Information

Game Tree (Extensive form of a Game)

- **Game Tree**

1. Initial node/Root, Action node, decision node
2. Branches
3. Decision Node, Terminal Node (Payoffs)
4. Information set, information partition

- **Uncertainty and "Nature's Moves" (Chance nodes)**

Information Set, Partition

- **Information set:** Player *i*'s information set at any particular point of the game is the set of different nodes in the game tree that he/she knows might be the actual node but between which he can't distinguish by direct observation

- **Information partition:** collection of information sets available to both players at each stage of the game

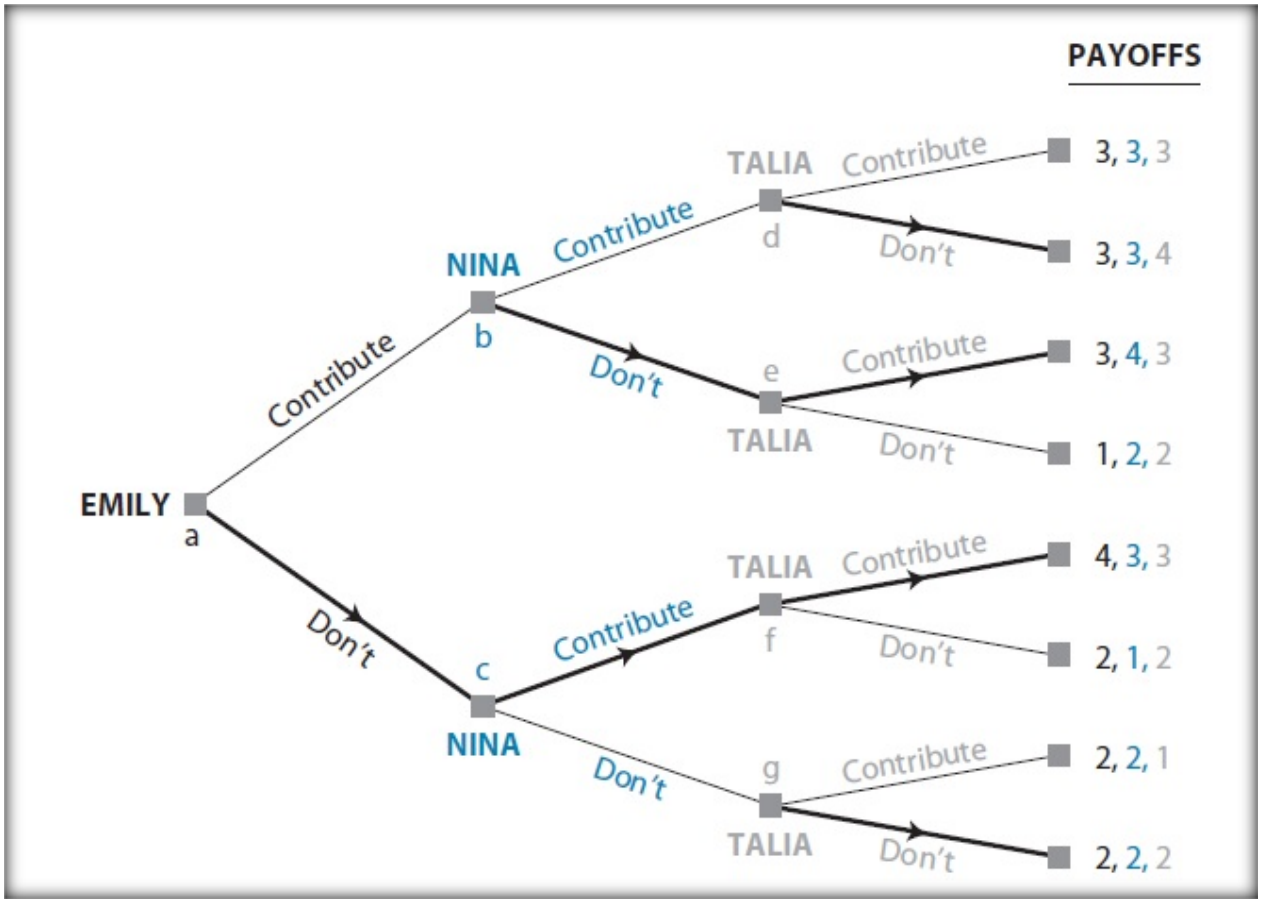
Types of Games by Information

- We can categorize games given informational structure:

