444 Lecture 3.3 - Backward Induction and Ties

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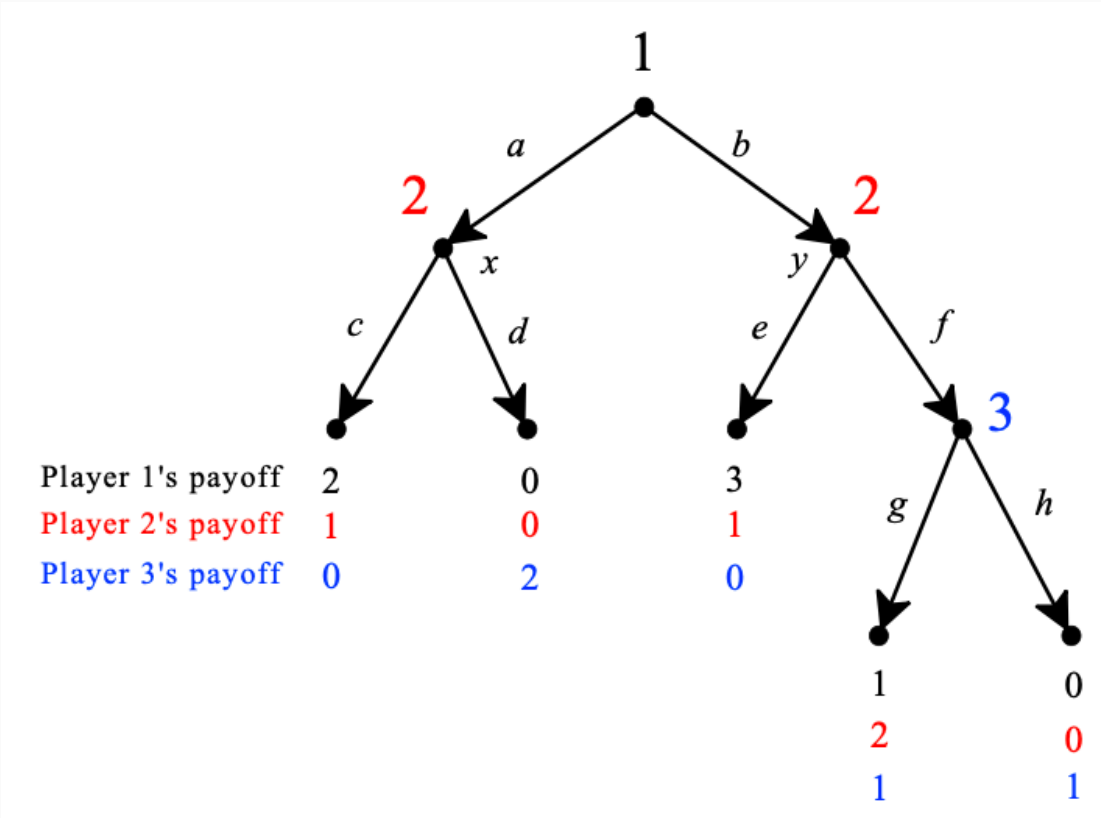
Plan

To address a bug in the backwards induction algorithm - ties.

