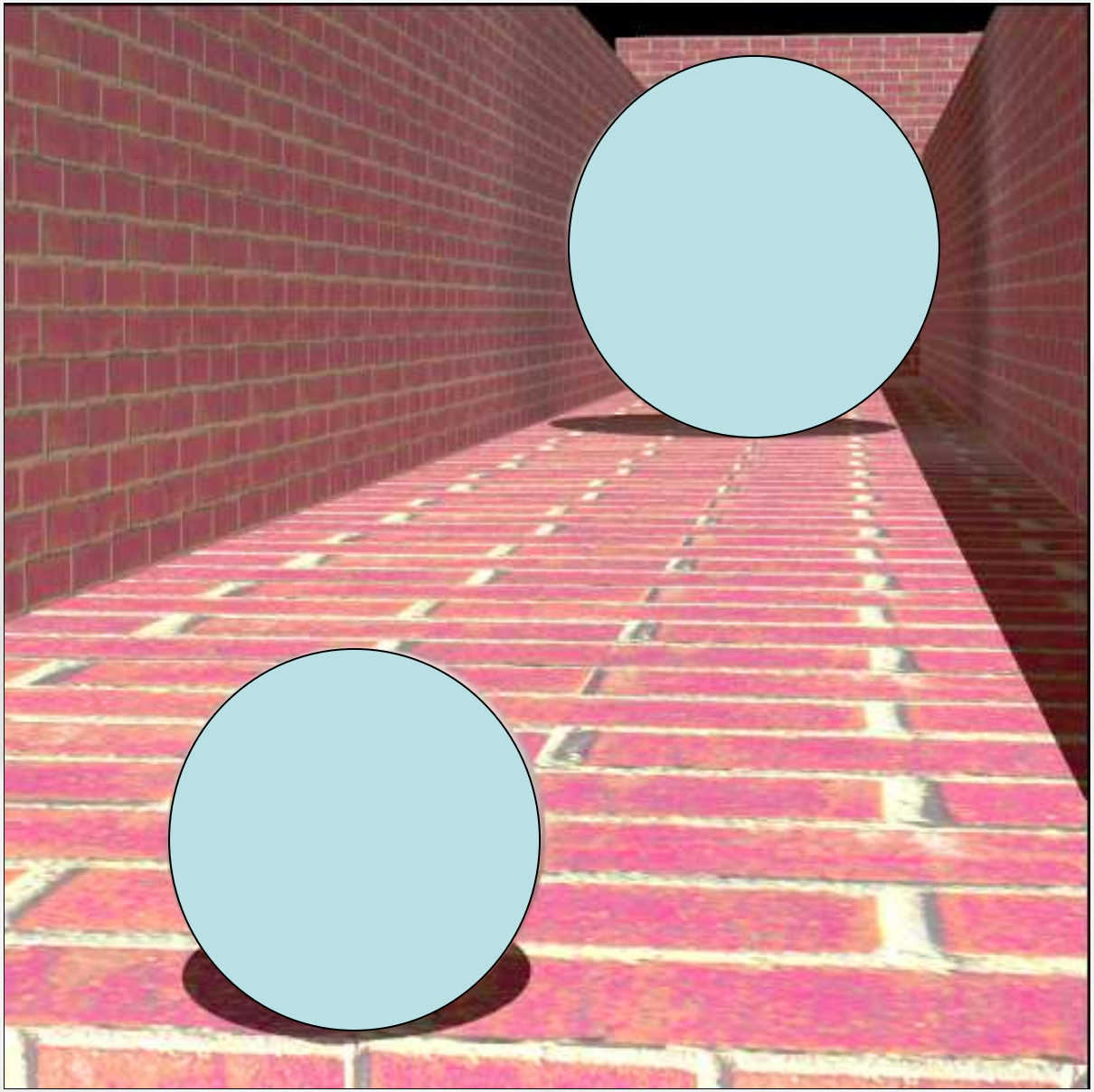
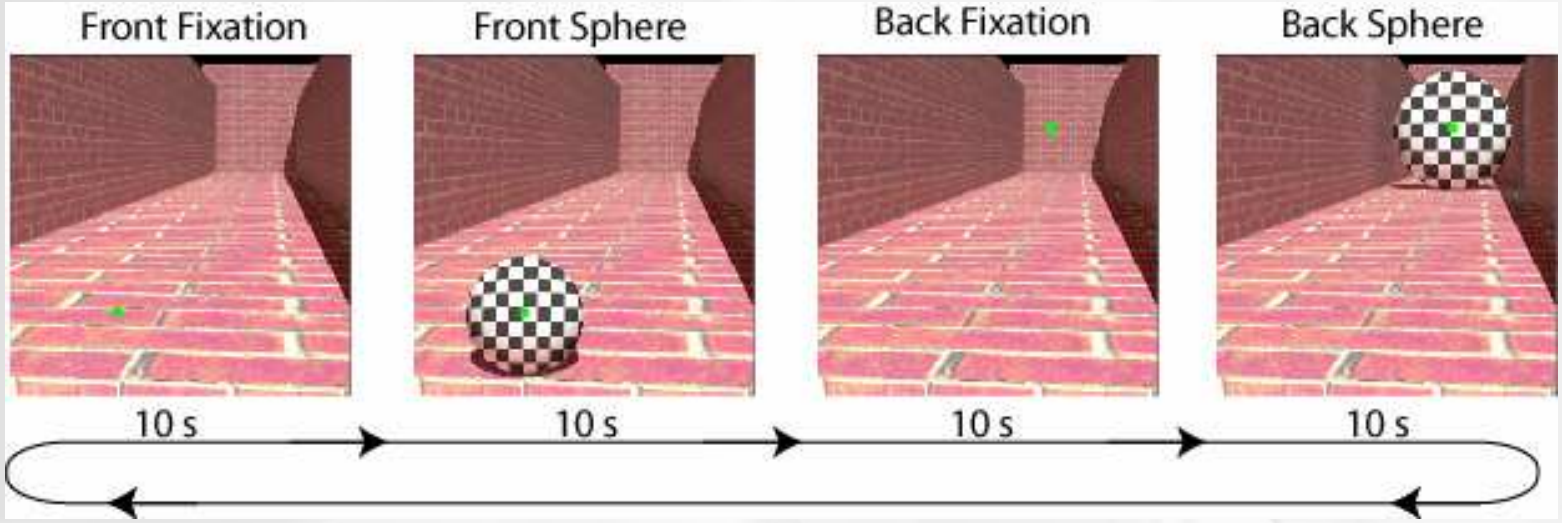
Using psychophysics to measure size constancy illusions.



