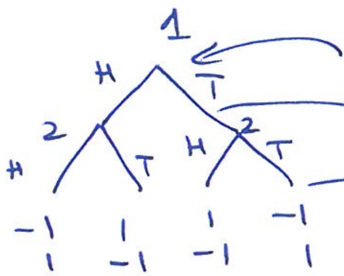
Extensive Form: Matching Pennies (B)



Initial Decision Node

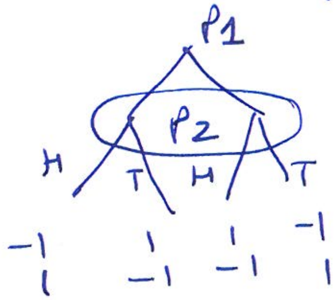
Branches

Terminal Nodes

Payoffs

This is a sequential move game, with perfect information.

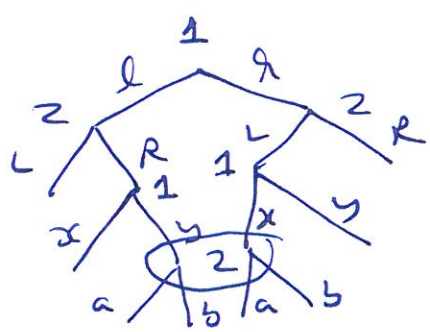
Matching Pennies (C)



Game with imperfect information

At every node, number of actions must be same.

Perfect Recall: Players do not forget what they once knew.

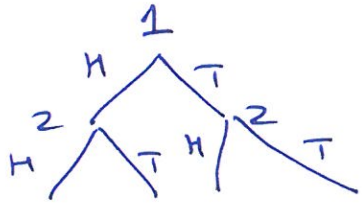


⇐ Violates Perfect Recall.

<u>Common Knowledge</u>: Players know structure of game, know rivals know, know rivals know they know, etc.....

<u>Strategy</u>: complete, contingent plan

eg.

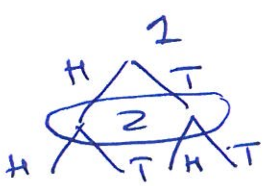


Set of Strategies for

P1: $S_1 =$

P2: $S_2 =$

MP(B)



$S_1 =$

$S_2 =$

MP(C)

If there are I players, vector ~~set~~ of strategies is $s = (s_1, s_2, \ldots, s_I) = (s_i, s_{-i})$

Normal Form (Reduced Form)

MP (B)

		P2 s_1	s_2	s_3	s_4
P1	H				
	T				

Normal Form notation $\Gamma_N = [I, \{S_i\}, \{u_i(\cdot)\}]$

MP (B) payoff functions

$$u_1(s_1,s_2) = \begin{cases} +1 \text{ if } (s_1,s_2) = (H, \text{ strategies } 3 \text{ or } 4) \\ \quad \text{ or } (T, \text{ strategies } 1 \text{ or } 3) \\ -1 \text{ if } (s_1,s_2) = (H, \text{ strategies } 1 \text{ or } 2) \\ \quad \text{ or } (T, \text{ strategies } 2 \text{ or } 4) \end{cases}$$

$$u_2(s_1,s_2) = -u_1(s_1,s_2)$$

Extensive Form $\Rightarrow$ Unique Normal Form

$\not\Leftarrow$

Mixed strategies: $\sigma_i \in [0,1]$ s.t

$\sigma_i(s_i) \geq 0$ & $\sum_{s_i \in S_i} \sigma_i(s_i) = 1$

If player i has M pure strategies

$$S_i = (s_{1i}, \ldots, s_{Mi})$$

then $\Delta(S_i) = \{ (\sigma_{1i}, \ldots, \sigma_{Mi}) \in \mathbb{R}^M :$

$$\sigma_{mi} \geq 0, \sum_{m=1}^{M} \sigma_{mi} = 1 \}.$$

$m = 1, \ldots, M.$