Disclaimer

- These slides are posted solely to accompany Matthew's lectures at the 2016 Russell Sage Summer Institute in Behavioral Economics.

- They are not edited carefully as stand-alone notes, and are not intended for general circulation.

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Introduction to Limited Rationality

Are people fully rational in maximizing their utility?⇌

- No.⇌

Huge variance in tolerance for doing models of it.⇌

- Bounded rationality long been a topic of economic research.⇌
- And (especially recently) great interest to economic theorists.⇌

Two claims:⇌

1. It is obvious people are not 100% rational, and that they are not 100% in commonly occuring high-stakes settings.⇌
2. And obvious that departures from 100% rationality matter.

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Introduction to Limited Rationality

- Strange, frustrating aesthetic on cognition:$\rightleftharpoons$
  - OK to model humans as superhuman gods$\rightleftharpoons$
  - OK to model as non-human machines or thoughtless lemmings.$\rightleftharpoons$
  - It is just not okay to model them as humans.

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Introduction to Limited Rationality

Proof of Claim 1:$\rightleftharpoons$

- Not getting A's in undergrad economics courses, or 800 on math and analytic SATs, GREs, etc., are departures from rationality with huge costs for those who make them.$\rightleftharpoons$
- The "real world" \$ cost to a smarter-than-average student at an elite university commiting the sunk-cost fallacy on an exam may be higher than most commiting it in the field, and yet many do so.$\rightleftharpoons$
- Benefit of solving unsolved problems in auction theory higher (instant lucrative tenure at top schools) than to MBAs in charge of bidding.$\rightleftharpoons$

Proof of Claim 2:$\rightleftharpoons$

- Billions of \$ in direct educational costs and maybe trillions of \$ on opportunity costs to teach math.

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Introduction to Limited Rationality

Some Themes/Perspectives on Limited Rationality$\rightleftharpoons$

Right that much bounded rationality seems "constrained optimal".$\rightleftharpoons$

- Given that our brains are not perfect, we make do with approximate heuristics; conserve energy, don't pay infinite attention, etc.$\rightleftharpoons$
- Identifying the source of "bounds" in bounded rationality does not magically make it unboundedly rational.$\rightleftharpoons$
- We won't emphasize the "theory-office neuro" that seeks to find the "foundations" of the human error as a constrained-maximization solution to structures that brains (are imagined to) have.

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Introduction to Limited Rationality

Labeling does not matter.$\rightleftharpoons$

- Not paying attention to details might legitly be called rational.$\rightleftharpoons$

But never use labeling to obfuscate:$\rightleftharpoons$

- If consumers' unenthusiasm for detailed calculations to choose optimal phone contract is called rational, do not then study markets or policy as if consumers are "no-mistake rationals".

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Introduction to Limited Rationality

Reminder: Complexity?⇌

- Bias of economists is to emphasize "complexity" as a source of imperfect reasoning.⇌
- Many important mistakes come not from complexity per se.⇌
  - Not realizing you'll have same self-control problem tomorrow as today isn't simpler than thinking you'll be the same.⇌
  - See patterns where there are none: many statistical errors are quite creative, effortful, and subtle ... just wrong.⇌
  - Never even considering extended warranty is simplest way to shop.⇌
- Misleading? Difficulty of question not same as simplicity of answer.⇌
  - Just because the answer is simple doesn't mean figuring it out is.⇌
  - Figuring out the right rule of thumb might be difficult.

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Introduction to Limited Rationality

- "Bound errors" and "Astray errors" are often complements.⇌
- In a complicated and distracted world, don't/can't solve.⇌
  - But Solow's Law: can't replace "rational" with "not rational".⇌
- So when you're guessing, what intuitions lead you astray?⇌
  - If can't solve for optimal auction bid, crudely adjust for WC?⇌

The "Slander Paradox" of modeling limited rationality⇌

- We write down simple models so that *we* can solve.⇌
- But then make agents look like idiots.⇌
- Claim:⇌
  - Usefulness, importance, and **applied correctness** of models higher when can be articulated in simple problems.⇌
  - But then **literal correctness** may be lower.

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Introduction to Limited Rationality

Whether people get right answer vs. whether they "know" right answer?⇌

- Two cautions:⇌
- Often smarter in fact than in principle/abstract:⇌
  - Per Friedman's famous illustration, an expert may be brilliant at pool without knowing the laws of physics.⇌
  - Tacit knowledge: economic actors often closer in practiced settings to idealized model of superhuman rationality than appears in direct tests.⇌
- But also: often smarter in principle/abstract than in fact.⇌
  - **Errors of implementation**.⇌
  - Thaler playing pool.⇌
  - You are masters of probability theory and would not make errors when the probability theory is made salient ... but commit those errors in life.

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Introduction to Limited Rationality

Useful to conceptualize Limited Rationality into two categories:

1. "Quasi-Maximization"$_{\rightleftharpoons}$
   1. Present Bias$_{\rightleftharpoons}$
   2. Preference Misprediction$_{\rightleftharpoons}$
   3. Narrow Bracketing and Narrow Focusing$_{\rightleftharpoons}$
2. "Quasi-Bayesian".$_{\rightleftharpoons}$
   1. Errors in probabilistic judgments about things$_{\rightleftharpoons}$ ... base-rate neglect, gambler's fallacy,$_{\rightleftharpoons}$
   2. motivated cognition: preferences and emotions distorting probabilistic judgments $_{\rightleftharpoons}$ ... cognitive dissonance, self-serving biases$_{\rightleftharpoons}$ (too little at this particular camp)$_{\rightleftharpoons}$
   3. Errors in statistical reasoning about volitional agents$_{\rightleftharpoons}$ ...level-k reasoning, cursedness and inferential naivety, hindsight bias

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Introduction to Limited Rationality

"Quasi-Maximization": Model 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 ...⇌

- 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.⇌
- Utility misprediction: because of current tastes or current focus, you (actively or passively) mispredict utility of future situations⇌
  - misremembering past episodes.⇌
- "Decision neglect" and "narrow bracketing": maximizing true utility among each choice set you focus on, but don't focus globally⇌
  - don't think about some choices, and don't integrate others.

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Introduction to Limited Rationality

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?⇌
  - An overweight person 'decided' thousands of times to eat more calories than he burned⇌ ... ever decide to become an overweight person?⇌
  - 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 3 Quasi-Max errors contribute.

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Introduction to Limited Rationality

Person maximizes a particular "goal" given his choice set:$\rightleftharpoons$

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

But V not actual utility function should be maximizing.

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Mispredicting Tastes

When making choices, we must (or should) take into account any impact current choices have on future well-being.$\rightleftharpoons$

- Apart from question of **how much she cares** about future utility...$\rightleftharpoons$ question of **what she believes** about future utility.

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Mispredicting Tastes

Note some issues missing because: ignoring belief-based utility⇌

- Mistaken beliefs about future tastes can matter both now and in the future *directly*–even if it does not change behavior. ⇌
- If going to a restaurant a week from now.⇌
  - enjoyment of meal depends in part on whether disappointed. ⇌
  - Hence, beliefs right before the meal matter - whether right or wrong.⇌
  - And if anticipation matters, can't depend on correctness.

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Mispredicting Tastes

Basic approach:⇌

- People have perceptions what will make them happy, take actions they assess as maximizing this perceived happiness.⇌
- But perceptions may be wrong.⇌

Formally: true utility is given by: $U^t = \sum_{\tau=t}^{T} u(\mathbf{c}_\tau, \mathbf{s}_\tau)$,⇌

- where $u(\mathbf{c}_\tau, \mathbf{s}_\tau)$ is her instantaneous utility in period τ,⇌
- T is her (possibly infinite) time horizon,⇌
- $\mathbf{c}_\tau$ is period-τ consumption vector ⇌
  - includes all period-τ behavior relevant for contemporaneous utility.⇌
- Vector $\mathbf{s}_\tau$ is person's "state" in period τ, which incorporates all factors that affect instantaneous utility besides current consumption.⇌

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Mispredicting Tastes

Let $\tilde{u}(\mathbf{c}_\tau, \mathbf{s}_\tau | \theta_t) \equiv$ prediction at time t in state $\mathbf{s}_t$ of $u(\mathbf{c}_\tau, \mathbf{s}_\tau)$, where

- θ_t is all things that might affect predictions besides the current
- θ_t will always contain $\mathbf{s}_t$, which (we shall shortly see) may be a major influence on prediction about the future.

Conventional assumption:

- Rational expectations: $\tilde{u}(\mathbf{c}_\tau, \mathbf{s}_\tau | \theta_t) = u(\mathbf{c}_\tau, \mathbf{s}_\tau)$.

But we allow:

- Systematic factors in θ_t that influence prediction of future utility?

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Mispredicting Tastes

These predictions ought be probabilistic:$\rightleftharpoons$

- person may have non-firm beliefs about her future utility.$\rightleftharpoons$
- We'll ignore.$\rightleftharpoons$
- People maximize $\widetilde{U}^t$ rather than U.$\rightleftharpoons$
- Behavioral implications$\rightleftharpoons$
- Because $\tilde{U}^t$ can vary by current state.$\rightleftharpoons$
  - people may exhibit *dynamic inconsistency*$\rightleftharpoons$
    - changing plans even in absence of new information.

