

# LAD Conferences

2 février 2010, 11h00  
DS-3470, 320 Ste-Catherine Est, Montréal

L a b o r a t o i r e d e r e c h e r c h e s u r l e s a s y m é t r i e s d ' i n t e r f a c e s

**Roland Friedrich, Max Planck Institute for Human Cognitive and Brain Sciences,  
Leipzig, Germany**

## Mathematical Logic in the Human Brain: Syntax

Theory predicts a close structural relation of formal languages with natural languages. Both share an underlying grammar in common which either generates (hierarchically) structured expressions or allows deciding whether a sentence is syntactically correct or not. The advantage of rule based communication is commonly believed to be its efficiency and effectiveness.

A particularly important class of formal languages are those underlying the mathematical syntax. Here we provide brain-imaging evidence that the syntactic processing of abstract mathematical formulae, written in a first order language, is as a rulebased generation and decision process, indeed efficient and effective. But remarkably enough, the neural network involved, consisting of intraparietal and prefrontal regions, does only involve Broca's area in a surprisingly selective way. This seems to imply that despite structural analogies, at the neural level common and current formal languages, such as used in mathematics and natural language are principally differently processed, with an observable "semantic shift".

This talk is based on joint work with A. D. Friederici.

**Roland Friedrich** is a researcher at *Max Planck Institute for Human Cognitive and Brain Sciences* in Leipzig, Germany.

### Selected Publications

Friedrich, R. and Friederici, A.D. (2009) *Mathematical Logic in the Human Brain: Syntax*. PLoS ONE 4(5): e5599

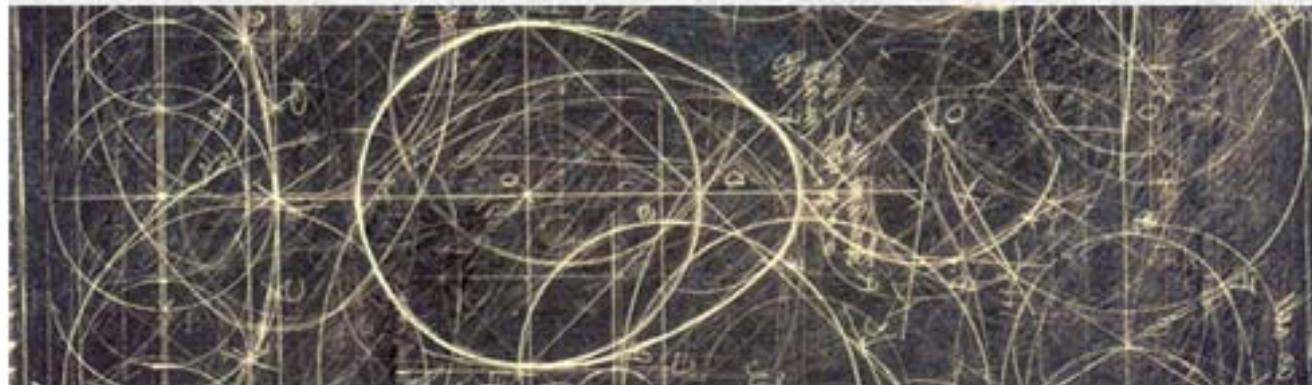
Friedrich, R.; Hutt, A.; Svensen, M.; Kruggel, F. (2000) *Detection of fixed points in spatiotemporal signals by a clustering method*. Physical Review, No.61, Issue 5, pp. 4691-4693

Friedrich, R.; Hutt, A.; Uhl, C. (1999) *Analysis of spatiotemporal signals: A method based on perturbation theory*. Physical Review, Vol. 60, Issue 2, pp. 1350-1358

### Anna Maria Di Sciullo

[www.interfaceasymmetry.uqam.ca](http://www.interfaceasymmetry.uqam.ca) | CRSH | FQRSC

en collaboration avec le **Comité d'animation scientifique du Département de Linguistique**



*Geometria dell'ovale incisione su rame stampa in negativo* © 2007 - Patrizio Di Sciullo - Tutti i diritti riservati.

