

## Iterated Prisoner's Dilemma Lab

Name \_\_\_\_\_, Section \_\_\_\_\_

### The Game

In a standard prisoner's dilemma game played as a one-shot non-cooperative game, both players have a dominant strategy of playing defect. But in many situations we do not strategically interact with another person only once. Axelrod (1984) asked a very natural question: "When should a person cooperate, and when should a person be selfish, in an ongoing interaction with another person?" (Axelrod, 1984, p. vii).

Axelrod ran a series of computer tournaments to explore this question using an iterated prisoner's dilemma (IPD) model. This lab exercise will have you compare the effectiveness of different strategies in an IPD. This lab exercise design is based on Axelrod's original tournament.

Consider the prisoner's dilemma model given below where positive payouts are used.

		Player 2	
		Cooperate	Defect
Player 1	Cooperate	3, 3	0, 5
	Defect	5, 0	1, 1

In the one shot game, both players would have a dominant strategy of Defect. Now, if you were to play this game repeatedly against the same player, how would you play?

### Lab Exercise

1. Go to <http://mcbridme.sba.muohio.edu/ace/labs/>

2. Click on the "Iterated PD" link to call up the information page on the model.

3. You can run the model in your browser by click on the link or if you've downloaded NetLogo, you can download the model from the website and run it from the desktop.

4. Setup and run a tournament among the following strategies:

- Random
- Cooperate
- Tit-for-Tat
- Tit-for-Two-Tats
- Unforgiving

In running your tournaments, implement the following guidelines:

- Run each trial for exactly 500 ticks of the simulation.
- Implement the tournament for each combination of strategies.
- For each tournament record the cumulative profits.

To implement a given trial:

- Set the "select-computer-strategy" switch to on.
- Before each run, select a strategy for the human player and a strategy for the computer play.
- Be sure the "Limit Rounds" switch is on and the slider set to 500 ticks. This will cause the counter to end at 501.
- After selecting strategies, click on the setup button.
- You can then either click play once repeatedly or click play repeatedly. BUT, be sure to play for exactly 500 ticks. Note that you can press Played Repeatedly to then click it again to pause the simulation and click Play Once to click in to exactly 500 ticks.

5. Complete the following tables. Report the points earned for the human player. For example: If a human Tit-for-Tat played a computer Cooperate and the human earned 1500 points, then enter 1500.

**Tournament Results**

		Computer			
Human	Random	Cooperate	Tit-for-Tat	Tit-for-Two-Tats	Un-forgiving
Random					
Co-operate					
Tit-for-Tat					
Tit-for-Two Tats					
Un-forgiving					

**Things to Notice:**

Does any strategy do particularly better than the others?

Does any strategy do particularly worse than the others?

Which strategy would you conclude “won” the tournament?  
 On what basis are you making that decision?