444 Lecture 5.8 - Why Nash?

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Plan

To look at the philosophical significance of Nash Equilibria.

Reading

Bonanno, sections 2.6 (which we discussed earlier) and 6.4.

Two Conjectures

1. It is rational to play any rationalizable strategy.
2. It is only rational to play Nash Equilibrium strategies

I'm going to end this week talking a bit about why people might prefer 2 over 1.

One Intuitive Idea

- Don’t just play Rock – the other person will figure it out.
- Rock every time is rationalizable.
- But you shouldn’t do it.
- Therefore principle 1 must be false.

Response 1

- Yeah, you shouldn't play Rock every single time, that's dumb.
- But on any given occasion, it's fine.
- And we know, from e.g., Prisoners' Dilemma, that we shouldn't infer what to do in a single shot game from what happens in the repeated game.

Response 2

- The orthodox solution (i.e., principle 2) actually doesn't give you the result you might want here.
- It is possible that the randomising device will come up Rock every single time.
- So if you think it's always irrational to play Rock repeatedly, you have to think both of these are wrong.

Response 3

- If principle 2 is right, all rational players will randomise every time.
- So the expected return of Rock is just the same as the expected return of randomisation.
- So it can’t be wrong to play it.

Mixing Response 2 and Response 3

- If principle 2 is right, and it's common knowledge that the players are rational, then the rational way to interpret the other player playing Rock every time is "Wow, their random device is having a freaky run."
- But if that's right, there isn't anything wrong with playing Rock every time.

Other Direction

- As we'll see when we get to O'Connor's book, you mostly see people wanting more restrictions on moves than Nash.
- But Bonanno ends chapter 6 with an interesting reason for thinking even rationalisability (i.e., IDSDS) is too strong.

Other Direction

- As we'll see when we get to O'Connor's book, you mostly see people wanting more restrictions on moves than Nash.
- But Bonanno ends chapter 6 with an interesting reason for thinking even rationalisability (i.e., IDSDS) is too strong.
- It's really incredibly unrealistic to know the utility function that the other player has.
- You might know the physical outcomes of the game, but knowing what utility each player gets is a huge assumption.
- So in practice, you should probably not rely too heavily on theories or policies that rely on this knowledge.

For Next Time

- Next week we will do a bit of revision of probability theory.
- It's completely optional; if you want a week off, take a week off.
- After that, we'll look at how game theorists think about signals and messages.