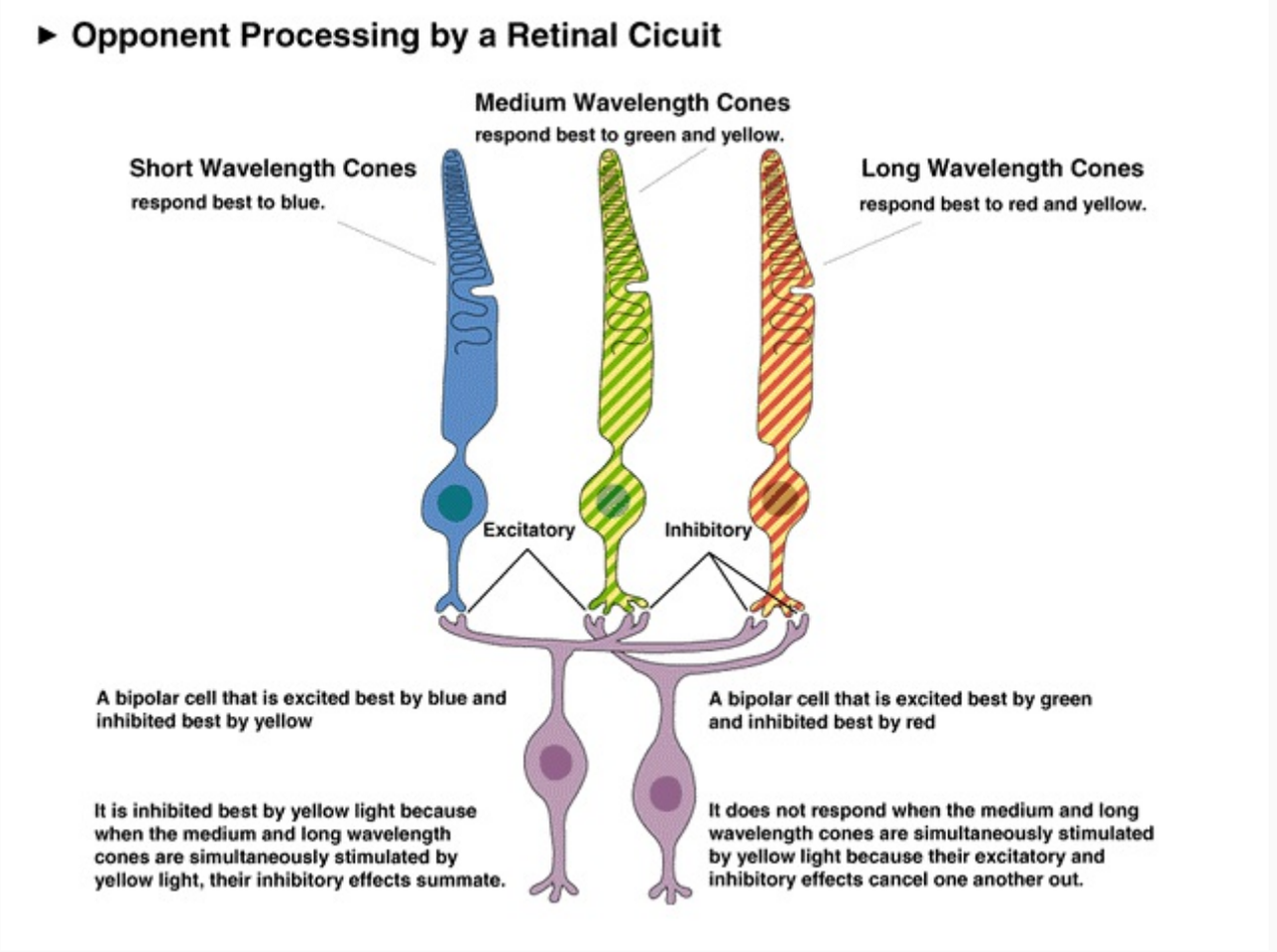




Coding of Color

Opponent Process Theory of Color Vision.