Reading

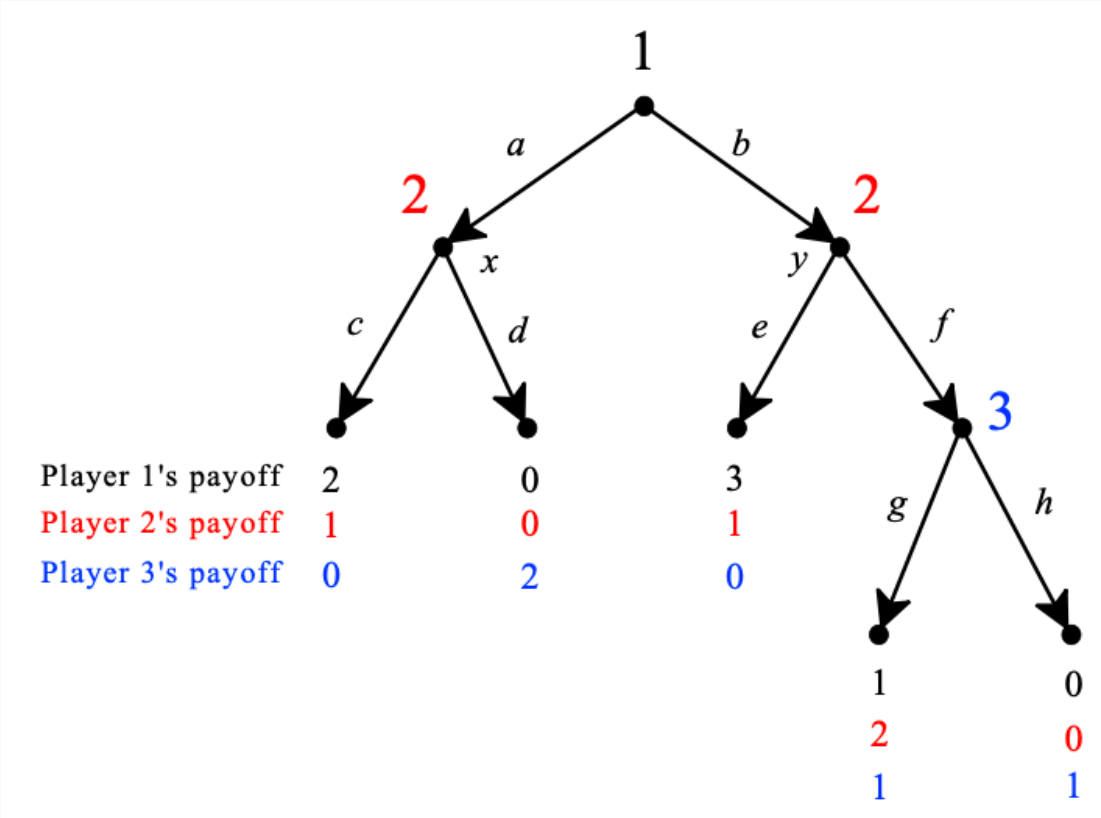
Bonanno, section 3.2.

