

SC 631: Games and Information
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Lecture 22-2: October 28

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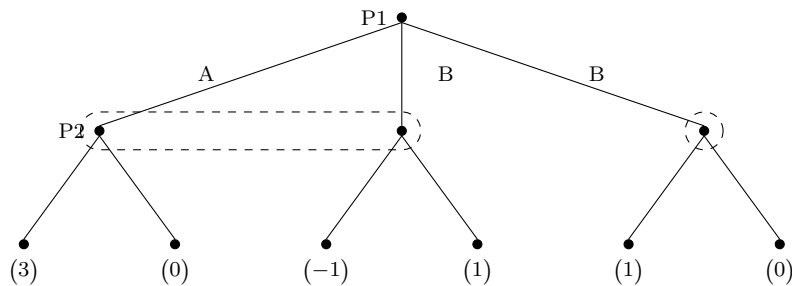
22.1 Recap

Theorem 22.1 (Kuhn, 1953): *If P_i has perfect recall then for every mixed strategy there exists an equivalent behavioral strategy.*

22.2 Examples

22.2.1 Example 1

Find Mixed Strategy Nash Equilibrium in the following zero sum game-



Solution

$$\forall i J^i(b_i^*, b^{*-i}) \leq J^i(b_i^*, b^{-i*}) \forall b_i \tag{22.1}$$

LHS Game

		<i>player 2</i>	
		<i>L</i>	<i>R</i>
<i>player 1</i>	<i>L</i>	3	0
	<i>R</i>	-1	1

Mixed Strategy Nash equilibrium

Player 1,

$$y_L^* = 2/5 \quad y_R^* = 3/5$$

Player 2,
 $z_L^* = 1/5$ $z_R^* = 4/5$
 Value of the game = 0.6.

RHS Game

Player 2 chooses L. Value of the game = 1.
 So player 1 will always chooses Right.

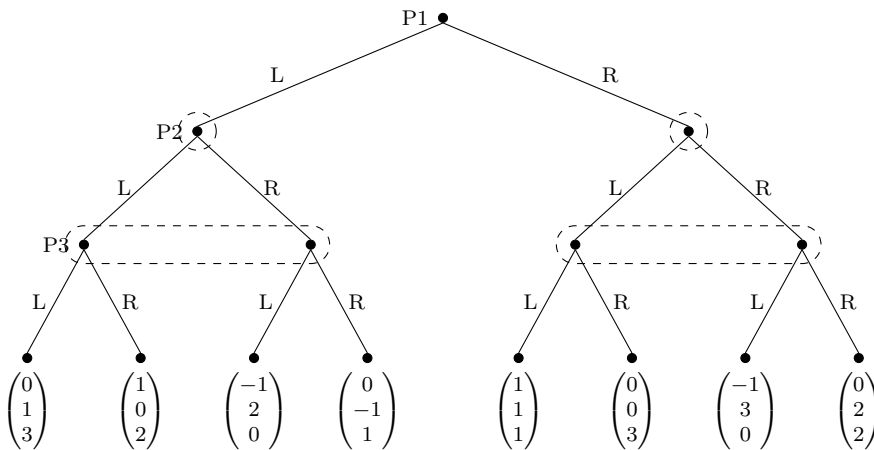
22.2.2 Algorithm

To recursively find Behavioral Strategy

1. Start from info set of last acting player.
2. Consider subextensive form (which will be static)
3. Find equilibrium in it in Mixed Strategies which are the same as Behavioral Strategies.
4. Work upwards

22.2.3 Example 2

Find Behavioral Strategy for-



Solution

$$b_2^*(\eta_1^2) = \begin{cases} L & \text{with prob } 1/2 \\ R & \text{with prob } 1/2 \end{cases} \tag{22.2}$$

$$b_2^*(\eta_2^2) = \begin{cases} L & \text{with prob } 0 \\ R & \text{with prob } 1 \end{cases} \tag{22.3}$$

$$b_3^*(\eta_1^3) = \begin{cases} L & \text{with prob } 1/2 \\ R & \text{with prob } 1/2 \end{cases} \tag{22.4}$$

$$b_2^*(\eta_2^3) = \begin{cases} L & \text{with prob 1} \\ R & \text{with prob 0} \end{cases} \quad (22.5)$$

$$b_1^*(\eta^1) = \begin{cases} L & \text{with prob 1} \\ R & \text{with prob 0} \end{cases} \quad (22.6)$$