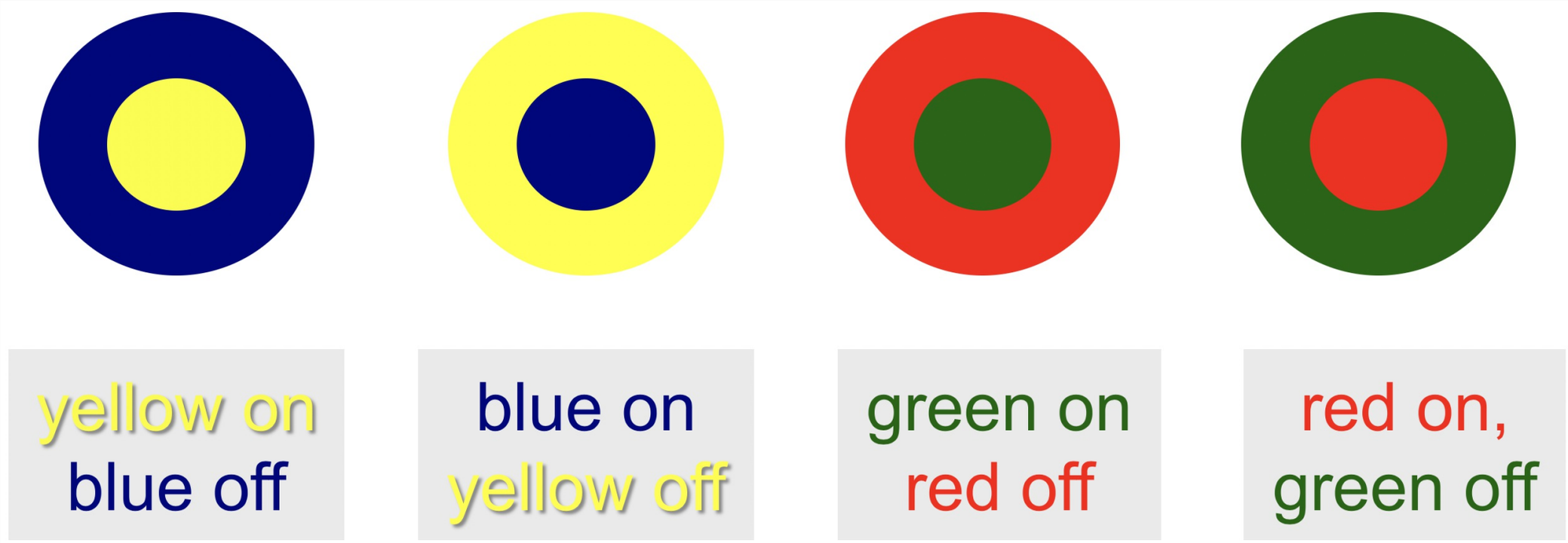
- 2 kinds of colour sensitivity in ganglion cells
  - "medium opposes long"
  - "short opposes medium/long"



