Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Cluster-Level Dynamics in a Neutral Phenotype Evolution Model

ADAM SCOTT, DAWN KING, SONYA BAHAR, Dept of Physics and Astronomy, University of Missouri at St. Louis — In agent-based models of nonequilibrium phase transitions, the agent dynamics can be described by reaction-diffusion processes such as branching-coalescing random walks. We have recently shown that a phase transition in a neutral phenotype evolution model comprised of many branching-coalescing random walkers belongs to the directed percolation (DP) universality class. However, while the organism processes are described by A->2A, 2A->A, & A->0, the cluster processes are B->nB, mB->B, & B->0 (where n and m are positive integers). Therefore, despite the DP behavior of the transition at the organism level, we do not expect the clusters to exhibit the same universality class. Here, we will investigate cluster branching behavior by measuring reaction rates and show that the cluster density exponent suggests a different universality class at the cluster level. These results may have significant implications for multilevel selection in evolutionary biology.

Adam Scott
Dept of Physics and Astronomy, University of Missouri at St. Louis

Date submitted: 15 Nov 2013 Electronic form version 1.4