1. Games with perfect information
2. Games with certain information
3. Games with symmetric information
4. Games with complete information

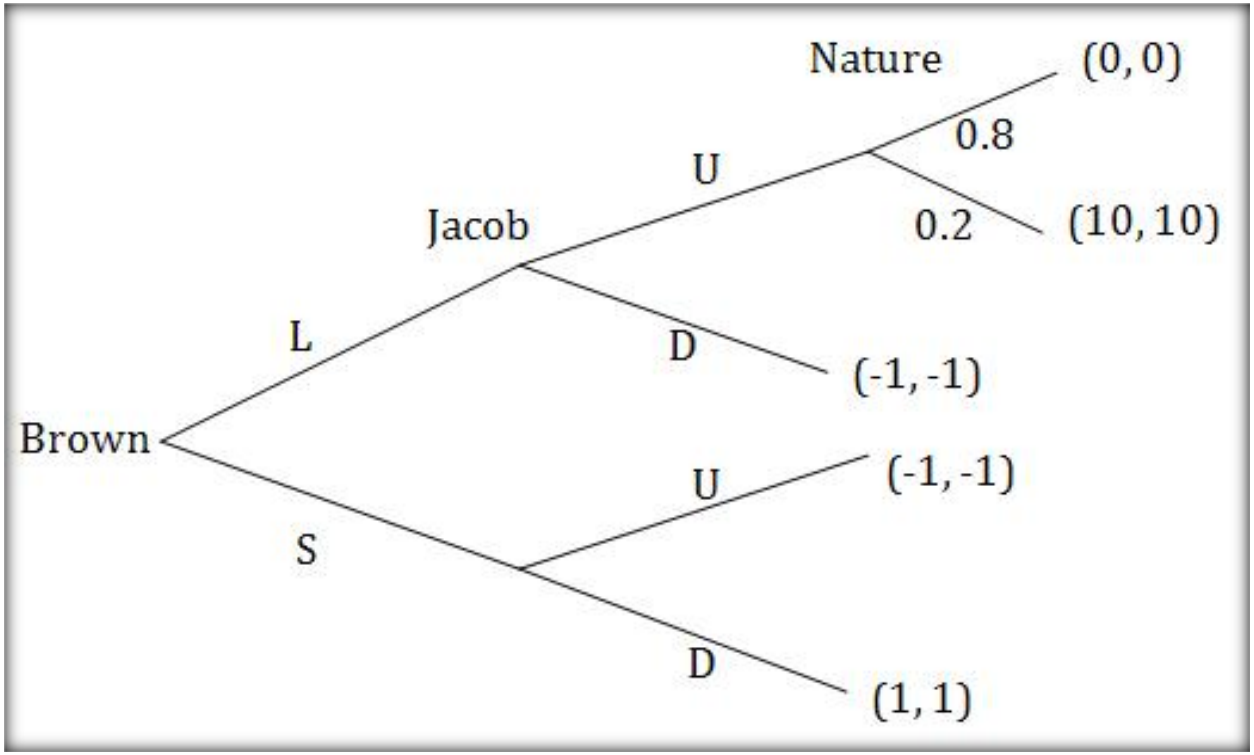
Perfect Information

1. Games with perfect information: A game is of perfect information iff the information sets of player are singleton sets or every player knows the full history of the game at each stage.



Uncertain Information

- Games with certain information: A game is said to be certain if nature doesn't move subsequent to any move by any of the players.



