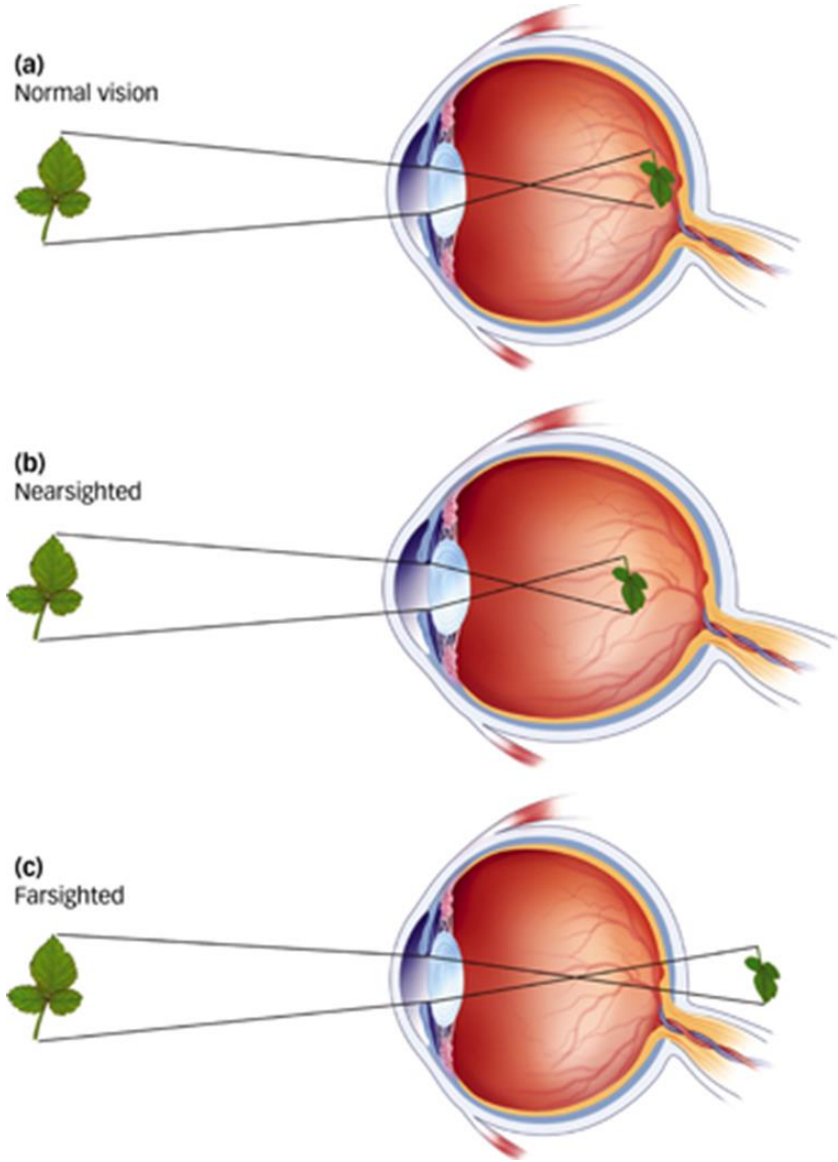
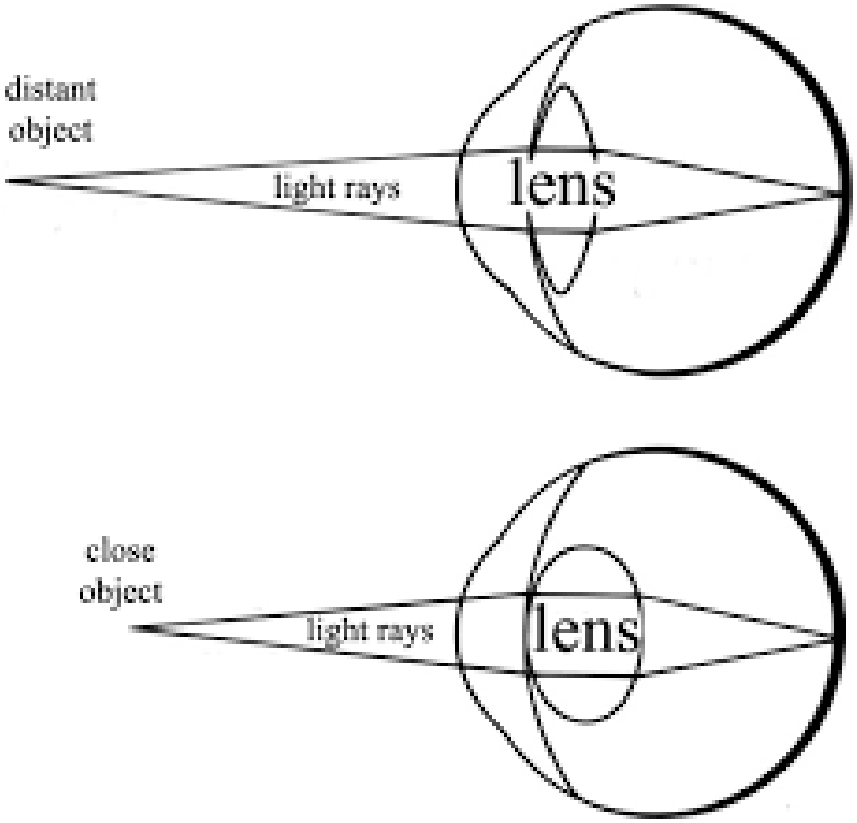
How We See: Are You Nearsighted or Farsighted?

