Exam 1

• Will cover Chapter 1 and Chapters 3 to 6
  – “Basic learning mechanisms” from today will be on Exam 2, not Exam 1
• Format:
  – 32 multiple choice (1 point each)
  – 6 short answer (points vary)

Multiple-choice questions

• 32 total
  – 19 on material discussed in class and in the book
  – 4 book-only
  – 9 class-only

Multiple-choice questions

• Distribution of class-and-book questions:

<table>
<thead>
<tr>
<th>Chapter</th>
<th># of questions</th>
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<tbody>
<tr>
<td>1</td>
<td>7</td>
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<td>3</td>
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<td><strong>Total:</strong></td>
<td><strong>19</strong></td>
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Multiple-choice questions

• 4 book-only questions:
  – Reliability vs. validity
  – General function of sympathetic, parasympathetic, and somatic nervous systems
  – Signal detection: Sensitivity vs. response criterion
  – Neural activity as a measure of consciousness (Fig. 6.9)

Multiple-choice questions

• 9 class-only questions:
  – Types of research in MSU psych department
  – Relative size of association areas across species
  – Location of face area
  – How a neuron increases its signal strength
  – Response of retinal ganglion cells to dim, bright, and split illumination (2 questions)
  – Stroop effect
  – Bottom-up factors in selective attention
  – Sensemaking process

Short-answer questions

• 3 questions on Karpicke and Roediger (2008)
  – Know the method and results at the level described in the lecture notes
• Draw a corner of the impossible triangle
• Be able to reconstruct the “toad + stool” example from Severed Corpus Callosum
• Be able to label cortical lobes, the primary sensory and motor areas of cortex, and CNS “stick figure” from Sept. 10 class
  – Sensory areas: visual, auditory, somatosensory
Basic learning mechanisms

Will be tested on Exam 2, not Exam 1

Learning

• Organisms have to adapt to their environment
• For all animals, this involves:
  – Habituation and dishabituation
  – Conditioning: classical and instrumental
    • Focus of today’s class
• For people this also involves:
  – Observational learning, skill learning, conceptual learning, lots of other types of learning

Conditioning

• Learning associations from
  – A stimulus to a response (classical/Pavlovian)
  – A response to a stimulus (instrumental/operant)
• Important distinctions:
  – A stimulus is part of the environment
    • Examples: A bell ringing, the smell of food
  – A response is part of the organism
    • Examples: A motor action, a thought or emotion, a physiological change

Classical conditioning

• Unconditioned stimulus (US):
  – A stimulus that elicits a response before learning
  – “Unconditioned” means “before learning”
• Unconditioned response (UR):
  – The response elicited by the US before learning
• Conditioned stimulus (CS):
  – Initially neutral (elicits no response)
  – Elicits a response after learning
  – Learning involves repeated pairing of CS and US
  – The organism learns that the CS predicts the US
• Conditioned response (CR):
  – The response elicited by the CS after learning
  – May resemble UR, but may not

Example: Little Albert

• US?
  – Clang
• UR?
  – Cry
• CS?
  – Rat
• CR?
  – Cry
• Here, the UR and CR are the same
• Other furry animals could act as the CS
  – Though maybe not as strongly
  – Stimulus generalization
Prediction is important

- Associative learning only happens if the CS predicts the US
  - After learning, the organism uses the CS as a signal to prepare for the US
  - The preparation involves the CR
- It takes many trials to know if the CS predicts the US, so associative learning takes a while

Example

- US?
  - Smell/sight of food
- UR?
  - Eat
- CS?
  - Sound of can opener
- CR?
  - Approach the can

Example: Getting a cavity filled

- US?
  - Needle poke
- UR?
  - Flinch
- CS?
  - Sight of needle
- CR?
  - Hold still, to prevent the flinch

Homeostasis

- Stability in body state maintained through self-regulation
  - Control centers in the brain detect deviations in temperature, glucose levels, etc.
  - Deviations trigger internal adjustments or behaviors that restore the target level
- Homeostasis is the basis for the homeostatic model of drug tolerance
  - Which assumes classical conditioning

Homeostatic model

- US:
  - Heroin
- UR:
  - Relaxed state, dry mouth
- CS?
  - Sights and sounds of the context where the user usually uses
- CR?
  - Neural and hormonal responses to maintain homeostasis
  - In absence of heroin, the CR produces agitated state, salivation

("Wetter" and "drier" may be reversed in Fig. 7.15.)

Instrumental conditioning

- Response: Some action by organism
- Reinforcement: A stimulus delivered after response to make that response more likely
- Shaping: Reinforcing behaviors that are increasingly similar to the desired response
Instrumental conditioning

Initial trials:

Later trials:

Example

- Cat:
  - Response?
    - Jump in tub
  - Reinforcement?
    - Water
- Shaping?
  - Reinforce going into bathroom, then reinforce jumping on tub deck

Example

- Dad:
  - Response?
    - Turn on water
  - Reinforcement?
    - Adorable cat behavior

Viewed as classical conditioning

- US?
  - Water
- UR?
  - Drink
- CS?
  - Dad in bathroom
- CR?
  - Jump in tub