Coding of Color

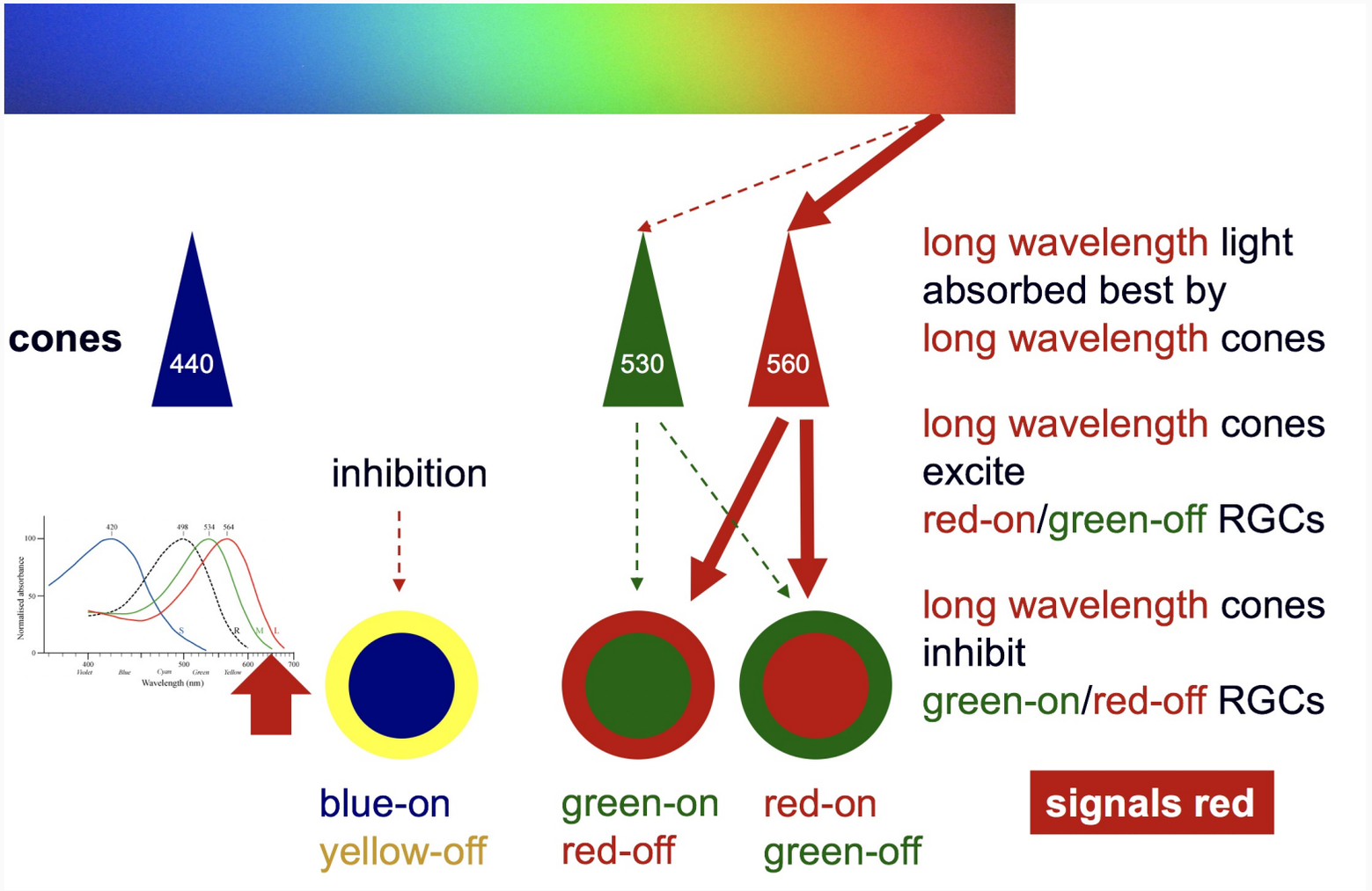
Opponent Process Theory of Color Vision.

- 2 kinds of colour sensitivity in ganglion cells
  - "medium opposes long"
  - "short opposes medium/long"
- roughly concentric cone-fed inputs



