

Introduction to Limited Rationality

EC404; Fall 2021

Prof. Ben Bushong

Last updated October 07, 2021

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:

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

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" ?

⇒ 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, $X_1, X_2, \dots, X_N, \dots$

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 $\bar{x} \in X$ without thinking, or
- **Narrowly Bracket:** $\{ \text{Max}_{x \in X} u(x), \text{ and } \text{Max}_{y \in Y} u(y) \}$ 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 preferring 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.