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Mispredicting Tastes

Models of such bias?⇌

- Only formal theory I know of is "projection bias".⇌
  - Loewenstein, O'Donoghue, and Rabin (2003)⇌
- In strongest and simplest form:⇌
  - $\tilde{u}(\mathbf{c}_\tau, \mathbf{s}_\tau | \mathbf{s}_t) = u(\mathbf{c}_\tau, \mathbf{s}_t)$.⇌
- People underappreciate (even predictable) changes in tastes.⇌
  - And hence falsely project their current tastes onto the future.⇌
- LOR claim general error embeds lots of intuitions:⇌
  - Kahneman's "transition heuristic"⇌
  - Gilbert's "Immune Neglect"⇌
  - (An interpretation of) Herrnstein and Prelec's "melioration"

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Mispredicting Tastes

Language and Psychology:$\rightleftharpoons$

- Misprediction vs. underappreciation:$\rightleftharpoons$
  - Caveat to the language and formalization using here:$\rightleftharpoons$
  - Is it really always a sort of "active misprediction" in the sense that people have articulated beliefs, but they get them wrong?

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Mispredicting Tastes

Two ways tastes change over time:⇌

- Temporary Fluctuations⇌
  - cues,⇌ satiation and deprivation,⇌ random moods,⇌ etc.⇌
- Longer-term changes⇌
  - adaptation—paraplegia, standard of living, etc., virtually any life event, good or bad, that we tend to adapt to.⇌ addiction,⇌ etc.⇌

Changing tastes are fact about utility, not an indication of irrationality.⇌

- The fact that tastes change, while not regularly part of core economics, is utterly consistent with rational choice, and has been much studied in rational-choice models recently.

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Mispredicting Tastes

10 domains of evidence so far (in increasing order of importance)$\rightleftharpoons$

1. Clothing$\rightleftharpoons$
2. Convertibles$\rightleftharpoons$
3. Swimming Pools$\rightleftharpoons$
4. Winning Lotteries$\rightleftharpoons$
5. Paraplegia$\rightleftharpoons$
6. Food$\rightleftharpoons$
7. Sex$\rightleftharpoons$
8. Drugs$\rightleftharpoons$
9. Academic tenure$\rightleftharpoons$
10. Mugs

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Mispredicting Tastes

Can identify misprediction of **marginal** utility using...$\rightleftharpoons$ price theory.$\rightleftharpoons$

- How habit forming cigarettes are.$\rightleftharpoons$
- If WTP for something in period t is systematically different in period $t' \leq t$ vs. period $t'' \leq t$, evidence misprediction.$\rightleftharpoons$
- (If $t', t'' < t$, unconfounded by present bias)$\rightleftharpoons$

But identifying misprediction of **levels** of utility is much harder.$\rightleftharpoons$

- Identifying mispredictions of how bad we'll feel smoking very hard$\rightleftharpoons$

A major form of evidence for preference misprediction:$\rightleftharpoons$

- value for future consumption depends on *current* situation in ways $\rightleftharpoons$
  - we think "can't" affect actual future value.$\rightleftharpoons$
  - and can't be information$\rightleftharpoons$
- This turns out to be some of the best evidence.

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Mispredicting Tastes

Underappreciating Fluctations in Taste

- Our utility for many important and familiar activities in vary greatly.⇌
- Nothing in economics says taste for food, sex, sleep, drugs, mugs (big five!) won't fluctuate greatly based on satiation and circumstances.⇌

We look to these activities for misprediction.⇌

1. Because of their importance, and⇌
2. Because universal experience with fluctuations, mispredictions highly suggestive of important bias, not just limited information.⇌

Despite *vast experience*, we underestimate these fluctuations.

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Mispredicting Tastes

Food$\rightleftharpoons$

- Studies support folk wisdom: buy more when shopping on empty stomach. $\rightleftharpoons$
- E.g., Nisbett and Kanouse (1968) Gilbert, Gill and Wilson (1998).$\rightleftharpoons$
- Classic: randomly give people muffins as they enter grocery store ... see if this influences their shopping.$\rightleftharpoons$
- When currently hungry act as if future taste for food will reflect such hunger, and when sated act as if sated in future.$\rightleftharpoons$
- Order too much when sitting down to meal, not realizing you'll become sated (for those of you who ever become sated...).$\rightleftharpoons$
- Or planning diet right after stuffing your face/not dieting.$\rightleftharpoons$
  - Not hungry now, so think can go the rest of your life without eating!

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Mispredicting Tastes

Evidence? Two beautiful experiments ...⇌

- Food⇌
- Addictive drugs⇌

David told you about Read and van Leeuwen (1998):⇌

- Office workers were asked to choose between "healthy snacks" and "unhealthy snacks" that they would receive in one week.⇌
  - Either when they should expect to be hungry (late in afternoon) or⇌
  - satiated (immediately after lunch).⇌
- Healthy: apples and bananas.⇌
- Unhealthy: crisps, borrelnoten, Mars Bars, and Snickers Bars.⇌
- Identifying hypothsis:⇌
  - "Unhealthy" more appealing when hungry.

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Mispredicting Tastes

% of Subjects Choosing "Unhealthy" Snack

		Future Hunger	
		Hungry	Satiated
Current	Hungry	78%	56%
Hunger	Satiated	42%	26%

- What does comparing columns tell us?
  - That the identifying hypothesis was right.

- What does comparing the rows tell us?
  - Projection bias.

Mispredicting Tastes

The food misprediction may or may not be important.⇌

- But should be kept in mind in more difficult cases that might more plausibly reflect limited information:⇌
- We experience fluctuations in hunger tens of thousands of times.⇌
  - Same with sleepiness, ⇌
  - sexual arousal,⇌
  - drug craving,⇌
  - mug craving⇌

Reminder of psychological/conceptual/linguistic problem:⇌

- "Misprediction" really the right term?⇌
- Nobody lacks cognitive access to effects of hunger state.⇌
- "Under-attendance-to" might be the right term.

↩℘

Mispredicting Tastes

Beautiful simple experiment in more dramatic context⇌

- Giordano, Bickel, Loewenstein, Jacobs, Marsch, and Badger (2002), and another permutation:⇌

Elicited (real stakes) WTP for *second* dose of heroin substitute BUP from 13 long-time heroin addicts regularly receiving single dose.⇌

- Reduces craving for heroin, aiding withdrawal⇌
- Asked: would you rather have⇌
  - 2nd dose or \$10?⇌
  - 2nd dose or \$20?⇌
  - ...⇌
  - 2nd dose or \$100?⇌
- Subjects told (truthfully) choice randomly implemented.⇌
- **Only 13 subjects!**

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Mispredicting Tastes

Could not legally or ethically withhold the usual first dose, which in fact was usually the only dose given.$\rightleftharpoons$

- But this 2nd dose is still attractive to addicts.$\rightleftharpoons$

Half asked when "more deprived" about 2nd dose, half asked when "less deprived" about 2nd dose.$\rightleftharpoons$

- More deprived: 2 hours before scheduled dose.$\rightleftharpoons$
- Less deprived: right after scheduled dose.$\rightleftharpoons$

Half asked WTP for 2nd dose today, half about 2nd dose on next visit.$\rightleftharpoons$

- Observe: always being asked about a *second* dose.

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Mispredicting Tastes

Average revealed value of a 2nd dose (always delivered in satiated state):

		When they would get the dose	
		Today	Next visit
Current	Deprived	\$75	\$60
Craving	Satiated	\$50	\$35

These WTPs are for *exact same circumstances by experienced* addicts.⇌

- Note the present bias.⇌
- But also note the projection bias.⇌

What is the "true" value?⇌

- Almost surely the \$35.⇌
- Why?

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Mispredicting Tastes

		When they would get the dose	
		Today	Next visit
Current	Deprived	\$75	\$60
Craving	Satiated	\$50	\$35

By BE principles ... probably the \$35 is closest to true well-being.. *Not* because drugs are bad and this is lowest ...but because

1. present bias says 2nd column better than first, and
2. projection bias says bottom row better than top.

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Mispredicting Tastes

Not a reckless act of proto-fascism to guess so.⇌

- Not psychologists, behavioral economists, government officials, doctors, or preachers declaring that people are too keen on drugs.⇌

4 different answers to what theory had said is same question⇌

- Incoherent to "use addict's WTP" when he has 4 different WTP's.⇌

Two rules of thumb:

- Don't follow normative advice from those descriptively wrong.
- If claim choice is error, must be **some** way to elicit what you believe is right choice.
- (Neither universal)

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Mispredicting Tastes

Hypothetical experiment:

		When they would get the dose	
		Today	Next visit
Current Craving	Deprived	$250	$200
	Satiated	$150	$100

- Right answer probably $200, not $150 or $100. Nor "$0".
- Maybe moral or externality reasons, etc.
- But not the mistakes we have explored.

Cautionary tale:

- Present bias makes us advocate prospective choice.
- But prospective choice bad if in different state
  - Very often **is** in different (cold) state.
- We can be amazingly un-empathetic & cruel to future craving self!
  - Being so cruel is a mistake.

