Prof. Dr. Gregor Schöner November 19, 2020

Exercise 3, due November 26, 2020

This is a reading and writing excercise. In response to each question, write a self-contained text that can be read without having read the question. Make sure you deliver to the reader all information necessary to appreciate the point you are making. Take the reader step by step through your argument. Use illustrations that you label and explain so that they can be understood without going back to the source.

Do not quote literally from sources, and indicate the source of illustrations.

Read the Chapter 3 "Embedding Dynamic Field Theory in Neurophysiology" by Sebastian Schneegans, Jonas Lins, and Gregor Schöner in the book "Dynamic Thinking" (available on the course web page). You don't need to read the boxes and you may also skip the section on two-layer fields, but read again the Section "Relationship between DPA's...." (p. 86) and the Conclusions.

1. Describe how a tuning curve is obtained for neurons in a sensory area of cortex. Illustrate the concept in a figure in which you commit to a particular feature dimension.

2. The experiment of Lee et al (1988) is described around Figure 3.3 and provides evidence for population coding of saccadic gaze shifts in superior colliculus. Summarize the argument in your own words. You can do this more abstractly than in the chapter. Try to express the core idea. Why was the same experimental demonstration not done for motor cortex? (The answer is in the chapter).

3. The chapter reviews how Distributions of Population Activation (DPA) can be defined for both sensory and motor areas. Could more than one DPA be constructed for any given neural population? What would be required experimentally to do that? Would it be even possible to construct both a sensory and a motor DPA for a *single* cortical area?