

Abstract: In this paper, we investigate gains from strategy revisions in deterministic evolutionary dynamics. To clarify the gain from revision, we propose a framework to reconstruct an evolutionary dynamic from optimal decision with stochastic (possibly restricted) available action set and switching cost. Many of major non-imitative dynamics can be constructed in this framework. We formally define net gains from revisions and obtain several general properties of the gain function, which leads to Nash stability of contractive games---generalization of concave potential games---and local asymptotic stability of a regular evolutionary stable state. The unifying framework allows us to apply the Nash stability to mixture of heterogeneous populations, whether heterogeneity is observable or unobservable or whether heterogeneity is in payoffs or in revision protocols. This extends the known positive results on evolutionary implementation of social optimum through Pigouvian pricing to the presence of heterogeneity and non-aggregate payoff perturbations. While the analysis here is confined to general strategic-form games, we finally discuss that the idea of reconstructing evolutionary dynamics from optimization with switching costs and focusing on net revision gains for stability is promising for further applications to more complex situations.