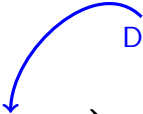


Nash Equilibria in pure strategies

Game Theory

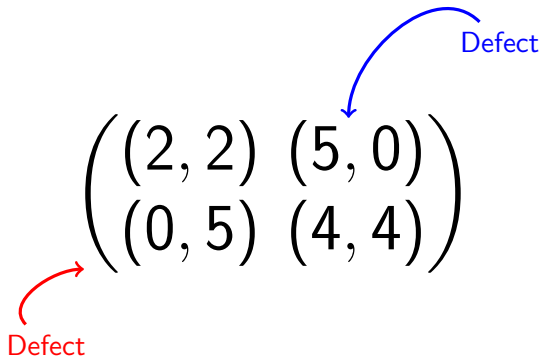
Vincent Knight

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



Defect

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



A diagram showing a 2x2 matrix with arrows pointing to specific elements labeled "Defect".

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

A blue arrow points from the label "Defect" to the element $(5, 0)$. A red arrow points from the label "Defect" to the element $(0, 5)$.

Diagram illustrating a 2x2 matrix with elements $(2, 2)$, $(5, 0)$, $(0, 5)$, and $(4, 4)$. The matrix is enclosed in large parentheses. The element $(4, 4)$ is circled in red. A red arrow points from the label "Defect" to the element $(0, 5)$. A blue arrow points from the label "Defect" to the element $(5, 0)$.

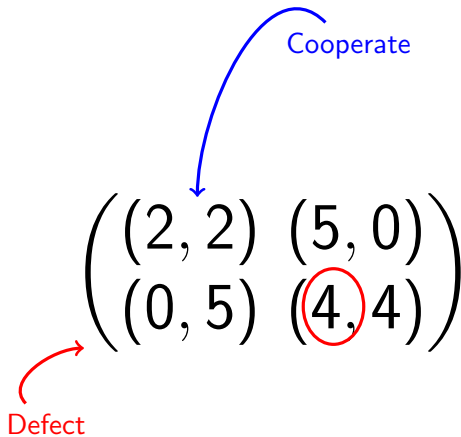
$$\begin{pmatrix} (2, 2) & (5, 0) \\ (0, 5) & (4, 4) \end{pmatrix}$$

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

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



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

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

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

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

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

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

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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:

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

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