Non-associative Learning

What is Non-associative Learning?

- Non-associative learning is a relatively permanent change in the strength of response to a single stimulus due to repeated exposure to that stimulus.
- Changes due to such factors as sensory adaptation, fatigue, or injury do not qualify as non-associative learning.

Types of Non-associative Learning

- Habituation – a *reduction* in the strength of response to a stimulus across repeated presentations.
- Sensitization – an *increase* in the strength of response to a stimulus across repeated presentations.

Habituation

- Two forms of habituation have been identified experimentally:
  - Short-term habituation – habituation lasting a few minutes or hours
  - Long-term habituation – habituation lasting for days or weeks

Short-term Habituation

- Stimulus presented at relatively short intervals (e.g., 15 seconds).
- Response to stimulus decreases rapidly with repetitions.
- Response strength recovers after a few minutes of non-stimulation.

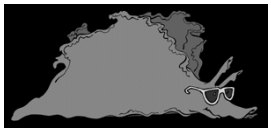
Long-term Habituation

- Short-term habituation induced repeatedly.
- Relatively long periods elapse between short-term habituation sessions (e.g., several hours, a day).
- Individual remains habituated to stimulus over days or weeks.

Sensitization

- Individual becomes more responsive to the stimulus with repeated presentations of the stimulus.
- Example: When you're trying to get to sleep, the sound of water dripping from the faucet becomes more and more difficult to ignore.

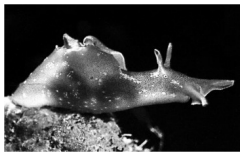
Aplysia Research



Neural mechanisms that mediate habituation and sensitization have been identified by studying *Aplysia,* a marine slug.

Advantages of *Aplysia* for Neurological Research

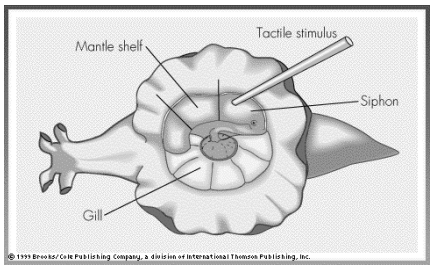
- Demonstrates nonassociative learning
- Relatively simple nervous system
- "Wiring" diagram is the same for all individuals.



Habituation in *Aplysia*

- Touching the siphon or gill causes retraction of mantle.
- Habituation occurs to repeated mild touch.
- But what changes during habituation?
- Kandel's research showed that the amount of neurotransmitter released at the sensory nerve endings decreases.

Experimental Setup for Studying *Aplysia* Habituation



Sensitization in *Aplysia*

- Begin by habituating gill-withdrawal response to light touch.
- Apply strong stimulation to head region (e.g., a shock).
- *Aplysia* now shows strong gill-withdrawal response to light touch.

Aplysia "Wiring" Diagram