BEHAVIORAL ECONOMICS · LECTURE 4

Failures of utility maximization

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Master Economics – Winter 2026/27

Before we start: two quick choices

Write your answers down; we come back to them during the lecture.

1 · You need a battery for your calculator. Which one do you buy?

- *Left half of the room:*
  A: 12 hours, 2% risk of leaking
  B: 14 hours, 4% risk of leaking
- *Right half of the room:*
  A, B, **or** C: 16 hours, 6% risk of leaking

2 · Think of a Bielefeld University coffee mug.

- *Left half:* you **own** the mug. What is the **lowest price** at which you would sell it?
- *Right half:* you do **not** own it. What is the **highest price** you would pay for it?

By the end of this lecture you should be able to

- Name the **implicit assumptions** of utility maximization beyond WARP.
- Describe eight classic experiments that challenge utility maximization.
- For each, identify **which property** is violated (WARP / regularity, monotonicity, consequentialism, initial-position irrelevance, procedure invariance).
- Use **regularity** (Lecture 3) to show that menu effects cannot come from random tastes or noise.
- Discuss whether each “failure” is **irrational** or has a rational explanation.

Roadmap

What utility maximization requires
Menu effects
Failing to maximize

Ownership and defaults
Framing and elicitation

Where we are in the course

The assumptions of the Robinson model

0. **Consistent preferences:** Robinson's choices can be described by a utility function u
1. **Costless optimization:** he always finds the option that maximizes u
2. **Correct beliefs & expected utility:** he knows p and maximizes expected utility
3. **Absolute, self-regarding consumption:** only his own (b, y) enters u
4. **Stable tastes:** the same u in both periods

Lecture 2 gave the testable content of Assumption 0 (WARP, GARP); Lecture 3 extended it to random choice (random utility, regularity). Today we confront it with the **evidence**: eight ways in which real choices fail it.

1

What utility maximization requires

WARP, the implicit assumptions built into it, and what population data can test.

Back to Lecture 2, and what we took for granted

Lecture 2

A choice function C maximizes a utility function iff it satisfies

- **WARP:** if $C(A) = x$ and $y \in A$, $y \neq x$, then $C(B) \neq y$ for every menu B containing x.

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Each failure today breaks **one** of these properties. Keep asking: which one?

From individuals to populations: regularity

Most experiments compare **different people** facing different menus. We see shares $P(x \mid A)$, not $C(A)$: stochastic choice data (Lecture 3).

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$$P(x \mid A) \;\geq\; P(x \mid B).$$

Adding options can never increase the share of an existing option.

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Recall from Lecture 3

A population of utility maximizers is a **random utility model** (RUM), and every RUM satisfies regularity: if x is i's best option in B, it is also i's best option in $A \subseteq B$.

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A violation of regularity in population data shows that **no** RUM fits the data: **some** individuals violate WARP.

2

Menu effects

Adding options to a menu changes the choice between options that were already available.

1. Choice difficulty: Tversky and Shafir (1992)

Students imagine they want to buy a CD player and see a one-day sale:

Treatment 1

- Buy the SONY player
- Wait and learn about other models

Treatment 2

- Buy the SONY player
- Buy the AIWA player
- Wait and learn about other models

1. Choice difficulty: Tversky and Shafir (1992)

Students imagine they want to buy a CD player and see a one-day sale:

Treatment 1

- Buy the SONY player 66%
- Wait and learn about other models 34%

Treatment 2

- Buy the SONY player
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- Buy the AIWA player 27%
- Wait and learn about other models 46%

Adding AIWA **raised** the share of "wait" from 34% to 46%: a violation of **regularity**, hence of WARP for some subjects.

2. Too much choice: Iyengar and Lepper (2000)

Design

- Tasting booth for jams in a supermarket, two treatments on alternating hours:
  - **Limited choice:** 6 jams.
  - **Extensive choice:** 24 jams (including the 6).
- Recorded: who **stops** at the booth, and who **buys** jam afterwards.

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Results

	Stop at booth	Buy, if stopped	Buy, overall
24 jams	60%	3%	$0.6 \times 0.03 = 1.8\%$
6 jams	40%	30%	$0.4 \times 0.30 = 12\%$

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More jams attract more people but sell **less**: “don’t buy” is chosen **more** often from the larger menu (and the 6-jam menu is a subset of the 24-jam menu), a violation of regularity.

