Selection of Cooperation in Spatially Structured Populations
HYUNMO YANG, Ulsan National Institute of Science and Technology, CHEOL-
MIN GHIM, Biomedical Engineering, Ulsan National Institute of Science and Tech-
nology — The social dilemma games give rise to an emergence of cooperation in
which altruistic individuals survive the natural selection at higher rate than ran-
dom chance. We try to extend our understanding of this spatial reciprocity by
including the impact of degree-degree correlation on the propensity toward proso-
cial behaviour in an otherwise well-mixed population. In a stochastic death-birth
process with weak selection, we find that the disassortative degree mixing, or neg-
ative correlation between the degrees of neighbouring nodes significantly promotes
the fixation of cooperators whereas the assortative mixing acts to suppress it. This
is consistent with the fact that the spatial heterogeneity weakens the average ten-
dency of a population to cooperate, which we describe in a unified scheme of the
effective isothermality in coarse-grained networks. We also discuss the individual-
level incentives that indirectly foster restructuring the social networks toward the
more cooperative topologies.

Cheol-Min Ghim
Ulsan National Institute of Science and Technology