Backwards Induction in Positive Sum Games



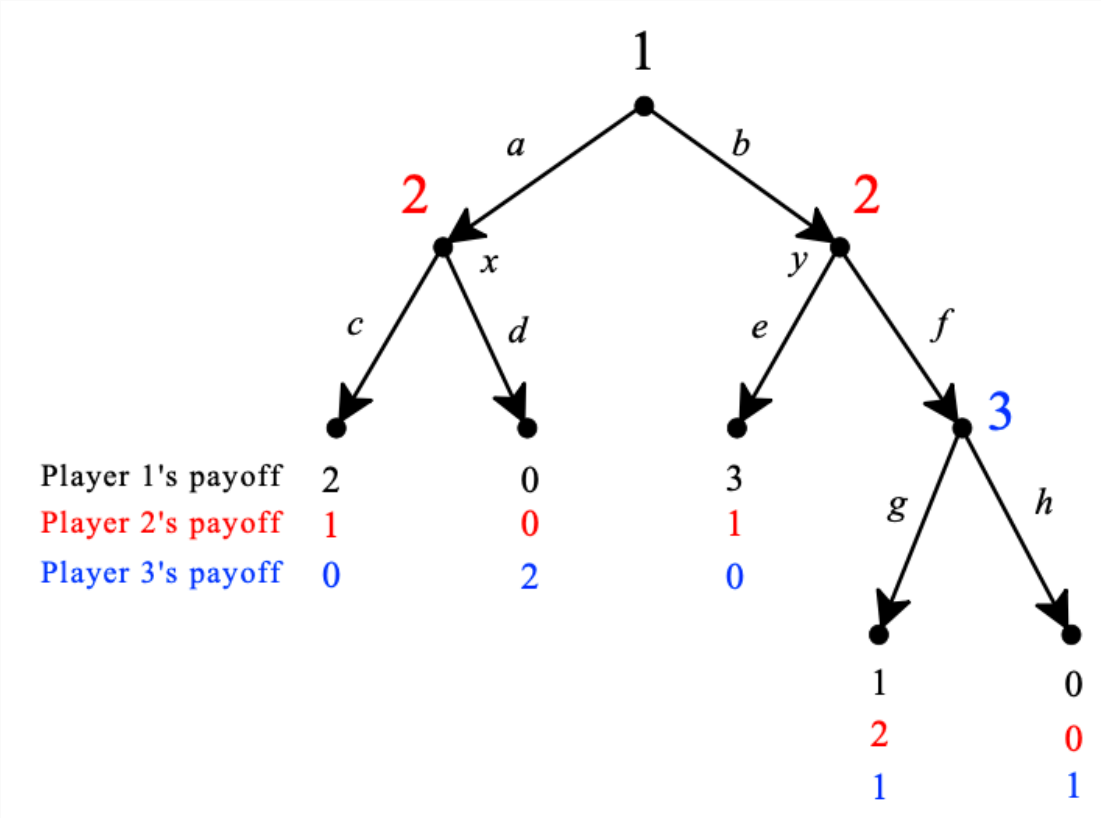
Three player game tree

- This is three player, but crucially, it is not zero sum.



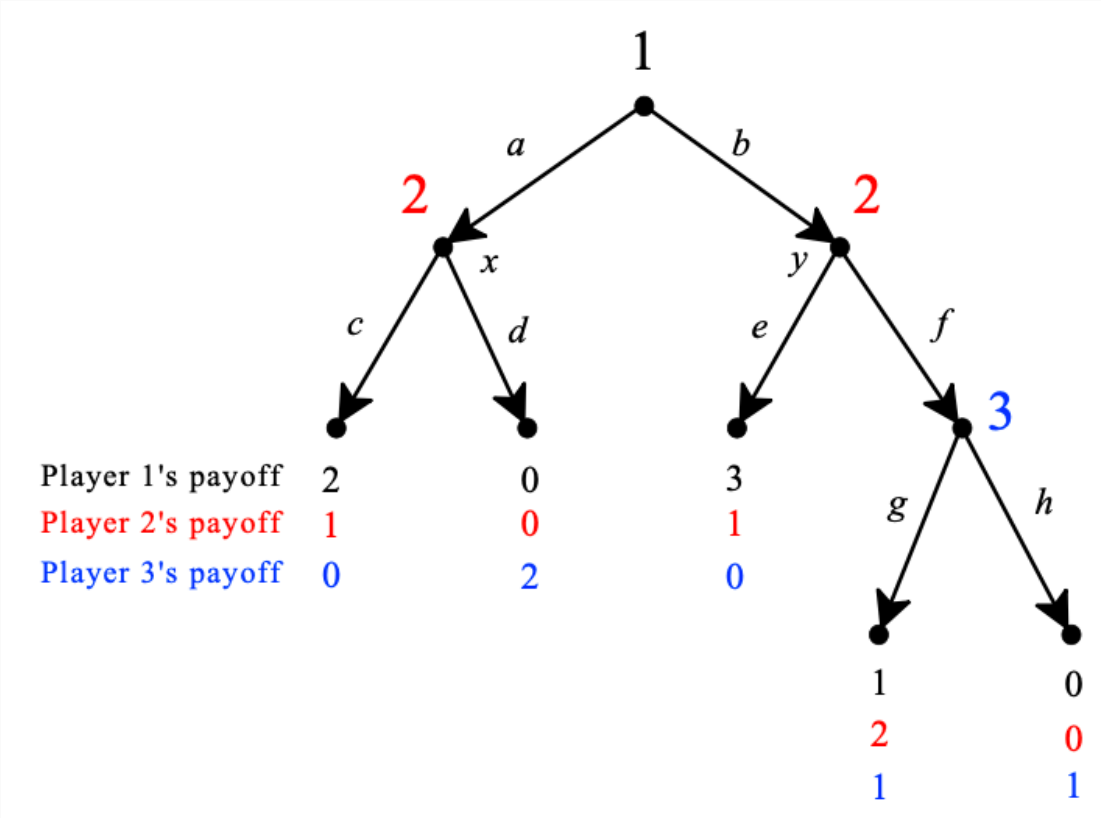
Three player game tree

- In the bottom right, Player 3 doesn't care which choice is made.



