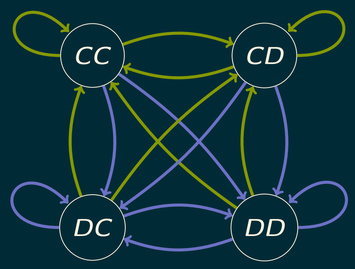
THE POWER OF MEMORY

In interactions both social and biological is memory size advantageous?

	C	D
C	3, 3	5, 0
D	0, 5	1, 1

	1	2	3	$\cdots$	$n-1$ (memory-1)	n
player p	C	C	C	$\cdots$	D	$\cdots$
player q	C	C	D	$\cdots$	D	$\cdots$

memory size-$n-1$



$$\begin{bmatrix} p_1q_1 & p_1(-q_1+1) & q_1(-p_1+1) & (-p_1+1)(-q_1+1) \\ p_2q_3 & p_2(-q_3+1) & q_3(-p_2+1) & (-p_2+1)(-q_3+1) \\ p_3q_2 & p_3(-q_2+1) & q_2(-p_3+1) & (-p_3+1)(-q_2+1) \\ p_4q_4 & p_4(-q_4+1) & q_4(-p_4+1) & (-p_4+1)(-q_4+1) \end{bmatrix}$$

W. H. Press and F. J. Dyson. **Iterated Prisoner's Dilemma contains strategies that dominate any evolutionary opponent** PNAS 2012. Introducing the zero determinant strategies:

$p^* \rightarrow$ manipulates $\rightarrow q$

This work considers an optimisation approach to identify:

$p^* \rightarrow$ best response $\rightarrow q$