Mispredicting Tastes

Field evidence?$\rightleftharpoons$

- Levy (2008) on tobacco$\rightleftharpoons$
- Acland and Levy (2010): gym-goers in an incentivized experiment do not appreciate the positive addiction of exercise regimes.$\rightleftharpoons$
- Conlin, O'Donoghue, and Vogelsang (2007): use returns of cold-weather clothing to estimate projection of sensations of being cold onto future.

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Mispredicting Tastes

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- Conlin, O'Donoghue, and Vogelsang (2007): use returns of cold-weather clothing to estimate projection of sensations of being cold onto future.$\rightleftharpoons$
- Busse, Pope, Pope, and Jorge Silva-Risso (2012) on cars (and car roofs) and houses (and swimming pools).$\rightleftharpoons$
- Augenblick and Rabin (2015) on willingness to do unpleasant task in future$\rightleftharpoons$
  - Decide before or after you've just done it?

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Mispredicting Tastes

Augenblick and Rabin (2015): $\rightleftharpoons$

- Estimate β (present bias), β_h (sophistication over present bias), and α (projection bias).$\rightleftharpoons$
- Design: $\rightleftharpoons$
  - People choose over effortful tasks at different wages and different dates.$\rightleftharpoons$
  - People also predict (in incentivized way) what they would choose at future dates and wages.$\rightleftharpoons$
- Difference between tasks completed today and in future identifies β.$\rightleftharpoons$
- Difference between prediction and actual effort identifies β_h (under caveat of consistency preferences).$\rightleftharpoons$
- **Difference between tasks chosen before and after completing mandatory work identifies α.**

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Mispredicting Tastes

Skipping over components, $\rightleftharpoons$

- Task is transcription of blurry greek letters, while getting pestered by noise requiring button press.$\rightleftharpoons$
- Each Day: **Complete mandatory work: 10 mandatory tasks.**$\rightleftharpoons$
- Stating preferences over immediate (today's) work.$\rightleftharpoons$
- Stating preferences over 2 future dates (except on last day).$\rightleftharpoons$
- Stating predictions over possible future work (except on last day).$\rightleftharpoons$
- Observing supplemental work decision that is implemented today.$\rightleftharpoons$
- Completing supplemental work decision

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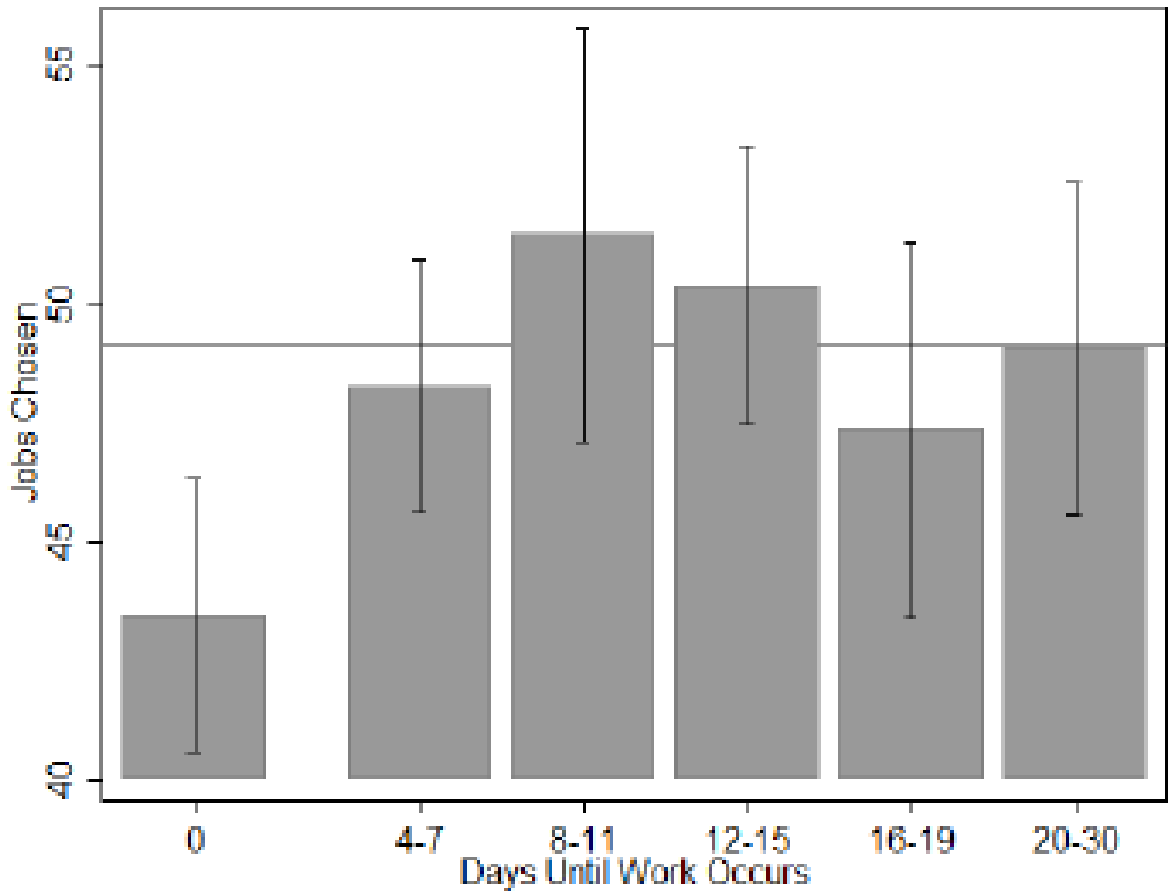
Mispredicting Tastes



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Mispredicting Tastes

Overview of results:

- $\beta \in (0.812, 0.835)$
- $\beta_h \in (0.999, 1.014)$
- $\delta \in (1.003, 1.005)_{\rightleftharpoons}$

Update ... Augenblick follow-up on 1-4 day delay ...

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Mispredicting Tastes

Relevant Part Here: $\rightleftharpoons$

- After completing mandatory tasks, tasks completed today decrease by $2-3$.$\rightleftharpoons$
- Taking censorship into account (40% of participants choose 0 or 100 tasks), this increases to $4-6$ depending on specification.$\rightleftharpoons$
- Held for immediate work, future work, and prediction of future work$\rightleftharpoons$
  - All as predicted by projection bias$\rightleftharpoons$
  - Note also: not a decrease over the weeks.

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Mispredicting Tastes

Busse, Pope, Pope, and Russo: test for projection bias (PB) in housing and car market⇌

- weather impacts current perception of value of⇌
  - convertibles, 4-wheel drives, black cars⇌
  - swimming pools and central air in homes

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Mispredicting Tastes

Data is ~20% of new car dealerships in US from January 1st 2001 to December 31st 2008⇌

- Includes date and location of purchase, some car characteristics, and price paid⇌
  - Locations are Nielsen Designated Market Areas (DMAs)⇌

Results for convertibles:⇌

- Huge seasonal fluctuations (as expected)⇌
- $10^{\bigcirc}$ Fahrenheit higher (than average in that DMA in that week of the year) leads to 0.07% points more⇌
  - Increase of 2.7% on base rate of 2.6%.⇌
- Going from completely clear to completely covered sky leads to a 0.126% points decrease⇌
  - Equivalent to roughly 18 degree Fahrenheit change⇌
- Same regression for 4-wheel drives yields similar results⇌
- Careful about alternative stories that might be driving the results

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Mispredicting Tastes

They also follow Conlin et al on clothing: $\rightleftharpoons$

- Do people return "mistakenly bought" convertibles more often?$\rightleftharpoons$
  - Maybe a little.$\rightleftharpoons$
- Do people return "mistakenly bought" 4-wheel drives more often?$\rightleftharpoons$
  - Tentatively yes.$\rightleftharpoons$

Housing market and swimming pools from NBER working paper, NOT from QJE paper.$\rightleftharpoons$

- Data: 4 million single-family residential properties across the US that sold at least twice in 1998-2008.$\rightleftharpoons$
- People pay more for pools and AC when weather hot.$\rightleftharpoons$
- And non-random weather variation more of puzzle:$\rightleftharpoons$
  - People get pools when *buy* in very hot month of August, though get house in October.

Mispredicting Tastes

Longer-Term Changes$\rightleftharpoons$

- We adapt to changes.$\rightleftharpoons$
- We form habits.$\rightleftharpoons$

Do we understand such changes?$\rightleftharpoons$

- We underestimate adaptation.$\rightleftharpoons$
- We underestimate habit formation.

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Mispredicting Tastes

Suppose each day of your life choosing whether to sniff widgets.