http://vision.psych.umn.edu/~boyaci/Vision/SizeAppletLarge.html

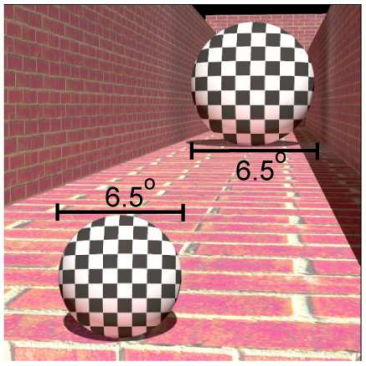
Can effects of size constancy be found in the visual cortex?

fMRI experiment by Murray et al. (2006)

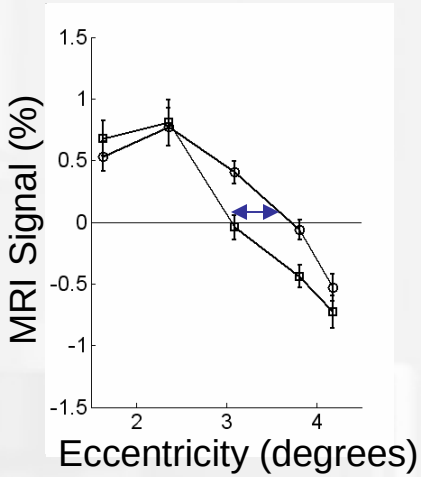


Measure responses in retinotopic area V1

fMRI experiment on size constancy by Murray et al. (2006)

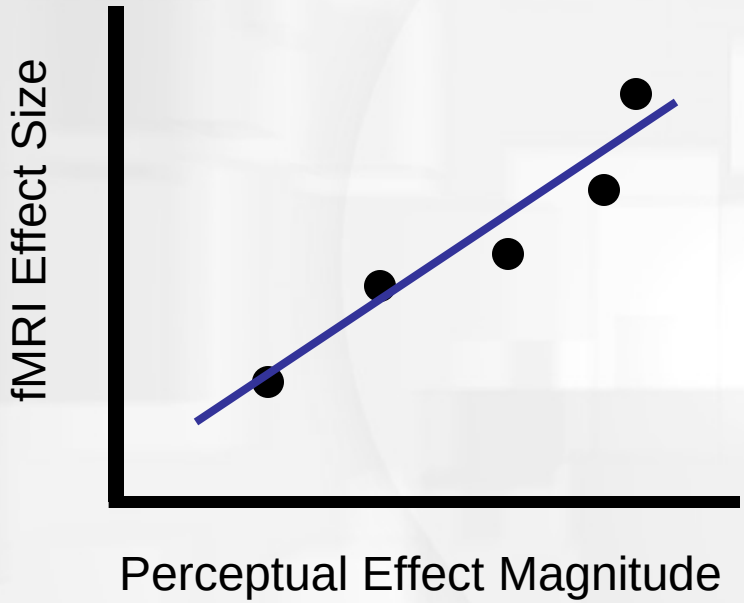


Perceptual difference in size (equal image size)



In V1, the retinotopic representation of the ball increased with the increased perceived size of the ball, even though it was the same size on the retina!

