

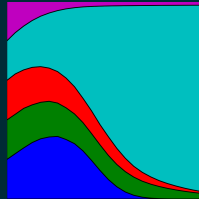
# Stability of defection, optimisation of strategies and testing for extortion in the Prisoner's Dilemma

Nikoleta E. Glynatsi

Dr Vincent Knight

Dr Jonathan Gillard

Dr Marc Harper

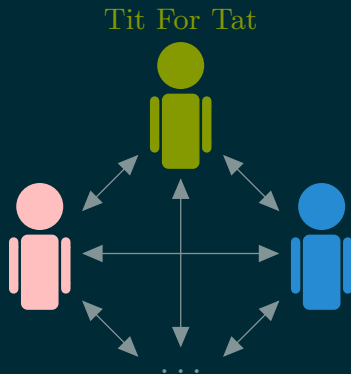


NICE? NOT NICE?



$$S_p = \begin{pmatrix} 3 & 0 \\ 5 & 1 \end{pmatrix} \quad S_q = \begin{pmatrix} 3 & 5 \\ 0 & 1 \end{pmatrix}$$

# Effective Choice in the Prisoner's Dilemma - Robert Axelrod, 1980



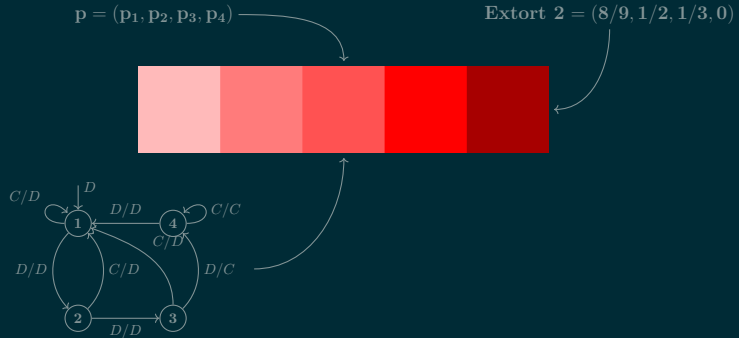
Iterated Prisoner's Dilemma contains strategies that dominate any evolutionary opponent - William H. Press and Freeman J. Dyson, 2012



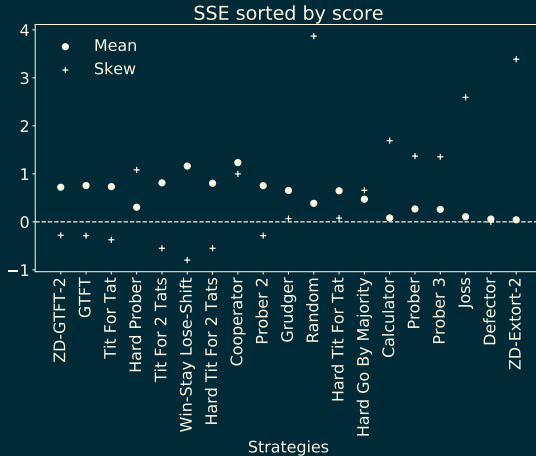
$$p = (p_1, p_2, p_3, p_4)$$

$$(S_P - P) = \chi(S_Q - P)$$

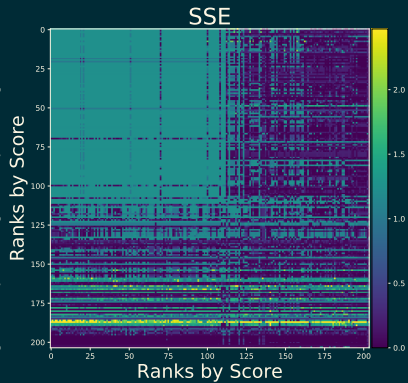
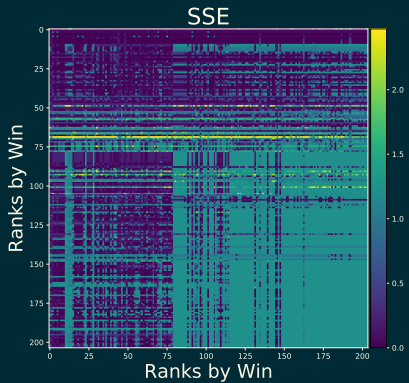
Recognising and evaluating the effectiveness of extortion in the  
Iterated Prisoner's Dilemma - Vincent A. Knight, Marc Harper,  
Nikoleta E. Glynatsi and Jonathan Gillard, 2019



