EVOLUTIONARY DYNAMICS IN STRUCTURED POPULATIONS

CORINA E. TARNITA

DEPARTMENT OF MATHEMATICS AND PROGRAM FOR EVOLUTIONARY DYNAMICS,
HARVARD UNIVERSITY

Abstract. Evolutionary dynamics are strongly affected by population structure. The outcome of an evolutionary process in a well-mixed population can be very different from that in a structured population. There have been many attempts to study the effect of population structure on evolutionary and ecological dynamics. These approaches include spatial models in ecology, viscous populations, spatial games and games on graphs. In this talk, I will present a new way to think about population structure. Unlike previous structures, the one I introduce now is dynamical: the population structure itself is a consequence of evolutionary dynamics. I will present a general mathematical approach for studying any evolutionary game in this structure. As a particular example, I will discuss the evolution of cooperation and derive precise conditions for cooperators to be selected over defectors.

Finally, I will use the same mathematical tools to derive a general condition for strategy $A$ to be favored over strategy $B$ in a large variety of structured populations.