Too much choice in financial decisions: Iyengar and Kamenica (2010)

Design (Experiment 1)

A coin is flipped. **Extensive** menu: all 11 gambles; **limited** menu: the 3 in **blue**.

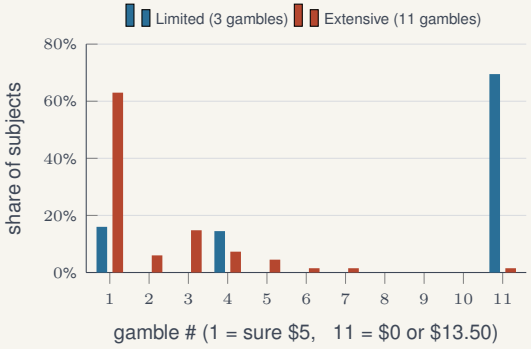
#	heads	tails
1	$5.00	$5.00
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5	$3.00	$9.50
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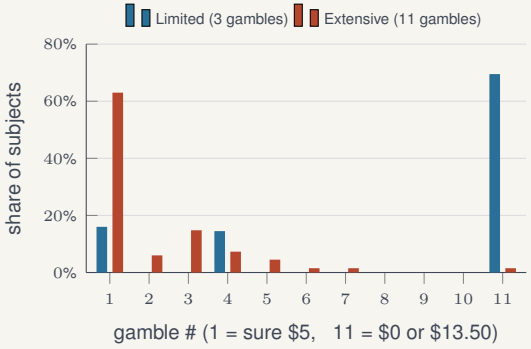


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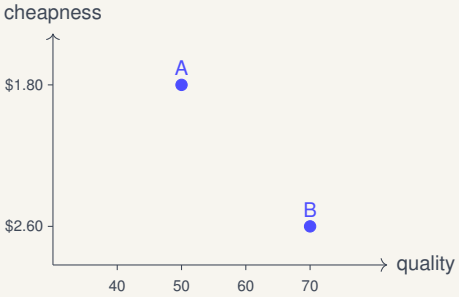


The sure $5 is in both menus; its share rises from **16%** to **63%**: a violation of **regularity** (Lecture 3). Larger menus push people towards the **simplest** option.

3. The attraction (decoy) effect: Huber et al. (1982)

Choice between two six-packs of beer

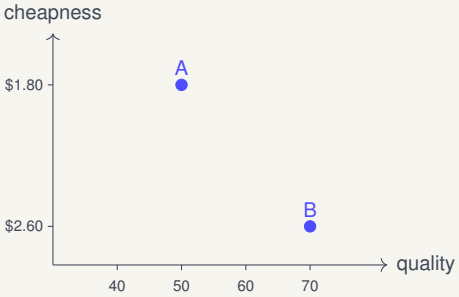
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- **A:** \$1.80, quality 50: 43%
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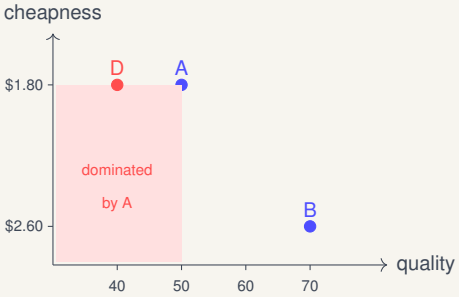
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- **A:** \$1.80, quality 50: 43%
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Add a decoy D: \$1.80, quality 40

- D is **dominated** by A (same price, lower quality), but not by B.
- Share of A rises to 63%.



Why the decoy effect violates regularity, hence WARP

Regularity test (Lecture 3)

- Menus: $\{A, B\} \subseteq \{A, B, D\}$.
- Every RUM satisfies

  $$P(A \mid \{A, B, D\}) \leq P(A \mid \{A, B\}).$$

  Observed: $63\% > 43\%$.
- So **no** random utility model, logit or other, fits these shares.