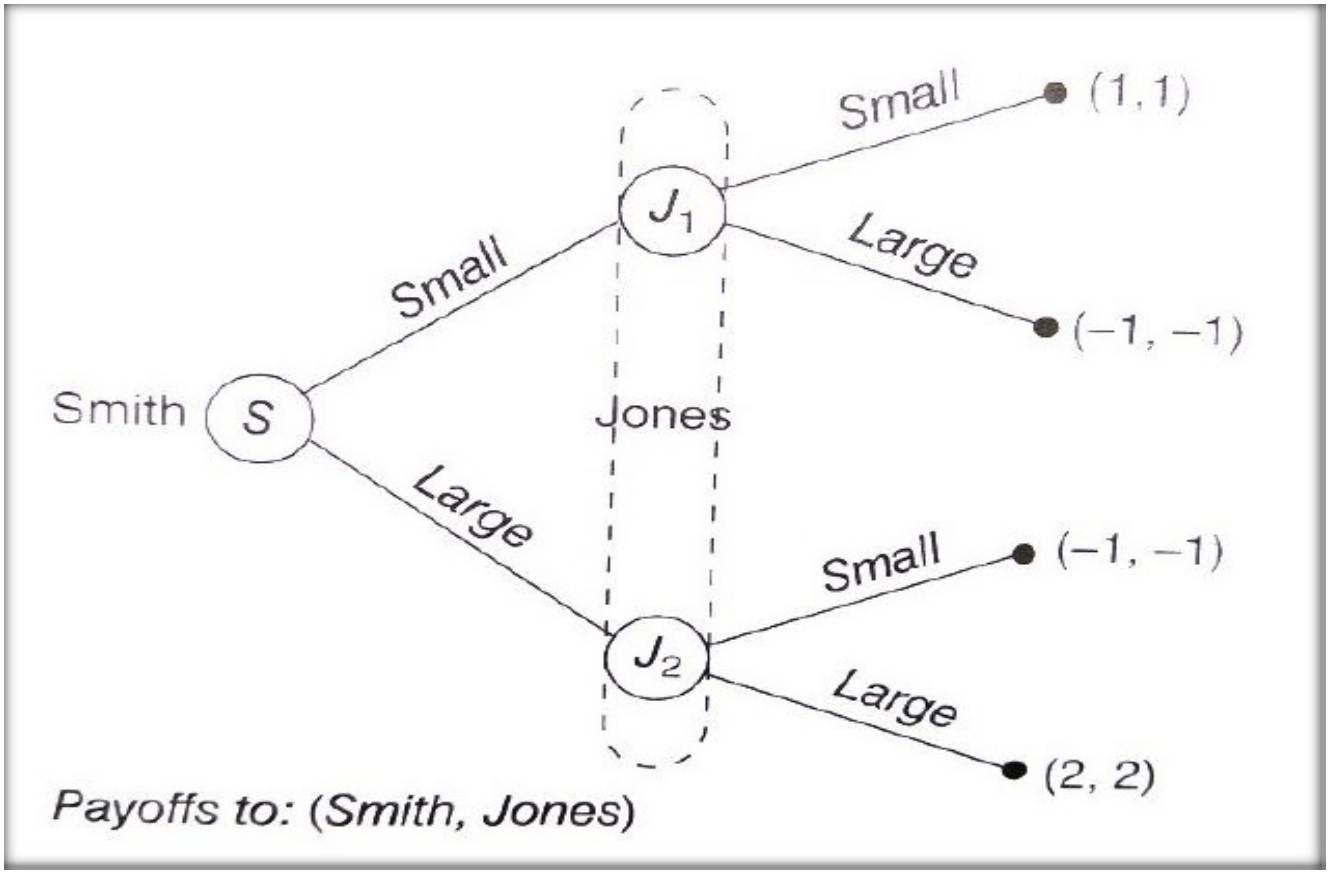
- This game is of perfect information as all the possible payoffs are known to both Jacob and Brown but the game is of uncertain information as nature moves randomly at a later stage of the game.

Uncertain and Imperfect Information

- A game of uncertainty will lead to information imperfection if only the move by the nature is unobservable to at least one of the players.

