

Hilary Term 2008

CABDyN SEMINAR SERIES
Saïd Business School, University of Oxford



Convenors:

Felix Reed-Tsochas, *James Martin Institute, Saïd Business School*
Jukka-Pekka Onnela, *Physics Department & 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 (<http://sbs-xnet.sbs.ox.ac.uk/complexity/>).

Tuesday 22nd January, 12.30 – 2.00 pm

Seminar Room B, Saïd Business School

Dr Nick Jones

**Physics Department and Oxford Centre for Integrative Systems Biology
University of Oxford**

Pink Noise and Sensory Adaptation

ABSTRACT

Pink, or $1/f$, noise is a kind of temporal fluctuation that, though widespread in nature, is not well understood. By focusing on the long-time correlations that are present in recordings of the rotation directions of a bacterial tail, I make a connection between the mechanism of bacterial sensory adaptation and pink noise. Using a toy model, I suggest that systems that can adapt to stimuli which vary by several orders of magnitude are likely to have efficient memories (or non-unary number representations) and that these memories can generate pink noise. I then suggest that the mysterious pink noise detected in human heart rate time series might also have its origin in adaptation and the efficient representation of external stresses. Along the way, I note a straightforward filtration that takes each successive position of a 1-D random walker and transforms it into another time series. The filtration is essentially the digit sum of the numeric representation of the position of the walker. This transformed time series shows pink or $1/f$ -like behaviour in its power spectrum.

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