List of all strategies used from [18]

- 1. Adaptive Deterministic Memory length: ∞ [22]
- 2. Adaptive Tit For Tat: 0.5 Deterministic Memory length: ∞ [35]
- 3. Aggravater Deterministic Memory length: ∞ [18]
- 4. Alexei: (D,) Deterministic Memory length: ∞ [39]
- 5. ALLCorALLD Stochastic Memory length: 1 [1]
- 6. Alternator Deterministic Memory length: 1 [27, 8]
- 7. Alternator Hunter Deterministic Memory length: ∞ [18]
- 8. AntiCycler Deterministic Memory length: ∞ [18]
- 9. Anti Tit For Tat Deterministic Memory length: 1 [15]
- 10. AON2 Deterministic Memory length: 2 [16]
- 11. Adaptive Pavlov 2006 Deterministic Memory length: ∞ [21]
- 12. Adaptive Pavlov 2011 Deterministic Memory length: ∞ [22]
- 13. Appeaser Deterministic Memory length: ∞ [18]
- 14. Arrogant QLearner Stochastic Memory length: ∞ [18]
- 15. Average Copier Stochastic Memory length: ∞ [18]
- 16. BackStabber: (D, D) Deterministic Memory length: ∞ [18]
- 17. Better and Better Stochastic Memory length: ∞ [25]
- 18. Black Stochastic Memory length: 5 [7]
- 19. Borufsen Deterministic Memory length: ∞ [7]
- 20. Bully Deterministic Memory length: 1 [28]
- 21. Bush Mosteller: 0.5, 0.5, 3.0, 0.5 Stochastic Memory length: ∞ [17]
- 22. Calculator Stochastic Memory length: ∞ [25]
- 23. Cautious QLearner Stochastic Memory length: ∞ [18]
- 24. Cave Stochastic Memory length: ∞ [7]
- 25. Champion Stochastic Memory length: ∞ [7]
- 26. Colbert Deterministic Memory length: 4 [7]
- 27. CollectiveStrategy Deterministic Memory length: ∞ [23]
- 28. Contrite Tit For Tat Deterministic Memory length: 3 [38]
- 29. Cooperator Deterministic Memory length: 0 [30, 27, 8]
- 30. Cooperator Hunter Deterministic Memory length: ∞ [18]
- 31. Cycle Hunter Deterministic Memory length: ∞ [18]
- 32. Cycler CCCCCD Deterministic Memory length: 5 [18]

- 33. Cycler CCCD Deterministic Memory length: 3 [18]
- 34. Cycler CCD Deterministic Memory length: 2 [27]
- 35. Cycler DC Deterministic Memory length: 1 [18]
- 36. Cycler DDC Deterministic Memory length: 2 [27]
- 37. Cycler CCCDCD Deterministic Memory length: 5 [18]
- 38. Davis: 10 Deterministic Memory length: ∞ [6]
- 39. Defector Deterministic Memory length: 0 [30, 27, 8]
- 40. Defector Hunter Deterministic Memory length: ∞ [18]
- 41. Desperate Stochastic Memory length: 1 [37]
- 42. Delayed AON1 Deterministic Memory length: 2 [16]
- 43. Double Crosser: (D, D) Deterministic Memory length: ∞ [18]
- 44. Doubler Deterministic Memory length: ∞ [25]
- 45. DoubleResurrection Deterministic Memory length: 5 [12]
- 46. EasyGo Deterministic Memory length: ∞ [22, 25]
- 47. Eatherley Stochastic Memory length: ∞ [7]
- 48. EugineNier: (D,) Deterministic Memory length: ∞ [39]
- 49. Eventual Cycle Hunter Deterministic Memory length: ∞ [18]
- 50. Evolved ANN Deterministic Memory length: ∞ [18]
- 51. Evolved ANN 5 Deterministic Memory length: ∞ [18]
- 52. Evolved ANN 5 Noise 05 Deterministic Memory length: ∞ [18]
- 53. Evolved FSM 4 Deterministic Memory length: 4 [18]
- 54. Evolved FSM 16 Deterministic Memory length: 16 [18]
