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Phase Transition Behavior in a Neutral Evolution Model[1] DAWN KING, ADAM SCOTT, NEVENA MARIC, SONYA BAHAR, University of Missouri at St. Louis — The complexity of interactions among individuals and between individuals and the environment make agent based modeling ideal for studying emergent speciation. This is a dynamically complex problem that can be characterized via the critical behavior of a continuous phase transition. Concomitant with the main tenets of natural selection, we allow organisms to reproduce, mutate, and die within a neutral phenotype space. Previous work has shown phase transition behavior in an assortative mating model with variable fitness landscapes as the maximum mutation size (μ) was varied (Dees and Bahar, 2010). Similarly, this behavior was recently presented in the work of Scott et al. (2013), even on a completely neutral landscape, for bacterial-like fission as well as for assortative mating. Here we present another neutral model to investigate the 'critical' phase transition behavior of three mating types – assortative, bacterial, and random – in a phenotype space as a function of the percentage of random death. Results show two types of phase transitions occurring for the parameters of the population size and the number of clusters (an analogue of species), indicating different evolutionary dynamics for system survival and clustering.

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