Project Diary Prisoners Dilemma

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# 20.02.2020 – 23.03.2020(Internal Tournament)

I coded a tournament consisting of a total of 38 strategies, 31 single player strategies, and 7 strategies being different versions of the same group strategies. The level of sophistication ranged from very basic strategies, such as all\_d, all\_c or random to complex strategies for example tit\_for\_tat\_Omega or pavlov\_Adaptive.

These are the results of the 31 tactics with the given scoring-matrix and 10000 games per meeting:

Strategy\_gradual\_Omega2: 16909

Strategy\_tft\_Omega: 16875

Strategy\_gradual\_Omega: 16813

Strategy\_pavlov\_Adaptive: 12909

Strategy\_tft\_forgiveness: 12658

Strategy\_Winner\_21\_soft: 11018

Strategy\_gradual: 9940

Strategy\_tft\_slow: 9431

Strategy\_tf2t: 7722

Strategy\_majo\_soft: 5494

Strategy\_tft\_hard: 4066

Strategy\_equalizer\_F: 3952

Strategy\_tft\_spiteful: 3639

Strategy\_tft\_Adaptive: 3596

Strategy\_tft: 3487

Strategy\_spiteful\_cc: 1090

Strategy\_spiteful: 985

Strategy\_all\_c: 898

Strategy\_pavlov: -1233

Strategy\_Winner\_12: -2470

Strategy\_Winner\_21: -23174

Strategy\_majo\_hard: -23297

Strategy\_mistrust: -28682

Strategy\_prober\_dcc: -39636

Strategy\_per\_ccd: -43244

Strategy\_per\_cd: -48606

Strategy\_random: -49796

Strategy\_per\_cdd: -61947

Strategy\_prober\_cdd: -62099

Strategy\_all\_d: -62990

Strategy\_mem2: -64033

These are the results of the 7 group-strategies in a tournament with all the other 31 strategies with the given scoring-matrix and 10000 games per meeting:

Strategy\_Lucifer\_V5: 20878

Strategy\_Lucifer\_V4: 20814

Strategy\_Lucifer\_V3: 20790

Strategy\_Lucifer: 12857

Strategy\_Lucifer\_V2: 8777

Strategy\_LucifersMinion\_V2: -87971

Strategy\_LucifersMinion: -89847

(The only difference between Lucifer\_V4 and Lucifer\_V5 is that V5 uses tft\_Omega and V4 uses gradual\_Omega)

**When it comes to group-strategies I will use Lucifer\_V5 in combination with LucifersMinion\_V2.**

To decide whether I will use tft\_Omega or gradual\_Omega2 I coded a program that will print out the results of the two strategies against all 38 with 1500 games per meeting:

result Strategy\_gradual\_Omega2 vs Strategy\_all\_c: 1500

result Strategy\_tft\_Omega vs Strategy\_all\_c: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_all\_d: -4514

result Strategy\_tft\_Omega vs Strategy\_all\_d: -4502

result Strategy\_gradual\_Omega2 vs Strategy\_equalizer\_F: 1500

result Strategy\_tft\_Omega vs Strategy\_equalizer\_F: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_gradual: 1500

result Strategy\_tft\_Omega vs Strategy\_gradual: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_majo\_hard: 1489

result Strategy\_tft\_Omega vs Strategy\_majo\_hard: 1484

result Strategy\_gradual\_Omega2 vs Strategy\_majo\_soft: 1500

result Strategy\_tft\_Omega vs Strategy\_majo\_soft: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_mem2: 1500

result Strategy\_tft\_Omega vs Strategy\_mem2: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_mistrust: 1489

result Strategy\_tft\_Omega vs Strategy\_mistrust: 1484

result Strategy\_gradual\_Omega2 vs Strategy\_pavlov: 1500

result Strategy\_tft\_Omega vs Strategy\_pavlov: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_per\_ccd: 490

result Strategy\_tft\_Omega vs Strategy\_per\_ccd: 490

result Strategy\_gradual\_Omega2 vs Strategy\_per\_cd: -758

result Strategy\_tft\_Omega vs Strategy\_per\_cd: -758

result Strategy\_gradual\_Omega2 vs Strategy\_per\_cdd: -2012

result Strategy\_tft\_Omega vs Strategy\_per\_cdd: -2005

result Strategy\_gradual\_Omega2 vs Strategy\_prober\_cdd: -4508

result Strategy\_tft\_Omega vs Strategy\_prober\_cdd: -4498

result Strategy\_gradual\_Omega2 vs Strategy\_prober\_dcc: 1484

result Strategy\_tft\_Omega vs Strategy\_prober\_dcc: 1484

result Strategy\_gradual\_Omega2 vs Strategy\_spiteful: 1500

result Strategy\_tft\_Omega vs Strategy\_spiteful: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_spiteful\_cc: 1500