Individual Differences

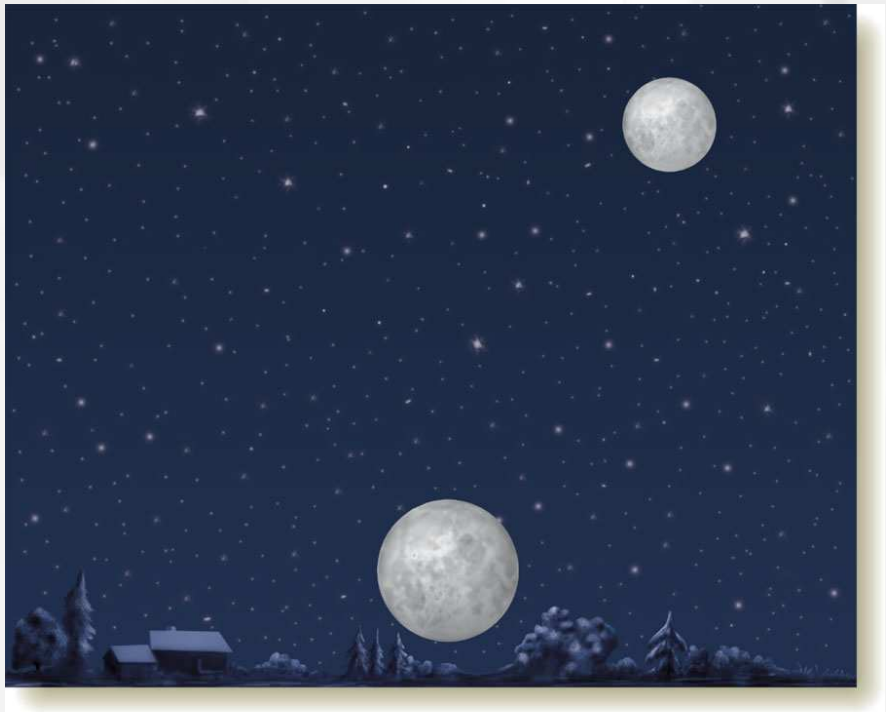


Subjects who perceived a stronger illusion showed a bigger effect in V1.

Moon Illusion

Moon Illusion

- Moon appears larger on horizon than when it is higher in the sky
- One possible explanation:
  - Apparent-distance theory - horizon moon is surrounded by depth cues while moon higher in the sky has none
  - Horizon is perceived as further away than the sky - called “flattened heavens”



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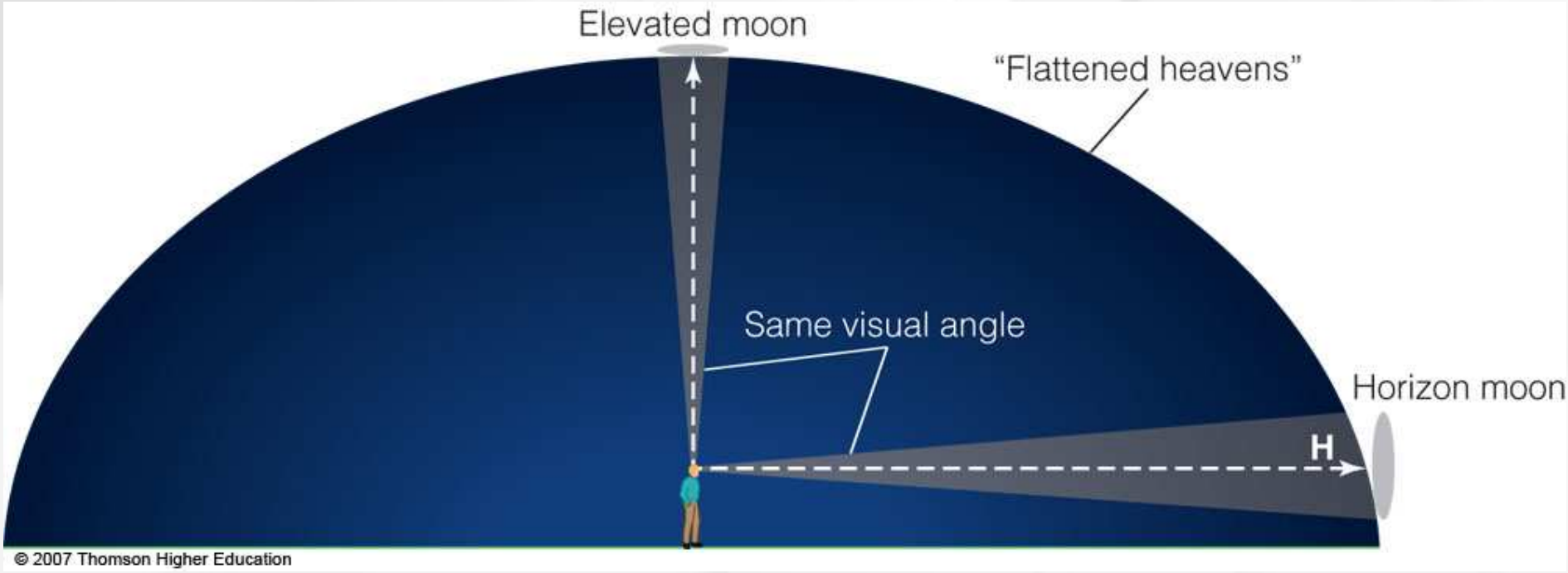

