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Nina Galanter, Dennis Silva, Jonathan T. Rowell, Jan Rychtář

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Nina Galanter[a], Dennis Silva, Jr.[b], Jonathan T. Rowell[c], Jan Rychtář[c]

[a] *Department of Mathematics and Statistics, Grinnell College, Grinnell, IA 50112, USA*
[b] *Department of Mathematical Sciences, Worcester Polytechnic Institute, Worcester, MA 01609, USA*
[c] *Department of Mathematics and Statistics, The University of North Carolina at Greensboro, Greensboro, NC 27412, USA*

Abstract

Many organisms maintain collective territories and compete on behalf of the fitness of the overall group. Inspired by this concept, the territorial raider model is a graph-based resource competition in which populations have fixed home locations and a limited range of sites accessible for raiding. In our present extension of the model, groups control "colonies" or "armies" which can be divided across multiple locations. We present Nash equilibria for games played on both regular graphs and regular bipartite graphs, and we also examine differences that emerge when populations are composed of discrete units (pack scale) or when they are continuously divisible (colony scale). Reliance upon defense over aggressive raiding is greater here than in the original model where populations had to totally commit to a singular action. This defensive posture increases with the advantage of the local population and also varies with the degree of the graph's connectivity. When discrete units are employed, multiple strategies emerge.

Keywords: structured populations, game theory, animal groups, territory

Email addresses: galanter@grinnell.edu (Nina Galanter), dssilva@wpi.edu (Dennis Silva, Jr.), jtrowell@uncg.edu (Jonathan T. Rowell), rychtar@uncg.edu (Jan Rychtář)