- In people with normal vision, both nearby and faraway objects are focused on the retina at the back of the eye
- In nearsighted people, faraway objects are focused in front of the retina
- In farsighted people, nearby objects are focused beyond the retina



How we see – near and farsightedness

Accommodation:
The lens changes shape to focus near or far objects on the retina.



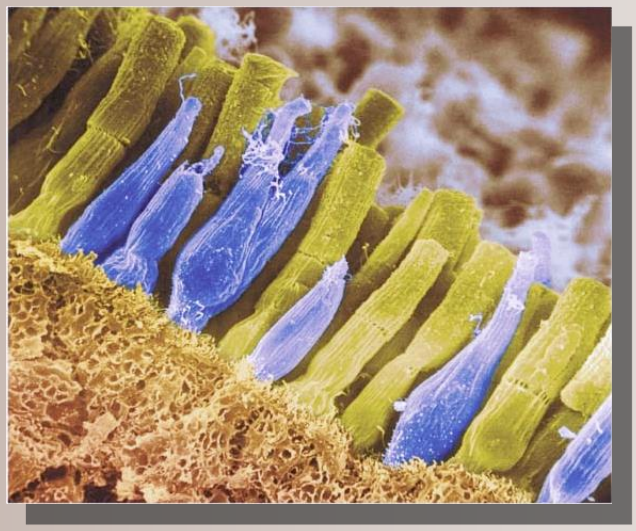
Photoreceptors

Rods

- Located in periphery of retina, peripheral vision
- Function in dim light
- Detect black, white, and grey, but not colors
- Does not detect detail

