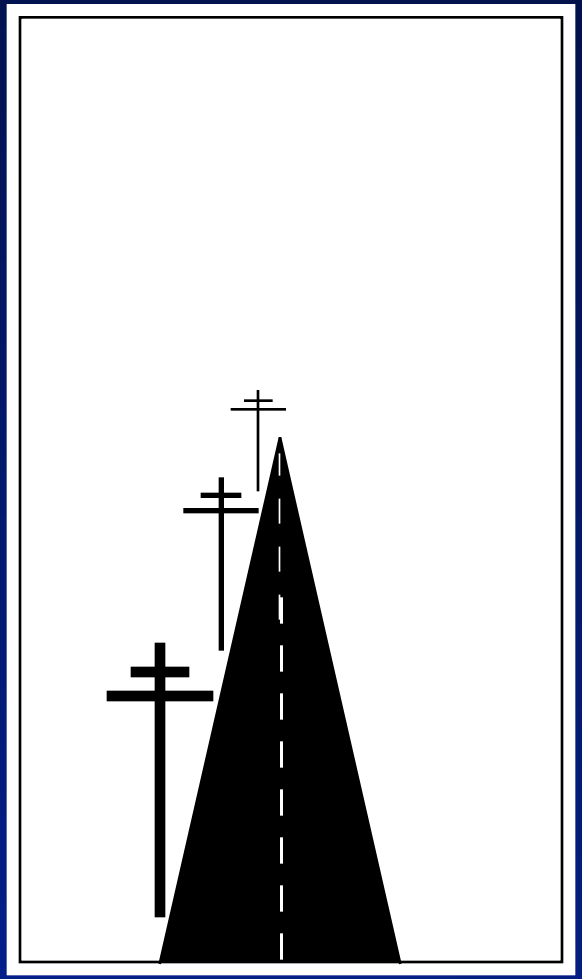
Depth Cues

- Psychological
- Physiological

Psychological Depth Cues

- Linear perspective

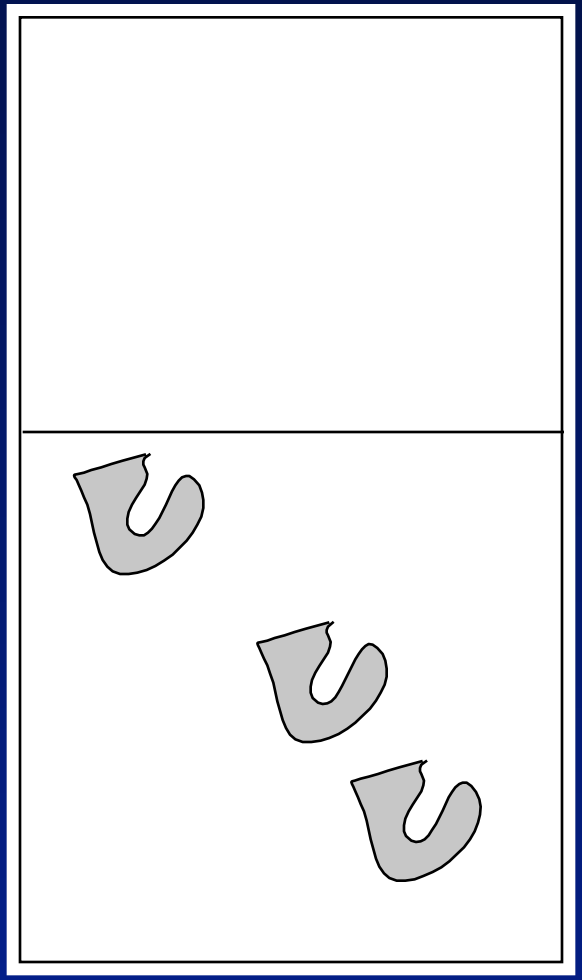
Size of the image of an object on the retina changes in inverse proportion to its change in distance.



Psychological Depth Cues

- Height in the field of view

Objects that rest on a surface below the horizon and are higher in the field of view are usually seen as being more distant.



