Week 5 Summary: Discounting the future. The value of information. Biased choice.

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1 Discounting the Future

1.1 Misc

Problem is known as `choosing consumption over time`. It's a formalization of why greedy approaches don't work.

1.1.1 Example case

Budgeting. You've got \$X to last you n time. Obviously, you can't just spend it straight away because you'll be screwed in the long run (almost immediate run, in this case)

1.2 Strategy

Essentially, do the following where:

- discount factor $\delta \in [0, 1]$
- x_1 represents the act of spending \$$x_1$
- \$X is the total amount of money you have

$$\max_{x_1} u(x_1) + \delta u(X - x_1)$$

1.2.1 Quickly calculating optimal act

If we assume u is concave, we just find the max point and solve for x_1, depending on the specifics of what your u function was in the first place. This is:

$$u'(x_1) = \delta u'(K - x_1)$$

1.2.1.1 TODO ??? Why can we assume concavity? Idk yet.

2 The Value of Information

1. Take the act that gives the max expected value without information
2. Take the act that gives the max expected value with information
3. `2 - 1` gives you the value of information.

Note: Value can indeed be negative (maybe having the info would bias you to act badly)

3 Biased Choice

Microecons stuff, basically.

3.1 Possible Fallacies

Note that these are not definitely fallacies and often can be argued either way.

3.1.1 Framing effects

The effect the frame/representation has on decision

3.1.2 Endowment effect

Tendency to value what we ave more than what we do not yet have

Possible Reasons

- Information (more info once we own it)
- Transaction costs
- Habit formation (linked to transaction costs)

3.1.3 Sunk Costs

Yes.

3.2 Heuristics

Central idea is that in order to deal with overwhelming info, we resort to heuristics (which may give rise to the 'fallacies') (idea from Kahneman and Tversky)

3.2.1 Representative Heuristic

- You have a representation of a thing, and use this to govern your estimation of a probability distribution
- Leads to problems where $\mathbb{P}(AB)$ is seen as more likely than $\mathbb{P}(A)$ on its own if you think B is more in line with the 'representation'

3.2.2 Availability Heuristic

- If you can think of an example of it happening, you assume it's more likely
- Leads to problems of anecdotal evidence/whatever example you have the brainpower to conjure up being used

4 Multiple Selves as a Framework to Understand Irrational Behavior (Ainslie)

4.1 General Argumentation Strategy

Ainsle is essentially proposing a new psychological, reductionist framework of interpreting irrational behaviour: modelling each individual as multiple, internally rational selves. He contrasts this with other reductionist attempts from psychology which he claims have failed.

4.2 Subtle vs Visceral Rewards

This is his terminology. I don't think it's standard. Also, was a little tough to decipher so I'm not sure I'm correct in this.

Visceral: basal, biological/survival rewards (visceral)

Subtle: other rewards (emotional etc)

4.3 Status Quo: The "Shopping List" Definition of Value

Essentially, "that which a person will pay money for is good"

- Also being turned to by psychologists as a method of defining reward
- Glaring problem (in depth below) is that people often behave irrationallly

4.4 Problems

4.4.1 Many rewards function as punishments as well

4.4.2 Abstemoniousness in situations where we could very well reward ourselves

4.4.3 Events serving as rewards are changeable

E.g. diminishing returns, fashion, etc

4.4.4 Many apparent rewards cannot be produced by direct effort

Described as "states which usually occur as by-products", and "lost in any systematic attempt to attain them".

Examples given are:

- sleep
- laughter
- happiness
- dignity

Personally, I see no problem here and disagree that systematic attempts are not possible. I don't see the issue with a sequence of steps being needed in order to achieve these states. Particularly since we've seen that multi-level decision trees can be linearized into a decision matrix.

4.5 Failed reductionist resolution attempts using the field of psychology

4.5.1 Classical Conditioning as a bridging mechanism (between 'subtle' and 'visceral' rewards)

Atomic units here are the visceral rewards, which are composed with each other in complex manners.

- Attempts to model subtle rewards as a composition of visceral ones.
- Problematic as the modelling complexity and verification of the model are pretty untenable
  - e.g. do you like computer science because someone told you you're good at computers when you were a kid? Not easy to prove it, and not necessarily correct either

4.5.2 `Elementary Drives for Game-like Rewards` as a bridging mechanism (between 'subtle' and 'visceral' rewards)

Atomic units here are the elementary drives for game-like rewards, which are composed with each other in complex manners.

- Attempt in the 60s by Fowler (1967) and Hunt (1963)
- Problem: Tough to extricate properties of situation needed to satisfy these drives
- Declared a failure by Coombs and Avrunin (1977)

4.5.3 Empirically, people often fail to max expected income/min costs

- Value of money varies a lot
  - Different people value money differently
  - People treat money differently in different situations (e.g. you're more okay losing \$100 when spending $1,000,000$ on a house than you would be normally)

4.5.4 People consent to undergo pain

4.5.5 Empirically, discount factor seems to be very, very high

4.6 Resolution using `multiple selves` (demonstrated by `intrapersonal bargaining`)

Atomic unit here is multilpe, internally-rational selves for each person, which interact through `intrapersonal bargaining` (basically the cartoon trope of angel/devil on your shoulders arguing over what you should do)

This is the crux of what the chapter is talking about. The author thinks it's very promising. IMO it's a great and promising approach, but he hasn't developed it well.

4.6.1 General rule of thumb

Agent will try to obtain "situations which permit a stable compromise between his long- and short-term interest"

4.6.1.1 Devices that aid compromise Note that this is supposedly descriptive. These devices supposedly act in concert to produce a prima facie irrationality.

- Extrapsychic devices (physical/social constraints which limit future choice space)
- Control of attention (philosophy of "out of sight -> out of mind")
- Control of emotions (e.g. "positive thinking")
- Private rules (grouping temptations into sets, to up the ante of breaking rules about giving in to any single temptation)