- $a_t = y$ if sniff, and $a_t = n$ if don't sniff.$\rightleftharpoons$

Sniffing has the following utility function:$\rightleftharpoons$

$$u_t(a_t = y | a_{t-1} = n) = 5$$
$$u_t(a_t = n | a_{t-1} = n) = 0$$
$$u_t(a_t = y | a_{t-1} = y) = -2$$
$$u_t(a_t = n | a_{t-1} = y) = -12 \rightleftharpoons$$

Some features of widget sniffing?$\rightleftharpoons$

- You always enjoy sniffing$\rightleftharpoons$
- Sniffing lowers future utility (from both sniffing and not sniffing)$\rightleftharpoons$
- But it raises the *marginal* utility of sniffing in the future.$\rightleftharpoons$
- Optimal behavior?$\rightleftharpoons$Projection-biased behavior?$\rightleftharpoons$
- Aside:$\rightleftharpoons$Sophisticated present bias? Naive present bias?

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Mispredicting Tastes

Evidence on mispredicting longer-term changes? $\rightleftharpoons$

- Much harder ...$\rightleftharpoons$

Hint of evidence on habit formation (!), and of direct interest:$\rightleftharpoons$

- Projection bias and Loss Aversion.

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Mispredicting Tastes

Classic study by Brickman, Coates, and Janoff-Bulman (1978):⇌

- People underappreciate adaptation—winning lotteries, losing limbs.⇌
- Interviewed people who had won lottery jackpot prizes within the last year (average winnings of $479,545) and a control group.⇌
- Virtually no difference in reported happiness.⇌
- No data on non-winners' predictions of how they would feel if they won.⇌
- But the notion that lottery winners are no happier than non-winners surely runs counter to the predictions of most people.⇌
  - Including, presumably, those playing the lottery.⇌
- Would people play if predicted full adaptation?⇌
- Some suggestive stronger evidence:

↬

Mispredicting Tastes

Cohen (1999, unpublished), cited by Kahneman (2000), asked a bunch of people to predict: "What % of time do you think somebody will be in Good ... Bad ... Neutral Mood" Y months after event X?⇌ She also asked respondents whether they knew somebody with that experience.⇌

Event:	Paraplegic		Lottery Winner	
Know somebody?	No	Yes	No	Yes
%G-%B One month later	-41	-50	58	64
%G-%B One year later	-37	-19	50	25

⇌

- How prediction immediate differ?⇌
- Prediction a year later?⇌

Hint of evidence on adaptation, and of direct interest:⇌

- Projection bias and Loss Aversion.

↩℘

Mispredicting Tastes

- **Behavioral economists love mugs ...**⇌
  - It's like heroin or borrelnoten to us!⇌
- Do people predict loss aversion?⇌
- Loewenstein and Adler (1995) randomly assigned subjects.⇌
- "Prediction" treatment shown an embossed coffee mug and then told that they would later be given one as a prize but would have the opportunity to exchange it for cash.⇌
- Shown form to be used to elicit their selling price, asked to complete it as they expected they would once they received the mug.⇌
- Then given mug, and form eliciting selling prices.⇌
- Other half of subjects given mugs without first making predictions, then completed the form eliciting selling prices.

↩

Mispredicting Tastes

Condition	Prediction of Valuation	Actual Valuation
Prediction	\$3.45	\$4.89
No Prediction	———	\$5.56

Interpretation: mini-look at habit formation.

- People underappreciate how ownership will affect their valuation.

Question: Why did they do the "no-prediction" condition?

- Answer: worries about dissonance/consistency

Question: What do the results indicate?

- Consistency indeed had some implications.

Mispredicting Tastes

An aside: is loss aversion itself a mistake?$\rightleftharpoons$

- Loss aversion clearly a real hedonic experience people have.$\rightleftharpoons$
- Incoherent virtually to interpret behavior otherwise.$\rightleftharpoons$

But two types of mistakes mean people over-attentive to gains and losses, so significantly a mistake.$\rightleftharpoons$

- Projection bias suggests that people over-attentive to losses and to gains, since don't realize that the sensation will wear off.$\rightleftharpoons$
- Next up: narrow bracketing makes people over-attentive to losses and gains, since don't think about how it will cancel out.

Mispredicting Tastes

Mugs Model worked out

- Old-fashioned view of loss aversion as involving status quo, not expectations. $\rightleftharpoons$
- Similar lessons surely hold if one models projection bias over belief-based preferences, but we have no formal models of that. $\rightleftharpoons$
- In period t a person can either "consume" a mug ($c_t = 1$) or not ($c_t = 0$). $\rightleftharpoons$
- Person can either feel endowed with mug ($s_t = 1$) or feel unendowed with mug ($s_t = 0$). $\rightleftharpoons$
- $s_t = c_{t-1}$

$\looparrowright$

Mispredicting Tastes

In experiment:$\rightleftharpoons$

- If the person decides to possess the mug, then $c_1 = c_2 = 1$.$\rightleftharpoons$
- If decides not to possess the mug, then $c_1 = c_2 = 0$.$\rightleftharpoons$

Both sellers and buyers choose between these two consumption flows$\rightleftharpoons$

- But sellers feel endowed in period 1 — they have $s_1 = 1$. $\rightleftharpoons$
- Buyers feel unendowed — they have $s_1 = 0$.$\rightleftharpoons$
- If in period 1 the person chooses to possess the mug, she will feel endowed in period 2 — she'll have $s_2 = 1$.$\rightleftharpoons$
- If in period 1 the person chooses not to possess the mug, she'll have $s_2 = 0$.

$\curvearrowright$

Mispredicting Tastes

True Utilities:$\rightleftharpoons$

u_t(mug now?| mug last period?)		consumption u		gain-loss u
u_t(y|y)	=	1	+	0
u_t(n|y)	=	0	+	-λk
u_t(y|n)	=	1	+	k
u_t(n|n)	=	0	+	0

$\rightleftharpoons$

where $y = 1$ and $n = 0$.$\rightleftharpoons$
Perceived Utility: $\widetilde{U}^t = \sum_{\tau=t}^{\infty} \delta^\tau \tilde{u}(\mathbf{c}_\tau, \mathbf{s}_\tau | \mathbf{s}_t)$.$\rightleftharpoons$

Consider the two extreme cases:$\rightleftharpoons$

$$\alpha = 0 \Longrightarrow \textit{Rational expectations} \Longrightarrow \tilde{u}(\mathbf{c}_\tau, \mathbf{s}_\tau | \mathbf{s}_t) = u(\mathbf{c}_\tau, \mathbf{s}_\tau) \rightleftharpoons$$

$$\alpha = 1 \Longrightarrow \textit{100\% projection bias.} \Longrightarrow \tilde{u}(\mathbf{c}_\tau, \mathbf{s}_\tau | \mathbf{s}_t) = u(\mathbf{c}_\tau, \mathbf{s}_t)$$

↬

Mispredicting Tastes

Rational Buying Price:$\rightleftharpoons$

- $B^{RAT} = u(y|n) - u(n|n) + \sum_{t=1}^{\infty} \delta^t [u(y|y) - u(n|n)]$
- $= 1 + k + \frac{\delta}{1-\delta}(1).\rightleftharpoons$

Rational Selling Price:$\rightleftharpoons$

- $S^{RAT} = u(y|y) - u(n|y) + \sum_{t=1}^{\infty} \delta^t [u(y|y) - u(n|n)]$
- $= 1 + \lambda k + \frac{\delta}{1-\delta}(1).\rightleftharpoons$

So: $L^{RAT} \equiv \frac{S^{RAT}}{B^{RAT}} = \frac{1+\lambda k(1-\delta)}{1+k(1-\delta)} > 1.\rightleftharpoons$

- Observe: $\frac{\partial L^{RAT}}{\partial \lambda} > 0$, $\frac{\partial L^{RAT}}{\partial k} > 0$, $\frac{\partial L^{RAT}}{\partial \delta} < 0.\rightleftharpoons$
  - Interpret?$\rightleftharpoons$
- Observe: $Lim_{\delta \longrightarrow 1} L^{RAT} = 1.\rightleftharpoons$
  - Interpret?

$\looparrowright$

Mispredicting Tastes

Projection-Bias Prices (exercise: derive these):$\rightleftharpoons$

$$B^{PROJ} = u(y|n) - u(n|n) + \sum_{t=1}^{\infty} \delta^t [u(y|n) - u(n|n)] =$$
$$1 + k + \frac{\delta}{1-\delta}(1+k).\rightleftharpoons$$

$$S^{PROJ} = u(y|y) - u(n|y) + \sum_{t=1}^{\infty} \delta^t [u(y|y) - u(n|y)] =$$
$$1 + \lambda k + \frac{\delta}{1-\delta}(1+\lambda k).$$

$\looparrowright$

Mispredicting Tastes

Observe: $B^{PROJ} > B^{RAT}$, $S^{PROJ} > S^{RAT}$.$\rightleftharpoons$

Observe: $L^{PROJ} \equiv \frac{S^{PROJ}}{B^{PROJ}} = \frac{1+\lambda k}{1+k}$.$\rightleftharpoons$

Observe: $L^{PROJ} > L^{RAT}$.$\rightleftharpoons$

So an interpretation of the evidence: $\rightleftharpoons$

- Loss aversion rationally derive from real RD-VNM prefs, but by narrow bracketing and projection bias are irrationally magnified.$\rightleftharpoons$

Can projection bias explain the Loewenstein and Adler stuff? $\rightleftharpoons$

- We know $S^{PROJ} = \sum_{t=0}^{\infty} \delta^t [u(y|y) - u(n|y)] = \frac{1}{1-\delta}(1+\lambda k)$.$\rightleftharpoons$
- But what will be unendowed Person's Prediction, $E[S^{PROJ}|n]$? $\rightleftharpoons$
- Claim: $E[S^{PROJ}|n] \equiv B^{PROJ}$ $(< S^{PROJ})$.

