Prof. Dr. G. Schöner, Institut für Neuroinformatik gregor.schoener@rub.de

April 29, 2016

# Exercise 2

Read the article "Dynamics of behavior: theory and applications for autonomous robot architectures" by Schöner, Dose, and Engels, available as a pdf download on the course web pages (Section 3 can be scanned only, no need to understand this in depth).

This article reviews both aspects of dynamics we discussed in the first two lectures, behavioral and neural dynamics. It provides all the arguments that were mentioned in the lecture, with more detail and better illustration!

1. Describe in words around Figure 3 how mental simulation of the dynamics may convince you that the zero crossing of this plot is an attractor.

2. In Figure 7, the bifurcation alluded to in the lectures is shown. Reproduce Figure 7 (bottom two panels) and label the attractors and repellors. What is the parameter that changes between these two plots? Use that parameter as the horizontal axis of a bifurcation diagram. Plot the fixed points on the vertical axis and mark all different solutions.

3. Use Figure 12 to discuss, what the conceptual difference is between a behavioral and a neural dynamics. These points were discussed in the lecture. Try to make them again in concrete form based on the text that refers to this figure.