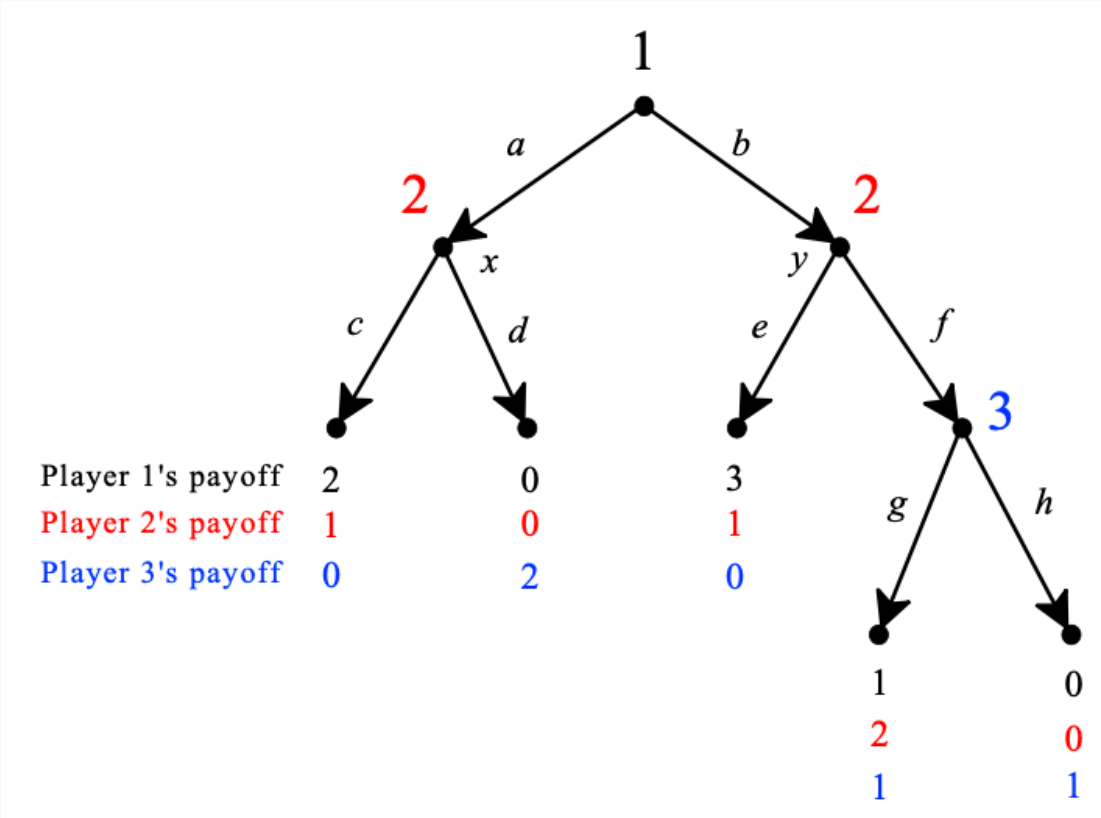
Three player game tree

- In the bottom right, Player 3 doesn't care which choice is made.
- So we can't infer what Player 3 will do.