Psychological Depth Cues

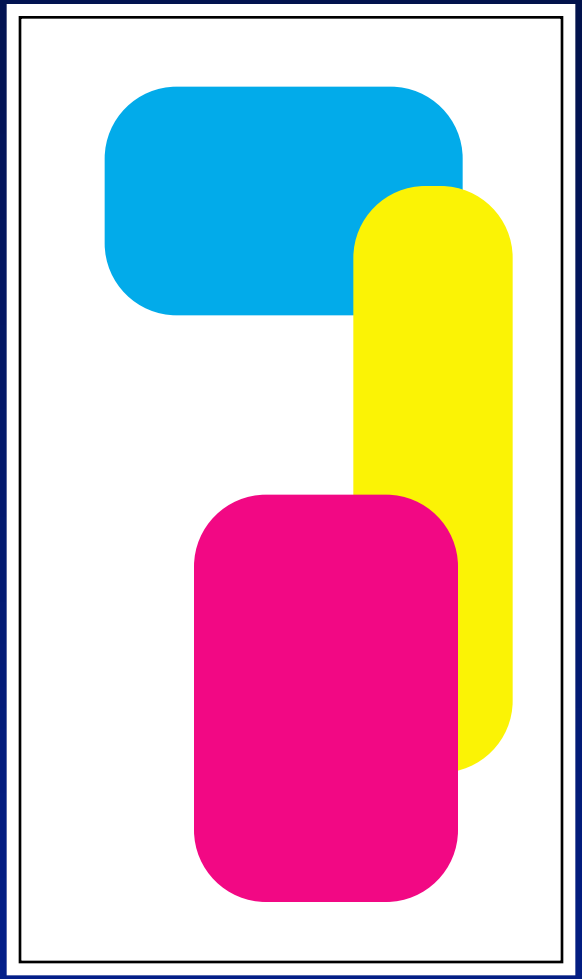
- Aerial perspective

Objects further away tend to become less distance, cloudy or hazy.

Psychological Depth Cues

- Interposition

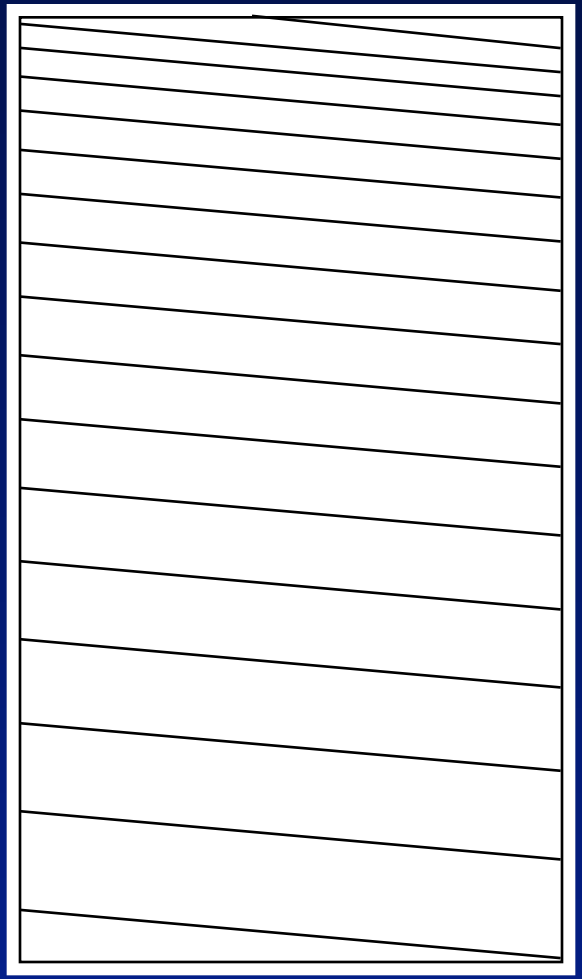
One object occludes, hides or overlaps another.



Psychological Depth Cues

- Texture Gradient

The pattern formed by a regular textured surface that extends away from the observer.