- 55. Evolved FSM 16 Noise 05 Deterministic Memory length: 16 [18]
- 56. Evolved Looker Up
1_1_1 - Deterministic - Memory length: ∞ - [18]
- 57. Evolved Looker Up
2_2_2 - Deterministic - Memory length: ∞ - [18]
- 58. Evolved HMM 5 Stochastic Memory length: 5 [18]
- 59. Feld: 1.0, 0.5, 200 Stochastic Memory length: 200 [6]
- 60. Firm But Fair Stochastic Memory length: 1 [13]
- 61. Fool Me Forever Deterministic Memory length: ∞ [18]
- 62. Fool Me Once Deterministic Memory length: ∞ [18]
- 63. Forgetful Fool Me Once: 0.05 Stochastic Memory length: ∞ [18]
- 64. Forgetful Grudger Deterministic Memory length: 10 [18]
- 65. Forgiver Deterministic Memory length: ∞ [18]
- 66. Forgiving Tit For Tat Deterministic Memory length: ∞ [18]
- 67. Fortress3 Deterministic Memory length: 3 [4]
- 68. Fortress4 Deterministic Memory length: 4 [4]
- 69. GTFT: 0.33 Stochastic Memory length: 1 [14, 29]

- 70. General Soft Grudger: n=1, d=4, c=2 Deterministic Memory length: ∞ [18]
- 71. Getzler Stochastic Memory length: ∞ [7]
- 72. Gladstein Deterministic Memory length: ∞ [7]
- 73. Soft Go By Majority Deterministic Memory length: ∞ [7, 27, 8]
- 74. Soft Go By Majority: 10 Deterministic Memory length: 10 [18]
- 75. Soft Go By Majority: 20 Deterministic Memory length: 20 [18]
- 76. Soft Go By Majority: 40 Deterministic Memory length: 40 [18]
- 77. Soft Go By Majority: 5 Deterministic Memory length: 5 [18]
- 78. ϕ Deterministic Memory length: ∞ [18]
- 79. Graaskamp Katzen - Deterministic - Memory length: ∞ - [7]
- 80. Gradual Deterministic Memory length: ∞ [10]
- 81. Gradual Killer: (D, D, D, D, D, C, C) Deterministic Memory length: ∞ [25]
- 82. Grofman Stochastic Memory length: ∞ [6]
- 83. Grudger Deterministic Memory length: 1 [37, 22, 10, 9, 6]
- 84. Grudger Alternator - Deterministic - Memory length: ∞ - [25]
- 85. Grumpy: Nice, 10, -10 Deterministic Memory length: ∞ [18]
- 86. Handshake Deterministic Memory length: ∞ [31]
- 87. Hard Go By Majority Deterministic Memory length: ∞ [27]
- 88. Hard Go By Majority: 10 Deterministic Memory length: 10 [18]
- 89. Hard Go By Majority: 20 Deterministic Memory length: 20 [18]
- 90. Hard Go By Majority: 40 Deterministic Memory length: 40 [18]
- 91. Hard Go By Majority: 5 Deterministic Memory length: 5 [18]
- 92. Hard Prober Deterministic Memory length: ∞ [25]
- 93. Hard Tit For 2 Tats Deterministic Memory length: 3 [34]
- 94. Hard Tit For Tat Deterministic Memory length: 3 [36]
- 95. Harrington Stochastic Memory length: ∞ [7]
- 96. Hesitant Q
Learner Stochastic Memory length: ∞ [18]
- 97. Hopeless Stochastic Memory length: 1 [37]
- 98. Inverse Stochastic Memory length: ∞ [18]
- 99. Inverse Punisher Deterministic Memory length: ∞ [18]
- 100. Joss: 0.9 Stochastic Memory length: 1 [34, 6]
- 101. Kluepfel Stochastic Memory length: ∞ [7]
- 102. Knowledgeable Worse and Worse Stochastic Memory length: ∞ [18]
- 103. Level Punisher Deterministic Memory length: ∞ [12]
- 104. Leyvraz Stochastic Memory length: 3 [7]
- 105. Limited Retaliate: 0.1, 20 Deterministic Memory length: ∞ [18]
- 106. Limited Retaliate 2: 0.08, 15 Deterministic Memory length: ∞ [18]