$\hookleftarrow$

Mispredicting Tastes

Melioration$_{\rightleftharpoons}$

- My spin (not theirs, and not capturing everything): Herrnstein and Prelec's notion of "melioration" is projection bias.$_{\rightleftharpoons}$
- Every day Theobald goes to eat in one of the only two restaurants in Scagsville: a (Austrian cuisine) or b (Belarusian cuisine).$_{\rightleftharpoons}$
- Theobald is completely patient ($\delta \longrightarrow 1$) and will live forever.$_{\rightleftharpoons}$
- His utility each day t is determined entirely by where he eats day t, $f_t \in \{a, b\}$, and where he ate yesterday, $f_{t-1} \in \{a, b\}$.

$\leftrightarrow\!\!\!\!\!\rho$

Mispredicting Tastes

His instantaneous utility on date t is given as follows:

$$u_t(f_t = a | f_{t-1} = a) = 6$$
$$u_t(f_t = b | f_{t-1} = a) = 5$$

$$u_t(f_t = a | f_{t-1} = b) = 9$$
$$u_t(f_t = b | f_{t-1} = b) = 4$$

Intuition for these preferences?

- Theobald always likes Austrian food better than Belarusian
- He likes each cuisine better when he's not eaten it recently.

Question: How Theobald maximize total utility from meals over life?

- He should alternative between Austrian and Belarusian

Why?

- Because that gives him average of $(5+9)/2 = 7$, rather than average of 6 if he always eats Austrian.

Mispredicting Tastes

$u_t(f_t = a | f_{t-1} = a) = 6$
$u_t(f_t = b | f_{t-1} = a) = 5$

$u_t(f_t = a | f_{t-1} = b) = 9$
$u_t(f_t = b | f_{t-1} = b) = 4$

Will Theobald alternate thusly?

- We just said yes if fully rational.
- No if myopic in sense of taste for immediate gratification.
  - Unlikely
  - Exercise: for what β, δ combinations will Theobald always eat Austrian?
- But "no" for more likely reason:
  - Don't see through logic of how current behavior affects future utility.
  - Projection bias makes you ignore the "internalities".
  - Different than not *caring* about future utility.
- Stress test: is projection bias calibrationally plausible for internality neglect?

Mispredicting Tastes

Intrapersonal vs. Interpersonal Preference (Mis)prediction⇌

Intrapersonal empathy gaps may lead to inter-personal empathy gaps.⇌

- Sellers of mugs or houses project their own tastes onto others ⇌
- old people project their (current) tastes on teens.⇌

But converse: others who are/have been in situation may be better at predicting our tastes in same situation than we are.⇌

- Tobacco addicts know better how non-addicts will feel when they become addicted than the non-addicts do.⇌

Accuracy may depend on current state of predicter, not their identity.

↬

Mispredicting Tastes

Interpersonal Projection Bias$\rightleftharpoons$

- We could formalize ability and inability to understand others' preferences as "Interpersonal Projection Bias"—biased assessment of others' preferences based on our own *current* preferences.$\rightleftharpoons$
- Importance of interpersonal projection bias?$\rightleftharpoons$
  - A claim (relevant to issues in how economists go about making welfare judgments or refusing to do so): For two people j and k, may often be that: $\tilde{u}(\mathbf{c}_\tau^k, \mathbf{s}_\tau^k | \mathbf{s}_t^j = \mathbf{s}_\tau^k)$ is more accurate than $\tilde{u}(\mathbf{c}_\tau^k, \mathbf{s}_\tau^k | \mathbf{s}_t^k \neq \mathbf{s}_\tau^k)$.$\rightleftharpoons$
- Interpersonal empathy gaps may be profoundly important.$\rightleftharpoons$
  - Much of our lives are understanding motives of others.$\rightleftharpoons$
  - Sometimes it requires imagination about their (different) preferences.$\rightleftharpoons$

$\hookleftarrow$

Mispredicting Tastes

But if we generically have different tastes?⇌

- We may underappreciate how others differ.⇌

Gagnon-Bartsch (2013): ⇌

- social inference if we project own tastes on others.⇌

His favorite example:

- People who dislike gym can't imagine those (freaks) who like the gym.⇌
- Exaggerate health benefits to explain...⇌
- So go to the gym

↩

Mispredicting Tastes

Errors because of such mispredictions?⇌

Many health officials, researchers, and community activists think the sexual-arousal and alcohol-arousal mispredictions are huge issue:⇌

- Very hard to get people to fully appreciate how they are likely to behave later that night when going out.⇌
- Underappreciate effects of⇌
  - Arousal on sexual behavior⇌
  - Peer pressure on drugs, alcohol⇌
  - Effect of alcohol on smoking, sex, etc⇌
- Most people have *some* awareness and sophistication.⇌
- But still there is a big worry about underestimating these even when (as with hunger) there is a huge amount of past evidence.

↩℘

Mispredicting Tastes

Addiction/Habit Formation$\rightleftharpoons$

- People may underappreciate the power of addiction. $\rightleftharpoons$
  - Under-investment in good habits (healthy food, exercise, coffee) $\rightleftharpoons$
  - Over-investment in bad habits (tobacco, alcohol)$\rightleftharpoons$
- If non-addicted, hard to: take into account the fact that consistent consumption will mean that you will both feel bad, and develop a stronger desire to keep consuming.$\rightleftharpoons$
  - Under-investment in "good addictions" (e.g., appreciation of classical music, exercise, coffee), and more importantly$\rightleftharpoons$
  - an over-development of bad addictions: tobacco, alcohol, etc.$\rightleftharpoons$
- Once addicted, underappreciating fluctuations and cues:$\rightleftharpoons$
  - binges, and (costly) failed attempts to quit.$\rightleftharpoons$

The role and power of habits may be massively underappreciated by economists ...

$\leftarrow\!\!\!\!\rho$

Mispredicting Tastes

"Nothing so needs reforming as other people's habits."
— Mark Twain

"The diminutive chain of habit is scarcely heavy enough to be felt till it is too strong to be broken."
— Samuel Johnson (simplification from 1800's temperance literature)

"The child is the Father of the Man."
— William Wordsworth

"The second half of a man's life is made up of nothing but the habits he has acquired during the first half."
— Feodor Dostoevsky

"Men's natures are alike; it is their habits that separate them."
— Confucius

"My problem lies in reconciling my gross habits with my net income."
— Errol Flynn

Mispredicting Tastes

Excess wealth-seeking/consumption?$\rightleftharpoons$

Don't fully appreciate how pleasure from future standard of living will decrease once we become accustomed to that standard of living.$\rightleftharpoons$

- *IF* consumption is more habit forming than leisure, may suggest that people excessively pursue wealth.$\rightleftharpoons$
- Thinking lots more money forever will bring us lots more happiness forever. But we'll get used to it.

$\hookleftarrow$

Mispredicting Tastes

Recently, scale of economic growth as source of well-being (in already-wealthy nations) called into question.$\rightleftharpoons$

- Misprediction might play a role.$\rightleftharpoons$
- This is in part based on better attention to the psychology/sociology of well-being, and part on purported panel and cross sectional empirical evidence that growth does not seem to bring much happiness.$\rightleftharpoons$
- (Research is on-going ... I believe non-adaptive models have exaggerated benefits of growth, but also very skeptical of over-strong claims doubting that money buys happiness.)

$\hookleftarrow$

Mispredicting Tastes

Some reasons that economic growth in nations may not buy much happiness:⇌

- 1. "Classical externalities": E.g., pollution, incessant marketing⇌
- 2. Social/Interpersonal Comparisons⇌
- 3. Intrapersonal comparison/habituation⇌

Note that the first two may call for skepticism about growth without assuming any irrational behavior, since they involve externalities.⇌

- But the third is especially compelling only if we posit some irrationality. If it is true that money doesn't buy happiness (for long), why would rational people work so hard to get more money?

↩ρ

Mispredicting Tastes

Purchase of a Durable Good$\rightleftharpoons$

- Initial excitement will decay over time. $\rightleftharpoons$
  - Especially excitement caused by "sales hype".$\rightleftharpoons$
- Also random fluctuations in excitement
- Fully rational person would take decay into account.

