Self-Organization of Local Cortical Circuits and Cortical Orientation Maps: A Nonlinear Hebbian Model of the Visual Cortex with Adaptive Lateral Couplings

Thomas Burger[§] and Elmar Wolfgang Lang*

Institute of Biophysics, Universität Regensburg, D-93040 Regensburg, Germany.
E-mail: elmar.lang@biologie.uni-regensburg.de

* Author for correspondence and reprint requests

Z. Naturforsch. **56 c,** 464–478 (2001); received August 11, 2000/February 1, 2001

Self-Organisation, Local Cortical Circuits, Nonlinear Hebbian Learning

A nonlinear, recurrent neural network model of the visual cortex is presented. Orientation maps emerge from adaptable afferent as well as plastic local intracortical circuits driven by random input stimuli. Lateral coupling structures self-organize into DOG profiles under the influence of pronounced emerging cortical activity blobs. The model's simplified architecture and features are modeled to largely mimik neurobiological findings.