**Chapter 6 Study Guide: Space Perception and Binocular vision**

* Depth cues (what are they, be able to identify examples of each, and whether they are binocular or monocular depth cues)
* Depth cues- information about the third dimension of visual space. Can be monocular or binocular.
  + Motion parallax- important depth cue based on head movement. Geometric info obtained from an eye in two diff positions at two different times is like the information from two eyes in different positions at the same time. Even with input from a single eye, motion parallax will provides a sense of depth.
  + aerial perspective- a depth cue based on the implicit understanding that light is scattered by the atmosphere. So more distant objects are subject to more scatter, so they will appear fainter, bluer, and less distinct
  + linear perspective- a depth cue based on the fact that lines that are parallel in a 3D world will appear to converge in a 2D image.
  + vanishing point- the apparent point at which parallel lines receding in depth converge.
    - If a hallway went back fat enough the walls, floor, and ceiling would seem to meet at this point.
  + Occlusion- a cue to relative depth order in which, for example, one object obstructs the view of part of another object.
  + texture gradient- a depth cue based on the geometric fact that items of the same size form smaller images when they are farther away. An array of items that change in size across the image will appear to form a surface in depth.
  + relative height-a depth cue, the observation that objects at different distances from the viewer on the ground plane will form images at different height in the retinal image. Objects farther away will be seen as higher.
  + size constancy- Refers to the fact that our perceptions of the **size** of objects are relatively constant despite the fact that the **size** of objects on the retina vary greatly with distance
  + metric depth cue- a depth cue that provides quantitative information about distance in the third dimension
  + nonmetric depth cue- a depth cue that provides information about the depth order (relative depth) but not depth magnitude (nose in front of face).
  + Familiar size- a depth cue based on knowledge of the typical size of objects.
* Eyes
  + Accommodation- the process by which the eye changes its focus (the lens gets fatter as we direct our gaze to a nearer object.
  + Convergence- the ability of two eyes to turn inward
  + Divergence- the ability of two eyes to turn outwards.
* Size and position cues
  + projective geometry- what happens when a 3D world is projected onto a 2D surface.
  + Relative size- a comparison of size between items without knowing the absolute size of either one.
* Kinetic depth perception
  + without any other perspective clues, motion can provide depth cues.
* pulfrich effect- this is a good example of how binocular vision impacts depth perception, if you put a dark lens over one eye we can perceive apparent motion in depth. By swinging a pendulum, we see a pendulum that is swinging from left to right as moving in an ellipse
* Panum’s Fusion area- this is the region where we do not have diplopia
  + Stereopsis occurs within a region where disparate information from both eyes is fused and perceived as a single object. Referred to as Panum’s fusional area.
  + Outside this region, objects seen by both eyes perceived as double (physiological diplopia)
  + In front or behind the horopter.
* Vieth Muller circle- the location of objects whose images fall on geometrically corresponding points in the two retinas.
  + Horopter vs diplopia
    - Horopter- the location of objects whose images lie on corresponding points. Zero disparity
    - Diplopia- double vision. If visible in both eyes, stimuli falling outside of panums fusional area will appear diplopic.
* Stereoscopes/stereograms
  + Steoscope- a device for presenting one image to one eye and another image to the other eye.
    - Proved that the visual system treats binocular disparity as a depth cue, regardless of whether the disparity is produced by actual or simulated images of a scene.
  + Stereoblindness- the inability to make use of binocular disparity as a depth cue. Used to describe individuals with vision in both eyes.
  + Dichoptic- viewing a separate and individual field by each eye.
  + Stereoacuity- the smallest detectable depth difference that can be seen in binocular vision.
* Binary Disparity- determine depth by comparing the two different images on both eyes.
  + Uncrossed disparity- the sign of disparity created by objects behind the plane of fixation (horopter). Images located behind the horopter will appear to be displaced to the right in the right eye and to the left in the left eye.
  + Crossed disparity- the sign of disparity created by objects in front of the plane of fixation (horopter). Images in front of the horopter appear to be displaced to the left in the right eye and to the right in the left eye.
* Binocular rivalry- a small disparity between the two eyes leads to fusion and stereopsis, so our brains integrate the information. If the disparity is large, however, it will cause the information from one of the eyes to be suppressed. In these situations, the image is bi-stable, and will flip back and forth.
* Free Fusion- the technique of converging or diverging the eyes in order to view a stereogram without a stereoscope. Pg. 151 in the book. I encourage you to try it for yourselves, it’s not easy.
* Influences of perception on binocular vision
  + Bayesian Approach- a statistical model based on reverent Thomas bayes’ insight that prior knowledge could influence our estimates of the probability of a current event.
  + uniqueness constraints- in stereopsis, the observation that a feature in the world is represented exactly once in each retinal image. This constraint simplifies the correspondence problem
    - correspondence problem- the problem of figuring out which bit of the image in the left eye should be matched with which bit in the right eye.
  + continuity constraints- in stereopsis, the observation that, except at the edges of objects, neighboring points in the world lie at similar distances from the viewer. Helps solve the correspondence problem.