

DISCRETE CONFLICTS WITH MULTIPLE BATTLEFIELDS

Many types of interaction between two or more individuals require splitting limited resources across a number of fronts and the outcome of these interactions depend on gaining advantage over the resources of other parties at each of these fronts. In military scenarios, the decision makers have to distribute units of army across a number of battlefields, in political campaigning a political party has to distribute its most popular members across several districts, in airport security specialised staff with sniffer dogs has to be distributed across several gates to intercept terrorists trying to get through with dangerous materials. All these scenarios are examples of strategic interactions called (after the military applications) *conflicts with multiple battlefields*. A distinctive feature of these scenarios is that resources come in indivisible units or, in other words, are *discrete*. Although conflicts with multiple battlefields have been studied since the beginning of modern game theory, most of this research focused on the scenarios where the resources are continuous. The aim of our project is to close the gap in understanding the scenarios with continuous and discrete resources.

What strategies should the interacting individuals use? What is the advantage or the disadvantage of a given side of conflict, given the amounts of resources and the number of battlefields? How to compute the optimal strategies and the value of the disadvantage given the parameters of the game? These are the questions that our project will attempt to give answers to.

We are going to address these questions using the rigorous methods of mathematics and theoretical computer science. The outcomes of our research will have mainly the nature of formal theorems and algorithms. Due to important applications (military conflicts, political competition, and, especially recently, security), the significance of the objectives exceeds the mere theoretical interest.