Cones

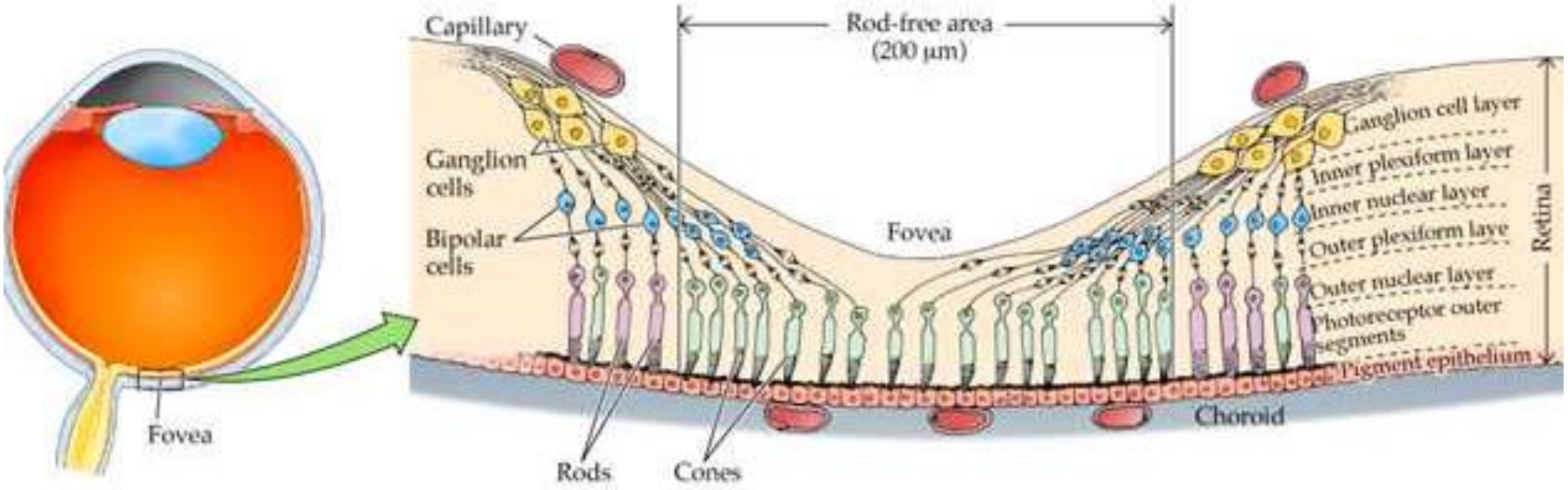
- Near center of retina (fovea)
- Function in bright or day light
- Detect fine detail
- Enable color perception