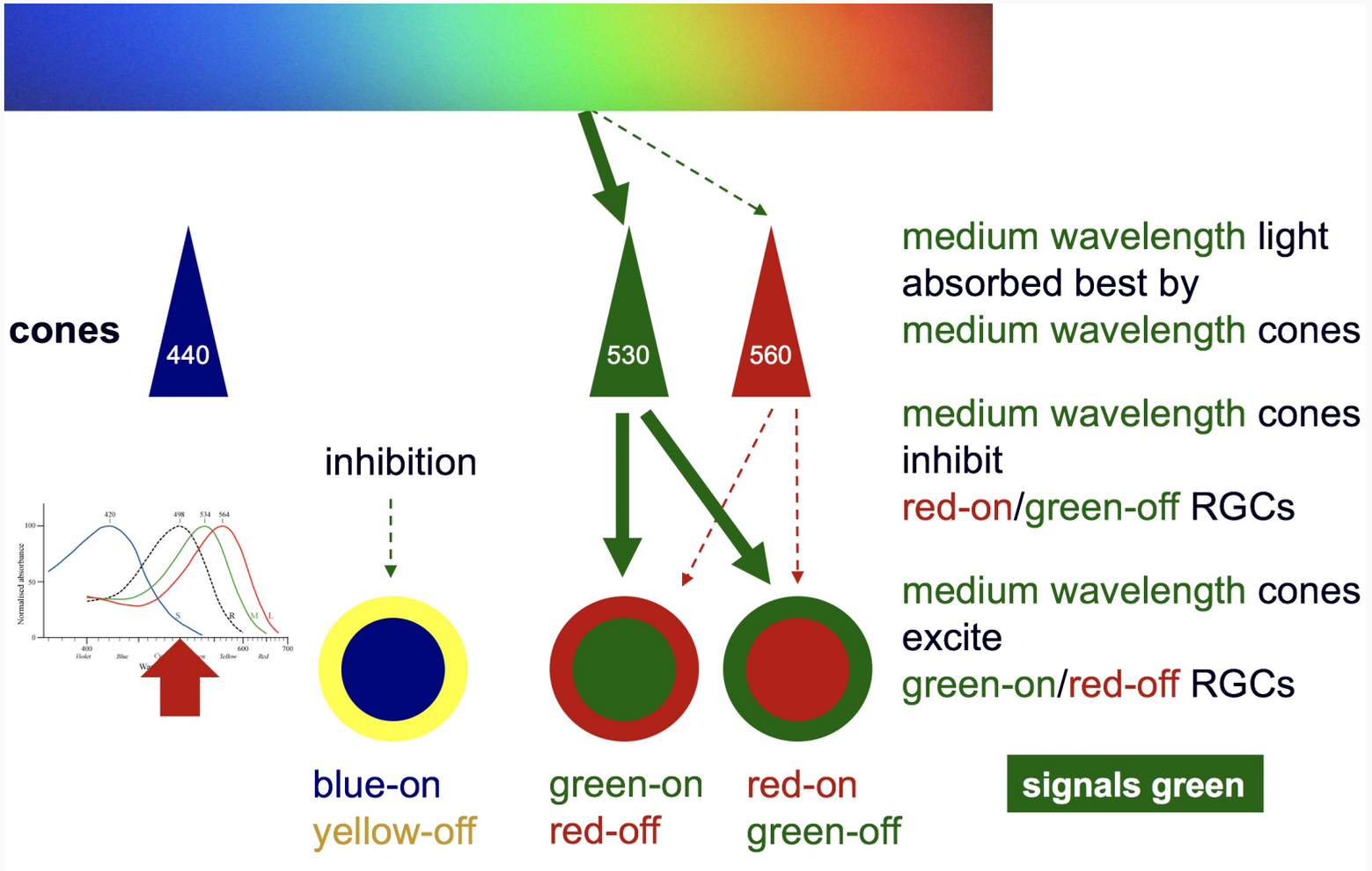
Coding of Color

Retinal Color-Coding, Long Wavelength Light.