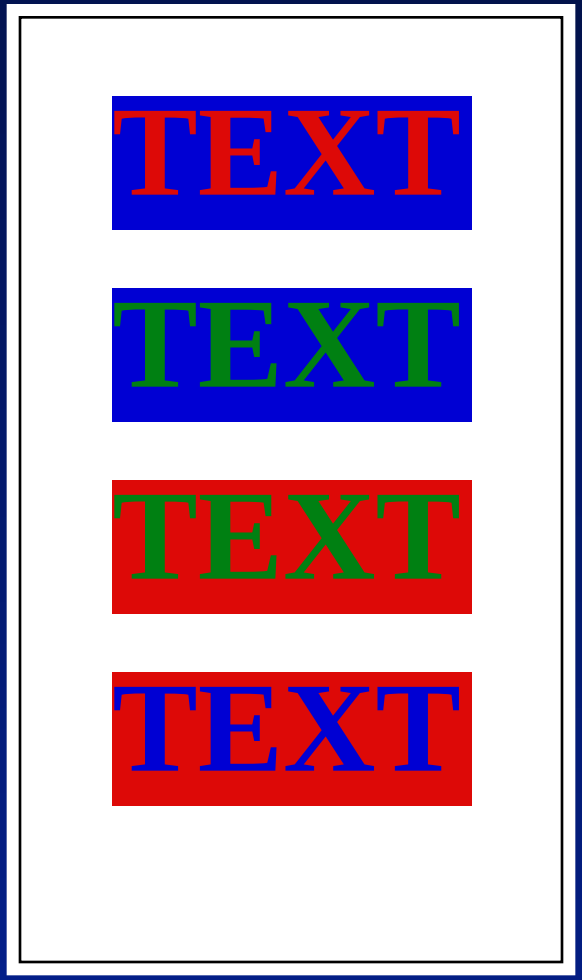


Psychological Depth Cues

- Color

Fluids in the eye cause refraction. Reds appear closer than blues. Bright objects appear closer than dull ones.

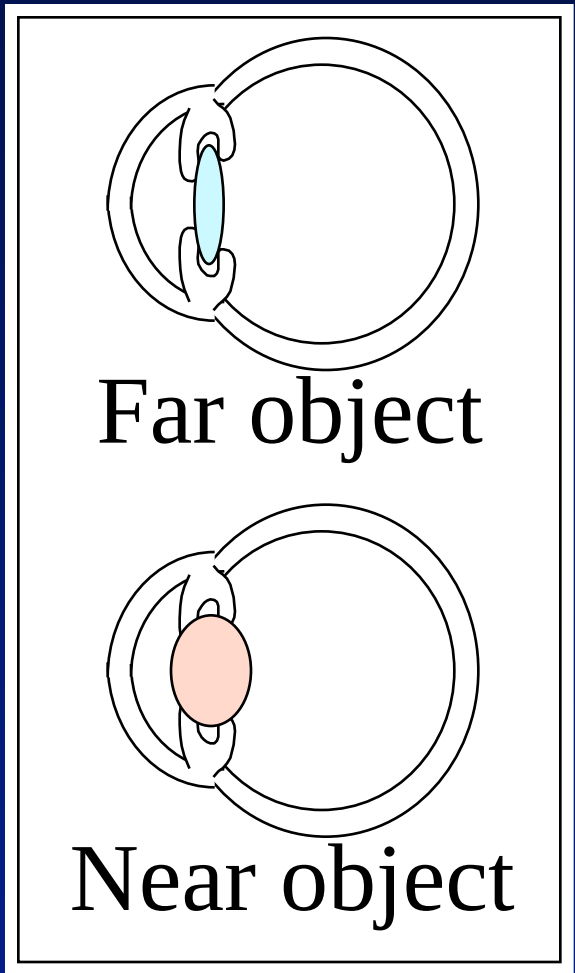
(chromostereopsis)



Physiological Depth Cues

- Accomodation

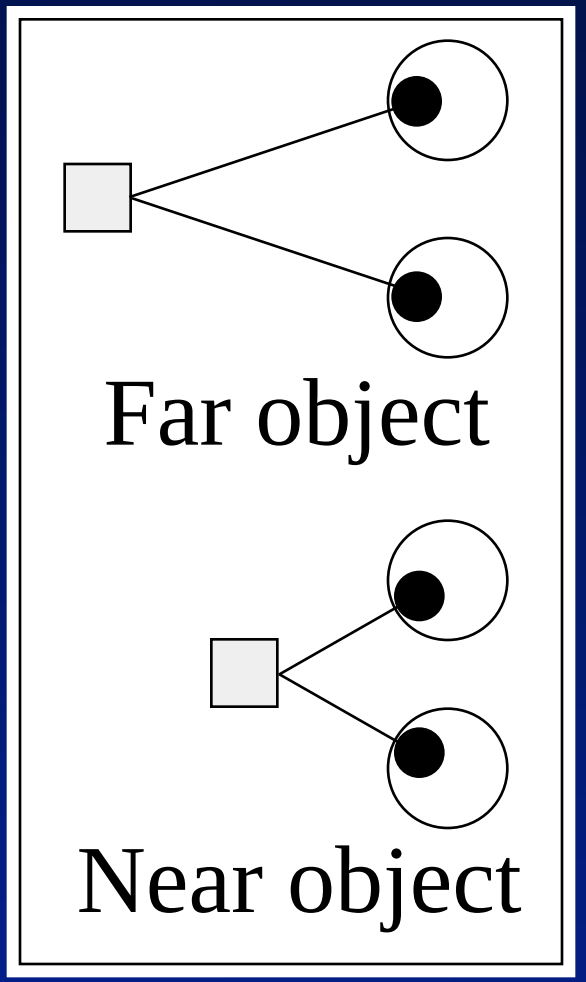
Change in focal length of the lens due to a change in tension from the ciliary muscle.



