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Dynamic Games and Applications: Second special Issue on Population Games - Introduction

Mark Broom, Vlastimil Krivan and Frank Riedel - editors.

This is the second special issue on Population Games, following the December 2014 issue. In this issue we continue the theme from the December issue, but focus on different aspects.

An important extension of classical theory is the analysis of games with a continuous strategy set. The sex ratio game, for instance, contains a continuum of strategies, although these are in effect just probabilistic weights of pure strategies. Many relevant games, e.g. Bayesian games, lead naturally to rich strategy sets which one frequently describes by real parameters. In general we need to be able to model cases where an arbitrarily large number of strategies are available. This theory has been extended in a number of ways, and is the subject of several papers within this special issue. *Ruijgrok and Ruijgrok* extend the basic work of Riedel and collaborators on replicator and other dynamics in games with a continuum of strategies. Growing in importance over recent years since its introduction by Metz and collaborators is the area of adaptive dynamics, which is a generalised methodology to consider the evolution of continuous traits, where payoffs are nonlinear. In *Vutha and Golubitsky* we see further development of the general theory of adaptive dynamics and in particular classifications of singular strategies. *Bernhard* considers an adaptive-dynamics model of the classical handicap principle from biological signalling of Amotz Zahavi.

Another important departure has been the consideration of games with some underlying structure. *Arieli* considers a congestion game on a network where levied taxes influence behaviour. Games involving structure often include finite populations, which necessitates the use of stochastic models, as we see in the work of *Kroumi and Lessard*, which models the evolution of cooperation in such a situation. Stochastics comes into population models in other ways too. For example *Cannings* considers a classical model with repeated mutations and shows long term stochastic patterns even in models that are of the original matrix-game type.

In summary, the modelling of populations using game theory is expanding in a number of important directions, and we hope that our double special issue of Dynamic Games and its Applications will be a useful resource to all those who are interested in evolutionary game theory.