Asymmetric Information

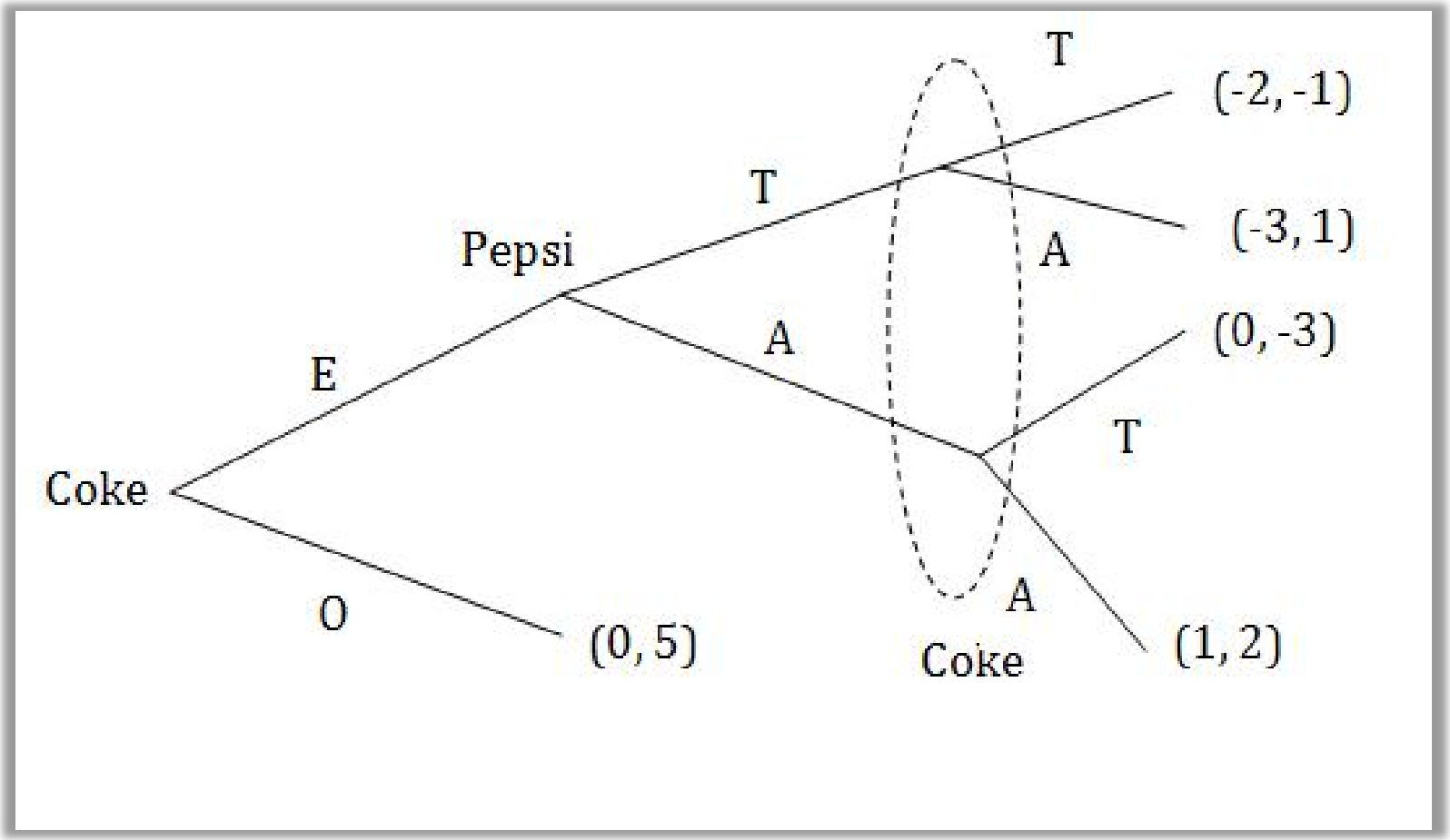
3. In a game of symmetric information a player's information set at (1) any node where he takes an action and/or (2) the end node contains at least the same elements as the information sets of every other player.