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Individual choices

- If the two groups are comparable, at least $63\% - 43\% = 20\%$ of subjects chose B from $\{A, B\}$ but A from $\{A, B, D\}$:

$$C(\{A, B\}) = B \quad \text{and} \quad C(\{A, B, D\}) = A,$$
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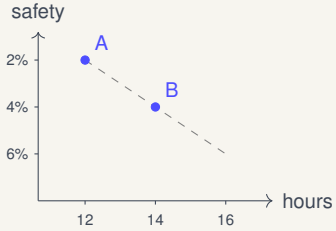
$$C(\{A, B\}) = B \quad \text{and} \quad C(\{A, B, D\}) = A,$$
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A “useless” option changes the ranking of the others: an **irrelevant alternative is not irrelevant**.

The compromise effect: Simonson (1989)

Calculator batteries

- **A:** 12 h, 2% corrosion risk
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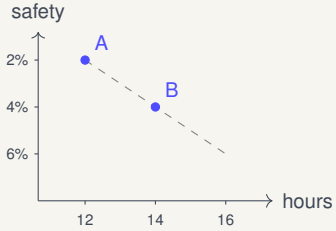
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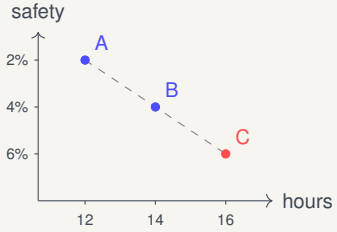
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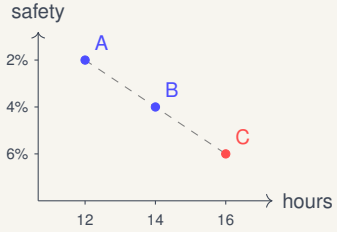
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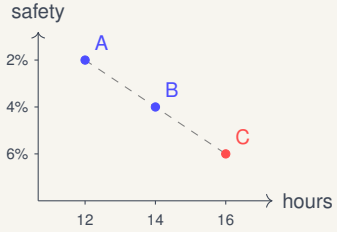
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The study: "Choice based on reasons"

- Students choose among products described by **two attributes** that trade off (batteries, beer, apartments, . . .). Each sees **one** menu.
- **Why?** The middle option is the **easiest to justify**: it is never the worst on any attribute. The effect is **stronger** when subjects expect to **explain** their choice to others.

The compromise effect is everywhere

In markets

- One of the most robust context effects in marketing: “medium” sizes, middle-priced wines, mid-range tariffs.
- Firms add a **premium** option partly to make the middle one look reasonable.

In animals

- Context effects in choice even appear in animals: decoys shift mate choice of female túngara frogs (Lea and Ryan, 2015).

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Menu effects are **systematic**, not noise (no RUM produces them, Lecture 3): they can be predicted, and exploited.

Recap: menu effects

Four menu effects

Effect	Example	Violated
Choice difficulty	Waiting rises from 34% to 46%	Regularity
Too much choice	Buying falls from 12% to 1.8%	Regularity
Attraction (decoy)	A rises from 43% to 63%	Regularity
Compromise	B rises from 43% to 60%	Regularity

In all four, **adding** options changes the choice between options that were already available: no random utility model (Lecture 3) can explain them.

3

Failing to maximize

When options are many and hard to evaluate, people leave money on the table.

4. Leaving money on the table

Your turn: which of the following would you choose?

4	2
3	13
20	11
15	8
8	10

Leaving money on the table

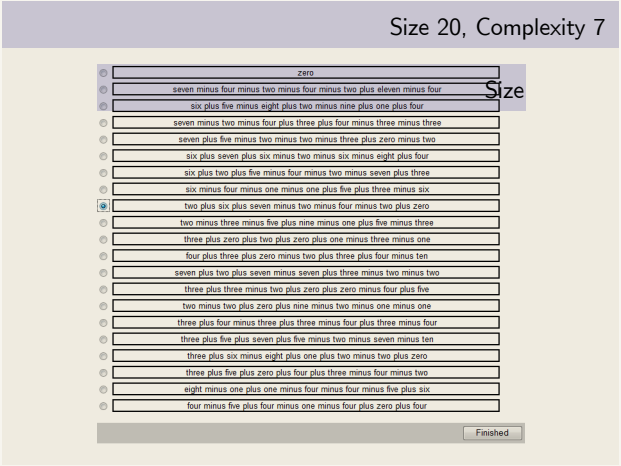
And now? Which of the following would you choose?