- 107. Limited Retaliate 3: 0.05, 20 Deterministic Memory length: ∞ [18]
- 108. Math Constant Hunter Deterministic Memory length: ∞ [18]
- 109. Naive Prober: 0.1 Stochastic Memory length: 1 [22]
- 110. MEM2 Deterministic Memory length: ∞ [24]
- 111. Michaelos: (D,) Stochastic Memory length: ∞ [39]
- 112. Mikkelson Deterministic Memory length: ∞ [7]
- 113. MoreGrofman Deterministic Memory length: 8 [7]
- 114. More Tideman and Chieruzzi Deterministic Memory length: ∞ [7]
- 115. Negation Stochastic Memory length: 1 [36]
- 116. Nice Average Copier Stochastic Memory length: ∞ [18]
- 117. N Tit(s) For M Tat(s): 3, 2 Deterministic Memory length: 3 [18]
- 118. Nydegger Deterministic Memory length: 3 [6]
- 119. Omega TFT: 3, 8 Deterministic Memory length: ∞ [33]
- 120. Once Bitten Deterministic Memory length: 12 [18]
- 121. Opposite Grudger Deterministic Memory length: ∞ [18]
- 122. π Deterministic Memory length: ∞ [18]
- 123. Predator Deterministic Memory length: 9 [4]
- 124. Prober Deterministic Memory length: ∞ [22]
- 125. Prober 2 Deterministic Memory length: ∞ [25]
- 126. Prober 3 Deterministic Memory length: ∞ [25]
- 127. Prober 4 Deterministic Memory length: ∞ [25]
- 128. Pun1 Deterministic Memory length: 2 [3]
- 129. PSO Gambler 1_1_1 Stochastic Memory length: ∞ [18]
- 130. PSO Gambler 2_2_2 Stochastic Memory length: ∞ [18]
- 131. PSO Gambler 2_2_2 Noise 05 Stochastic Memory length: ∞ [18]
- 132. PSO Gambler Mem1 Stochastic Memory length: 1 [18]
- 133. Punisher Deterministic Memory length: ∞ [18]
- 134. Raider Deterministic Memory length: 3 [5]
- 135. Random: 0.5 Stochastic Memory length: 0 [35, 6]
- 136. Random Hunter Deterministic Memory length: ∞ [18]
- 137. Random Tit for Tat: 0.5 Stochastic Memory length: 1 [18]
- 138. Remorseful Prober: 0.1 Stochastic Memory length: 2 [22]
- 139. Resurrection Deterministic Memory length: 5 [12]
- 140. Retaliate: 0.1 Deterministic Memory length: ∞ [18]
- 141. Retaliate 2: 0.08 Deterministic Memory length: ∞ [18]
- 142. Retaliate 3: 0.05 Deterministic Memory length: ∞ [18]
- 143. Revised Downing: True Deterministic Memory length: ∞ [6]

- 144. Richard Hufford - Deterministic - Memory length: ∞ - [7]
- 145. Ripoff Deterministic Memory length: 2 [2]
- 146. Risky QLearner Stochastic Memory length: ∞ [18]
- 147. SelfSteem Stochastic Memory length: ∞ [11]
- 148. ShortMem Deterministic Memory length: 10 [11]
- 149. Shubik Deterministic Memory length: ∞ [6]
- 150. Slow Tit For Two Tats 2 Deterministic Memory length: 2 [25]
- 151. Sneaky Tit For Tat Deterministic Memory length: ∞ [18]
- 152. Soft Grudger Deterministic Memory length: 6 [22]
- 153. Soft Joss: 0.9 Stochastic Memory length: 1 [25]
- 154. SolutionB1 Deterministic Memory length: 3 [Ashlock2015]
- 155. SolutionB5 Deterministic Memory length: 5 [Ashlock2015]
- 156. Spiteful Tit For Tat Deterministic Memory length: ∞ [25]
- 157. Stalker: (D,) Stochastic Memory length: ∞ [11]
- 158. Stein and Rapoport: 0.05: (D, D) Deterministic Memory length: ∞ [6]