$\hookleftarrow$

Mispredicting Tastes

Projection bias: underestimate decay and fluctuations. Hence:$\rightleftharpoons$

- Firms may choose socially excessive levels of sales hype. $\rightleftharpoons$
- "Artificial durableness": firms create long-term contract (e.g., magazine subscriptions) based on current excitement.$\rightleftharpoons$
- If decay, always too likely to buy.$\rightleftharpoons$
- If excitement exogenous, random, non-decaying.$\rightleftharpoons$
  - Any given period, mistake both directions.$\rightleftharpoons$
  - Buy when most excited $\longrightarrow$ too likely eventually buy

$\hookleftarrow$

Mispredicting Tastes

Hard-to-Reverse Decisions

In difficult-to-reverse decisions:⇌

- Projection bias leads people to underappreciate the degree to which the "hot" feelings will dissipate.⇌
- Too likely to make irreversible decisions. ⇌
  - Getting married in the heat of passion⇌
  - Committing suicide in the depth of depression⇌
  - Sending that e-mail under the grip of rage⇌

↩℘

Mispredicting Tastes

Both normative policy analysis and descriptive political economy: $\rightleftharpoons$

- Cooling-off periods.$\rightleftharpoons$

Mandatory "cooling-off period" for sales contracts:$\rightleftharpoons$

- Customer has option to back out for some period?$\rightleftharpoons$
- Cost: delays transaction date, prevents trade that is inherently short-term, makes hard for trading partner to rely on trade.$\rightleftharpoons$
- Benefit if people have projection bias: $\rightleftharpoons$
  - People less likely stuck with bad purchases.$\rightleftharpoons$
  - Decreased incentives for sales hype to induce temporary excitement.

$\hookleftarrow$

Mispredicting Tastes

Revealed Preferences & Revealed Predictions of Preferences$_{\rightleftharpoons}$

- We should not be in the business of condescendingly deciding what people's preferences 'ought' to be.$_{\rightleftharpoons}$
- Within reason, *De gustibus non est disputandum*$_{\rightleftharpoons}$
- But "within reason" matters ... $_{\rightleftharpoons}$
  - Attributing behavior to *functionally* insane 'utility maximization' rather than real mistakes is not humility, or anti-paternalism. It is far less insulting *and* far better science to attribute behavior to human mistakes than to inhuman preferences.

$\hookleftarrow\rho$

Mispredicting Tastes

And (for economists) the mother of all functionally insane preferences:⇌

- **throwing away money**⇌

The best friend of Psychology & Economics in the whole wide world is the same as the best friend in the whole wide world of the rest of Economics: P_____ T_____.⇌

- **Price Theory**⇌

It's more important than even P_____ T_____!⇌

- **Prospect Theory**⇌

How do we reveal potential misprediction of preferences? (Revealing certain types of statistical mistakes is in fact easier than this.)

↩℘

Mispredicting Tastes

Recall addiction example:$\rightleftharpoons$

$$u_t(a_t = y | a_{t-1} = n) = 5$$
$$u_t(a_t = n | a_{t-1} = n) = 0$$

$$u_t(a_t = y | a_{t-1} = y) = -2$$
$$u_t(a_t = n | a_{t-1} = y) = -12 \rightleftharpoons$$

If these are consumption utilities, and as part of complete model you tried to look at price effects? Suppose:$\rightleftharpoons$

- Prices $(p_1, p_2, p_3, ..., p_T) = (3, 9, 9, ..., 9)$ generated $(a_1, a_2, a_3, ..., a_T) = (y, y, y, ..., y) \rightleftharpoons$
- Prices $(p_1, p_2, p_3, ..., p_T) = (6, 6, 6, ..., 6)$ generated $(a_1, a_2, a_3, ..., a_T) = (n, n, n, ..., n) \rightleftharpoons$
- Unless person dislikes \$, have revealed misprediction.

↬

Mispredicting Tastes

I think preference misprediction/uncertainty may be real big-ticket item in positive and (especially) welfare economics.$\rightleftharpoons$

- Mis-optimizing like some of examples of fluctuating/satiating preferences$\rightleftharpoons$
- Big life choices? $\rightleftharpoons$ How do we have any idea of utility of $\rightleftharpoons$
  - Career choice?$\rightleftharpoons$ (e.g., leaving the farm)?$\rightleftharpoons$
  - Emigration?$\rightleftharpoons$
  - Moving away from California?$\rightleftharpoons$
  - Marriage?$\rightleftharpoons$
  - "Coming out"?$\rightleftharpoons$
  - Growing old?$\rightleftharpoons$
  - **Children?**$\rightleftharpoons$
  - Habits, habits, habits, habits, and habits.$\rightleftharpoons$
- Other uncertainties and biases than projection bias.

$\hookleftarrow\rho$

Decision Neglect & Narrow Bracketing

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

- 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.$\rightleftharpoons$
- Life is long and complicated.$\rightleftharpoons$
  - The "official" notion of what economic models say is, arguably, as if we sit down and formulate a complete contingent plan of what we'll do.$\rightleftharpoons$
  - And then implement.

$\hookleftarrow$

Decision Neglect and Narrow Bracketing

Not what we do!⇌

- Two hard-to-distinguish departures:⇌
  - Decision Neglect: We make choices in only infinitesimal percentage of infinity of choice sets we face, and⇌
  - Narrow bracketing: We don't fully integrate our decisions with other decisions even when could increase utility from doing so.⇌

Explicit, but not always emphasized, these two are crucial to prospect theory.⇌

- Gained much more focus recent years.

↩℘

Decision Neglect and Narrow Bracketing

- Nobody (including economists) thinks people do the Max-L thing.⇌
  - But turns out our failure to do global maximization matters.⇌
- This limit to rationality closest to complexity-based we look at:⇌
- People must narrowly bracket, too complicated to broadly bracket.⇌
- But, we'll show:⇌
  - People narrowly bracket even in relatively simple settings.⇌
  - **the way people narrowly bracket suboptimal within the class of narrow-bracketing rules of behavior**⇌
  - **and worse than simpler rules.**⇌
- Major caveat to some of below:⇌
  - News Utility⇌
  - We've been talking about wrong preferences.⇌
  - We'll argue not full story.

↩

Decision Neglect and Narrow Bracketing

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

- Suppose just two of these infinite number of potential choices.⇌
- When facing choice sets X and Y :⇌
- **Should:** ⇌
  - 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:** ⇌Max $_{x \in X}$ $u(x)$, Max $_{y \in Y}$ $u(y)$⇌

DN and NB ubiquitous, relating to all preferences.⇌

- But they are absolutely central for understanding risk preferences.

↩

Decision Neglect and Narrow Bracketing

Choose 50/50 lose \$80 / lose nothing over lose \$35 for sure?⇌

- Per prospect theory, most people choose the 50/50 gamble.⇌
- This is throwing away expected value.⇌

Coins in your pocket? Could take the sure loss \$35, then play 50/50 ±\$40 with person next to you ...⇌ generates 50/50 lose \$75, gain \$5.⇌

- "Unambiguously" better than what most people do.⇌
- Change your answer?⇌
- If merely reminding you of a possibility changes your choice?

↩℘

Decision Neglect and Narrow Bracketing

Inconsistent with rational, broad bracketing of *any* preferences to behave risk-lovingly over modest stakes.⇌

- Why make such a claim?⇌
- If market for fair bets, you can always take a sure loss, and just try to go shopping for fair bets to get back risk. ⇌

So, after thought you chose C{50/50 lose $80/gain $0, lose $35} =⇌

- 50/50 lose $80/gain $0⇌

After *no* thought you "chose" C{50/50 lose $40/gain $40, lose $0} =⇌

- $0.⇌

Had you thought of it would have chosen differently in **both** choice sets, but have done so in the first.⇌

- This is **Decision Neglect**.

↩

Decision Neglect and Narrow Bracketing

Social preferences: Suppose choice between:⇌

- 15 apples for self and 0 for an anonymous other vs. 9 for self and 4 for that same anonymous other.⇌

Would you choose (0,15), or (4,9)?⇌

- Why?⇌

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

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

And what's up with the dictator games? ⇌

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

Note: Unclear these are mistakes, since unclear what true social pref.⇌

- But raises challenges to models people have developed.

↩

Decision Neglect and Narrow Bracketing

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.

↩

Decision Neglect and Narrow Bracketing

Narrow Bracketing⇌

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 Neglect and Narrow Bracketing

Direct:

- Tversky and Kahneman (1986)$\rightleftharpoons$
  - Large, hypothetical stakes$\rightleftharpoons$
- Rabin and Weizsacker (2009) replication:$\rightleftharpoons$
  - Real, small stakes.$\rightleftharpoons$
- Wording simpler than the original.$\rightleftharpoons$

TK (1986): "Imagine that you face the following pair of concurrent decisions. First examine both decisions, then indicate the options you prefer."$\rightleftharpoons$

- Note particularly the instructions' use of "concurrent" and the request to FIRST examine both decisions.$\rightleftharpoons$
- Following presentation slightly simpler form than TK.$\rightleftharpoons$
- Also, RW make clearer the "independence" of the two lotteries.

$\hookleftarrow$

Decision Neglect and Narrow Bracketing

Choose between:⇌
A: $240
B: (.25 +$1,000, .75 $0)⇌
Choose between:⇌
C: -$750
D: (.75 -$1,000, .25 $0.)⇌

- Per prospect theory ...Behavior:⇌
  - 84% A over B, 87% D over C.⇌
- Claim: This is narrow bracketing!⇌
  - Indication 1: same % as when choosing only 1 pair!

