



MICHAELMAS TERM 2009

Saïd Business School, University of Oxford

SEMINAR SERIES

Convenors: Felix Reed-Tsochas, Institute for Science, Innovation and Society, Saïd Business
Eduardo López, Saïd Business School

Our meetings intend to provide a forum for rigorous research (in a broad range of disciplines) focusing on complex adaptive systems, using methods and techniques such as agent-based modelling and complex network analysis. Since potential areas of application for such approaches can be located across the social, natural and engineering sciences, our aim is to involve participants from a wide range of departments in Oxford. We welcome talks which focus on particular areas of application and associated technical issues, but also encourage contributions which address more fundamental conceptual or mathematical problems. The CABDyN Seminar Series is one of the activities of the CABDyN Research Cluster.

Tuesday 3rd November, 12:30-14:00

James Martin Seminar Room

Prof Paul Bressloff

Mathematical Institute, University of Oxford

*‘Geometric Visual Hallucinations, Euclidean Symmetry and the
Functional Architecture of Visual Cortex’*

ABSTRACT

Geometric visual hallucinations are seen by many observers after taking hallucinogens, on viewing bright flickering lights, on waking up or falling asleep, in “near death” experiences, and in many other syndromes. We present a dynamical theory of their origin in primary visual cortex (area V1), based on the assumption that the form of the eye-brain map and the network architecture of V1 determine their geometry. Based on anatomical evidence, we take the network architecture to exhibit certain symmetries rendering it invariant under a novel action of the Euclidean group, composed of rigid body reflections, rotations and translations in the plane. Using this symmetry, we show how the common types of geometric hallucinations arise dynamically through the spontaneous formation of neural activity patterns within the cortical network. Our results thus suggest that the cortical mechanisms that generate geometric visual hallucinations are closely related to those used to process contrast edges and contours in normal vision.

Sandwiches and drinks will be provided

For further information contact info.cabdyn@sbs.ox.ac.uk

Seminar webpage: http://sbs-xnet.sbs.ox.ac.uk/complexity/complexity_seminars.asp

Please note: Although the seminar programme detailed above was correct at the time of printing, seminar arrangements are subject to change so, for the latest information please check seminar webpage.