

Conflict and Cooperation in Microorganisms

Juan F Poyatos, CNB-CSIC

Logic of Genomic Systems laboratory

Exercise 1

Analyze this game with different conditions
e.g., $T > R > P > S$, $T > R > S > P$, ...

		C	D
C		R	S
D		T	P

R: **R**eward for mutual cooperation

P: **P**unishment for mutual defection

T: **T**emptation to defect

S: **S**ucker's payoff

Exercise2

We discussed the following four papers in class; write a comment on what you think of the paper that your group presented and/or simulate the basic evolutionary dynamics linked to it (and comment the results).

- Mol Microbiol. 2011 Jan;79(1):166-79.

A molecular mechanism that stabilizes cooperative secretions in *Pseudomonas aeruginosa*. Xavier JB, Kim W, Foster KR.

- PLoS Biol. 2010 Sep 14;8(9).A mixture of "cheats" and "co-operators" can enable maximal group benefit. MacClean RC, Fuentes-Hernandez A, Greig D, Hurst LD, Gudelj I.

- Proc Natl Acad Sci U S A. 2009 Sep 15;106(37):15786-90. The evolution of information suppression in communicating robots with conflicting interests. Mitri S, Floreano D, Keller L.

- Nature 467: 82-86 (2010). Bacterial charity work leads to population-wide resistance. Lee HH, Molla MN, Cantor CR and Collins JJ.

Exercise3

- Simulate the Simpson's paradox in matlab
- Discuss the conditions in which cooperation evolves, plotting several parameters spaces; e.g., number of groups vs. size of groups, etc.
- Use Price's equation to explain the results.