ABM – Week 8 – Seminar – LVL3

Purpose

This task will allow you to use links and to model agent interactions using game theory. Agents will interact in pairs and will grow or shrink based on their success in those interactions. The code uses the 'matrix' extension.

Model

Open the model international_relations_baseline.nlogo. You will develop this model to represent nations interacting periodically in pairs. The interactions will take the form of the following game, where nations may choose to be friendly, neutral or hostile (payoffs are to the row player):

Take a couple of minutes to look at the code and take particular note of the following things:

- What are the global variables?
- What variables do the turtles have?
- How does the model define the payoff matrix?
- How has the shape of the turtles been changed?
- How have the turtles been arranged across the world?

Tasks

1. Create directed links between all the turtles. At each tick, select a link and make the turtles at either end play the game shown above. Since the nations all have the "random" strategy, they should choose their row/column at random. Based on the outcome of the game, make each turtle gain the appropriate amount of utility. Complete the set-sizes procedure so that a nation's size is proportional to its utility.

2. Introduce a second strategy option for my-strategy, called "hostile". Make sure that some turtles use this strategy. Turtles with this strategy should always be hostile in their interactions. Colour nations differently according to their strategy.

3. (HARD) Introduce one of the following new strategies:

    - "grim"
      (Be friendly with other nations until they are neutral/hostile towards you, then always be hostile.)
    - "tit-for-tat"
      (Always act towards other nations the way that they acted towards you in your most recent interaction with them.)

    To achieve this, every directed link will need to store a list representing the history of how the nation at one end has acted in its interactions with the nation at the other end. Nations will need to refer to these histories when deciding on how to behave.