↩

Decision Neglect and Narrow Bracketing

- But Indication 2: proof of narrow bracketing:⇌
- Subjects' combined choices:⇌
  - 73% AD, 11% AC, 14% BD, 3% BC.⇌
- But:⇌
  - AD is .75 -$760, .25 +$240.⇌
  - BC is .75 -$750, .25 +$250.⇌

Prefering AD to BC inconsistent with

- Any theory ever proposed in either psychology or economics, and⇌
- Reality.⇌
- Even preference theories permitting dominance violations (Bell, Loomes and Sugden, Kőszegi and Rabin, Wakker et al) don't permit.

  ⇌
- Clearly a mistake.

↩

Decision Neglect and Narrow Bracketing

Reminder:$\rightleftharpoons$

- Much/**most** of what has been called NB or cousins (e.g., myopic loss aversion a la Benartzi and Thaler) may be rational news utility.$\rightleftharpoons$
- But this form of narrow bracketing is (almost) surely an error.

$\hookleftarrow\rho$

Decision Neglect and Narrow Bracketing

Rabin and Weizsacker Replication$\rightleftharpoons$

- Email from experimental recruiter, 24h before the experiment, announcing a show-up fee of £22, which "may be used as your endowment in the experiment.$\rightleftharpoons$
- During the experiment, depending on your actions and chance, it might be possible to add to, or lose from, this amount. [...] You are about equally likely to make gains as losses (on top of the £22)."$\rightleftharpoons$

Slight reformulation (instructions make independence salient), scaled-down real stakes (paid 100% of time)

$\hookleftarrow$

Decision Neglect and Narrow Bracketing

"You face the following pair of concurrent decisions.⇌ First examine both decisions, then indicate your choices, by circling the corresponding letter.⇌ Both choices will be payoff relevant, i.e. the gains and losses will be added to your overall payment."⇌

Decision (i): Choose between
A. sure gain of £2.40
B. 25% chance gain £10.00, 75% chance gain £0.00.⇌
Decision (ii): Choose between
C. sure loss of £7.50
D. 75% chance lose £10.00, 25% chance lose £0.00.

↩

Decision Neglect and Narrow Bracketing

Results:

A and C	21%
A and D	28%
B and C	11%
B and D	40%

$\rightleftharpoons$

So 28% choose the joint lottery

$$AD : (-\$7.60, 0.75; +\$2.40, 0.25)$$

over the first-order stochastically dominating lottery

$$BC : (-\$7.50, 0.75; +\$2.50, 0.25).$$

$\rightleftharpoons$

Note: Only 49% choosing A ... not as much as you'd predict by PT.

$\rightleftharpoons$

- All other examples, large-scale hypotheticals match PT better.

$\hookleftarrow$

Decision Neglect and Narrow Bracketing

Present (different subjects/sessions) the exact same choices "broadly":⇌

- "Choose one of the following four":⇌
  - AC: sure loss of £5.10
  - AD: 75% chance lose £7.60, 25% chance gain £2.40.
  - BC: 75% chance lose £7.50, 25% chance gain £2.50.
  - BD: a 56.25% chance to lose £10.00, a 37.5% chance to gain/lose £0.00, and a 6.25% chance to gain £10.00⇌
- Results:

	separate	broad
AC	21%	11%
AD	28%	0%
BC	11%	38%
BD	40%	51%

⇌

- Note for later: the first column not only different from 2nd⇌
  - but complete gibberish as preferences.

↩

Decision Neglect and Narrow Bracketing

Another feature of results:$\rightleftharpoons$

- More violations of dominance for large-scale hypotheticals than small-scale real.$\rightleftharpoons$
  - But could be large scale, **not** hypothetical that changes behavior$\rightleftharpoons$
  - Also found more violations of dominance for large-stake hypotheticals than small-stakes **hypotheticals**.$\rightleftharpoons$
- Researchers tend to crank up the stakes when hypothetical$\rightleftharpoons$
  - may be mis-identifying stake effects for hypotheticality effects.$\rightleftharpoons$
- But:$\rightleftharpoons$
  - I don't believe we'd see the same violations for large real stakes.

$\hookleftarrow$

Decision Neglect and Narrow Bracketing

So what?⇌

- People don't do impossible and completely integrate life choices!⇌

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

- Claim is not that people are stupider than they have to be (but see below) 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: in your face, and still don't integrate.⇌

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

↩

Decision Neglect and Narrow Bracketing

Rebuttal 1:⇌

- We can trick people with just-so choice combinations.⇌
  - that don't matter in utility terms?⇌
  - People threw away **ten pence** in an experiment manifestly designed to get people to violate dominance.⇌
  - Didn't bother with calculations... right not to do so.⇌
- That rebuttal is largely valid⇌
  - But ...

↩℘

Decision Neglect and Narrow Bracketing

Answer 3: Not about these preferences, or this pair!$\rightleftharpoons$

- Simple dominance with almost any preferences:$\rightleftharpoons$
- Narrow bracketers of course do not violate FOSD for most pairs of choices they face.$\rightleftharpoons$
- RW argue the violations$\rightleftharpoons$
  - can occur for arbitrarily small degrees of narrow bracketing$\rightleftharpoons$
  - can be economically significant$\rightleftharpoons$
  - appear in a wide range of experimental tasks$\rightleftharpoons$
  - Almost surely is exhibited massively in non-campus life.

$\hookleftarrow$

Decision Neglect and Narrow Bracketing

Theorem (RW, 2009): Suppose that utility v is not CARA (i.e., not $\beta - \alpha e^{-rx}$ for any β, α, r).$\rightleftharpoons$ Then there is a pair of choices between binary 50/50 lottery and sure thing where the narrow bracketer violates FOSD.$\rightleftharpoons$

- In fact, the violation is the simple dominance of the form we observed above, and which is not explicable by any preferences.$\rightleftharpoons$

Intuition is quite simple, and does not depend on risk-lovingness.$\rightleftharpoons$

- Any change in risk attitudes, in sense of not having constant absolute risk aversion, exposes to dominance.$\rightleftharpoons$
- If take risk in range where less risk averse, but turn down same risk in range where more risk averse, could do better by flipping.

$\hookleftarrow$

Decision Neglect and Narrow Bracketing

Suppose⇌

- CE of 50/50 (\$30,\$70) ≈ \$48 → pay \$2 to avoid risk⇌
- CE of 50/50 (\$0,\$40) ≈ \$14 → pay \$6 to avoid risk.⇌

So for same risk:⇌

- Sometimes you'll refuse to pay \$3, other times pay \$5 to avoid.⇌

I offer you 50/50 (\$30,\$70) vs. \$47, and you choose (\$30,\$70).⇌

- You don't pay \$3 to avoid risk.⇌

I offer you 50/50 (\$0,\$40) vs. \$15, and you choose \$15.⇌

- You pay \$5 to avoid risk.⇌

So you choose 50/50 (\$45,\$85).⇌ But you could have had (\$47,\$87).
↩℘

Decision Neglect and Narrow Bracketing

Indirect Evidence of narrow bracketing$\rightleftharpoons$

- Even if don't observe choices that are going uncombined ...$\rightleftharpoons$
- Any plausible background risk often implies that any "global preferences" ought be locally linear ...$\rightleftharpoons$
- Some data, through April 2002 (point would be much stronger with up-to-date data ...) Percentage of days that Stock Market (VWRETD) change:$\rightleftharpoons$

An underestimate of variability of stock portfolio:$\rightleftharpoons$

- 2% of time $\Delta \in [-.01\%, +.01\%]$ (uniform), 98% outside
  14% of time $\Delta \in [-.1\%, +.1\%]$ (uniform), 86% outside
  83% of time $\Delta \in [-1\%, +1\%]$ (bellish), 17% outside.

$\hookleftarrow$

Decision Neglect and Narrow Bracketing

Bracketing calibrations ... If have 2:1 loss aversion over total changes in wealth *today* ... what should be reaction to individual bets?$\rightleftharpoons$

- That is, if you merely combine any particular gamble; bet in lab experiment, or the extended warranty if you go buy stereo, or the deductible on housing insurance if happen to be paying for the insurance today ... $\rightleftharpoons$

If \$10,000 in stock market ...$\rightleftharpoons$
should accept 50/50 *g* \$10.25/ *l* \$9.75 bet.$\rightleftharpoons$
If \$100,000 in stock market...$\rightleftharpoons$
should accept 50/50 *g* \$103/ *l* \$98 bet or
50/50 *g* \$10.02/ *l* \$9.98 bet.$\rightleftharpoons$

- Whatever modest-scale risk aversion appears not consistent with integrating these

$\hookleftarrow$

Decision Neglect and Narrow Bracketing

Indirect evidence of NB in social preferences.$\rightleftharpoons$

- (Don't know of any direct evidence for social preferences)$\rightleftharpoons$
- Consider: Charness and Rabin (2002): 45% of C's choose allocation to randomly chosen, unknown pair of (\$4, \$4) over (\$7.50, \$3.75).$\rightleftharpoons$
- How do we explain that?$\rightleftharpoons$
  - Suppose C has VN-M preferences $U_C(W_A, W_B) = Min[W_A, W_B]$, where W_i is the Person i's wealth.$\rightleftharpoons$
  - Will broad-bracketing C ever choose $(\triangle W_A, \triangle W_B) = (4, 4)$ over $(7.50, 3.75)$ to random other parties?$\rightleftharpoons$
- Omitted calibration algebra, but I claim: no.$\rightleftharpoons$
  - 50% chance 7.50 going to poorer guy!

