

Section 6: Imperfect information

Econ C110 / PoliSci C135

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In this section, we will deal with dynamic games of imperfect information and solve for NE and SPNE.

1 Extensive form games of imperfect information

Definition 1. An **information set** connects nodes that a player cannot distinguish. On an extensive form game, this is drawn as a dotted line or circle.

At an information set, a player's action must be the same for every node in the information set.

Definition 2. A **strategy** in an extensive form game of imperfect information *responds to each information set* at which a player is called to play.

Recall. A **subgame** is a collection of nodes and branches that satisfies three properties:

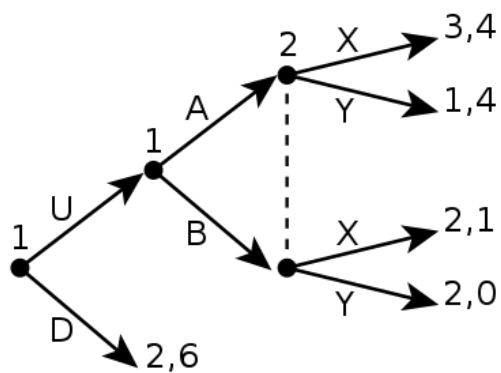
1. It starts at a single decision node.
2. It contains every alternative at this node and all nodes after this node.
3. It doesn't split up any information sets.

Recall. A **subgame perfect Nash equilibrium (SPNE or SPE)** is an equilibrium in an extensive form game. The strategy profile is a Nash equilibrium in every subgame, even ones that aren't reached. Subgame perfect Nash equilibria are a subset of Nash equilibria.

Note. In a game of imperfect information, you cannot use backward induction! You must find SPNE by finding the NE of all subgames.

2 Exercises

Exercise 1. Consider the following game.



- What are the subgames of this game?
- What are each player's information sets?
- What is/are the NE in each subgame (including the full game)?
- What is/are the SPNE?

Exercise 1. Consider the following game.