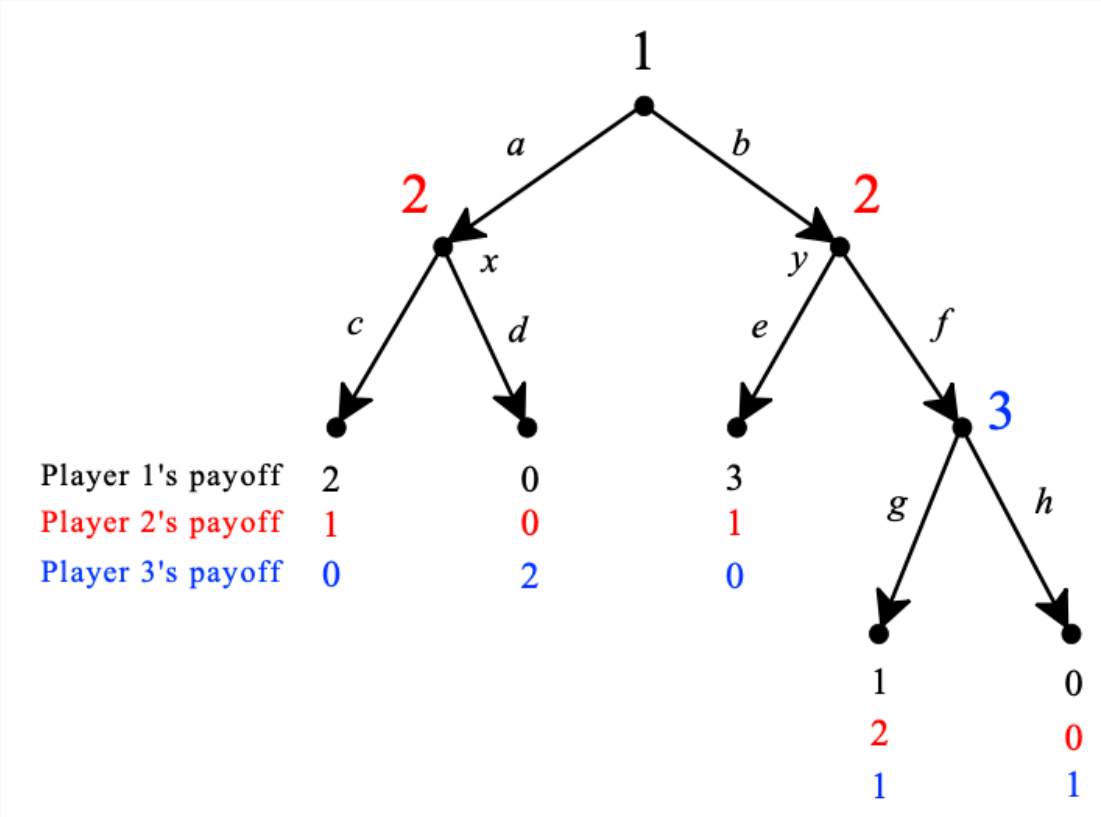
Three player game tree

- But the other players do care what Player 3 will do.