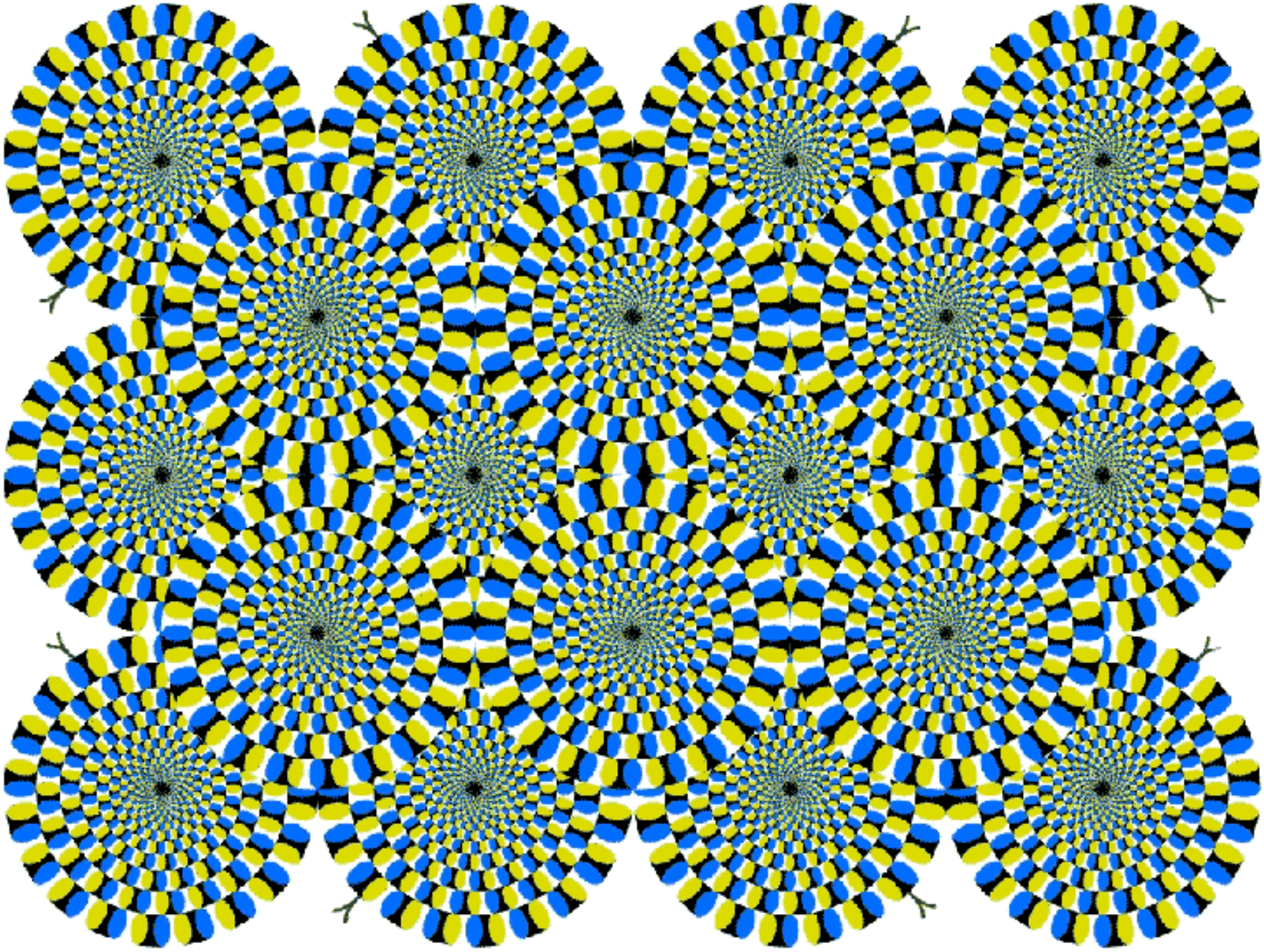
Rods tinted yellow
Cones tinted purple

RECEPTORS IN THE HUMAN EYE

	Cones	Rods
Number	6 million	120 million
Location in retina	Center	Periphery
Sensitivity in dim light	Low	High
Color sensitive?	Yes	No
Detail sensitive?	Yes	No