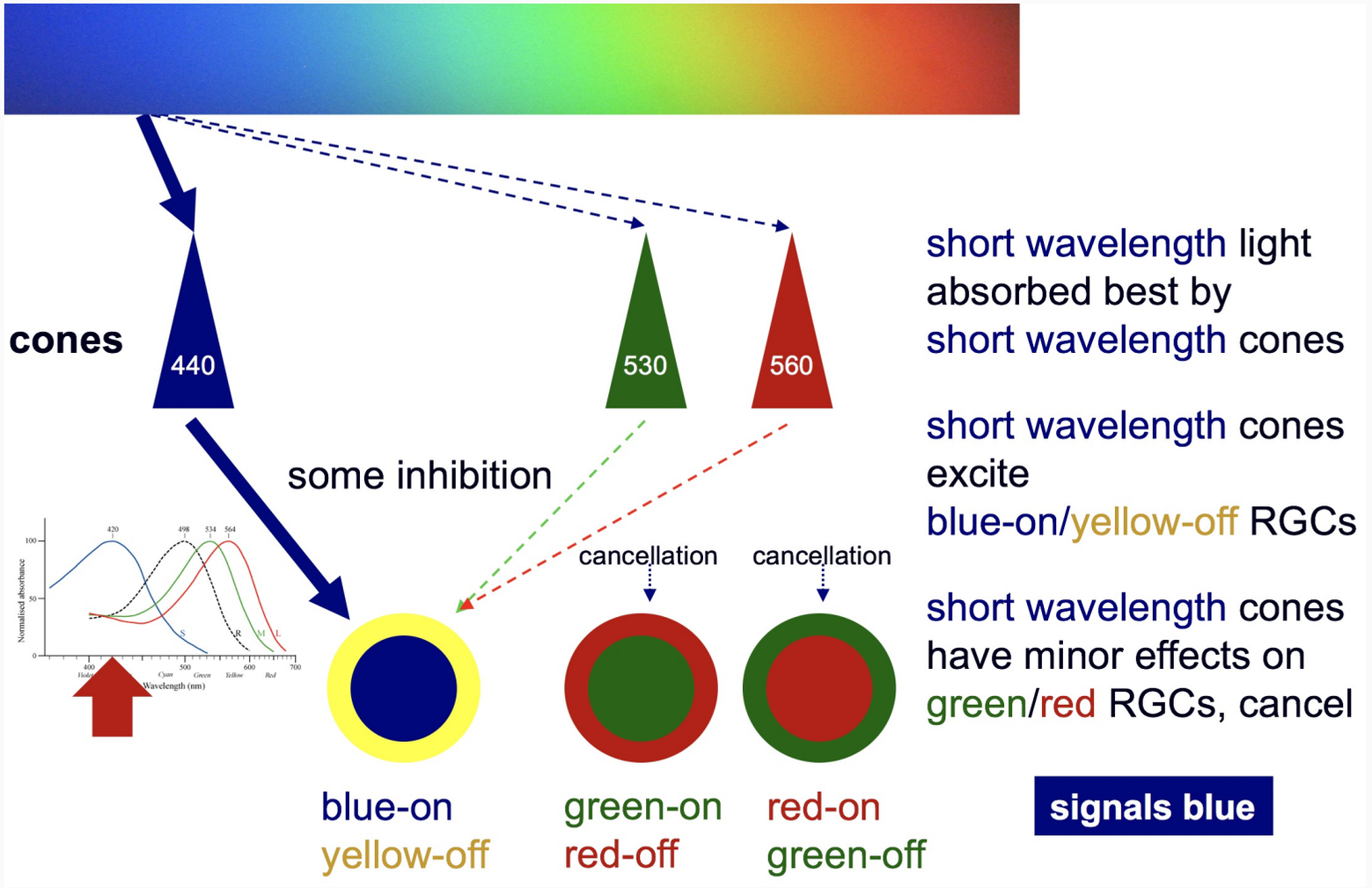
Coding of Color

Retinal Color-Coding, Medium Wavelength Light.