But it’s not that simple: People say the moon looks *closer* near the horizon.

Your tax dollars at work: some research on the Moon Illusion

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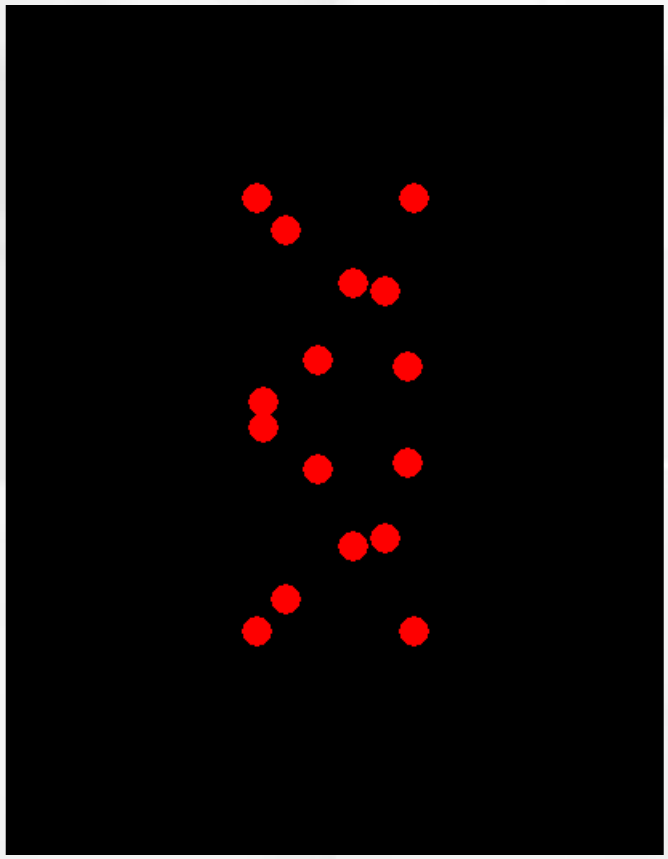
Chapter 9: Perceiving Movement

- Why do some animals freeze in place when they sense danger?
- How do films create movement from still pictures?
- When we scan a room, the image of the room moves across the retina, but we perceive the room and the objects as remaining stationary. Why does this occur?

Four Ways to Perceive Movement

1. **Retinal motion** – an object is physically moving on the retina



The ‘Kinetic Depth Effect’ (KDE)

Four Ways to Perceive Movement

2. **Apparent movement** - stationary stimuli are presented in slightly different locations

Four Ways to Perceive Movement

2. **Apparent movement** - stationary stimuli are presented in slightly different locations

Four Ways to Perceive Movement

3. **Induced movement** - movement of one object results in the perception of movement in another object