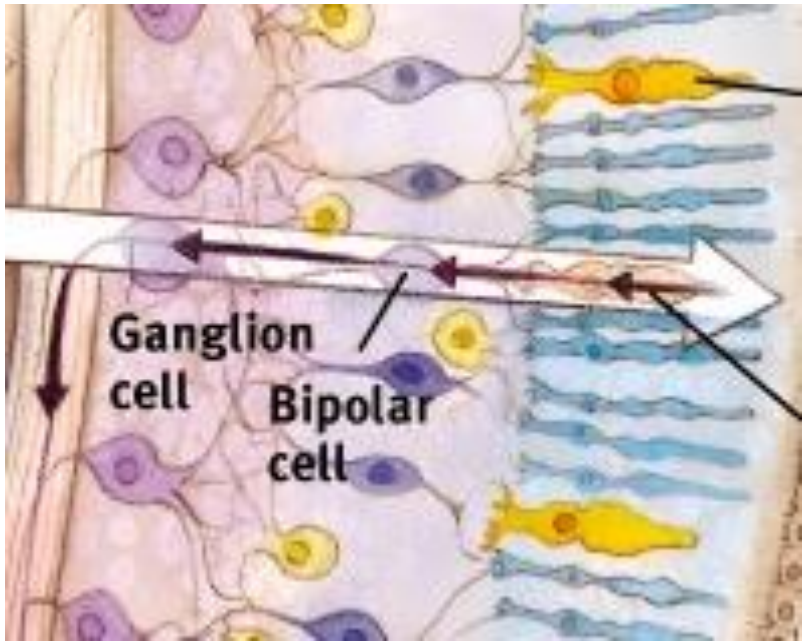

Capillary
Rod-free area
(200 μm)
Ganglion cell layer
Inner plexiform layer
Inner nuclear layer
Outer plexiform laye
Outer nuclear layer
Photoreceptor outer segments
Pigment epithelium
Retina
Ganglion cells
Bipolar cells
Fovea
Fovea
Choroid
Rods
Cones

Rods and Cones work together



Bipolar & Ganglion Cells

Bipolar cells receive messages from photoreceptors and transmit them to ganglion cells, which are for the optic nerve.