- 159. Stochastic Cooperator Stochastic Memory length: 1 [Adami2013]
- 160. Stochastic WSLS: 0.05 Stochastic Memory length: 1 [Amaral2016]
- 161. Suspicious Tit For Tat Deterministic Memory length: 1 [15, 10]
- 162. Tester Deterministic Memory length: ∞ [7]
- 163. TF1 Deterministic Memory length: ∞ [18]
- 164. TF2 Deterministic Memory length: ∞ [18]
- 165. TF3 Deterministic Memory length: ∞ [18]
- 166. ThueMorse Deterministic Memory length: ∞ [18]
- 167. ThueMorseInverse Deterministic Memory length: ∞ [18]
- 168. Thumper Deterministic Memory length: 2 [2]
- 169. Tideman and Chieruzzi Deterministic Memory length: ∞ [6]
- 170. Tit For Tat Deterministic Memory length: 1 [6]
- 171. Tit For 2 Tats Deterministic Memory length: 2 [8]
- 172. Tranquilizer Stochastic Memory length: ∞ [6]
- 173. Tricky Cooperator Deterministic Memory length: 10 [18]
- 174. Tricky Defector Deterministic Memory length: ∞ [18]
- 175. Tricky Level Punisher Deterministic Memory length: ∞ [12]
- 176. Tullock: 11 Stochastic Memory length: 11 [6]
- 177. Two Tits For Tat Deterministic Memory length: 2 [8]
- 178. VeryBad Deterministic Memory length: ∞ [11]
- 179. Weiner Deterministic Memory length: ∞ [7]
- 180. White Deterministic Memory length: ∞ [7]

- 181. Willing Stochastic Memory length: 1 [37]
- 182. Winner12 Deterministic Memory length: 2 [26]
- 183. Winner21 Deterministic Memory length: 2 [26]
- 184. Win-Shift Lose-Stay: D Deterministic Memory length: 1 [22]
- 185. Win-Stay Lose-Shift: C Deterministic Memory length: 1 [19, 34, 29]
- 186. WmAdams Stochastic Memory length: ∞ [7]
- 187. Worse and Worse Stochastic Memory length: ∞ [25]
- 188. Worse and Worse 2 Stochastic Memory length: ∞ [25]
- 189. Worse and Worse 3 Stochastic Memory length: ∞ [25]
- 190. Yamachi Deterministic Memory length: ∞ [7]
- 191. ZD-Extortion: 0.2, 0.1, 1 Stochastic Memory length: 1 [32]
- 192. ZD-Extort-2: 0.1111111111111111, 0.5 Stochastic Memory length: 1 [34]
- 193. ZD-Extort3: 0.11538461538461539, 0.333333333333333333333, 1 Stochastic Memory length: 1 [30]
- 194. ZD-Extort-2 v2: 0.125, 0.5, 1 Stochastic Memory length: 1 [20]
- 195. ZD-Extort-4: 0.23529411764705882, 0.25, 1 Stochastic Memory length: 1 [18]
- 196. ZD-GTFT-2: 0.25, 0.5 Stochastic Memory length: 1 [34]
- 197. ZD-GEN-2: 0.125, 0.5, 3 Stochastic Memory length: 1 [20]
- 198. ZD-Mem2 Stochastic Memory length: 2 [LiS2014]
- 199. ZD-Mischief: 0.1, 0.0, 1 Stochastic Memory length: 1 [32]
- 200. ZD-SET-2: 0.25, 0.0, 2 Stochastic Memory length: 1 [20]
- 201. e Deterministic Memory length: ∞ [18]
- 202. Dynamic Two Tits For Tat Stochastic Memory length: ∞ [18]
- 203. Meta Hunter: 6 players Deterministic Memory length: ∞ [18]
- 204. Meta Hunter Aggressive: 7 players Deterministic Memory length: ∞ [18]

References

- [1] Ethan Akin. "What you gotta know to play good in the iterated prisoners dilemma". In: Games 6.3 (2015), pp. 175–190.
- [2] Daniel Ashlock and Eun-Youn Kim. "Fingerprinting: Visualization and automatic analysis of prisoner's dilemma strategies". In: *IEEE Transactions on Evolutionary Computation* 12.5 (2008), pp. 647–659.