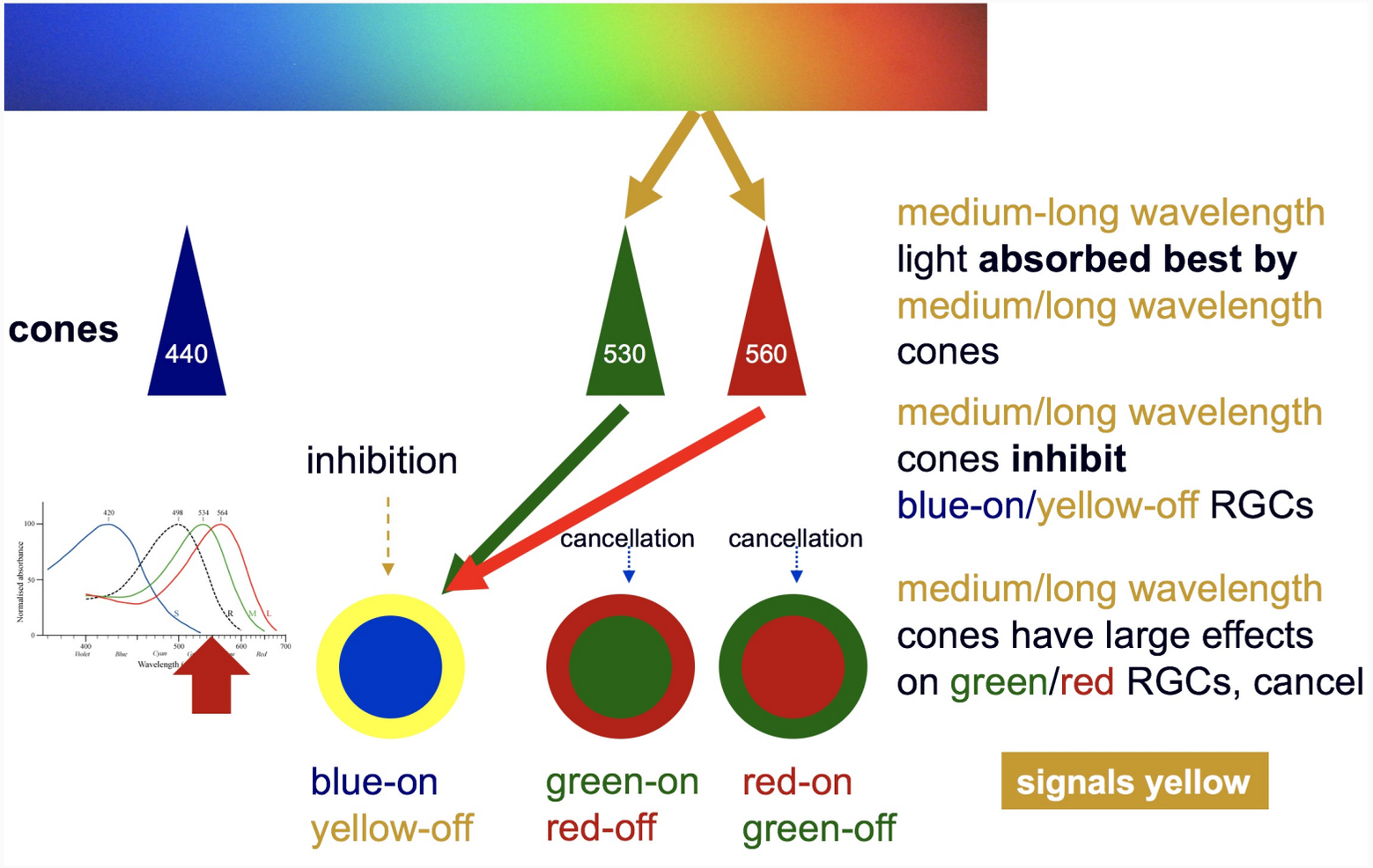
Coding of Color

Retinal Color-Coding, Short Wavelength Light.



