

*Università degli Studi di Pavia*  
**DOTTORATO DI RICERCA IN FISICA**

**CORSO DI SEMINARI DI INDIRIZZO TEORICO**

**A.A. 2005/2006**

**Martedì 10 gennaio 2006 alle ore 16.00**

**Sala Riunioni, Dipartimenti Fisici, via Bassi 6**

**Prof. ALESSANDRO TREVES**

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**Cos'è il dono del linguaggio?  
Ipotesi sulla ricorsività infinita e sulle sue basi  
nell'operare delle reti corticali**

Abstract: Understanding the neural basis of higher cognitive functions, such as those involved in language, requires as a very prerequisite a shift from mere localization, which has been popular with imaging research, to an analysis of network operation. A recent proposal points at infinite recursion as the core of several higher functions, and thus challenges cortical network theorists to describe network behavior that could subserve infinite recursion. Considering a class of reduced models of large semantic associative networks, whose storage capacity can be studied analytically with statistical physics methods, I have simulated their dynamics, once the units are endowed with a simple model of firing frequency adaptation. Such models naturally display latching dynamics, i.e. they hop from one attractor to the next following a stochastic process based on the correlations among attractors. It turns out, from the simulations and from analytical arguments, that infinite latching only occurs after a phase transition, once the network connectivity becomes sufficiently extensive to support structured transition probabilities between global network states. The crucial development endowing a semantic system with a non-random dynamics would thus be an increase in connectivity, perhaps to be identified with the dramatic increase in spine numbers recently observed in the basal dendrites of pyramidal cells in Old World monkey and particularly in human frontal cortex.

**Gli studenti di Dottorato e tutti gli interessati sono cordialmente invitati**

Titolare del Corso  
Prof. Annalisa Marzuoli