$\hookleftarrow$

Decision Neglect and Narrow Bracketing

- Given symmetric beliefs by C, $Exp\{\triangle Min[W_A, W_B]$ from $(7.50, 3.75)\} \geq p3.75 + \frac{1-p}{2}3.75 + \frac{1-p}{2}7.50$, where $p \equiv prob(|W_A^{init} - W_B^{init}| \leq 3.75)$.$\rightleftharpoons$
- Then we can see if (7.50,3.75) is a better idea than (4,4) if $p3.75 + \frac{1-p}{2}3.75 + \frac{1-p}{2}7.50 > 4.00$, since she knows she is raising $Min[W_A, W_B]$ by \$4 if she chooses (4,4).$\rightleftharpoons$
- Hence, $(\triangle W_A, \triangle W_B) = (7.50, 3.75)$ better than $(4, 4)$ if $p < \frac{13}{15} \approx .87$.$\rightleftharpoons$
- More generally: Even "global Rawlsians" should be piecemeal surplus-maximizers in all small-scale allocations.$\rightleftharpoons$

Revealed Preferences & Revealed Mistakes⇌

Kőszegi and Rabin (2008), "Revealed Preferences and Revealed Mistakes":⇌

- Just because people don't 100% maximize utility does not mean that there is no relationship between what they do and their preferences.⇌

One could simultaneously identify preferences and mistakes.⇌

- **Preferences often revealed by choice, even when not implemented by choice.**⇌
- Rabin and Weizsacker jointly estimate preferences and extent of narrow bracketing.⇌
  - Preferences estimated (not imposed): PT value function.⇌
  - $\frac{5}{6}$ bracket narrowly, $\frac{1}{6}$ bracket broadly.

Decision Neglect and Narrow Bracketing

In RW, estimating preferences while **imposing** broad bracketing: $\rightleftharpoons$

- gibberish.$\rightleftharpoons$

Estimate **jointly** with narrow bracketing:$\rightleftharpoons$

- See clear (prospect theory) preferences.$\rightleftharpoons$
- Note: bracketing jointly estimated, not imposed.$\rightleftharpoons$
- For both normative *and* descriptive economics, allowing for errors aids us in revealing preferences.$\rightleftharpoons$
- Fetishizing rationality undermines useful revealed preference.

Decision Neglect and Narrow Bracketing

What combinations of preferences and types of mistakes could explain the general pattern of modest-scale risk non-neutrality we observe?⇌

	DMU(W) (or its kin)	"Classical PT" Or KR I, II	"News-U PT" E.g., KR III
Fully rational			(✓)
"Constrained optimal"			✓
plausible constrained-suboptimal		(✓)	✓
Implausible errors	✓	✓	✓

- ✓ ≡ could explain most/all instances.
- (✓) ≡ could maybe explain in a scientifically serious way some of what we observe.⇌

End of aside...

↬

Decision Neglect and Narrow Bracketing

- Let (x_H, x_T) represent a lottery that pays $\$x_H$ and $\$x_T$ if the next flip comes up heads or tails.$\rightleftharpoons$
- When Fiona observes a coin just came up heads: $(90, 109) \succ (100, 100)$.$\rightleftharpoons$
- When just came up tails: $(109, 90) \succ (100, 100)$.$\rightleftharpoons$
- On a "new" coin: $(100, 100) \succ (90, 111)$, $(100, 100) \succ (111, 90)$.$\rightleftharpoons$

Conclude about Fiona's preferences?$\rightleftharpoons$

- Maybe: coin-dependent risk attitudes (risk-loving on new coins, risk-averse on old)?$\rightleftharpoons$
- Or ... possibly a well-known, common error: the gambler's fallacy.$\rightleftharpoons$
- *And* we have observed that she is risk-averse.$\rightleftharpoons$

Is Fiona better off new coin or old?

$\looparrowright$

Decision Neglect and Narrow Bracketing

Suppose observe that Fiona chooses to bet on 'old' coins rather than new: she'd choose choice set$_{\rightleftharpoons}$

$\{(90, 109), (100, 100), (109, 90)\}_{OLD\rightleftharpoons}$

over

$\{(90, 111), (100, 100), (111, 90)\}_{NEW\cdot\rightleftharpoons}$

- Which choice set makes her better off?

$\looparrowright$

Decision Neglect and Narrow Bracketing

How do we respond to Fiona?⇌

- We could never ever talk about examples like Fiona.⇌
- We could argue that the study of Fiona is not economics.⇌
- We could take the moralistic stance, which seems at time the stance some economists are de facto taking: ⇌
  - If Fiona is an idiot, she deserved what she gets ...⇌
  - Making empirical claim that incentives to make right choices work is not same as saying incentives righteous even when they don't work.

↬

Decision Neglect and Narrow Bracketing

Punchline: Useful RP *Without* 100% Rationality.⇌

Once making reasonable ancillary assumptions, then can use revealed preference without *maintaining* assumption of 100% rationality.⇌

- We didn't see Fiona *implement* her risk attitudes. ⇌
- But she did *reveal* them.⇌
- We have found out Fiona believes in GF **and** that she is risk averse!⇌

Good theories of mistakes will lead to re-invigoration of revealed preference as a powerful tool for identifying people's (mistakes and) well being.

↬

Decision Neglect and Narrow Bracketing

Suppose that both Ming and Yao are each observed choosing among options x, y, and z this semester.$\rightleftharpoons$

- What are x, y, and z?$\rightleftharpoons$
- I'm not telling you.$\rightleftharpoons$

Suppose that we observe their choices richly:

Choice Set	Ming's Choice	Yao's Choice
$\{x, y\}$	x	x
$\{y, z\}$	y	y
$\{x, z\}$	z	z
$\{x, y, z\}$	y	x

$\rightleftharpoons$

- Is Ming fully rational? Is Yao fully rational?$\rightleftharpoons$
- What are their preferences?$\rightleftharpoons$
- Same or different preferences?$\rightleftharpoons$
- Which choice set makes them happiest?$\rightleftharpoons$
- What if I told you $\{x, y, z\}$ was really $\{x, \{y, z\}\}$?

Decision Neglect and Narrow Bracketing

Ming's and Yao's Choice Set: $\{x \equiv$ Don't volunteer for seminar; $y \equiv$ Volunteer for seminar, prepare 10 hours, give bad seminar; $z \equiv$ Volunteer for seminar, prepare 20 hours, give good seminar$\}$.$\rightleftharpoons$

Choice Set	Ming's Choice	Yao's Choice
$\{x, y\}$	x	x
$\{y, z\}$	y	y
$\{x, z\}$	z	z
$\{x, \{y, z\}\}$	y	x
$\{\{x, y, z\}, \{z\}\}$	y	z

$\rightleftharpoons$

What is going on which each of these guys?$\rightleftharpoons$

Maybe funky preferences. Or maybe misprediction. If present-biased based, then we think$\rightleftharpoons$

- They are both present-biased, and prefer z to x.$\rightleftharpoons$
- Yao is sophisticated, Ming not.

$\looparrowright$

Decision Neglect and Narrow Bracketing

Ming's and Yao's Choice Set: $\{x \equiv$ Don't volunteer for seminar;
$y \equiv$ Volunteer for seminar, prepare 10 hours, give bad seminar;
$z \equiv$ Volunteer for seminar, prepare 20 hours, give good seminar$\}$.$\rightleftharpoons$

Choice Set	Ming's Choice	Yao's Choice	Hsu's Choice
$\{x, y\}$	x	x	x
$\{y, z\}$	y	y	y
$\{x, z\}$	z	z	x
$\{x, \{y, z\}\}$	y	x	x
$\{\{x, y, z\}, \{z\}\}$	y	z	x

$\rightleftharpoons$

- Compare to their abstract choices—we predict for Ming his "most revealed" is his least favorite!$\rightleftharpoons$
- And neither chooses most preferred from $\{x, y, z\}$.$\rightleftharpoons$
- But Hsu seems to prefer x.$\rightleftharpoons$
- No idea what doctrinaire economist who disallows such observations would infer ... but see taste for z despite non-implementation.

$\looparrowright$

The P-Word$_{\rightleftharpoons}$

- A more scientific, humbler "if-then" welfare conclusions about policy.$_{\rightleftharpoons}$
- Typically does not lead to unambiguously smaller choice sets.
  - Sin Taxes vs. Ramsey Taxes: *different* triangles.
  - Sin Taxes vs. sugar blight: different genesis of the triangles
  - Other examples: replacing it with a *strictly larger* non-triangle (e.g., facilitating commitment devices).$_{\rightleftharpoons}$
  - Mostly: "cautious paternalism", regulations that interfere very little with rationals, but help people making mistakes.$_{\rightleftharpoons}$
- Keep in mind, via habit formation, changed lives, huge amount of life outcomes determined $<$ age 18.

$\looparrowright$