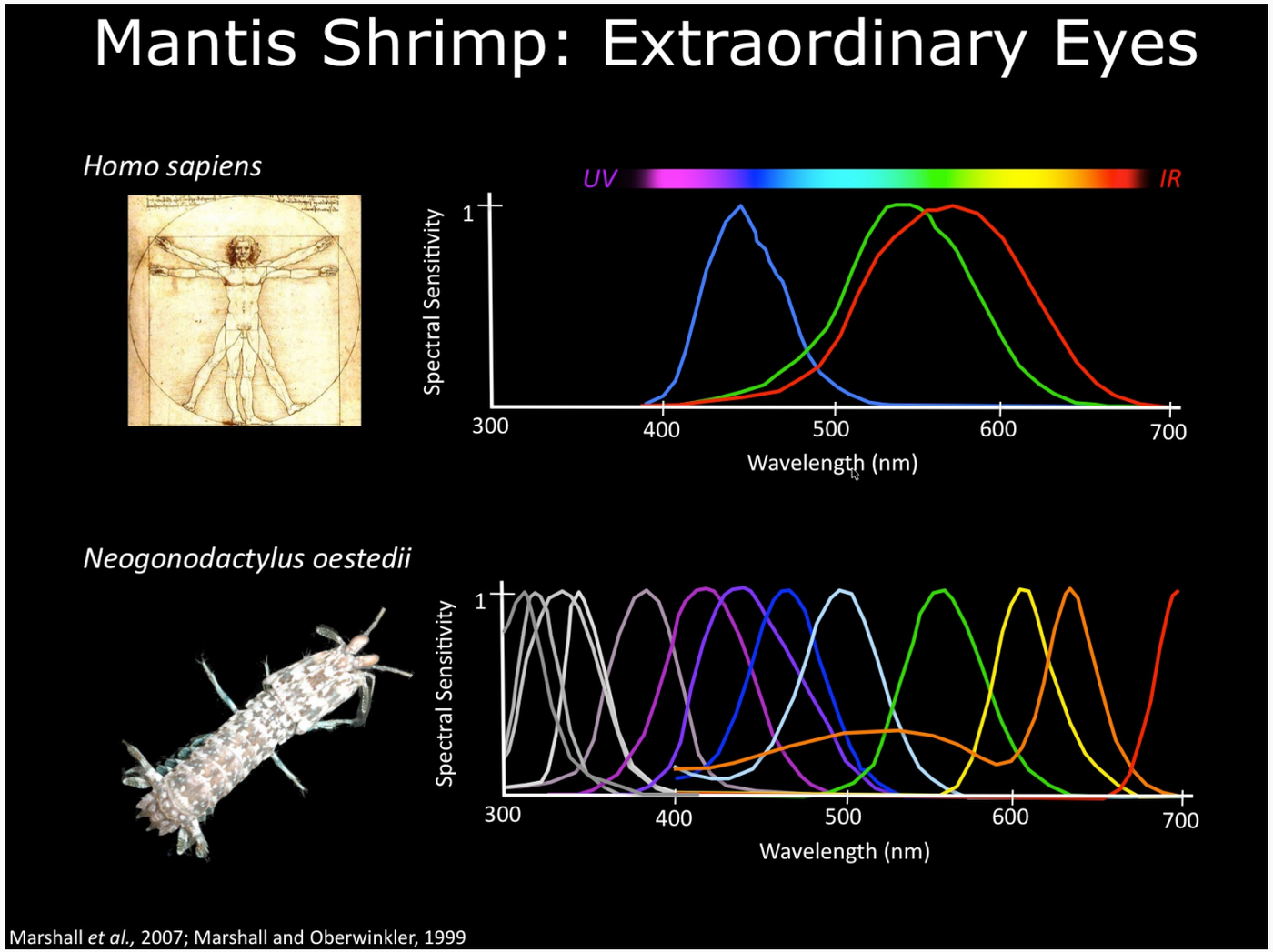
Coding of Color

Retinal Color-Coding, Med-Long Wavelength Light.