Physiological Depth Cues

- Convergence (Vergence)

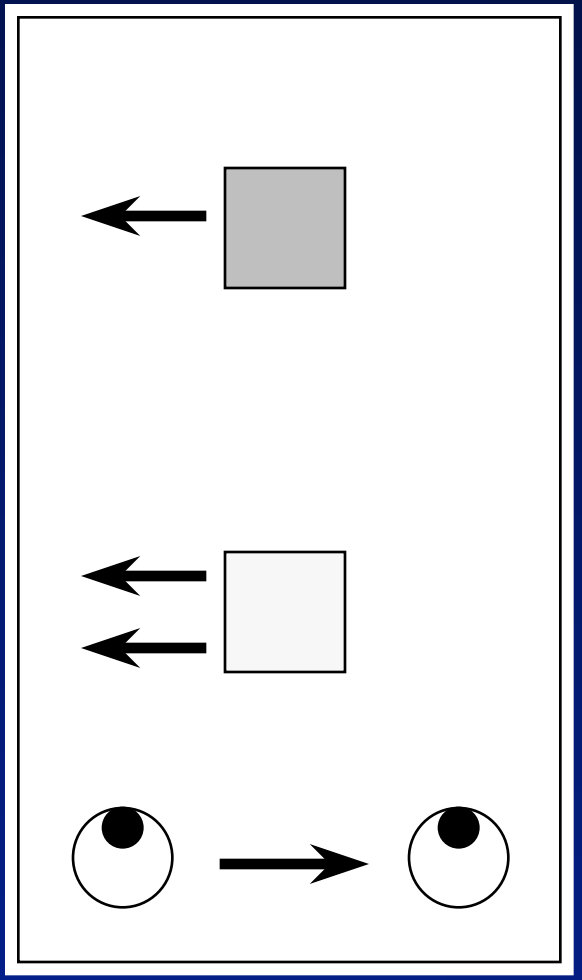
Rotation of the eyes inward to focus on objects as they move closer to the observer.



Physiological Depth Cues

- Motion parallax

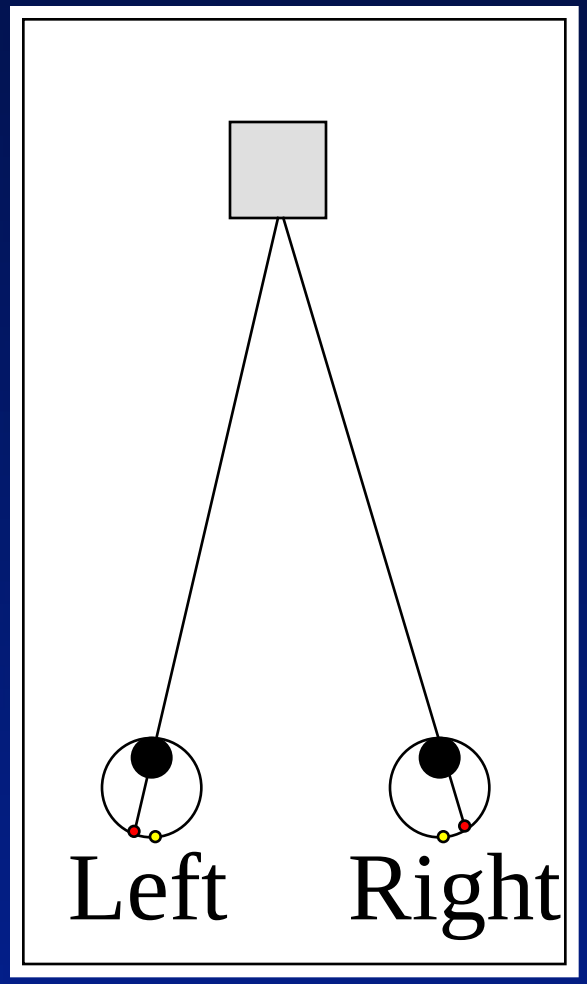
As an observer moves, nearby objects appear to move rapidly while far objects appear to move more slowly.