- [3] Daniel Ashlock, Eun-Youn Kim, and Nicole Leahy. "Understanding representational sensitivity in the iterated prisoner's dilemma with fingerprints". In: *IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews)* 36.4 (2006), pp. 464–475.
- [4] Wendy Ashlock and Daniel Ashlock. "Changes in prisoners dilemma strategies over evolutionary time with different population sizes". In: *Evolutionary Computation*, 2006. CEC 2006. IEEE Congress on. IEEE. 2006, pp. 297–304.
- [5] Wendy Ashlock, Jeffrey Tsang, and Daniel Ashlock. "The evolution of exploitation". In: Foundations of Computational Intelligence (FOCI), 2014 IEEE Symposium on. IEEE. 2014, pp. 135–142.
- [6] Robert Axelrod. "Effective choice in the prisoner's dilemma". In: Journal of conflict resolution 24.1 (1980), pp. 3-25.
- [7] Robert Axelrod. "More Effective Choice in the Prisoner's Dilemma". In: Journal of Conflict Resolution 24.3 (1980), pp. 379–403. ISSN: 0022-0027. DOI: 10.1177/002200278002400301.

- [8] Robert Axelrod. The Evolution of Cooperation. Basic Books, 1985. ISBN: 0-465-02121-2. URL: https://www.amazon.com/Evolution-Cooperation-Robert-Axelrod/dp/0465021212?SubscriptionId=AKIAIOBINVZYXZQZ2U3A&tag=chimbori05-20&linkCode=xm2&camp=2025&creative=165953&creativeASIN=0465021212.
- [9] Jeffrey S Banks and Rangarajan K Sundaram. "Repeated games, finite automata, and complexity". In: *Games and Economic Behavior* 2.2 (1990), pp. 97–117.
- [10] Bruno Beaufils, Jean-Paul Delahaye, and Philippe Mathieu. "Our meeting with gradual, a good strategy for the iterated prisoners dilemma". In: *Proceedings of the Fifth International Workshop on the Synthesis and Simulation of Living Systems.* 1997, pp. 202–209.
- [11] Andre LC Carvalho et al. "Iterated Prisoners Dilemma-An extended analysis". In: (2013), pp. 1–6. DOI: 10. 21528/CBIC2013-202.
- [12] Arnold Eckhart. CoopSim v0.9.9 beta 6. https://github.com/jecki/CoopSim/. 2015.
- [13] Marcus R Frean. "The prisoner's dilemma without synchrony". In: *Proceedings of the Royal Society of London B: Biological Sciences* 257.1348 (1994), pp. 75–79.
- [14] Marco Gaudesi et al. "Exploiting evolutionary modeling to prevail in iterated prisoners dilemma tournaments". In: *IEEE Transactions on Computational Intelligence and AI in Games* 8.3 (2016), pp. 288–300.
- [15] C. Hilbe, M. A. Nowak, and K. Sigmund. "Evolution of extortion in Iterated Prisoner's Dilemma games". In: *Proceedings of the National Academy of Sciences* 110.17 (Apr. 2013), pp. 6913–6918. DOI: 10.1073/pnas. 1214834110.
- [16] Christian Hilbe et al. "Memory-n strategies of direct reciprocity". In: *Proceedings of the National Academy of Sciences* 114.18 (2017), pp. 4715–4720.
- [17] Luis R Izquierdo and Segismundo S Izquierdo. "Dynamics of the Bush-Mosteller learning algorithm in 2x2 games". In: *Reinforcement Learning*. InTech, 2008.
- [18] Vince Knight et al. Axelrod-Python/Axelrod: V4.2.0. 2018. DOI: 10.5281/zenodo.1252994.
- [19] David Kraines and Vivian Kraines. "Pavlov and the prisoner's dilemma". In: *Theory and decision* 26.1 (1989), pp. 47–79. ISSN: 00405833. DOI: 10.1007/BF00134056.
- [20] Steven Kuhn. "Prisoner's Dilemma". In: *The Stanford Encyclopedia of Philosophy*. Ed. by Edward N. Zalta. Spring 2017. Metaphysics Research Lab, Stanford University, 2017.
