

1145-35-2802

**Russ F. deForest\*** ([russ.f.deforest@gmail.com](mailto:russ.f.deforest@gmail.com)), 109 McAllister Bldg, University Park, PA 16802. *Cross-diffusive instabilities and pattern formation in a nonlinear public goods game.*

Evolutionary game models have been used to investigate coexistence of multiple types (strategies, phenotypes) within a single population in a variety of settings, from yeast or tumor cells to flour beetles or lizards. In these settings the fitness of a particular expressed type depends on its relative frequency within the larger population. Of particular interest are public goods game models where socially cooperative behavior coexists alongside behavior that is exploitative. We consider a system of quasilinear partial differential equations as a spatial model of a nonlinear public goods game. Each type is represented by a density and the fitness of each type depends locally on the density of all types. We demonstrate conditions for the existence of a cross-diffusive instability, leading to pattern formation and the advantageous aggregation of the cooperative type (Received September 25, 2018)