444 Lecture 2.2 - Utility

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Plan

- To say what it means to talk about the outcomes of games in terms of **utility**.

Associated Reading

Bonanno, section 2.1.

Game Outcomes

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1. Describe the physical situation that results.

Game Outcomes

There are two natural ways to specify the outcome of a game.

1. Describe the physical situation that results.
2. Describe how much **utility** each player gets from that result.

Utility

- We are usually going to be focussed on the second.
- That's because we want to know what makes sense from the players' perspectives.
- And just knowing the physical outcmes doesn't tell us that.

What is Utility

- It’s not score.
- The players are aiming to maximise their own number, not maximise the difference between the numbers.

A memorable scoreboard

What is Utility

- The players would prefer a 3-4 result (i.e., 3 for them, 4 for other player) to a 2-1 result.
- So this is very much unlike soccer, even though the numbers will often feel a lot like soccer scores.

What is Utility

- It’s not money, for two distinct reasons.
- First, the players might care how much money the other players get.

Utility and Altruism

Consider these three situations

1. Billy gets $90, Suzy gets $100.
2. Billy gets $100, Suzy gets nothing.
3. Billy gets $110, Suzy gets $100.

How do you order these in terms of utility to Billy, from highest to lowest?

Utility and Altruism

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Utility and Altruism

- We don't know given just this description.
- If Billy wants Suzy to get money, he might prefer option 1 to option 2.
- If Billy wants Suzy to not have money, he might prefer option 2 to option 3.

What is Utility

- It’s not money, for two distinct reasons.
- Second, getting twice as much money typically doesn’t produce twice as much utility.

What is Utility

It is, more or less, desirability.

- Outcome O_1 has more utility for player X than outcome O_2 iff X prefers to be in O_1 than O_2.

Utility and Numbers

- Now you might have noticed something odd there.
- We are trying to define this numerical quantity, but we've just told you something about when it is bigger or smaller.
- Surely we need to say something more, like how much bigger or smaller it is in different situations.

For Next Time

- We will start working on that very question.