result Strategy\_tft\_Omega vs Strategy\_spiteful\_cc: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_tf2t: 1500

result Strategy\_tft\_Omega vs Strategy\_tf2t: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_tft: 1500

result Strategy\_tft\_Omega vs Strategy\_tft: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_tft\_hard: 1500

result Strategy\_tft\_Omega vs Strategy\_tft\_hard: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_tft\_slow: 1500

result Strategy\_tft\_Omega vs Strategy\_tft\_slow: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_Winner\_12: 1500

result Strategy\_tft\_Omega vs Strategy\_Winner\_12: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_Winner\_21: 1489

result Strategy\_tft\_Omega vs Strategy\_Winner\_21: 1484

result Strategy\_gradual\_Omega2 vs Strategy\_Winner\_21\_soft: 1500

result Strategy\_tft\_Omega vs Strategy\_Winner\_21\_soft: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_tft\_spiteful: 1500

result Strategy\_tft\_Omega vs Strategy\_tft\_spiteful: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_tft\_Omega: 1500

result Strategy\_tft\_Omega vs Strategy\_tft\_Omega: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_gradual\_Omega: 1500

result Strategy\_tft\_Omega vs Strategy\_gradual\_Omega: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_gradual\_Omega2: 1500

result Strategy\_tft\_Omega vs Strategy\_gradual\_Omega2: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_tft\_forgiveness: 1500

result Strategy\_tft\_Omega vs Strategy\_tft\_forgiveness: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_pavlov\_Adaptive: 1500

result Strategy\_tft\_Omega vs Strategy\_pavlov\_Adaptive: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_tft\_Adaptive: 1500

result Strategy\_tft\_Omega vs Strategy\_tft\_Adaptive: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_random: -738

result Strategy\_tft\_Omega vs Strategy\_random: -545

result Strategy\_gradual\_Omega2 vs Strategy\_random: -852

result Strategy\_tft\_Omega vs Strategy\_random: -614

result Strategy\_gradual\_Omega2 vs Strategy\_random: -755

result Strategy\_tft\_Omega vs Strategy\_random: -836

result Strategy\_gradual\_Omega2 vs Strategy\_Lucifer: 1500

result Strategy\_tft\_Omega vs Strategy\_Lucifer: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_Lucifer\_V2: 1500

result Strategy\_tft\_Omega vs Strategy\_Lucifer\_V2: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_Lucifer\_V3: 1500

result Strategy\_tft\_Omega vs Strategy\_Lucifer\_V3: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_Lucifer\_V4: 1500

result Strategy\_tft\_Omega vs Strategy\_Lucifer\_V4: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_Lucifer\_V5: 1500

result Strategy\_tft\_Omega vs Strategy\_Lucifer\_V5: 1500

result Strategy\_gradual\_Omega2 vs Strategy\_LucifersMinion: -4499

result Strategy\_tft\_Omega vs Strategy\_LucifersMinion: -4491

result Strategy\_gradual\_Omega2 vs Strategy\_LucifersMinion\_V2: -4499

result Strategy\_tft\_Omega vs Strategy\_LucifersMinion\_V2: -4491

## Evaluation of outcomes and decision of single player strategy

The two strategies seem to be nearly equal and just show small differences (marked in blue). These small differences add up to +30 points for tft\_Omega. However, tft\_Omega seems to be performing better against random strategies. The reason for that is, in my eyes, that gradual\_Omega forgives two times in a row and therefore looses more points until the opponent-strategy is identified as random. As a final test I made a game where both strategies battle 10000000 times against a random strategy with only 50 moves per meeting:

results of Strategy\_tft\_Omega: -357939304

results of Strategy\_gradual\_Omega2: -397652474

**Due to tft\_Omega’s better performance against random and it’s better performance overall I decided to use tft\_Omega as my single player strategy.**

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# 24.03.2020(Client)

## Starting sequence with server

Today I will start coding the client that talks to the server. Right now just the test mode is completed from sides of the server and the protocol should be the Following:

Server: Hello

Client: Introducing Thies\_tft\_Omega

Server: \*sends port-number\*

Client: \*reconnects on that port\*

Server: JOIN, TEST OR QUIT

Client: TEST

Server: BEGIN

Client: COOPERATE/DEFECT

Server: GAMEOVER/O-COOPERATE/O-DEFECT

\*Repeat the last two steps until Client recieves a GAMEOVER.

## Managing the game itself

**My strategies work with the chars: c,d** so I have to make a method which **converts the incoming O-COOPERATE and O-DEFECT to c and d** to add it to the history. And I will have to convert the outgoing moves from c and d to DEFECT and COOPERATE