4+6+10-11-23+9	2+3+6-11-14+9+10
3+9-17-99+102-6+15	6+18-19-55+70
20-27+7-19+2+3-5	11+2-5+7-8-9+10
15-5-5+6+16+17-20-9	8+9+10-11+8+2+6-32
8+8+9-13-9-6+7	10-9+17-23+10+2+15

Caplin et al. (2011): design

Design

- Each option is a sum written in words (“four plus eight minus two. . . ”); its value is paid out.
- Pick the option with the highest value.
- 22 subjects, 657 choices.
- 6 treatments:
  - complexity: 3 or 7 operations;
  - menu size: 10, 20 or 40 options.



A choice screen: 20 options, complexity 7.

Caplin et al. (2011): results

Failure rate (best not chosen)

Menu size	3 ops	7 ops
10	7%	24%
20	22%	56%
40	29%	65%

Average loss ($)

Menu size	3 ops	7 ops
10	0.41	1.69
20	1.10	4.00
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Subjects leave money on the table, and **more** so the larger and harder the menu.

Is leaving money on the table irrational?

The standard model

- With u strictly increasing in money, choosing a lower amount violates **monotonicity**.
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- Understanding each option takes effort; subjects may consider only a **subset** of options and stop at a satisfactory one.
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This failure is less about Assumption 0 than about Assumption 1 (costless optimization): see Part 2 (satisficing, rational inattention).

4

Ownership and defaults

What you own, or what happens if you do nothing, changes what you choose.

Measuring valuations: the BDM mechanism

Goal: elicit how much a subject values an object, in an incentive-compatible way (Becker et al., 1964).

The mechanism

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The mechanism

1. The subject states a price r (her "bid").
2. A random price x is drawn, say uniformly on $[0, 10]$.
3. If $x \leq r$: she gets the object and pays x (**not** r). If $x > r$: nothing happens.

Measuring valuations: the BDM mechanism

Goal: elicit how much a subject values an object, in an incentive-compatible way (Becker et al., 1964).

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Why truth-telling is optimal

Let v be her value (payoff $v - x$ if she buys). Say $v = 4$.

- Bid $r = 6$: same as $r = 4$, except when $x \in (4, 6]$: then she buys at a price above v and **loses**.
- Bid $r = 2$: same as $r = 4$, except when $x \in (2, 4]$: then she misses a purchase with gain $v - x > 0$.

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Bidding $r = v$ is a (weakly) dominant strategy: stating her true value is optimal whatever x turns out to be.

5. The endowment effect: Kahneman et al. (1991)

Design

- 44 subjects; 22 randomly chosen ones receive a coffee mug.
- Owners state at which prices they would **sell** the mug, non-owners at which prices they would **buy** one.
- The experimenter computes the **market-clearing price**; trades take place at that price.

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Prediction (no endowment effect)

Mugs should end up with the 22 subjects who value them most ("mug lovers").

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- They buy from the 11 "mug haters" who have one: about **11 trades**.

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Results (four sessions)

- Number of trades: 4, 1, 2 and 2.
- Median selling price (WTA) \$5.25; median buying price (WTP) \$2.75.

Does the endowment effect violate rationality?

WTA and WTP

Let $U(m, w)$ be utility from owning the mug ($m \in \{0, 1\}$) and wealth w.

$$\text{WTA: } U(0,\, w + \text{WTA}) = U(1,\, w), \qquad \text{WTP: } U(1,\, w - \text{WTP}) = U(0,\, w).$$

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Quasi-linear utility

$U(m, w) = v\, m + w$: WTA $=$ WTP $= v$. In choice terms: owner and non-owner both compare *mug* with *\$v*.

Income effects

With income effects, WTA $>$ WTP is possible, but for a \$5 mug the gap should be **tiny**.

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A WTA/WTP ratio close to 2 means the **initial position** changes the ranking of {mug, money}: a violation of initial-position irrelevance, not of WARP within a menu.

