Sensation & Perception

• Sensation:
  – The immediate and basic experience generated by simple stimuli

• Perception:
  – The interpretation of these sensations, giving them meaning and organization

Senses…

…share similarities and interact with other senses
  – All only react to some kind of energy or force
  – All react optimally to change (sensitization)
  – Usually more than one sense is stimulated (e.g., taste, smell, sight)
    • We interpret “patterns” of stimulation
Stimuli...

...are rich and varied
- Seldom pure isolated stimuli
  - Look at floor texture (e.g., room context, chairs, tables)

Sensory systems
- Are efficient (e.g., candle at 20 miles, tick of a watch at 20 feet)...but can be inaccurate under some circumstances
- Bottom-up processing
  - data driven processing
  - can be inaccurate
Prior Knowledge and Expectations

- These shape and alter perceptions
  - Top-down processing guides perceptions via:
    - Cognitive processes
    - Attention
    - See what you “want to see”
    - Hear what you “want to hear”
Historical Overview

Nativism vs. Empiricism

Nativists:
- Plato
- Rene Descartes

Empiricists:
- Hobbes
- Locke
- Berkeley
Historical Overview

1) Greek philosophers – eye receives “copies” of objects

2) Empiricists – we learn to perceive
   – Berkeley: How do we perceive depth with 2D receptors???
   – James: “blooming, buzzing confusion”

Historical Overview (contd.)

3) Gestaltists – we are tuned to perceive organization

4) Ecological approach
   – e.g., Gibson: active observer seeks out information from a rich visual world; we perceive directly

5) Information processing approach – processing stages

6) Computational approach – perception as computation
   – Develop mathematical models of how information can be processed
Stages of the Perceptual Process

1) Distal stimulus: our environment
2) Proximal stimulus: information that stimulates the receptors (i.e., light striking the retina)
3) Transduction: transforming proximal stimulus into another form of energy (i.e., our brains process electrochemical not “light” energy)

4) Neural processing: computations
5) Perception: organization of computations
6) Recognition: meaningfulness of perception
7) Action: response to meaning
Overview of Relationships
(for studying perceptual processes)

- Stimulus-perceptual: change the physical stimulation and “ask” how perception changes (behavioral)
- Stimulus-physiological: measure brain/neuron activity in response to stimulation
- Physiological-perceptual: measure how physiological capabilities correlate with perception

Perception can be defined as…

- The interaction of a set of sensory systems with aspects of the environment
Why “set”?

- Sensory systems interact, together generate a representation of “reality” (in the lab, the goal is to set up unusual conditions that decouple these systems)

Why “system”?  

- No single cell (no receptor cell, no cortical “detector” cell) can represent perceptual information—the interaction of MULTIPLE CELLS is always required
Why “aspects”?

- We have species-specific sensitivity to dynamic, biologically-relevant aspects of the physical world

In this discussion…

- Much of our time will be spent describing these systems and how they interact with one another and the environment
- Example: Species-specificity
  - e.g., there are tacit assumptions at work in research on human perception