1146-92-18 **Daniel Brendan Cooney*** (dcooney@math.princeton.edu), Program in Applied and Computational Math, Fine Hall, Washington Road, Floor 2, Princeton, NJ 08540. *The Replicator Dynamics for Multilevel Selection in Evolutionary Games.*

We consider a stochastic model for evolution of group-structured populations in which selection operates at two organization levels: individuals compete with individuals in their group, while groups compete with other groups. Payoff is obtained from the Prisoner's Dilemma. In the limit of infinite population size, we derive a non-local PDE describing the probability distribution of groups in the population. We characterize the long-time behavior of our system, with an emphasis on understanding the most frequent group compositions at steady state.

When average payoff of groups is maximized by all-cooperator groups, steady state composition ranges from all-defector groups when individual-level selection dominates to all-cooperator groups when group-level selection dominates. When group payoff is maximized by a mix of cooperators and defectors, then the steady state features a fewer cooperators than required for the mix optimizing group payoff, even in the limit where group-level selection is infinitely stronger than individual-level selection. In such cases, the conflict between the two levels of selection cannot be decoupled, and cooperation cannot be sustained at all when between-group competition favors an even mix of cooperators and defectors. (Received November 08, 2018)