Theoretical explanations

Loss aversion (prospect theory)

Giving up the mug is coded as a *loss*, buying it as a forgone gain (Part 4).

Cautious preferences

Subjects are unsure of their own taste and act on the worst plausible one (Cerreia-Vioglio et al., 2015).

Psychological inertia

Without a strong reason, people keep the status quo (Gal, 2006).

Asymmetric states of mind

- *ownership:* owning creates a connection with the good (Morewedge and Giblin, 2015);
- *reference prices:* sellers think about market prices, buyers about their own taste (Weaver and Frederick, 2012).

Evolution

An endowment effect strengthens one's bargaining position (Huck et al., 2005).

6. Status quo bias

Idea

People are more likely to choose an option because it is the *status quo*.

What is a status quo?

- something you chose before;
- the way things currently are;
- what happens if you **do nothing**: the **default** (inertia, omission bias).

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- what happens if you **do nothing**: the **default** (inertia, omission bias).

If the default changes choices between the same options, choice depends on the initial position, not only on the menu.

Madrian and Shea (2001): design

Setting

- A large US firm offers a **401(k)** plan: tax-favoured retirement saving with an employer match. Economists expect almost everyone to join.
- On 1 April 1998 the firm changed only the **default**:

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Before: opt-in

- New employees are **not** enrolled.
- To join, fill out a form.
- Do nothing $\Rightarrow$ no saving.

After: opt-out (automatic enrollment)

- New employees are enrolled at a default rate (3% of salary, money-market fund).
- To leave, fill out a form.
- Do nothing $\Rightarrow$ saving.

The menu {enroll, not enroll} is the same; only the default differs.

Madrian and Shea (2001): results

401(k) participation

Cohort	Hired	401(k) participation
OLD	before the change (opt-in), similar tenure	about 37%
NEW	after the change (automatic enrollment)	about 86%

- Most NEW participants also keep the **default** rate and the default fund, which few OLD employees had chosen.

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- Most NEW participants also keep the **default** rate and the default fund, which few OLD employees had chosen.

Changing nothing but the default more than doubles participation: choices depend on the **initial position**.

Why do defaults matter?

Effort / transaction costs

Filling out a form is costly, so people stay put.

Suggestion

The default is read as a recommendation from the employer.

Inertia and procrastination

“I will do it next month” (Part 5).

Loss aversion

The default is the reference point (Part 4).

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Loss aversion

The default is the reference point (Part 4).

Defaults are a powerful policy tool (*nudges*): whether that is good depends on whether the default is good for people (normative question).

Recap: ownership and defaults

Endowment effect

WTA $\approx 2 \times$ WTP for a mug; far fewer trades than predicted.

Status quo bias

Automatic enrollment raises 401(k) participation from about 37% to 86%.

Both violate **initial-position irrelevance**: the same menu, a different starting point, a different choice.
Leading explanation: **reference dependence** (Part 4); competing ones: inertia, cognitive costs, inference.

5

Framing and elicitation

Choices change with how options are described, presented or elicited, even when the outcomes stay the same.

7. Framing effects

Framing effect

Choices change with *inconsequential* changes in how options are presented.

- Under one description, x is chosen from A; under another, y is chosen from the same A.

Which property?

Strictly, this violates **consequentialism** (only outcomes matter), not WARP.

Lecture 1 example

The disease problem (“200 saved” vs “400 die”).

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Lecture 1 example

The disease problem (“200 saved” vs “400 die”).

Is it always irrational? A description can carry information, or make an attribute salient.

Bushong et al. (2010)

Design

- Students are shown snack foods; their **willingness to pay** is elicited with BDM.
- Three presentation formats of the same snack:
  - written description;
  - picture;
  - the **real food** in front of them.

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The authors suggest a **Pavlovian** mechanism:

> *"The function of these mechanisms is to deploy behaviors that lead to the consumption of appetitive items when those items are physically exposed to them [. . .] by changing the value that the brain assigns to particular items."*

Bertrand et al. (2010): design

Setting

- Field experiment with a South African consumer lender (subprime: borrowers with poor credit scores, think “low SCHUFA rating”).
- About 53,000 former clients receive direct-mail loan offers with a randomized **interest rate** and randomized **advertising content**:

Randomized advertising content

- a photograph on the letter;
- the rate called “special” or “low”;
- suggested uses of the loan;
- a large or small table of example loans;
- the monthly payment besides the rate;
- a comparison with a competitor’s rate;
- mention of speaking the local language;
- a cell-phone raffle.