Four Ways to Perceive Movement

4. **Motion aftereffect**

Four Ways to Perceive Movement

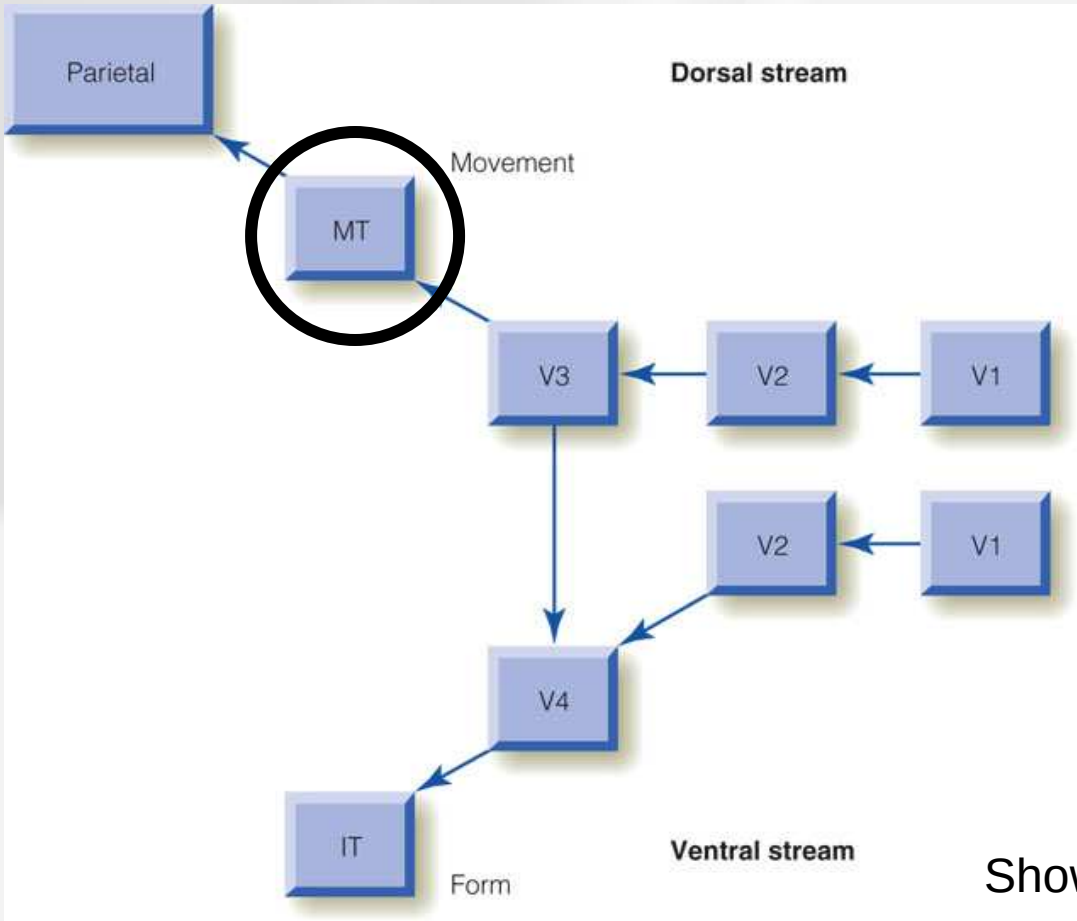
4. Motion aftereffect

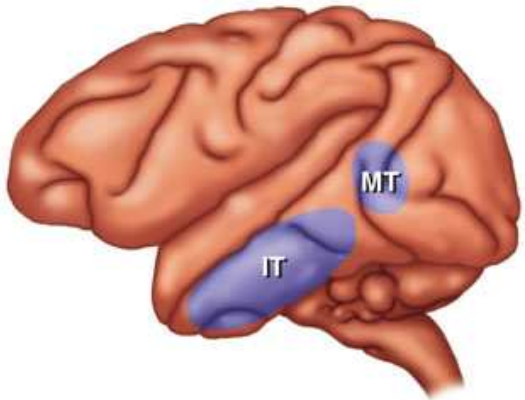
Like face adaptation, the motion aftereffect is evidence of direction selective neurons. Adapting to one direction changes the balance in the response to a stationary stimulus, causing the perception of motion in the opposite direction.

Physiological basis of retinal motion perception

Hubel and Wiesel discovered direction selective cells in the cat.

Almost all neurons in area MT of the monkey are direction selective.

