Pascal FRIES

Mercredi 22 Juin 2005
Conférence Systèmes Dynamiques

14h00 – 14h45

Neuronal communication through neuronal coherence

Within the central nervous system, the main occupation of a given group of neurons is to interact with other groups, sometimes even across long distances. It had been commonly assumed that the influence of one neuronal group onto another is primarily determined by the mean rate of action potentials. However, recent evidence suggests that a postsynaptic neuron actively compensates slow changes in mean input rate and primarily responds to precisely synchronous input barrages. I will present evidence that neuronal groups that are selected through attentional mechanisms do in fact increase their impact on target groups through precise oscillatory synchronization. In addition, long-range neuronal coherence appears to greatly amplify the effects of local oscillatory synchronization. I will show that modulations of subjects' readiness to respond in a simple reaction time task correlate closely with the strength of gamma-band (40-70 Hz) coherence between motor cortex and spinal cord. This coherence may contribute to an effective cortico-spinal interaction and shortened reaction times. Both local- and long-range neuronal coherence are thus flexibly and dynamically modulated by cognitive factors and appear as prime candidate mechanisms for a dynamic control of information flow through the central nervous system.

Pascal FRIES
Principal Investigator
Neuronal Coherence Group
F. C. Donders Centre for Cognitive Neuroimaging
University of Nijmegen
Adelbertusplein 1
6525 EK Nijmegen
The Netherlands
Phone: (+31) (0)24 36 10657
Fax: (+31) (0)24 36 10989
e-mail: pascal.fries@fcdonders.kun.nl
website: www.kun.nl/fcdonders/