CMSS One-Day Workshop

15 February 2017

Speaker: Dieter Armbruster (Arizona State University)
Title: The Economics of Need Based Transfers
Abstract: "Need based transfers (NBT) are actions to compensate losses after disasters. NBT are given based on shared values and reect the understanding of the random nature of disasters. Codied, they create an economic system that we call the Economics of Gift Giving. To be specic, we study an economic system, whereby people that fall below a threshold (e.g. welfare threshold) will receive help from people that are richer. In a series of projects focussed on agent based simulations, we have studied dierent aspects of this economy: i) We have discussed the impact of the dierent nature of economic disasters, specically the correlation between disasters. We show that, all other things being equal, spatially correlated disasters have a lower impact than temporally correlated disasters. ii) We have studied the impact of the rules of NBT - if multiple agents are in need, who is allowed to ask rst and whom do they ask. We nd that, for a short time horizons, the optimization is similar to a knapsack problem: Resources are optimally used when an agent with surplus y supports an agent that needs y–ϵ with ϵ as small as possible. However, if disasters happen frequently and a long term horizon is considered, this policy leads to extremely bad long term outcomes whereas a policy that asks the richest agent rst seems to be optimal. iii) In order to go beyond pure simulation studies, we are also using kinetic theory to generate Boltzmann-type equations and their hydrodynamic limits, leading to Fokker-Planck type equations for the time evolution of the wealth distributions. Preliminary analyses of these equations show the emergence of Pareto wealth distributions and of log-normal wealth distributions depending on dierent priority rules for NBT. In addition, progress is reported on optimization problems like how to reduce the number of agents below the welfare threshold in shortest time."

Speaker: Patrick O'Callaghan (University of Queensland)
Title: Measuring Utility With Partial Mixture Sets
Abstract: "We provide necessary and suffcient conditions on preferences for a cardinal, linear utility representation on a partial mixture set. A mixture set is path-connected via a suitably synchronised collection of paths. A partial mixture set need not be path-connected. To compensate for this weakening of the mixture set axioms of Herstein and Milnor, we strengthen the usual axioms on preferences. Partial mixture sets allow us to capture nonlinear utility using a standard independence axiom. This we demonstrate via preferences that have a properly quadratic utility representation on the square of a Brownian bridge. Partial mixture sets are also useful in settings where mixtures between certain prospects are unjustied, e.g. unawareness."

Speaker: Robin Hankin (Auckland University of Technology)
Title: A Generalization of Bradley-Terry Strengths and An Application in Australian MasterChef
Abstract: "Order statistics occur frequently in competitive situations such as racing and one natural description of the competitors' strengths is the Bradley-Terry model. This specifies that the result of pairwise comparisions are Bernoulli random variables. The Bradley-Terry model may easily be generalized to the case of more than two competitors; and the entire finishing order is informative about the competitors' strengths. However, many situations involve identifying the *weakest* competitor. This paper presents a generalization of Bradley-Terry to accommodate such observations and introduces a new suite of software for its calculation. The techniques are used to analyse results from two sports which use ranking techniques: single scull rowing, and the competitive cooking game show MasterChef Australia. A number of natural statistical hypotheses may be tested straightforwardly using the software."

Speaker: Mark Wilson (University of Auckland)
Title: Social Choice, Electoral Systems and Social Networks - A Brief Overview Based on My Research Programme
Abstract: "This talk gives a brief overview of Mark's current work (some with PhD students) in the following areas: social choice (voting rules, resource allocation), electoral systems (simulation, optimal systems, swing models), social/economic networks (signed networks, networks of legal statutes). Depending on interest, some topics may be presented in greater detail in the CMSS seminar in 2017."

Speaker: Egor Ianovski (University of Auckland)
Title: Strategy-proof consular elections
Abstract: "The Gibbard-Satterthwaite theorem states that an onto social choice function cannot be both strategy-proof and non-dictatorial if the number of alternatives is at least three. The Duggan-Schwartz theorem proves an analogue in the case of set-valued elections: if the function is onto with respect to singletons, and can be manipulated by neither an optimist nor a pessimist, it must have a weak dictator. However, the assumption that the function is onto with respect to singletons makes the Duggan-Schwartz theorem inapplicable to elections which necessarily select a committee with multiple members. In this talk we make a start on this problem by considering elections which elect a committee of size two (such as the consulship of ancient Rome)."

Speaker: Jaimou Liu (University of Auckland)
Title: Interpersonal Ties - A Brief Overview of My Recent Research
Abstract: "My research in the past year has been broadly focused on the structural analysis of interpersonal ties in social networks. In this short talk I will briefly address three questions towards this theme: 1. How does an individual create ties with an established network to gain a positional advantage. 2. What is cohesion in a social network? 3. What could be the dark side of the missing of interpersonal ties?"

Speaker: Matthew Ryan (Auckland University of Technology)
Title: Scalability of Choice Probabilities
Abstract: "We consider *binary choice probability functions* a function that maps each possible binary (i.e., two-element) choice set to the probabilities with which a given decision-maker will choose each option. Binary choice probabilities are *scalable* if there exists a utility scale for alternatives with respect to which choice probabilities are suitably monotone. This is a fundamental concept in mathematical psychology. We review standard scalability concepts and introduce a novel variant, which we call *strict scalability*. We establish axiomatic foundations for this concept necessary and sufficient conditions for binary choice probabilities to be strictly scalable. When the set of alternatives is countable, the required conditions are equivalent to the familiar condition of *weak substitutability*."

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