Bertrand et al. (2010): results

Results

- Content had **significant** effects on loan take-up.
- Individually, the **photo** and a **small table** of example loans mattered most.
- Some content effects were as large as a sizeable cut in the **interest rate**.

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- Some content effects were as large as a sizeable cut in the **interest rate**.

Choices can be moved by “gimmicks” that leave the economic terms unchanged (as advertisers know). We are long on examples and **short on unifying theories**.

8. Preference reversals: Lichtenstein and Slovic (1971)

A stylized version with two lotteries

- **$-bet** a: 20% chance of $100, 80% of $0 (expected value $20).
- **P-bet** b: 90% chance of $22, 10% of $0 (expected value $19.80).

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Two tasks

1. **Choose** between a and b.
2. **Value** each lottery: state your minimum selling price (elicited with BDM).

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Two tasks

1. **Choose** between a and b.
2. **Value** each lottery: state your minimum selling price (elicited with BDM).

Preference reversal: many subjects choose b over a, but put a **higher** price on a than on b.

Why a preference reversal is a contradiction

Stated value

Let $CE(a)$ be the stated value of a: the subject is indifferent between a and $\$CE(a)$ for sure.

Why a preference reversal is a contradiction

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A contradiction

Suppose $CE(a) = \$18$, $CE(b) = \$15$, and $b \succ a$ in the choice task. Then

$$a \sim \$18 \underset{\text{monotonicity}}{\succ} \$15 \sim b,$$

so by transitivity $a \succ b$: contradiction with $b \succ a$.

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Choice and valuation reveal **opposite** rankings: the **response mode** affects the preference.

Recap: eight failures of utility maximization

Eight failures

Failure	Key evidence	Property violated
1. Choice difficulty	Tversky and Shafir (1992)	Regularity (WARP)
2. Too much choice	Iyengar and Lepper (2000)	Regularity (WARP)
3. Decoy / compromise	Huber et al. (1982); Simonson (1989)	Regularity (WARP)
4. Money on the table	Caplin et al. (2011)	Monotonicity
5. Endowment effect	Kahneman et al. (1991)	Initial-position irrelevance
6. Status quo bias	Madrian and Shea (2001)	Initial-position irrelevance
7. Framing	Bushong et al. (2010); Bertrand et al. (2010)	Consequentialism
8. Preference reversals	Lichtenstein and Slovic (1971)	Procedure invariance

Random utility (Lecture 3) can absorb noise, but not the menu effects (1–3). The next parts of the course model these **systematic** failures.

Exercises

1 · Easy

In Iyengar and Lepper (2000), 1,000 shoppers pass each booth. How many jars are sold with 6 and with 24 jams? Which number would a store manager care about?

2 · Intermediate

BDM with prices uniform on $[0, 10]$, value v, bid r. Show that the expected payoff is $\frac{1}{10}\left(vr - \frac{r^2}{2}\right)$ for $r \leq 10$, and that it is maximized at $r = v$.

3 · Intermediate

In the preference-reversal lotteries, let $u(z) = \sqrt{z}$ (expected utility). Compute $EU(a)$, $EU(b)$, $CE(a)$, $CE(b)$. Can an expected-utility maximizer exhibit a reversal?

4 · Advanced

Compromise effect: B gets 43% in $\{A, B\}$. Assume logit and $u(C) = u(A)$. (a) Which share of B does logit predict in $\{A, B, C\}$?
(b) Observed: 60%. Show that no RUM, logit or other, can generate it.

Discussion questions

Biases and rationality

- Are these biases **context-dependent**, or stable features of human decision-making?
- Can they be **adaptive** responses to limited information, attention and time? Could they be rational once cognitive or psychological costs are accounted for?
- Is it really **rationality** that is violated, or economists' **modeling assumptions** about it?

