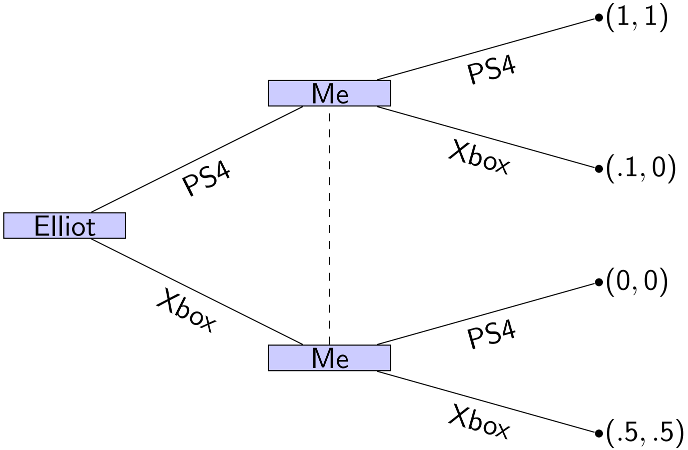
Next generation consoles and an introduction to normal form games

Game Theory

Vincent Knight


Elliot
PS4
Xbox
Me
Me
PS4
Xbox
PS4
Xbox
(1, 1)
(.1, 0)
(0, 0)
(.5, .5)

- A finite set of N players: Elliot and I.
- Strategy spaces for the players: $S_1, S_2, S_3, \ldots S_N$ - $S_1 = S_2 = \{\text{Xbox}, \text{PS4}\}$.
- Payoff functions for the players: $u_i : S_1 \times S_2 \cdots \times S_N \to \mathbb{R}$

$$\begin{pmatrix} (.5, .5) & (0, 0) \\ (.1, 0) & (1, 1) \end{pmatrix}$$

Xbox

$$\begin{pmatrix} (.5, .5) & (0, 0) \\ (.1, 0) & (1, 1) \end{pmatrix}$$

Xbox

PS4

$$\begin{pmatrix} (.5, .5) & (0, 0) \\ (.1, 0) & (1, 1) \end{pmatrix}$$

$$\begin{array}{cc} & \begin{array}{cc} \text{Xbox} & \text{PS4} \end{array} \\ \text{Xbox} & \begin{pmatrix} (.5, .5) & (0, 0) \\ (.1, 0) & (1, 1) \end{pmatrix} \end{array}$$

$$\begin{array}{cc} & \begin{array}{cc} \text{Xbox} & \text{PS4} \end{array} \\ \begin{array}{c} \text{Xbox} \\ \text{PS4} \end{array} & \begin{pmatrix} (.5, .5) & (0, 0) \\ (.1, 0) & (1, 1) \end{pmatrix} \end{array}$$

Mixed strategy: σ_i

$$\sum_{i=1}^{|S_i|} \sigma_i = 1$$

$$\sigma_1 = (.3, .7) \text{ and } \sigma_2 = (.8, .2)$$

$$\begin{pmatrix} (.5, .5) & (0, 0) \\ (.1, 0) & (1, 1) \end{pmatrix}$$

$$\begin{aligned}
u_1(\sigma_1, \sigma_2) &= \sum_{r \in S_1, s \in S_2} \sigma_1(r)\sigma_2(s)u_1(r, s) \\
&= .3 \times .8 \times .5 + .3 \times .2 \times 0 + .7 \times .8 \times .1 + .7 \times .2 \times 1 = .19 \\
u_2(\sigma_1, \sigma_2) &= \sum_{r \in S_1, s \in S_2} \sigma_1(r)\sigma_2(s)u_2(r, s) \\
&= .3 \times .8 \times .5 + .3 \times .2 \times 0 + .7 \times .8 \times 0 + .7 \times .2 \times 1 = .134
\end{aligned}$$

What happens when I ‘always’ buy an Xbox?