Colonel Blotto Game With Asymmetric Values

Idea for Future Research

By James Sly

Another idea for a possible research paper would describe a new variation of the Colonel Blotto game that assigns a range of values for each battlefield that are different for each player. The classic Colonel Blotto game has two players allocate a fixed number of troops between multiple battlefields, where the player that devotes the most troops wins the battle, and the goal is to try and win as many battlefields as you can. In the classic game, each player has the same amount of troops and all the battlefields are equally valuable to both players. This variation would have each player distribute a fixed amount of troops between multiple battlefields but instead of trying to win the most battles, each battlefield is assigned a specific point value, different for each battlefield and different for each player, that goes to the winner of the battle, and the goal of each side is to maximize the number of total of points awarded. I use this model in one of my policy memos to analyze what might happen if there were an international ban on countries supporting insurgencies in foreign countries (Sly 2020).

The way to analyze the game is to plot each battlefield on an X-Y axis, where the X-axis represents the value of the battlefield to player 1, and the Y-axis represents the value of the battlefield to player 2. One of the most obvious strategies is to distribute the troops in direct proportion to how valuable they are, and if both players adopt this strategy and both have the same number of troops, then you can draw a 45 degree line on the graph, and all the battlefields below the line are won by player 1 and all the battlefields above the line are won by player 2. If one player has more troops than the other, then this dividing line rotates up or down depending on which player gets more troops. Players might start with a strategy allocating troops proportionally, but might quickly realize that they can reduce the number of troops sent to the battlefields where there are large differences in value. The side that values it most will likely win those handily, so there is no need for the side that values them less to send any troops at all. Once this happens, then the side that values a battlefield most highly can reduce troop levels as well, knowing the other side is most likely going to send no troops and can win with a small amount sent themselves. All the extra troops from these battlefields with large differences in value can be diverted to the most contentious battlefields to increase the chance of winning those battlefields that fall close to the dividing line being the two sides. In theory, a player could try and increase their winnings by making sure when they lose they lose big and when they win they win small among the battlefields that are contested, but practically it is difficult to know with much precision what your opponent will do, so it then becomes difficult to organize a strategy based on this insight that will yield you many positive results.

The next part of the paper would recruit people to play this game in the lab. Each person could be given a fixed amount for participating, and then given $10 to allocate among 5 different battlefields with a range of values for both sides, where they would then win money for each battlefield they win based on

how valuable it is to them. Players could then play the same game, with the same opponent, multiple times to see how strategies adapt over time as they learn more about how the game is likely to work. By running the game in the lab, researchers could see if players do allocate troops in proportion to the value of the battlefield, and also whether each side carves out spheres of influence by devoting fewer troops to battlefields with large differences in values between the two players. You might even see players try and adopt the strategy of losing big and winning small in order to increase the number of battlefields they win.

This variation of the Colonel Blotto game offers new strategic dynamics that would be valuable to analyze especially since it could have important application to foreign policy. Researchers could learn how sophisticated the strategies are likely to get, which could tell them what to expect in similar situations in the real world. The experiments would be easy to run, and teach us more about some important strategic dynamics, and so would be worth ultimately doing in the lab.

Reference

Sly, James. 2020. "Avoiding Foreign Insurgencies." Unpublished policy memo. June.