1040-91-136 **Arne Traulsen*** (traulsen@mpil-ploen.mpg.de), Max-Planck Institute for Evolutionary Biology, August-Thienemann-Str. 2, 24306 Ploen, Germany. *Evolutionary Game Dynamics in Finite Populations: The Evolution of Costly Punishment.*

Traditionally, evolutionary game dynamics is described in infinitely large populations, where stochastic effects can be neglected. Only recently, stochastic processes have been applied to model evolutionary game dynamics in finite, well-mixed populations analytically. In this context, analytical results are obtained that can be very different from the usual results of the replicator dynamics, depending on the population size, the intensity of selection, and the mutation rate. However, in the appropriate limit, the replicator dynamics is recovered. As applications, the evolution of cooperation and the emergence of punishment will be discussed. (Received January 30, 2008)