Introduction to Limited Rationality

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Some Thoughts

We can think about the idea of "Limited Rationality" in two ways (both are inspired by tons of work in psychology and under-explored in economics):

1. Informally: "Ways that our probabilistic beliefs are wrong". We call these collected errors **Quasi-Bayesian**.

- [1.1] Errors in probabilistic judgments about things. e.g., base-rate neglect, gambler's fallacy.
- [1.2] Errors in statistical reasoning about volitional agents e.g., level-k reasoning, cursedness and inferential naivety, hindsight bias.
- [1.3] "Motivated cognition": preferences and emotions distorting probabilistic judgments e.g., cognitive dissonance, self-serving biases.

But category we do for next few weeks . . .

"Quasi-Maximization"

We will model the person as engaging in traditional constrained maximization at each moment in time.

- But specify exact mistake the person is making in which function she is maximizing, or in what choice set she is choosing from.

Does not correspond to maximizing **true** preferences because

- [1.1] Present bias: moment by moment, you maximize full intertemporal utility, but at each moment tend to overweight current utility (and may mispredict the propensity to do so in the future).
- [1.2] Utility misprediction: because of current tastes or current focus, you (actively or passively) mispredict utility of future situations.
- [1.3] " Decision neglect" and "narrow bracketing": maximizing true utility among each choice set you focus on, but don't focus globally

Quasi-Maximization Defined More Broadly

Person maximizes a particular " goal" given his choice set:

$$\mathbf{Max}_{x \in X} V(x).$$

But V not actual utility function **should** be maximizing.

Lesson and theme for economics of quasi-maximization perspective:

- Have we ever chosen our " life course" ?

$\Rightarrow$ Our piecemeal maximization may lead to life course we never **chose**.

- A smoker "decided" thousands of times to smoke ... but did she ever decide to become a smoker?
- A person in $12,000 credit-card debt made all the choices leading to that debt ... but did she ever decide to be $12,000 in debt?

All three quasi-maximization errors contribute.

Life.

Life's a bitch _____, and then _____ you die.

- Life's a bitch *of a complicated expected-utility maximization problem*, and then *millions of isolated decisions taken and billions of potential decisions untaken later* you die.
- Economic models tend to operate as if we sit down and formulate a complete contingent plan of what we'll do. And then we implement that choice.

Of course, perfect planning followed by perfect execution of plans is not what people do. Two hard-to-distinguish departures:

1. **Decision Neglect:** We make choices in only infinitesimal percentage of infinity of choice sets we face.
2. **Narrow bracketing:** We don't fully integrate our decisions with other decisions even when we could increase utility from doing so.

Nobody (including economists) thinks people do the maximize-complete-contingent-lifetime-expected-utility thing.

But turns out our failure to do global maximization matters.

- This limit to rationality is the closest to a complexity-based mistake that we'll discuss in this course. (There are, of course, others)

We'll show:

- People narrowly bracket even in relatively simple settings.
- The **way** people narrowly bracket is suboptimal within the class of narrow-bracketing rules of behavior.
- **. . .** and worse than **simpler** rules.

Life is an infinite series of (potential) choice sets, $X_1, X_2, \ldots X_N, .$

When facing choice sets X and Y, the agent

Should:

$$\text{Max}_{x,y \in X \times Y} u(x, y).$$

Instead might:

- **Decision Neglect**: "choose" some $\overline{x} \in X$ without thinking, or
- **Narrowly Bracket**:] $\text{Max}_{x \in X} u(x)$, and $\text{Max}_{y \in Y} u(y)$ separately.

Casey faces choice: 50/50 lose $80 / lose nothing over lose $35 for sure?

- Per prospect theory, Casey may choose the 50/50 gamble.
- This is throwing away expected value.

What if Casey has a coin in their pocket. Could take the sure loss $35, then play 50/50 $40 with person next to them.

- This generates 50/50 lose $75, gain $5.
- Unambiguously better than what most people do.

Deeper question: what does it mean if *merely reminding you of a possibility* changes your choice?

- Suppose you are choosing between 15 apples for self and 0 for an anonymous other vs. 9 for self and 4 for that other person.

Would you choose (15, 0), or (9, 4)?

Could take the 15 apples and split them up any way you want.

- Didn't prevent you from doing whatever you wanted afterwards.
- (15,0) isn't your final allocation if you don't want it to be.
- Why not turn (15,0) into (9,6)?

Huge literature in economics about so-called "Dictator Games".

- How many $10 dictator games did person to left of you play yesterday?

These are cases of " Decision Neglect" .

- Experimenters bring into focus relevant pies to pay attention to, and the relevant set of people to split it among.
- But more generally in life such focus happens by accident, by the design of others, and occasionally by our own design.

Two general approaches to showing that people "narrowly bracket" :

- Direct---show people don't combine problems they'd be better off combining.
- Indirect---combine presumptive facts about "background noise" to argue calibrationally that observed choices are " too non-linear" to be consistent with integrating with unobserved other parts of life.
- Note: "indirect" shows simultaneously that people don't even narrowly bracket in as wise a way as they could.

Decision (i): Choose between

> $240 for certain and (.25, $1000; .75, $0)

Decision (ii): Choose between

> $-750 for certain and (.75, -$1000; .25, $0)

What does Prospect Theory tell us about behavior in this setting?

- 84% A over B, 87% D over C.

This is an error of narrow bracketing!

We can see the real problem when we look at the combination of choices.

Subjects' combined choices:

- 73% AD, 11% AC, 14% BD, 3% BC.
- AD is really a lottery composed of: (.75, -$760; .25, $240).
- BC is really a lottery composed of: (.75, -$750; .25 +$250).

So prefering AD to BC inconsistent with any theory ever proposed in either psychology or economics.

So What?

You might retort: Okay, so people don't do impossible and completely integrate life choices. And?

Answer 1: yes, impossible. And so we study it.

- Claim is not that people are stupider than they have to be given that they are subject to human constraints.
- Humans on average make the mistakes that humans on average make.
- The point is rather: people are less rational than economic models suppose, in ways that matter.

Answer 2: This situation is in your face, and still don't integrate.

- So we've learned something about how powerful it is.

Answer 3: This result is general; it's not about these preferences, or this pair of choices.

Rabin and Weizsacker argue the violation we just illustrated

- can occur for arbitrarily small degrees of narrow bracketing
- can be economically significant
- appear in a wide range of experimental tasks
- Almost surely is exhibited massively in non-campus life.