Large fluctuations and fixation in evolutionary games MICHAEL
ASSAF, MAURO MOBILIA — One of the most striking effects of fluctuations in
evolutionary game theory is the possibility for mutants to fixate (take over) an en-
tire population. In this work we use a semi-classical theory to study fixation in
evolutionary games under non-vanishing selection, and investigate the relation be-
tween selection intensity and demographic (random) fluctuations. This approach
allows the accurate treatment of rare large fluctuations and yields the probability
and mean time of fixation beyond the weak-selection limit, often considered in pre-
vious works. The power of the theory is demonstrated on prototypical models of
cooperation dilemmas with multiple absorbing states, and we find excellent agree-
ment between the theoretical predictions and numerical simulations. Furthermore,
we show that our treatment is superior to the Fokker-Planck approximation for finite
selection intensity. M. Assaf and M. Mobilia, J. Stat. Mech. P09009 (2010). M.
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