1-7-BR-NE-2

1-7-BR-NE-2

Best Response and Nash Equilibrium

Game Theory Course:
Jackson, Leyton-Brown & Shoham

Best Response

- If you knew what everyone else was going to do, it would be easy to pick your own action

---

Best Response

- If you knew what everyone else was going to do, it would be easy to pick your own action
- Let $a_{-i} = \langle a_1, \ldots, a_{i-1}, a_{i+1}, \ldots, a_n \rangle$.
  - now $a = (a_{-i}, a_i)$ *your own action*

(a_{-i}) action seq of everybody except you, player i

Definition (Best response)

$a_i^* \in BR(a_{-i})$ iff $\forall a_i \in A_i, u_i(a_i^*, a_{-i}) \geq u_i(a_i, a_{-i}).$

Best response — *your BR* — *other* — *better than anything else*
assume all other agent play a_{-i}

Nash Equilibrium

- Really, no agent knows what the others will do.
- What can we say about which actions will occur?

Nash Equilibrium

- Really, no agent knows what the others will do.
- What can we say about which actions will occur?

- Idea: look for stable action profiles.

Definition (Nash Equilibrium)

a set of action
$a = \langle a_1, \ldots, a_n \rangle$ is a ("pure strategy") *Nash equilibrium* iff
$\forall i, a_i \in BR(a_{-i}).$

each is Best Response to others
every agent