„Games in Communication II" 2007

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Zentrum für interdisziplinäre Forschung
Tagungsraum „Round Table" (Raum 213)
11:15h – 12:15h

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Fixation conditions in finite population games

In a recent article "Finite population always choose optimal languages" (Theor.Pop.Biol., to appear 2007), Pawlowitsch employed a first-order condition (as selection intensity becomes small) for fixation of a strategy in finite populations. The theory draws upon earlier results by Nowak et al. (Nature, 2004) who modeled contests with 2 x 2 base games in a finite (large) population by means of a frequency-dependent Moran process. In essence, this condition was claimed by Nowak et al. (2004) to be equivalent to fixation with a probability exceeding that of equidistribution for large population numbers.

While being correct for a large class of games (i.e. generically), this condition is not necessary for an important subclass of doubly symmetric base games. We investigate first- and second-order conditions and arrive at interesting local interpretations, as well as a nice characterization of degeneracy in terms of the base game for the case where the first-order condition fails. Exactly in this situation, we show that fixation never holds if the strict inequality specified by Nowak et al. (2004) is weakened. These results become relevant in highly structured games like sender-receiver games treated in Pawlowitsch (2007) which may exhibit inherent degeneracy in the above sense. Fortunately, the results in Pawlowitsch (2007) are unaffected since her argument only uses sufficiency, not necessity of the conditions specified by Nowak et al. (2004).