

Prevailing Strategies in Game Theory

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Introduction

In game theory there are different game where you and your opponent have to choose to defect or cooperate, and receive a number of points depending on the outcome of the game. Thus, choosing to defect or cooperate depends on the game. In the below game, it would be best to cooperate, because you on average would get more points.

	Cooperate	Defect
Cooperate	4	2
Defect	2	1

Figure 1. Sample Matrix

In this study, 4 classic types of games were analyzed to see if there was a common strategies that did well. For example, in the game prisoner's dilemma, most winning strategies are variations of "Tit-for-Tat" The tested games were prisoner's dilemma, hero, assurance, and chicken.

Methods

Tournaments were ran for all of the games, each with the same 17 strategies, using a computer program. After each tournament, strategies would either gain or lose in popularity depending on the outcome of the previous tournament. After a series of tournaments were ran, there were a clear series of winners.

In order to verify that the strategies did not win only because of their competition, a second round of tournaments was played using only strategies that survived in at least one game. These strategies were cautious greed, all-d, reverse tit-for-tat, all-c, tit-for-tat, spite, reverse cautious greed, reverse deceptive matching. Reverse mirror mirror, repeat, and pavlov.

Results

Prisoner's Dilemma

	Cooperate	Defect
Cooperate	3	0
Defect	5	1

The best strategies in both tournaments for prisoner's dilemma were spite and tit-for-tat .

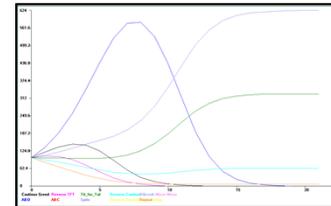


Figure 2. Prisoner's Dilemma Second Tournament Results

Hero

	Cooperate	Defect
Cooperate	0	3
Defect	5	1

The best strategies for hero in both tournaments were all-d and cautious greed.

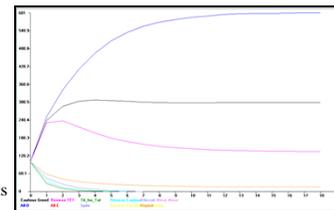


Figure 3. Hero Second Tournament Results

Assurance

	Cooperate	Defect
Cooperate	5	0
Defect	3	1

Although spite, tit-for-tat and pavlov placed in the top three, there was no clear winner.

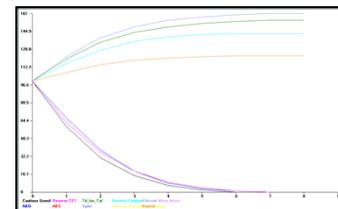


Figure 4. Assurance Second Tournament Results

Chicken

	Cooperate	Defect
Cooperate	3	0
Defect	5	1

The best strategies in both tournaments for chicken were all-d and cautious greed.

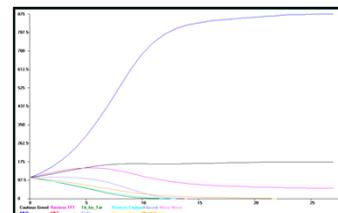


Figure 5. Chicken Second Tournament Results

Conclusions

Through our samplings of different games, it is clear that there is no one strategy that works in all games. Different games had a different selection of strategies that won and died. However despite the variance in the winners of the individual games, certain trends emerged.

For the games prisoner's dilemma and assurance, in general similar types of strategies did better. Spite, tit-for-tat, and pavlov all initially start out cooperating, and only defect if the opponent does so. Thus, these games favor cooperation over defection.

For the games chicken and hero, the same strategies did well –all-d and cautious greed. Both of these strategies defect more than cooperate.

Our work shows that there are two types of scenarios – one where "nice" strategies (more cooperation than defection) do well and one where "mean" strategies (more defection than cooperation) do well.

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