- Information sets of Jones : {J1, J2}; Smith: {J1}, {J2}

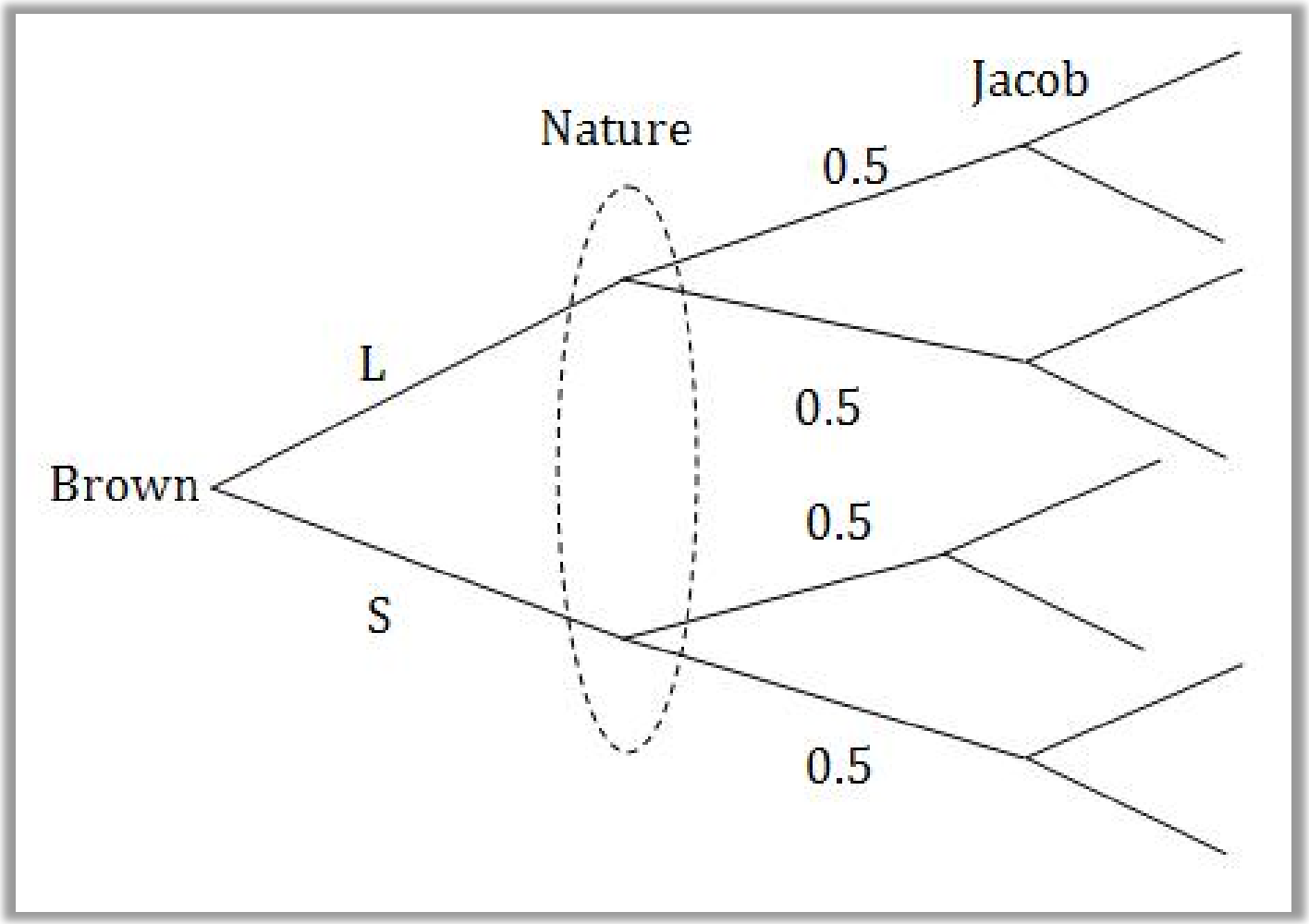
Asymmetric Information

3. Similarly in sequential game



Complete Information

4. Games with complete information: Nature doesn't move initially or if it moves then observable to all.



Information (Continued)

- Imperfect information: Can arise due to –

i. Simultaneous move

ii. Incomplete information

iii. Asymmetric information

iv. Uncertainty (with some characterization, as discussed)

Reference

- Rasmusen, E. (2005). Games and Information. Basil Blackwell. [Chapter 2].