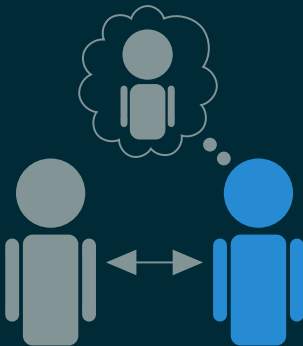
# Extortion and cooperation in the Prisoner's Dilemma - A. J. Stewart and J. B. Plotkin., 2012





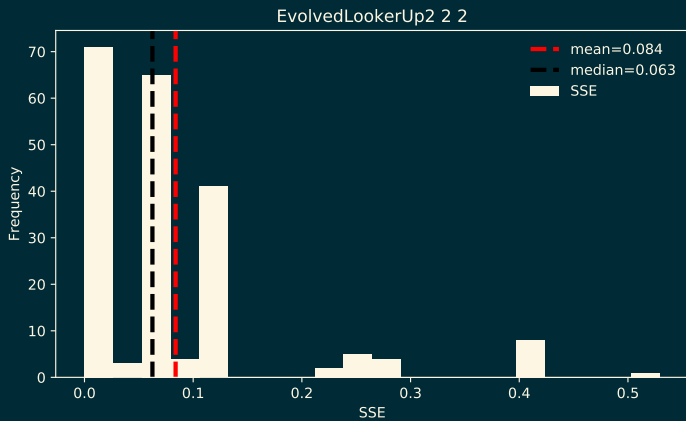


Stability of defection, optimisation of strategies and the limits of memory in the Prisoner's Dilemma - Nikoleta E. Glynatsi and Dr Vincent Knight

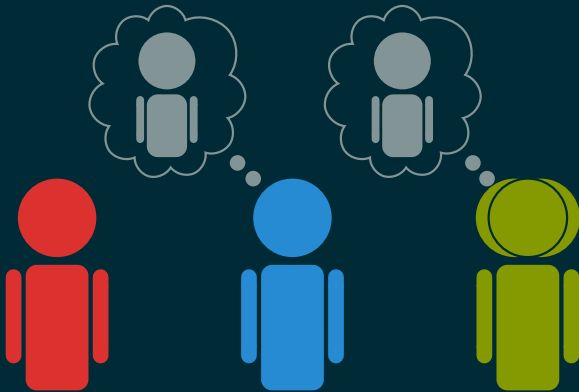


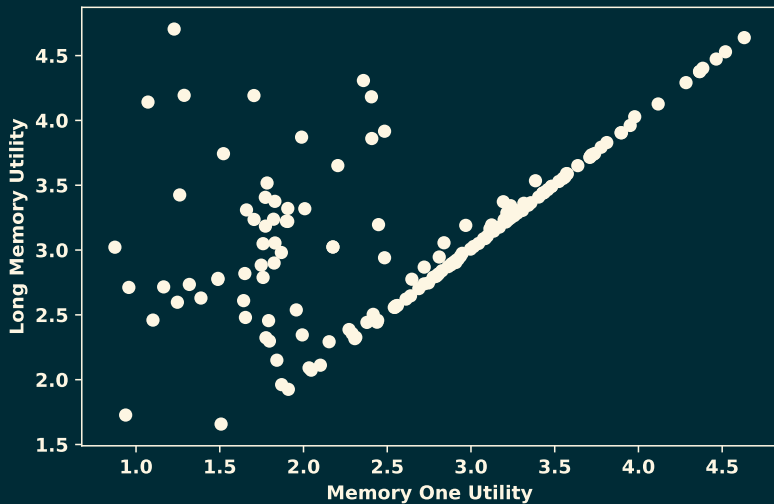
$$u_q(p) = \frac{\frac{1}{2} p Q p^T + c p + a}{\frac{1}{2} p \bar{Q} p^T + \bar{c} p + \bar{a}}$$

$$p^* = \operatorname{argmax}_p u_q(p)$$











- ZD strategies are not adaptable.



- Extortion is not optimal.



- Longer memory is beneficial.



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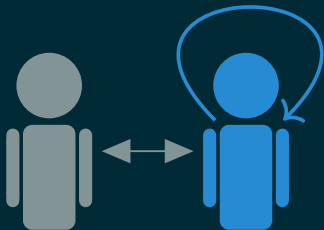
@NikoletaGlyn

Glynatsine@cardiff.ac.uk

<https://arxiv.org/abs/1904.00973>



Stability of defection, optimisation of strategies and the limits of memory in the Prisoner's Dilemma - Nikoleta E. Glynatsi and Dr Vincent Knight



$$p^* = \operatorname{argmax}_p u_q(p) + u_{p^*}(p^*)$$

