305 Lecture 37 - Utilities

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Plan

- In this lecture we'll talk about the notion of utility, the idea that we can numerically measure how good an option is for a chooser. # Ordinal and Cardinal Utilities

Ranking

- The dominance view makes recommendations just looking at the **ranking** of various options.
- It doesn't look at how much we prefer one option over another, just on what is preferred to what.

Ordinal Utility

- To use the technical language, dominance just depends on **ordinal utilities**.
- The term **ordinal** here means that we only look at the **order** of the options.

Cardinal Utility

- The rules that we'll look at rely on **cardinal utilities**.
- Whenever we're associating outcomes with numbers in a way that the magnitudes of the differences between the numbers matters, we're using cardinal utilities.

Why More Than Order Matters (An Example)

- Chris and Robin each have to make a decision between two airlines to fly them from Detroit to Los Angeles.
- One airline is more expensive, the other is more reliable.
- To oversimplify things, let's say the unreliable airline runs well in good weather, but in bad weather, things go wrong.
- And Chris and Robin have no way of finding out what the weather along the way will be.
- They would prefer to save money, but they'd certainly not prefer for things to go badly wrong.

A Table

So they face the following decision table.

	Good weather	Bad Weather
Fly Cheap Airline	4	1
Fly Good Airline	3	2

If we're just looking at the ordering of outcomes, that is the decision problem facing both Chris and Robin.

Filling in Details

- The cheap airline that Chris might fly has a problem with luggage.
- If the weather is bad, their passengers' luggage will be a day late getting to Los Angeles.

Filling in Details

- The cheap airline that Chris might fly has a problem with luggage.
- If the weather is bad, their passengers' luggage will be a day late getting to Los Angeles.
- The cheap airline that Robin might fly has a problem with staying in the air.
- If the weather is bad, their plane will crash.

Details Matter

- Those seem like very different decision problems.
- It might be worth risking one's luggage being a day late in order to get a cheap plane ticket.
- It's not worth risking, seriously risking, a plane crash.
- That's to say, Chris and Robin are facing very different decision problems, even though the ranking of the four possible outcomes is the same in each of their cases.
- So it seems like some decision rules should be sensitive to magnitudes of differences between options.

Utility

- Intuitively, think of utilities as measuring how good an outcome is.
- The theory we're building towards is thoroughly subjectivist, so think of 'how good' as meaning 'how good along all and only dimensions the agent making the decision cares about'.

Scale

- Utilities aren't really measured on any scale.
- Indeed, like temperature measures, they don't even have a fixed zero point.
- It is usually convenient to associate 0 utility with the status quo, and then have negative numbers for outcomes worse than status quo, and positive numbers for outcomes better than status quo.
- But that's just a convention; you can set the 0 wherever you like.
- And you can set the utility 1 point at anything better than 0.

Scale (continued)

- But that's where the convention stops.
- Once you fix the 0 and 1 points, nothing else is fixed by pure convention.
- Temperatures are like this too.

Dollars and Utility

Orthodox utility theory takes the following two facts to be important, and in need of explanation, and to ultimately have the same explanation:

1. If you or I got a windfall prize of $1,000,000, it would be an enormous, life-altering, change. But if Mark Zuckerberg got a windfall prize of $1,000,000, he'd barely notice it.
2. If given a choice between a guaranteed $1,000,000, and a 50/50 chance of winning $2,000,000, you would almost certainly take the $1,000,000. Indeed, most of you would do so with barely a moment's hesitation.

The Explanation

- The more money you have, the less utility you get from each extra dollar.
- There is a **declining marginal utility** to money.
- The marginal utility of a good is how much utility a person gets, relative to where they are now, from a little extra of that good.
- For most goods, the more of them you have, the less useful an extra one is.
- This is especially true for money.

For Next Time

- We will look at how to think about decisions where dominance reasoning doesn't apply.