THE MAJORITY GAME ON REGULAR AND RANDOM NETWORKS

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Abstract : In the two strategy majority/minority game on a network, at time *t*, an individual observes some subset of its neighbors' strategies, and then adopts at time *t+1* that strategy which was more/less frequently played by its neighbors at time *t*. We shall examine in this paper a variety of distinct models which vary the subsets observed, the synchrony of actions, the regularity, or otherwise, of the networks, the mix of majority and minority players. Important measures of the dynamics of such systems such as the nature of the fixed points, and limit cycles are discussed. The expected payoffs under certain games are computed and compared. In particular we shall examine complete networks, hypercubes and a certain class of cubic networks. These graphs have rather different numbers of symmetries which impact on the properties of the dynamics. The work is of an exploratory nature and hopefully will suggest many potential lines of enquiry.

Biographical Sketch:

Chris Cannings is an Emeritus Professor at the University of Sheffield, UK having previously held appointments at the Universities of Aberdeen, UK and Pavia, Italy and visiting positions at Stanford, Cambridge and Utah. He is a member of the Peer Review College of the U.K. Engineering and Physical Sciences Council, the College of Experts of the U.K. Medical Research Council, and an Expert for the Institut de la Santé et de la Recherche Médicale, France. With David Balding and Martin Bishop he is editor of the Handbook of Statistical Genetics. His research focuses on the mathematical modelling of biological processes, particularly population genetics and evolution. His main contributions have (perhaps) been, single locus models of selection (e.g. [1], [2]), the introduction of the exchangeable model of random genetic drift (e.g. [3], [4]), the development of the "peeling" algorithm for calculations on complex genealogies [5], analysis of the War of Attrition (e.g. [6], [7]), the study of the patterns of Evolutionary Stable Strategies for finite conflicts (e.g. [8], [9]), and aspects of enumeration and simulation of genealogies [10], [11]. Current work is on dynamics of, and on, networks, particularly in Amorphic Computing, where randomly linked microprocessors can self-assemble to perform various tasks (www.amorph.group.shef.ac.uk).

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