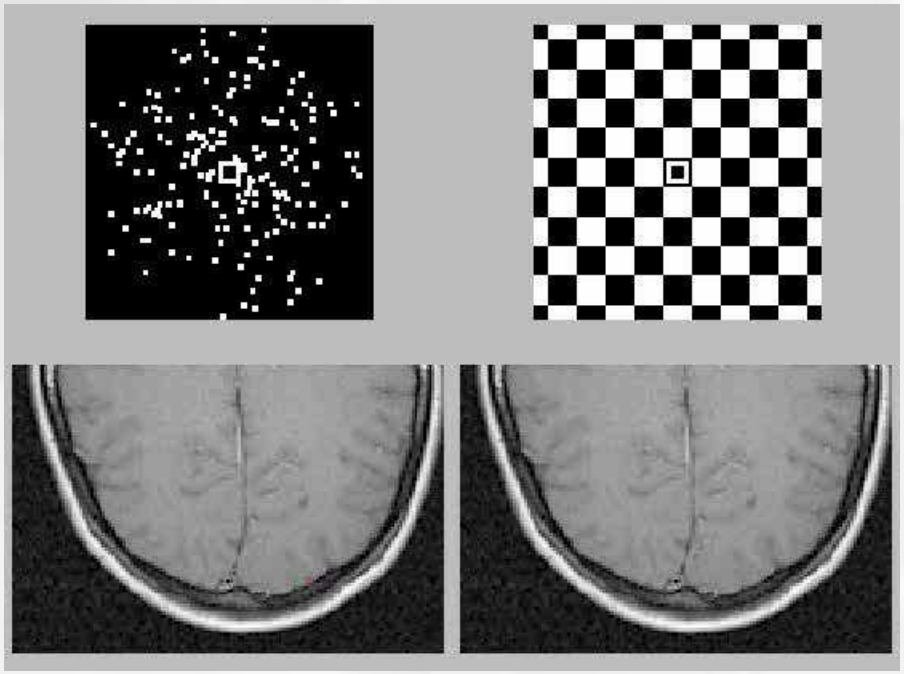




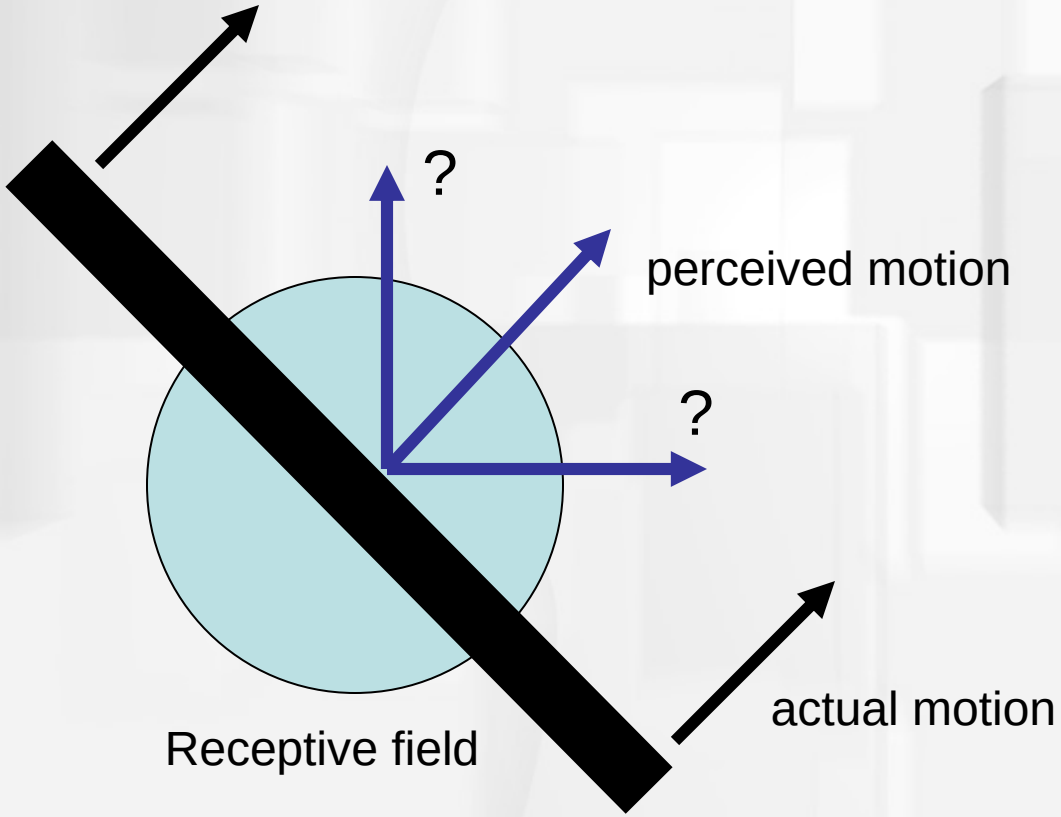
Show Newsome MT movies…

Physiological basis of retinal motion perception

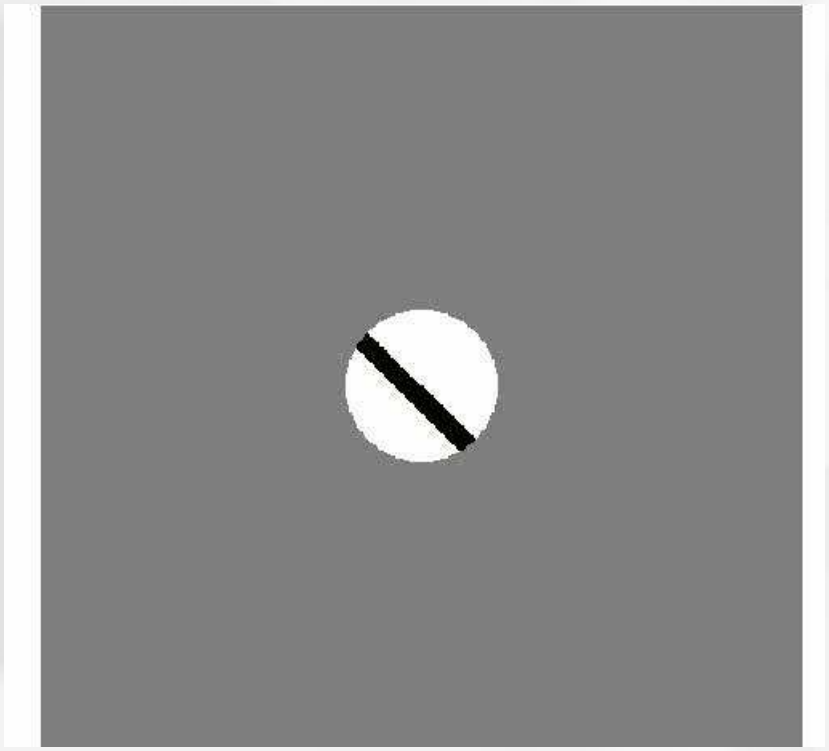