- [21] Jiawei Li et al. "How to design a strategy to win an IPD tournament". In: *The iterated prisoners dilemma* 20 (2007), pp. 89–104.
- [22] Jiawei Li, Philip Hingston, and Graham Kendall. "Engineering design of strategies for winning iterated prisoner's dilemma competitions". In: *IEEE Transactions on Computational Intelligence and AI in Games* 3.4 (2011), pp. 348–360.
- [23] Jiawei Li and Graham Kendall. "A strategy with novel evolutionary features for the iterated prisoner's dilemma." In: Evolutionary Computation 17.2 (2009), pp. 257–274. ISSN: 1063-6560. DOI: 10.1162/evco.2009.17.2.257. URL: http://www.ncbi.nlm.nih.gov/pubmed/19413490.
- [24] Jiawei Li and Graham Kendall. "The effect of memory size on the evolutionary stability of strategies in iterated prisoner's dilemma". In: *IEEE Transactions on Evolutionary Computation* 18.6 (2014), pp. 819–826. DOI: 10.1109/TEVC.2013.2286492.
- [25] LIFL. PRISON. http://www.lifl.fr/IPD/ipd.frame.html. 2008.
- [26] Philippe Mathieu and Jean-Paul Delahaye. "New Winning Strategies for the Iterated Prisoner's Dilemma (Extended Abstract)". In: 14th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2015) (2015), pp. 1665–1666. ISSN: 15582914.
- [27] Shashi Mittal and Kalyanmoy Deb. "Optimal strategies of the iterated prisoner's dilemma problem for multiple conflicting objectives". In: *IEEE Transactions on Evolutionary Computation* 13.3 (2009), pp. 554–565.
- [28] John H Nachbar. "Evolution in the finitely repeated prisoner's dilemma". In: Journal of Economic Behavior & Organization 19.3 (1992), pp. 307–326.
- [29] Martin A Nowak and Karl Sigmund. "A strategy of win-stay, lose-shift that outperforms tit-for-tat in the Prisoner's Dilemma game." In: *Nature* 364.6432 (1993), pp. 56–58. ISSN: 0028-0836. DOI: 10.1038/364056a0.
- [30] W. H. Press and F. J. Dyson. "Iterated Prisoner's Dilemma contains strategies that dominate any evolutionary opponent". In: *Proceedings of the National Academy of Sciences* 109.26 (May 2012), pp. 10409–10413. DOI: 10.1073/pnas.1206569109.
- [31] Arthur J Robson. "Efficiency in evolutionary games: Darwin, Nash and the secret handshake". In: *Journal of theoretical Biology* 144.3 (1990), pp. 379–396.

- [32] Lars Roemheld. "Evolutionary Extortion and Mischief: Zero Determinant strategies in iterated 2x2 games". In: arXiv preprint arXiv:1308.2576 (2013).
- [33] Wolfgang Slany, Wolfgang Kienreich, et al. "On some winning strategies for the Iterated Prisoners Dilemma, or, Mr. Nice Guy and the Cosa Nostra". In: *The iterated prisoners dilemma* 20 (2007), p. 171.
- [34] A. J. Stewart and J. B. Plotkin. "Extortion and cooperation in the Prisoner's Dilemma". In: *Proceedings of the National Academy of Sciences* 109.26 (June 2012), pp. 10134–10135. DOI: 10.1073/pnas.1208087109.
- [35] Elpida Tzafestas. "Toward adaptive cooperative behavior". In: *Proceedings of the Simulation of Adaptive Behavior Conference*. Citeseer. 2000, pp. 334–340.
- [36] Unkwown. www.prisoners-dilemma.com. http://www.prisoners-dilemma.com/. 2017.
- [37] Pieter Van den Berg and Franz J Weissing. "The importance of mechanisms for the evolution of cooperation". In: *Proc. R. Soc. B.* Vol. 282, 1813. The Royal Society, 2015, p. 20151382.
- [38] Jianzhong Wu and Robert Axelrod. "How to cope with noise in the iterated prisoner's dilemma". In: *Journal of Conflict resolution* 39.1 (1995), pp. 183–189.
- [39] Zoo of strategies. 2011. URL: http://lesswrong.com/lw/7f2/prisoners_dilemma_tournament_results/.