JOE APALOO, St. Francis Xavier University
Evolutionary Stability in Ecological Populations

Ever since Maynard Smith and Price's (1973) pioneering work, evolutionary game theory has advanced from matrix to continuous games, from single to multiple species, from scalar to vector-valued strategies, and from static analyses to adaptive dynamics. This journey made by many contributors has spawned a multitude of evolutionary stability concepts. Essentially three related stability concepts underlie the theory for predicting the outcomes of natural selection: ESS, convergence stability and NIS. The ESS concept is associated with strategies that cannot be invaded by rare alternative strategies. Convergence stability is associated with strategies that will progressively be approached under natural selection. The NIS concept is associated with strategies that can invade any nearby resident strategy. Here, we use the fitness generating function concept (G -function) and adaptive landscapes to illustrate these stability concepts. The G-function permits us to see both dynamics explicitly. The height of the adaptive landscape determines whether a given strategy would produce positive or negative population growth, and the slope of the landscape determines the selection pressure on any given strategy. Each stability concept manifests as particular configurations of the landscape. We conclude by tabulating how most of the evolutionary stability acronyms, definitions and terminologies reduce to one or several aspects of ESS, convergence stability and NIS.