Humans have a homologous area, called ‘MT*’

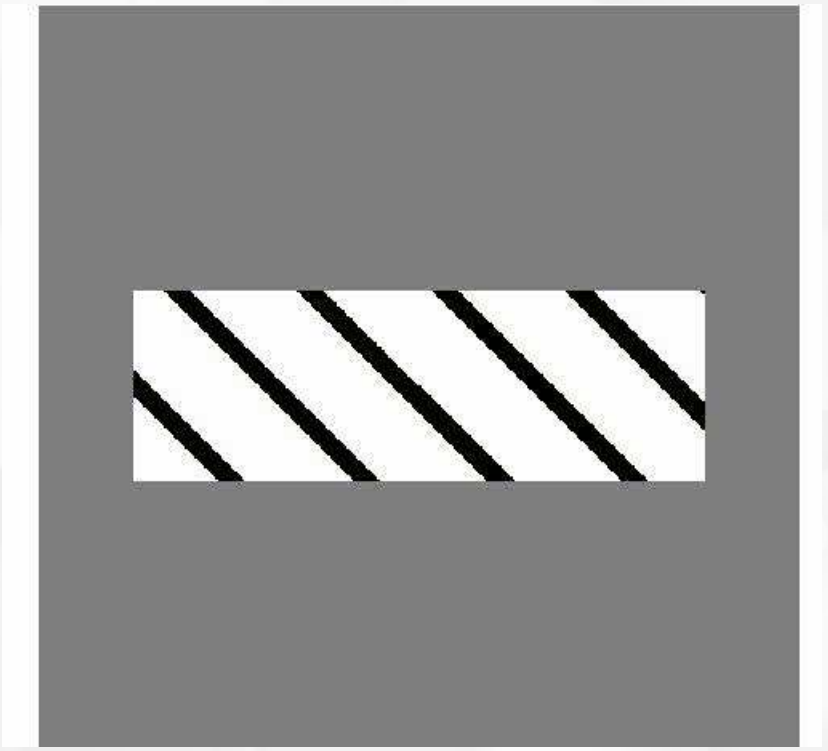


The ‘aperture problem’: the direction of a moving bar though an aperture (like a receptive field) is ambiguous



The ‘aperture problem’





