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Daniel B Cooney* (dcooney@math.princeton.edu), Program in Applied and Computational Math, Fine Hall, Washington Road, Floor 2, Princeton, NJ 08540. *Assortment and Reciprocity Mechanisms for Promotion of Cooperation in a Model of Multilevel Selection.*

In the study of the evolution of cooperation, many mechanisms have been proposed to help overcome the self-interested cheating that is individually optimal in the Prisoners' Dilemma and other social dilemmas. These mechanisms include assortative or networked social interactions, reciprocity rules to establish cooperation as a social norm, or simultaneous competition between individuals favoring cheaters and competition between groups favoring cooperators. Here, we build on recent mathematical tools describing the dynamics of multilevel selection to consider the role that assortment and reciprocity mechanisms play in facilitating cooperation in concert with multilevel selection. We explore a deterministic partial differential equation variant of the replicator equation which the effects of within-group and between-group competition, and we demonstrate the synergistic effects between population structure within groups and the competitive ability of cooperative groups when groups compete according to collective payoff. (Received January 24, 2020)