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Beating Cheaters at Their Own Game JOSEPH RAUCH, JANE KONDEV, Brandeis Univ, ALVARO SANCHEZ, Rowland Inst. Harvard Univ — Public goods games occur over many different scales in nature, from microbial biofilms to the human commons. On each scale stable populations of cooperators (members who invest into producing some good shared by the entire population) and cheaters (members who make no investment yet still share the common goods) has been observed. This observation raises interesting questions, like how do cooperators maintain their presence in a game that seems to heavily favor cheaters, and what strategies for cooperation could populations employ to increase their success? We propose a model of a public goods game with two different player populations, S and D, which employ two different strategies: the D population always cheats and the S population makes a stochastic decision whether to cooperate or not. We find that stochastic cooperation improves the success of the S population over the competing D population, but at a price. As the probability of cheating by the S players increases they outcompete the D players but the total population becomes more ecologically unstable (i.e., the likelihood of its extinction grows). We investigate this trade off between evolutionary success and ecological stability and propose experiments using populations of yeast cells to test our predictions.

Joseph Rauch
Brandeis Univ

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