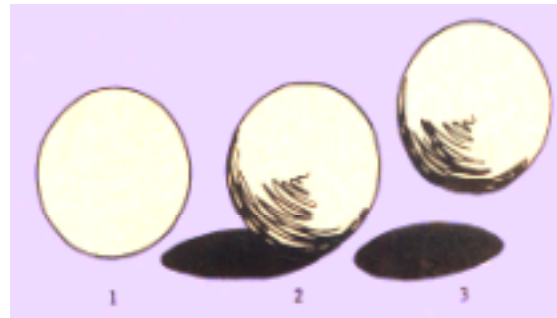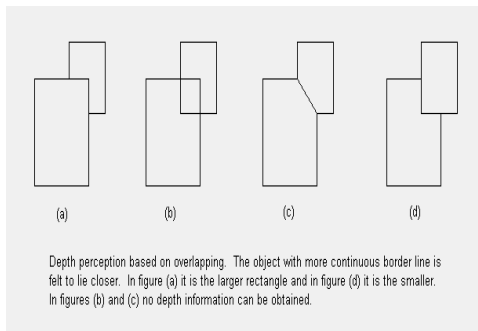# Depth Perception

Absolute depth- a measure of depth in units (feet, meters)

Relative depth- depth position compared to other objects in the scene

Visual Cues

    A.   **Monocular Depth Cues**- visual depth information that is effective with one eye

        1.   **Artistic Cues**- used by artists in 2D paintings of 3D objects
            a. These are good for basic depth order, but not precise relative information.
            b. Examples: occlusion, relative height, cast shadows, relative size, familiar size, linear perspective, and texture grating.

(a)   (b)   (c)   (d)

Depth perception based on overlapping. The object with more continuous border line is felt to lie closer. In figure (a) it is the larger rectangle and in figure (d) it is the smaller. In figures (b) and (c) no depth information can be obtained.

Occlusion (the most powerful)- the object in front is considered to be closer.

Cast shadow- the first ball (1) does not seem solid. It is perceived more as a flat circle. By adding shadows (2), it appears more like a solid ball resting on a surface. If the cast shadow is no longer attached to the image of the ball (3), the ball appears to be floating above the surface.

2. Motion Depth Cues: **Deletion and Accretion**- when two surfaces are located at different distances , any sideways movement of the observer causes surfaces to appear to move relative to one another. The brain uses this information to infer depth order.

  a.   The back surface is covered up, or <u>deleted</u>, by the one in front when the observer moves in one direction.
  b.   The back surface is uncovered, or <u>accreted</u>, when the observer moves in the other direction

Activity1:   To demonstrate another type of monocular cue called "**motion parallax**," you can go outside and look at a tree with one eye and try to see which branches are in front of the other. Then with your eye still covered move from side-to-side and notice how the distance between the branches 'pops out' at you. You will see that you have to be moving in order for this to work. Motion parallax gives very precise depth information. The drawback is that movement gives away an animal's or person's location, so predator animals have developed an alternate means of getting precise depth information: binocular depth cues.

B. **Binocular Depth Cues**- requires information from both eyes to be combined in the brain; gives very precise relative depth information.

  1.   Disparity- the difference in the images on the two eyes is determined and then this difference is transformed in to the perception of depth.
  2.   These types of cues (binocular) are very precise. Binocular processing requires two eyes on the front of the head (most predators), rather than eyes on the side of the head (most prey animals). An example of animals with binocular vision include humans or bears.

Activity 2:   You can show yourself the difference between the views of the two eyes by this activity. Close your left eye. Extend your arm at eye level and hold up your index finger. Cover up some object in your visual scene. Next close your right eye and open your left eye, and notice that your finger seems to have shifted. The large the depth between your finger and the object, the bigger the shift that will occur.