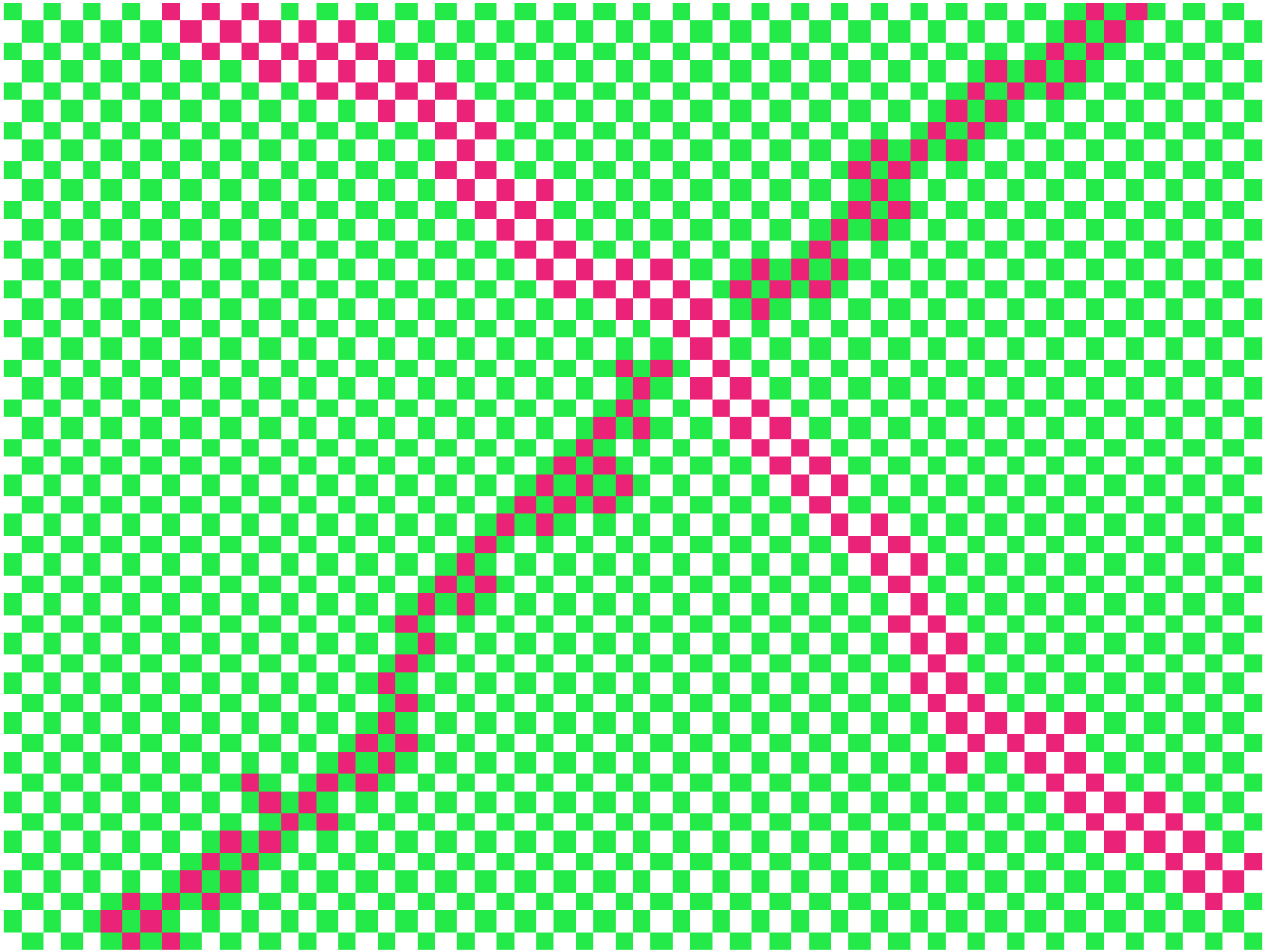


RODS

- Several rods share 1 bipolar and 1 ganglion cell
- Rod vision lacks detail, but, by combining their efforts, groups of rods allow us to see in low light

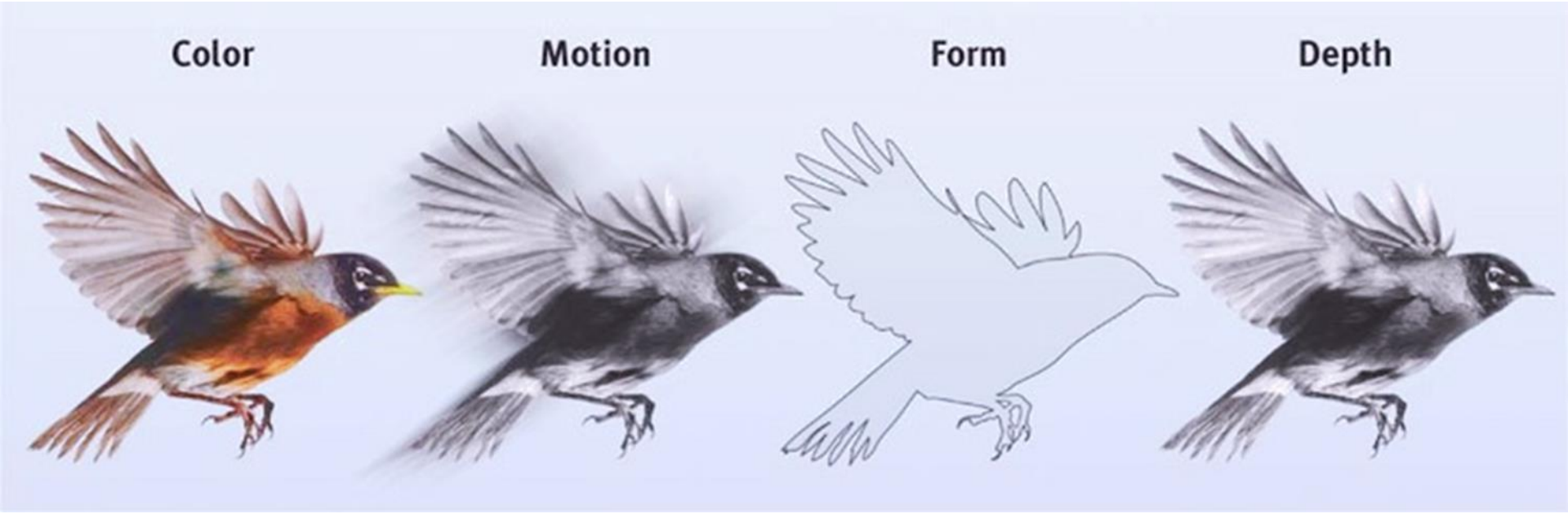
CONES

- Each cone has its own bipolar and ganglion cell
- This allows us to see detail but bright light is needed



