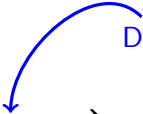


Nash Equilibria in pure strategies

Game Theory

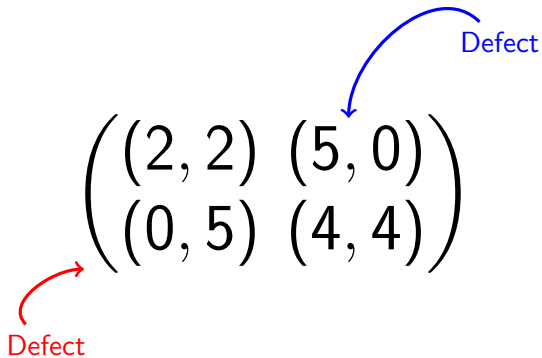
Vincent Knight

$$\begin{pmatrix} (2, 2) & (5, 0) \\ (0, 5) & (4, 4) \end{pmatrix}$$



Defect

$$\begin{pmatrix} (2, 2) & (5, 0) \\ (0, 5) & (4, 4) \end{pmatrix}$$

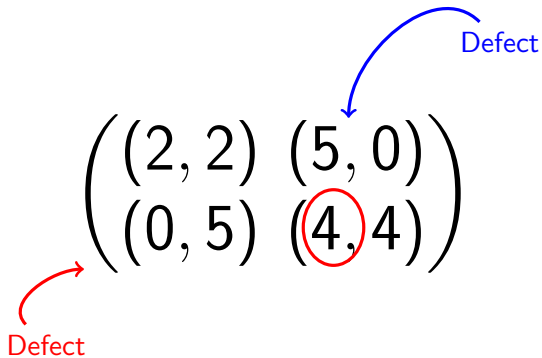


A 2x2 matrix is shown with two defects highlighted. A red arrow points to the bottom-left element (0, 5), and a blue arrow points to the top-right element (5, 0). Both arrows are labeled "Defect".

$$\begin{pmatrix} (2, 2) & (5, 0) \\ (0, 5) & (4, 4) \end{pmatrix}$$

Defect

Defect



A 2x2 matrix is shown with two defects highlighted. A red arrow points to the bottom-left element (0, 5), and a blue arrow points to the top-right element (5, 0). The number 4 in the bottom-right element (4, 4) is circled in red.

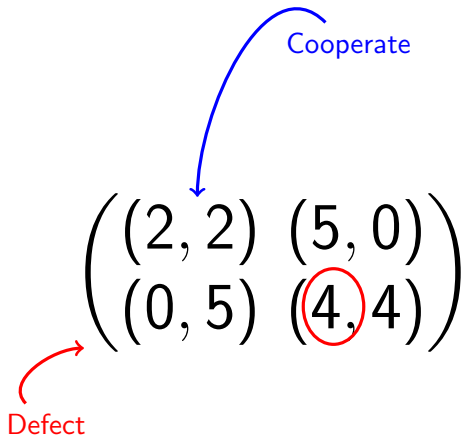
$$\begin{pmatrix} (2, 2) & (5, 0) \\ (0, 5) & (4, 4) \end{pmatrix}$$

Defect

Defect

Cooperate

$$\begin{pmatrix} (2, 2) & (5, 0) \\ (0, 5) & (4, 4) \end{pmatrix}$$



Cooperate

$$\begin{pmatrix} (2, 2) & (5, 0) \\ (0, 5) & (4, 4) \end{pmatrix}$$

Defect

$$\begin{pmatrix} (2, 2) & (5, 0) \\ (0, 5) & (4, 4) \end{pmatrix}$$

$$\begin{pmatrix} (2, 2) & (5, 0) \\ (0, 5) & (4, 4) \end{pmatrix}$$

$$\begin{pmatrix} (2, 2) & (5, 0) \\ (0, 5) & (4, 4) \end{pmatrix}$$

Nash Equilibrium: \tilde{s} such that $u_i(\tilde{s}) \geq u_i(\bar{s}_i, \tilde{s}_{-i})$ for all i

$$\begin{pmatrix} (2, 2) & (5, 0) \\ (0, 5) & (4, 4) \end{pmatrix}$$



$$u_1(q_1, q_2) = (K - q_1 - q_2)q_1 - kq_1$$

$$u_2(q_1, q_2) = (K - q_1 - q_2)q_2 - kq_2$$

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$\frac{\partial u_1}{\partial q_1} = 0 \dots$ finds best response for Player 1:

$$q_1^* = q_1^*(q_2)$$

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$\frac{\partial u_1}{\partial q_1} = 0 \dots$ finds best response for Player 1:

$$q_1^* = q_1^*(q_2)$$

$\frac{\partial u_2}{\partial q_2} = 0 \dots$ finds best response for Player 2:

$$q_2^* = q_2^*(q_1)$$

$$u_1(q_1, q_2) = (K - q_1 - q_2)q_1 - kq_1$$

$$u_2(q_1, q_2) = (K - q_1 - q_2)q_2 - kq_2$$

$\frac{\partial u_1}{\partial q_1} = 0 \dots$ finds best response for Player 1:

$$q_1^* = q_1^*(q_2)$$

$\frac{\partial u_2}{\partial q_2} = 0 \dots$ finds best response for Player 2:

$$q_2^* = q_2^*(q_1)$$

$$\begin{cases} \tilde{q}_1 = q_1^*(\tilde{q}_2) \\ \tilde{q}_2 = q_2^*(\tilde{q}_1) \end{cases}$$