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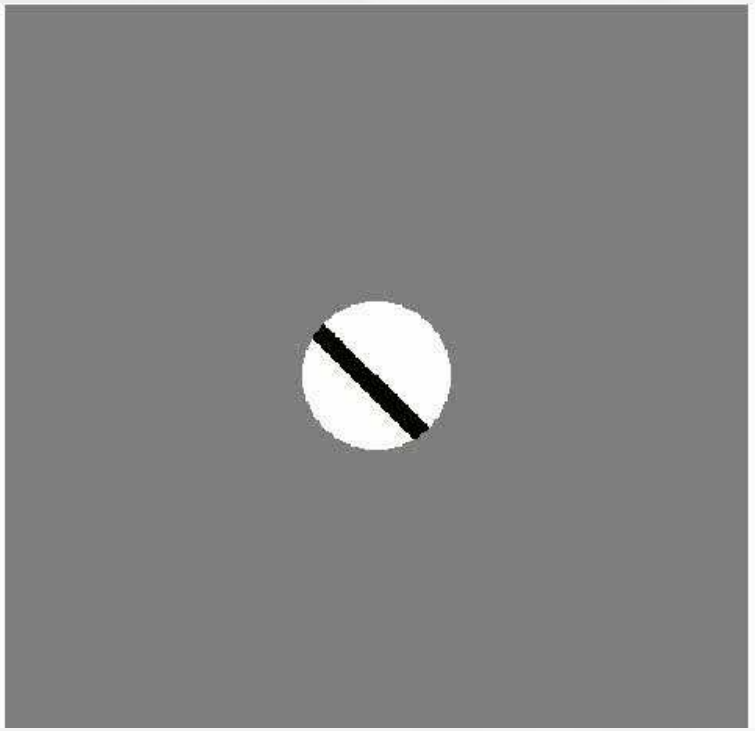
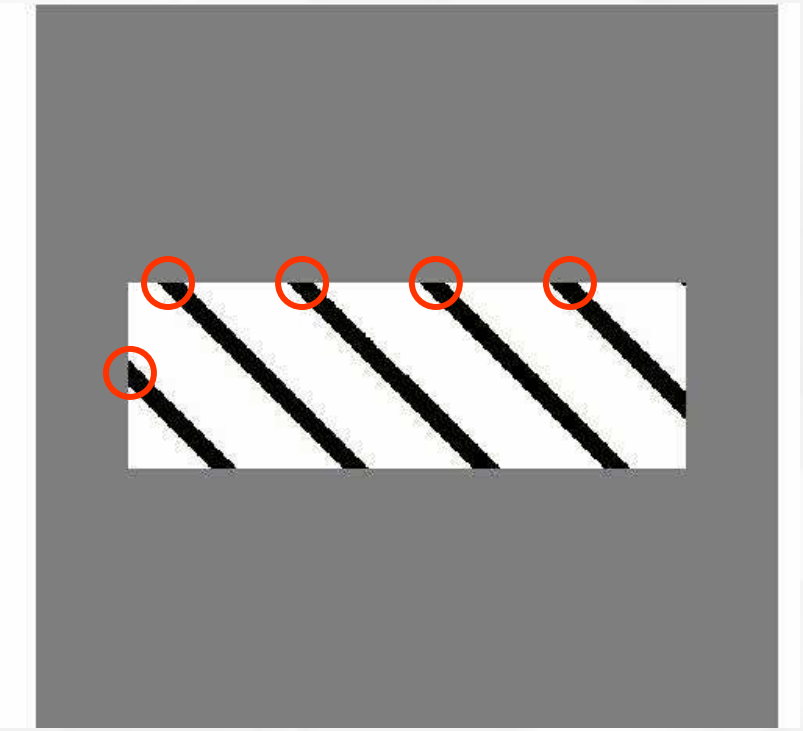
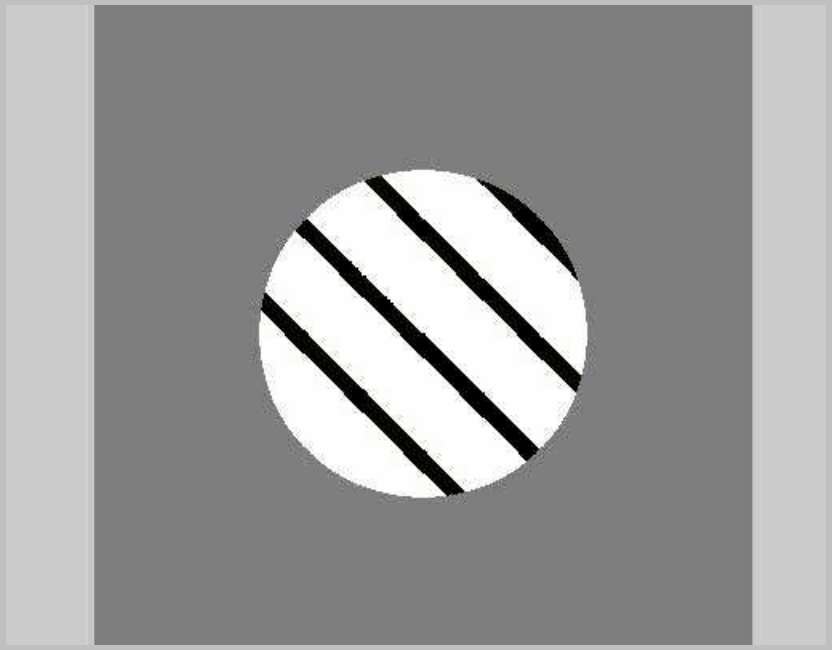




Why does this look like horizontal motion?

The edge of the stimulus contains ‘terminators’ that serve as a cue to the direction of motion.

The ‘aperture problem’



The overall average of the ‘terminators’ determines the overall direction of motion.