444 Lecture 7.2 - Two Puzzles about Bayesian Equilibrium

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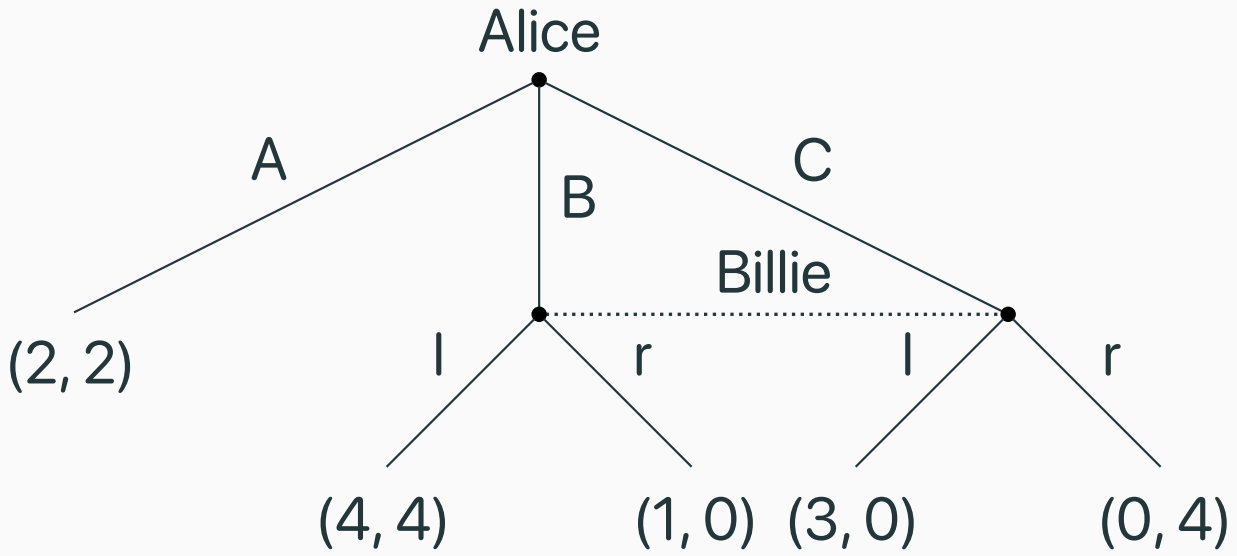
First Puzzle



- I don't really know what to do here.

Strategy Table

	l	r
A	2, 2	2, 2
B	4, 4	1, 0
C	3, 0	0, 4

Note that $\langle A, r \rangle$ is a Nash equilibrium, and B dominates C.

Bayesian Equilibrium

The following is even a Bayesian Equilibrium

- Alice plays A.
- Billie believes with probability 1 that Alice will play A.
- If Billie finds herself at the B/C set, she will believe that Alice played C.
- So she will do what's best for her given this belief, i.e., play r.
- Alice knows this.

Alice plays A and gets 2, and she believes she would get 1 if she played B and 0 if she played C. So she's doing the thing that's best by her lights.

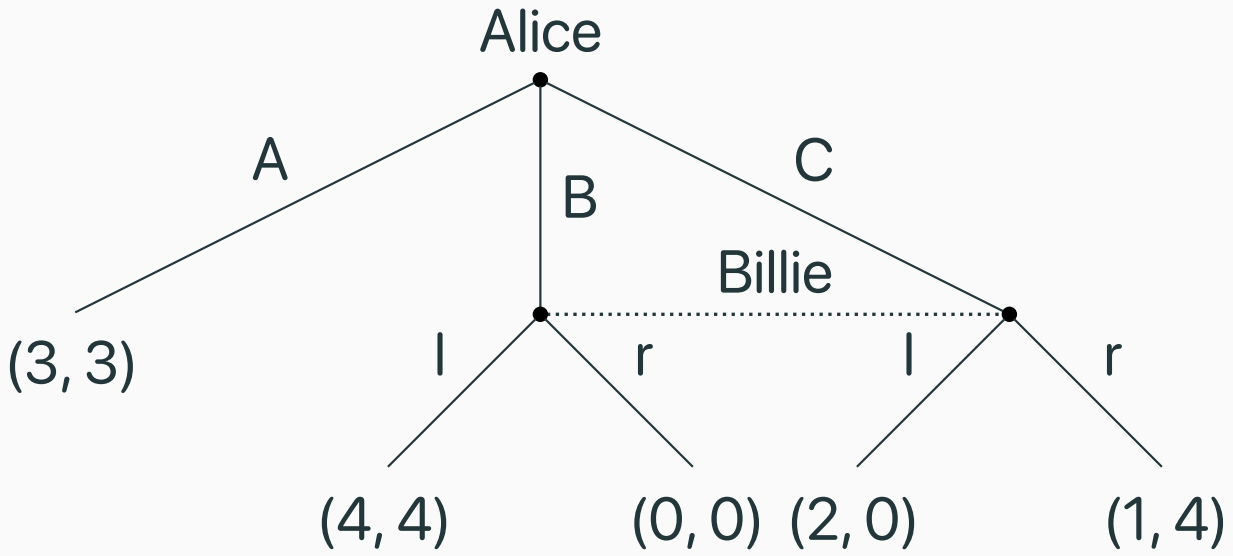
Wait a Minute!

- Billie is disposed to believe that if Alice does something weird (play B or C), she will do something really weird (play a dominated strategy).
- Is this an OK thing for Billie to believe?
- It seems a bit weird.
- Maybe if Alice has not given Billie conclusive evidence that she will do something bizarre - i.e., play a dominated strategy - it's wrong to believe that she's done something bizarre.
- So if we get to B/C, Billie should believe we're at B, so should play l, and knowing that, Alice should play B.

Which is right?

- I don’t really know.
- Here we’re already into contested territory.
- Let’s take one further step into contested territory.

Second Puzzle



- I really don't know what to do here.

Why is it Puzzling

- $\langle A, r \rangle$ is a Bayesian (and Nash and subgame perfect) equilibrium.
- But maybe Alice should choose B.

Why is it Puzzling

- $\langle A, r \rangle$ is a Bayesian (and Nash and subgame perfect) equilibrium.
- But maybe Alice should choose B.
- Note that A dominates C.
- So if Billie knows that Alice doesn't choose dominated options, and this survives learning that Alice has chosen B or C, then Billie will know that Alice has chosen B.
- And then Billie will choose l, so Alice should choose B.

Two Big Questions

1. Are there philosophical grounds to change our theory of equilibrium selection to make Alice choose B in both of these games?
2. If we want to do that, what's the best mathematical theory that generates the intended result?

- Both of these are hard questions, but not one's I'm going to address in this course.
- We have to stop somewhere, and there are always more questions like this to ask and answer.
- Instead I'm going to a special class of games: signaling games.