What are learning and memory?
Learning

- Nonassociative
  - Habituation
  - Sensitization
- Associative (“Simple” conditioning)
  - Classical (Pavlovian) conditioning
  - Operant / Instrumental conditioning
Sensitization & Habituation
### Operant / Instrumental conditioning

<table>
<thead>
<tr>
<th>Response</th>
<th>Consequence</th>
<th>Example</th>
<th>Effect on Response Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive reinforcement</td>
<td>Positive event begins</td>
<td>Food given</td>
<td>Increase</td>
</tr>
<tr>
<td>Negative reinforcement</td>
<td>Negative event ends</td>
<td>Pain stops</td>
<td>Increase</td>
</tr>
<tr>
<td>Punishment</td>
<td>Negative event begins</td>
<td>Pain begins</td>
<td>Decrease</td>
</tr>
<tr>
<td>Punishment (response cost)</td>
<td>Positive event ends</td>
<td>Food removed</td>
<td>Decrease</td>
</tr>
<tr>
<td>Nonreinforcement</td>
<td>Nothing</td>
<td>—</td>
<td>Decrease</td>
</tr>
</tbody>
</table>

**Example:**
- **Behavior:** Pressing the bar
- **Consequence:** Getting food

**Diagram:**
- **Consequence:** Getting food
- **Behavior:** Pressing the bar
• An everyday use of *operant conditioning*
What “kind” of memory?

- Short-term or long-term memory?
- Implicit or Explicit memory?
- Declarative or Procedural?
- Episodic or Semantic?
- Simple or Configural?
How do we know if two “kinds” of memory are actually different categories?

http://www.youtube.com/watch?v=OmkiMlvLKto

http://www.youtube.com/watch?v=ymEn_YxZqZw
Why do we need to measure animal memory in neuroscience?

Short-term memory

[Diagram showing acquisition and testing phases for DMTS and DNMTS]
Episodic memory

- "Normal" memory in 8-arm radial maze
- Impaired memory in 8-arm radial maze
“Semantic” memory

Configural memory in the **Morris water maze**
• NOVA segment on HM
  • http://thebrainobservatory.ucsd.edu/content/video-scientia-nova-memory
• NY Times article on HM
  • http://www.nytimes.com/2008/12/05/us/05hm.html