COMPLEXITY & INTERDISCIPLINARY TOPICS
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Spatial organization and mobility effects in collective hunting and defense strategies of predatorprey systems, Annette Cazaubiel, École Normale Supérieure - International Center of Fundamental Physics, Paris - France, Alessandra F. Lütz, Jeferson J. Arenzon, Instituto de Física - UFRGS , Porto Alegre RS - Brasil _There is a myriad of strategies that predators utilize to increase their rate of success. Among them, preys may be attacked in a cooperative, coordinated way, these actions being correlated in space and time. The number of known examples of coordinated hunting, whether intra or interspecies, has increased in the last years and examples include hawks, crocodiles, spiders, etc. Although there are some additional costs, hunting or defending in group may bring several benefits for predators and preys, respectively, what have been widely studied. Despite these mounting evidences, much less attention has been dedicated to model such behavior.

This problem has been recently considered within a game theoretical framework in which the abundances of preys and predators were assumed constant and only the fraction of those populations using either an individual or collective strategy evolves. Lett et al (2004 Theor. Pop. Biol. 65 263) considered a mean field approach in which these densities are described by Lotka-Volterra-like equations, taking into account some of the advantages and disadvantages for both preys and predators choosing a grouping strategy. More specifically, it is assumed that grouping lowers the risk of predation at the cost of increasing the competition for resources, while predators have a greater probability of success at the expense of having to share the prey with others.

We present a spatial version of this model that locates individuals or groups on a lattice and study it in the limits of both low and high population viscosity (with or without diffusion, respectively), and compare these results with the mean field predictions. Of particular interest is the coexistence region with both grouped and individual predators and prey persist within the population. When compared with the mean field case, fundamental differences appear and are strongly affected by finite size effects.