Mechanisms and theories

- Where in **real life** should these biases appear?
- Do they share **common mechanisms** (loss aversion, limited attention, inertia), or do they contradict each other?
- Should economists seek a **unified theory** (prospect theory, bounded rationality, dual-process models), or treat them as different phenomena? Do behavioral models improve **prediction**, or mainly description?

Final take-aways

1. Utility maximization rests on WARP **and** on implicit assumptions: consequentialism, monotonicity, initial-position irrelevance, determinism.
2. Noise alone is compatible with **random utility** (Lecture 3). Menu effects are not: they violate **regularity**, so no random utility model fits them.
3. Other experiments show that **ownership**, **defaults**, **descriptions** and the **response mode** change choices.
4. Not every "failure" is irrational: search costs, information and attention may explain some of them, which is the starting point of Part 2 (Lectures 5–9).

References I

Becker, G. M., DeGroot, M. H., and Marschak, J. (1964). Measuring utility by a single-response sequential method. *Behavioral Science*, 9(3):226–232.

Bertrand, M., Karlan, D., Mullainathan, S., Shafir, E., and Zinman, J. (2010). What's advertising content worth? evidence from a consumer credit marketing field experiment. *The quarterly journal of economics*, 125(1):263–306.

Bushong, B., King, L. M., Camerer, C. F., and Rangel, A. (2010). Pavlovian processes in consumer choice: The physical presence of a good increases willingness-to-pay. *American Economic Review*, 100(4):1556–71.

Caplin, A., Dean, M., and Martin, D. (2011). Search and satisficing. *American Economic Review*, 101(7):2899–2922.

Cerreia-Vioglio, S., Dillenberger, D., and Ortoleva, P. (2015). Cautious expected utility and the certainty effect. *Econometrica*, 83(2):693–728.

Gal, D. (2006). A psychological law of inertia and the illusion of loss aversion. *Judgment and Decision Making*, 1(1):23–32.

Huber, J., Payne, J. W., and Puto, C. (1982). Adding asymmetrically dominated alternatives: Violations of regularity and the similarity hypothesis. *Journal of consumer research*, 9(1):90–98.

Huck, S., Kirchsteiger, G., and Oechssler, J. (2005). Learning to like what you have – explaining the endowment effect. *The Economic Journal*, 115(505):689–702.

Iyengar, S. S. and Kamenica, E. (2010). Choice proliferation, simplicity seeking, and asset allocation. *Journal of Public Economics*, 94(7-8):530–539.

Iyengar, S. S. and Lepper, M. R. (2000). When choice is demotivating: Can one desire too much of a good thing? *Journal of personality and social psychology*, 79(6):995.

References II

Kahneman, D., Knetsch, J. L., and Thaler, R. H. (1991). Anomalies: The endowment effect, loss aversion, and status quo bias. *Journal of economic perspectives*, 5(1):193–206.

Lea, A. M. and Ryan, M. J. (2015). Irrationality in mate choice revealed by túngara frogs. *Science*, 349(6251):964–966.

Lichtenstein, S. and Slovic, P. (1971). Reversals of preference between bids and choices in gambling decisions. *Journal of experimental psychology*, 89(1):46.

Madrian, B. C. and Shea, D. F. (2001). The power of suggestion: Inertia in 401 (k) participation and savings behavior. *The Quarterly journal of economics*, 116(4):1149–1187.

Morewedge, C. K. and Giblin, C. E. (2015). Explanations of the endowment effect: an integrative review. *Trends in Cognitive Sciences*, 19(6):339–348.

Plott, C. R. and Zeiler, K. (2005). The willingness to pay–willingness to accept gap, the "endowment effect," subject misconceptions, and experimental procedures for eliciting valuations. *American Economic Review*, 95(3):530–545.

Simonson, I. (1989). Choice based on reasons: The case of attraction and compromise effects. *Journal of consumer research*, 16(2):158–174.

Tversky, A., Slovic, P., and Kahneman, D. (1990). The causes of preference reversal. *American Economic Review*, 80(1):204–217.

Tversky, A. and Shafir, E. (1992). Choice under conflict: The dynamics of deferred decision. *Psychological science*, 3(6):358–361.

Weaver, R. and Frederick, S. (2012). A reference price theory of the endowment effect. *Journal of Marketing Research*, 49(5):696–707.