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Jan Rychtar* (rychtar@uncg.edu), Department of Mathematics and Statistics, UNCG, Greensboro, NC 27412, and **Mark Broom**, Department of Mathematics, City University London, London, United Kingdom. *The evolution of cooperation - kin selection and greenbeard genes.*

One way to convince ourselves that no cooperation can evolve among defectors is via a simple yet one of the most famous games in all of game theory - the Prisoner's dilemma (PD) game. The players of this game adopt one of the two strategies: a) a cooperator who pays a cost so that another individual can receive a benefit, or b) a defector who can receive benefits, but it has no cost as it does not deal out any benefits at all. As seen from this formulation, no rational individual would opt to be a cooperator. Yet, we can see cooperation everywhere around us and thus (assuming defectors were here first) there must exist at least one mechanism for its evolution. Nowak (2006, 2012) discusses several of such mechanisms, including the kin selection by which cooperation can spread if the benefits go primarily to genetic relatives. In this talk we will introduce a simple PD-like asymmetric matrix game and show how Hamilton's rule can easily be recovered. We will also introduce a simple PD-like symmetric matrix game to model the evolution of cooperation via greenbeard mechanism, which can be seen as a special case of kin selection. (Received September 03, 2013)