

Spy Chameleon Bot (SCB)

The spy chameleon bot adopts the strategy of its opponent after spying on it. By observing the probabilities of non-cooperation and forgiveness of its opponent, it sets up its own behaviour.

The working of the bot is as follows:

Assumption: On average the bot plays 150 rounds with an opponent.

For the first half of the rounds, the bot follows simple tit for tat strategy, but also 'spies' on the opponent by keeping track of how many times the opponent's move differed from SCB's previous move. In other words, the bot counts how many times the opponent defected after the SCB cooperated, and how many times the opponent cooperated after SCB defected. This gives it an estimate of the 'cheating' probability and 'forgiveness' probability of the opponent.

After 75 rounds, SCB changes its strategy to defeat the opponent. In order to adapt to any change in strategy of the opponent, it continues spying. SCB exploits the forgiveness of the opponent by setting its 'cheating' (defection) probability to the sum of the opponent's cheating probability and the opponent's forgiveness probability. It sets its forgiveness probability to be the same as the opponent's forgiveness probability. Hence the bot defects slightly more but forgives the same as its opponent.

In summary, the bot will operate as follows:

For the first half rounds:

Play tit for tat i.e. repeat the opponents last move.

For the second half:

Set spy_chameleon's cheating and forgiveness probabilities as described above.

If the opponent defects on its last move, then cooperate with forgiveness probability.

Else if the opponent cooperates in the last move, then defect with cheating probability.

Notice that if the opponent plays purely tit for tat, Spy Chameleon Bot(SCB) will also play tit for tat. Against an always defect bot, the SCB will play always defect. If an opponent plays randomized tit for tat, the bot will play a meaner randomized TFT. Also if an opponent changes strategy at any point in the game, SCB will detect the change and play accordingly. Hence the bot uses its opponent's willingness to cooperate to maximize mutual benefit, but does not get exploited by a skewed tit for tat strategy.

SCB is disappointed when its opponent defects, and is happy when the opponent cooperates. It is guilty when it cheats its opponent, and is cautious when it forgives its opponent. SCB ignores the emotions received from the other bot as it knows that the emotions may or may not represent the future behaviour of the opponent.