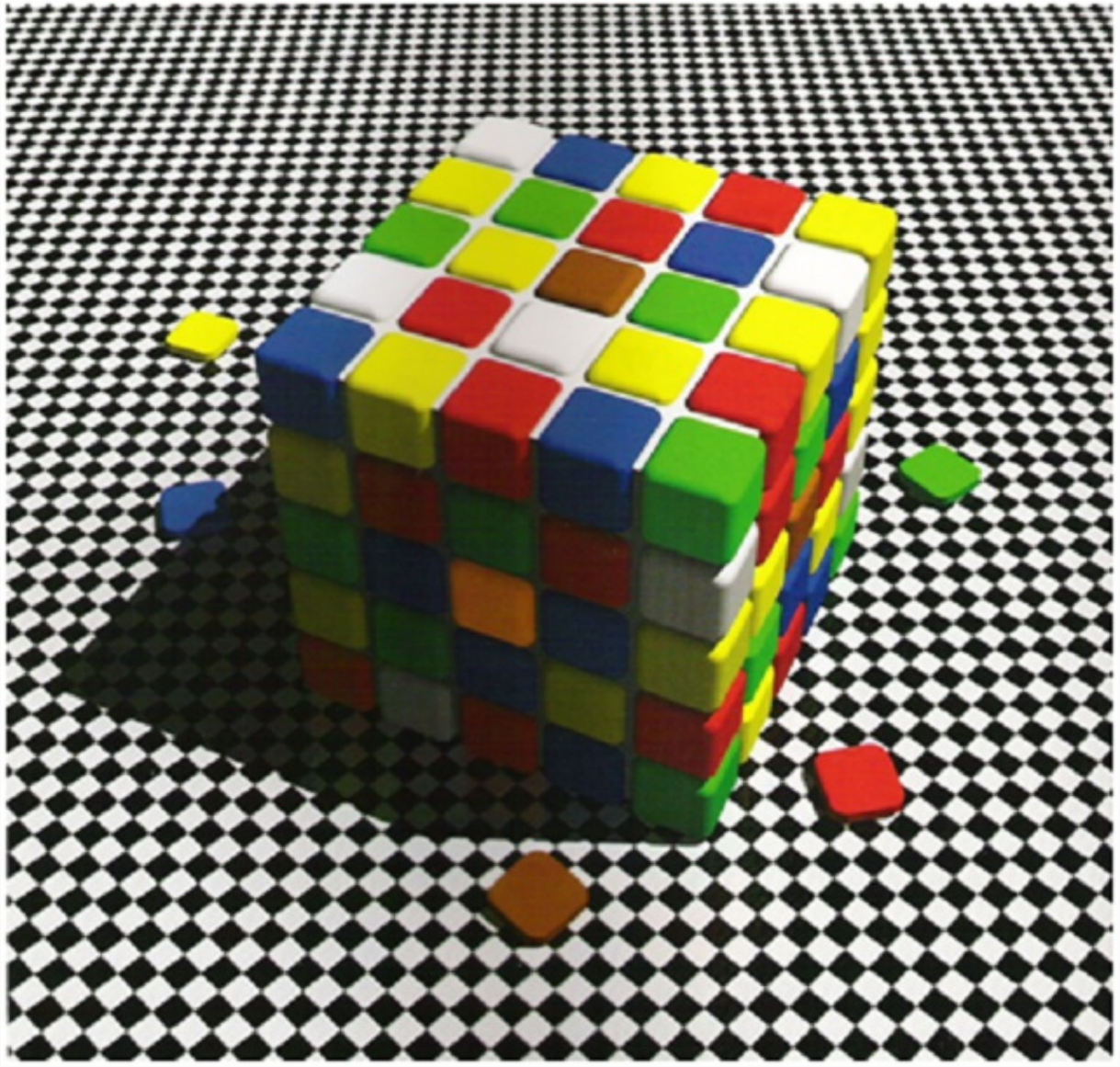
Coding of Color

That Mantis Shrimp Again.



Coding of Color

Higher-Level Processing



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