Perception

- **distal stimulus** – a real object out in the world
- **proximal stimulus** – the registration of an object on our senses
- **percept** – the interpretation of the proximal stimulus
Interactive Processing
(what you see vs. what you expect)

• **bottom-up processes** (data driven)
  – lower levels (e.g. dots, lines, texture, etc.) are not affected by upper levels (e.g. distance, objects, etc.)

• **top-down processes** (theory driven)
  – lower levels are influenced by upper levels (e.g. expectations can cause you to perceive things differently)
Visual Primitives
(lateral inhibition and excitation)
Illusions and Center-surround
Aftereffects

- Many visual representations involve opponent processing
  - when one interpretation becomes fatigued, the alternative takes over
Interpreting Visual Ambiguity

• Gestalt Grouping Principles
  – proximity
  – similarity
  – good continuation
  – closure
  – common fate
• Constructivists approach to 3D perception
  – Inferring 3D through 2D cues (beyond stereopsis)
Constancy

Closer objects cast larger retinal images

Farther objects cast smaller retinal images
• size constancy
  – Ames room

• Figure-Ground Separation
  – darker areas interpreted as ground
• Occlusion (interposition)
  – Broken contours indicate an object in front

• Convergence and texture
• shading and illumination
  – automatic brightness and color normalization
• local information (usually) overrides global
Neural Correlates of Perception

• single-cell recordings
  – Receptive field
    • what the cell responds to
  – Simple versus complex cells
    • Hubel and Wiesel
    • Desimone
      – Specialized for faces
Divide and Conquer
Direct Perception

- Ecological approach to perception
  - perceptual **invariances**
    - affordances
    - optic flow
      - point of heading
      - time to contact
  - no need to **construct** interpretation:
    - the real (moving) environment provides an abundance of information
      - motion parallax
    - stripped down patch-light displays
      - walking
      - biological motion