

Lab 10

March 10, 2009

In-Depth Investigations

In the previous labs we studied a range of neural phenomena, from single neurons to networks. In this lab we go back and examine these phenomena in more detail, focusing on interesting questions for which there was no time in the regular session. This lab may be done individually or with your regular lab partner.

Pick a previous lab and come up with a follow-up experiment using the same setup. You should let your interests guide you, but get approval from the TA at least one day before the lab session. In case of writer's block, there are several example experiments included at the end of this handout.

10.1 Prelab

Make a general plan for your new experiment. Include the experimental procedure, the results desired (including the final plots), and be sure to include any equations you will use to fit the data. This description should be very clear as to what the end goal of the experiment is. When designing the experiment, remember that previous three-hour labs have included only a couple of experiments resulting in one or two summary figures.

10.2 Setup

Any setup for the previous labs may be used. Refer to that lab handout for details as to the parameter file specification. Ask the TA for any additional information on the lab setups or if you have a desire for a specific board prior to the lab session. Be sure you are fully prepared before the lab session.

10.3 Experiments

Perform the experiment you designed in the prelab. You must take new data for this lab, but feel free to use old data when planning the procedure. When writing up, there is no need to detail the lab procedures unless they have changed from the prelab. Make sure the figures you choose to include concisely summarize the main results of the experiment.

10.4 Postlab

What further questions do the results of your experiment raise? What additional experiments could you do to answer these?

10.5 Example Experiments

- **Ca-Free Bursts:** By changing the reset level of the neuron, it is possible to produce bursting with the Ca current turned off (Lab 3). Explain and investigate this behavior.
- **Synchrony for Skeptics:** Explore the effect of parameters that should not change the synchronous network period (Lab 5). Inhibition amplitude and background input current are two possible choices.
- **Noisy Associations:** A small level of noise can increase the number of potentiated synapses (Lab 8). Explore the effect of different levels of noise on associative memory recall performance (Lab 9).