Visual Information Processing

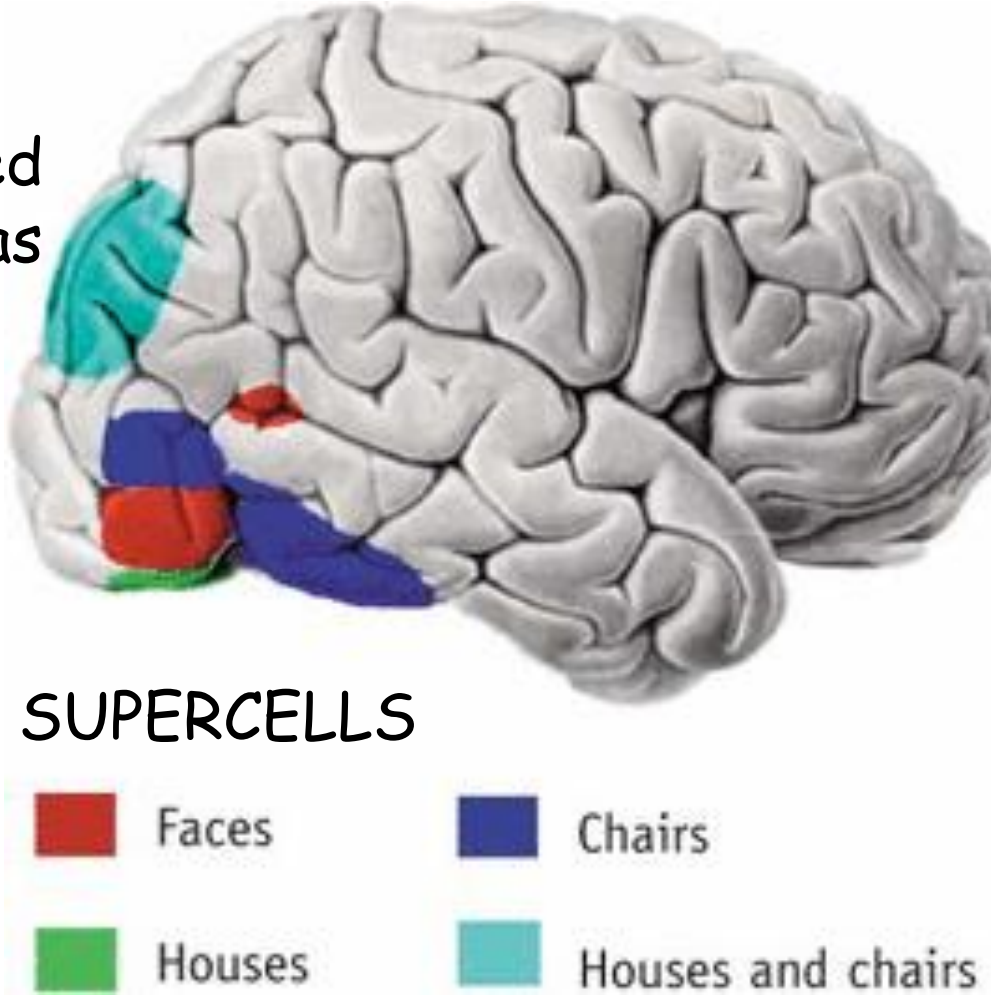
- The brain processes color movement, form, and depth simultaneously in different areas.
- The brain integrates the separate, parallel dimensions of visual info interpreted in different areas into one perceptual image.



Processing disruption

Feature Detectors

- **Hubel and Wiesel** discovered that certain **features** such as visual patterns, certain edges, lines, or movements are processed in *specialized areas called feature detectors*



- Think of it as a "visual encyclopedia." "Supercells" specialize in responding to certain types of stimuli:
  - Specific gaze
  - Head angle
  - Posture, etc.

"We can tell if a person is looking at a shoe, a chair, or a face, based on the pattern of their brain activity," notes researcher James Haxby (2001).