

## Solution Key - 7.012 Recitation 17 - 2010

### Questions

In *Aplysia*, or sea slug, the axonal connections of all the neurons have been traced.

In experiment 1, you tap the mantle of this organism 60 times, once every 2 sec, at a stretch and look at its gill withdrawal reflex. In experiment 2, you give 10 taps, once every 2 sec, wait for an hour before giving the next 10 taps. You repeat this 6 times every day for a couple of days. You then stop for a few days and repeat the experiment again. You find that although the total number of taps is same in both the experiments, the response of the organism is different in these two experiments.

- i. Which of these two experiments would likely result in **short-term-habituation**? Explain what **short-term-habituation** is and why this habituation lasts only for a few minutes?

*Experiment #1. Short-term habituation is a short-term loss of responsiveness to stimuli. This lasts only for a few minutes because over time the sensory neuron may run out of neurotransmitter.*

- ii. For the experiment you **did not select** while answering part (i), explain why the final response is an example of **long-term-habituation**.

*Experiment #2. Long-term habituation is a long-term loss of responsiveness to stimuli. Since the stimuli is applied over a large duration of time, this results in long term habituation of the organism to the applied stimuli and consequently a decreased release of the neurotransmitter containing vesicles or even an alteration in the neuronal circuits.*

- iii. What does the fact that **long-term-habituation** occurs tell you about the plasticity of neuronal circuits?

*Long-term habituation shows that neuronal circuits can be rewired (are plastic) in response to stimuli given at different times and at different strengths, so as not to waste cellular resources.*