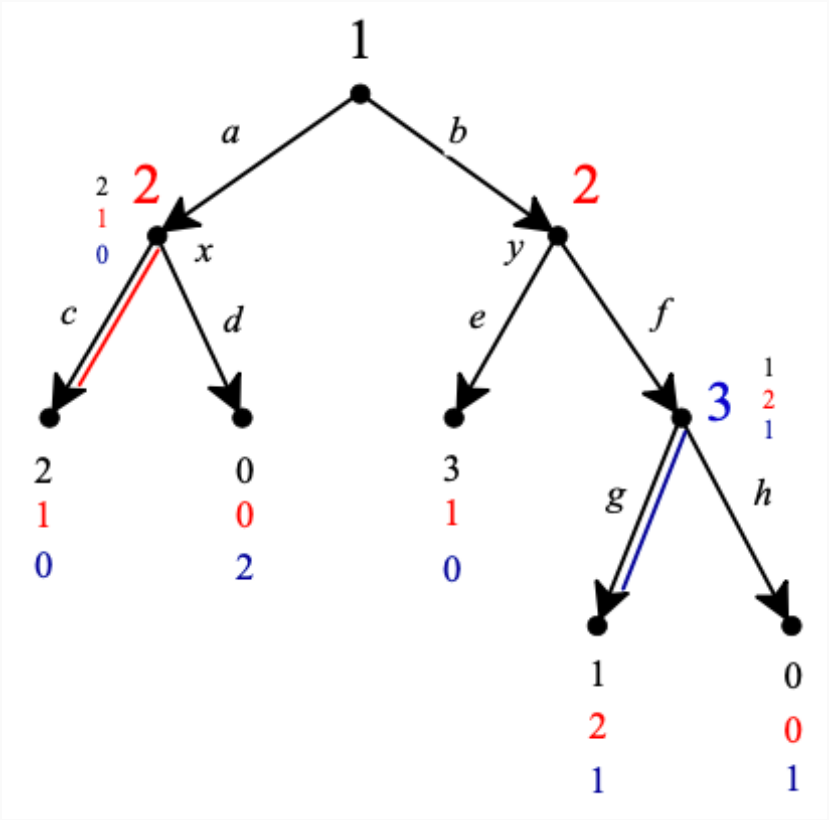
Three player game tree

- But the other players do care what Player 3 will do.
- So we can't just ignore this choice.



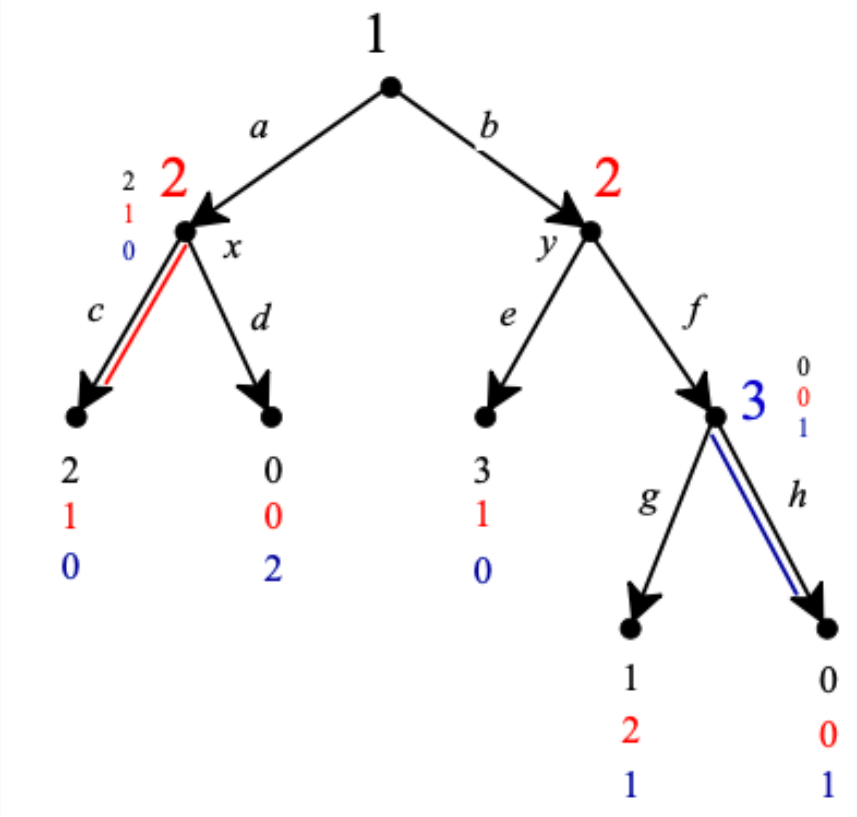
Three player game tree

- The solution is to build two trees, one for each of Player 3's choices.



Solution One

- First, assume 3 plays g.
- Then 2 would play f at node y.
- So 1 will actually play a.



Solution One

- Now, assume 3 plays h.
- Then 2 would play e at node y.
- So 1 will actually play b triggering this play.

Multiple Solutions

- This is a game with multiple backwards induction solutions.
- The solutions don't just differ in what Player 3, who faces the tie, plays.
- They differ in the very first move!
- This is the totally general case; most solution concepts are like this.
- But it's a pain to deal with.

For Next Time

- We will look at how game trees relate to what we did last week.