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Rebecca S. Terry* (terry@math.utah.edu) and **Frederick R. Adler**. *Dynamics of Cooperation in Temporally Varying Environments*. Preliminary report.

An organism's phenotype is defined as the expression of its genetic material. This expression may change under different environmental conditions. The ability to alter one's phenotype by turning on or off specific genes in response to changes in one's environment is known as phenotypic plasticity. Cooperation in certain microbial species is an example of phenotypic plasticity whereby some individuals express particular genetic machinery to produce a resource available to the entire population while others fail to express that same machinery but benefit from consumption of the resource without the cost of its production. Depending on the availability of the resource in the environment, an organism may switch from an expressing to a non-expressing state or vice versa. We develop a mechanistic model to explore the dynamics of cooperation and phenotypic plasticity in social microbes under varying environmental conditions. Using an adaptive dynamics approach, we examine whether there exists an evolutionarily stable switching strategy between states. (Received February 20, 2018)