305 Lecture 9.3 - 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.

Associated Reading

Odds and Ends, chapter 12

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.

For Next Time

- We will look at how to use utility theory to make decisions.