Physiological Depth Cues

- Binocular Disparity (Stereopsis)

Difference in the images projected on the left and right eyes when viewing a 3D scene.



Depth Cues

- Cues are usually additive
- Some cues are more powerful
- Cues may produce conflicting depth information

Depth Cues

- Stereo Blindness

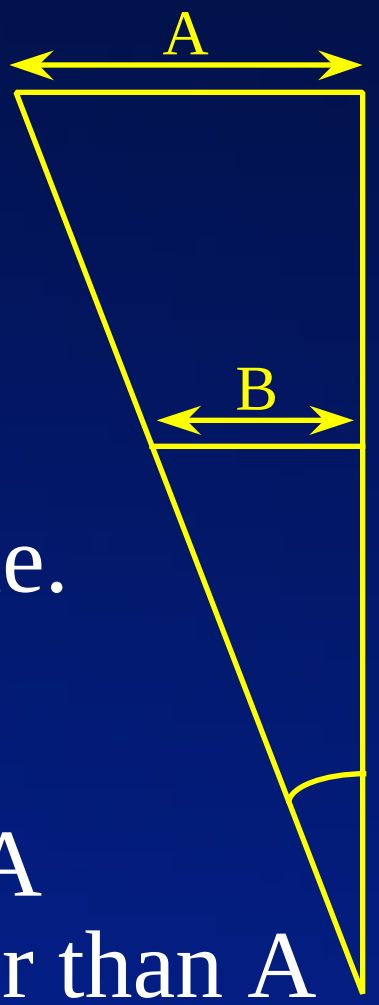
Approximately 10% of the population cannot see the depth in stereo images.

Emmert's Law

- Size constancy

The ratio of perceived
size to perceived distance is
constant for a given visual angle.

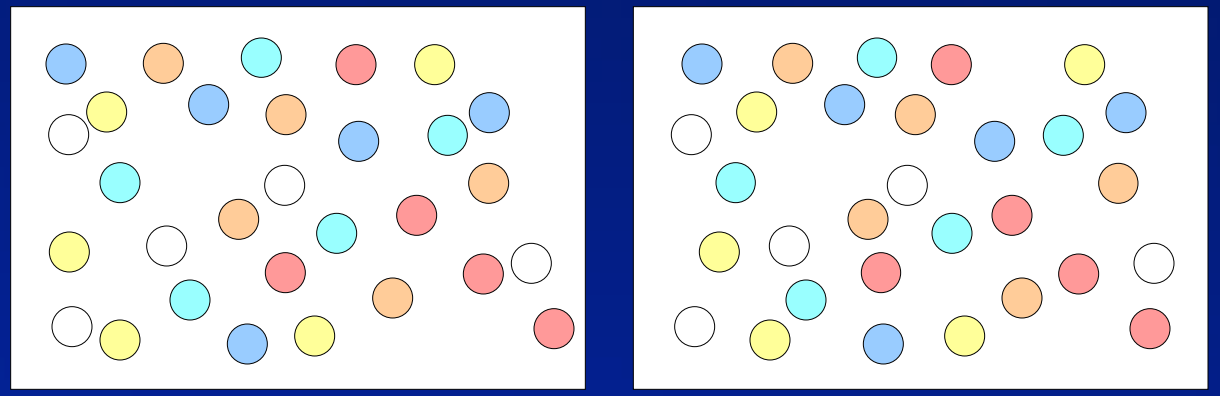
Given the same retinal angle,
B is perceived as smaller than A
because B is perceived as closer than A



Emmert's Law

- An example:

All the circles are the same size, but binocular disparity tells you they are at different depths, so the further back they appear, the larger they appear.



Emmert's Law

- The moral:

If you are going to have objects moving around in three dimensions in stereo, make sure they obey the laws of linear perspective.