BEHAVIORAL ECONOMICS · LECTURE 17

Preference for commitment

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Before we start: pick a restaurant

Two restaurants

You are trying to eat healthily. Tonight you can go to one of two restaurants.

Restaurant 1	fish, salad
Restaurant 2	fish, salad, **burger**

Your choice

Which restaurant do you choose? Is there any reason to choose **Restaurant 1**?

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Robinson's version

Go to the yoga class he pre-paid, or to Friday's bar, where yoga and bourbon are both available?

Learning objectives

By the end of this lecture you should be able to:

- Model choice **between menus** and explain why the standard model implies "more is never worse".
- State the **Gul–Pesendorfer** representation and interpret u and v.
- Compute menu utilities and distinguish **giving in** from **costly self-control**.
- State **set betweenness** and prove that the model satisfies it.
- Explain why uncertainty about future tastes creates a **preference for flexibility**.

Roadmap

Choice between menus

The Gul–Pesendorfer model

Axioms: set betweenness

Preference for flexibility

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

Today: the first choice-based approach to Assumption 4. A decision maker who **removes options** from her own future menu reveals that her future self is tempted by something her present self dislikes.

1

Choice between menus

A decision maker who strictly prefers fewer options reveals a temptation problem; the standard model never does.

Commitment in practice

How can we identify someone with a temptation problem **from choices alone**?

Restricting future choices

People **restrict their own future choices** to avoid giving in later (Ariely and Wertenbroch, 2002):

- deadlines, blocking websites, pre-paying, locking money away.

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Self-imposed penalties

People voluntarily impose **penalties** on their future selves (Bryan et al., 2010):

- commitment contracts, “swear jars”, betting against oneself.

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Such people **prefer fewer options**: a restaurant whose *menu* only offers healthy food.

Preferences over menus

Setup

- X: a set of alternatives (dishes; in the original model, lotteries over them).
- A **menu** is a non-empty subset $A \subseteq X$, e.g.

$$A = \{f, b\} \text{ (fish or burger)},$$
$$B = \{b, s\} \text{ (burger or salad)}.$$

- $\succsim$ is a preference over **menus**: $A \succsim B$ means “I would rather choose later from A than from B”.

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Timing

1. *Morning (no temptation):* choose a menu.
2. *Evening (temptation present):* choose a dish from that menu.

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Question: when does a preference over menus reveal a temptation problem?

The standard model: a menu is worth its best item

Standard model

In the standard model you value a menu **only for its best option**:

$$A \succsim B \iff \max_{p \in A} u(p) \geq \max_{q \in B} u(q).$$

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With $A = \{f, b\}$ and $B = \{b, s\}$

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- if you like **salad** best, you prefer B;
- if you like the **burger** best, you are indifferent.

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- if you like **fish** best, you prefer A;
- if you like **salad** best, you prefer B;
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$U(A) = \max_{p \in A} u(p)$ is the **indirect utility** of the menu, like $v(m)$ for wealth in Lecture 1.

Is it always better to have more options?

From the point of view of the standard model, **yes** (or at least never worse).

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Add an alternative q to a menu A

- either q is better than everything in A: it is chosen, and $A \cup \{q\} \succ A$;
- or some $p \in A$ is at least as good as q: nothing changes, and $A \cup \{q\} \sim A$.

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More generally: bigger is better

$$B \subseteq A \implies \max_{p \in A} u(p) \geq \max_{q \in B} u(q)$$
$$\implies A \succsim B.$$

A standard decision maker never **strictly** prefers a smaller menu. Choosing Restaurant 1 is impossible for her.

Temptation breaks monotonicity

A dieter

A dieter may strictly prefer

Menu 1 $= \{f, s\} \succ$ Menu 2 $= \{f, s, b\}$.

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Why?

There is no temptation when choosing *between* menus, only when choosing *from* them:

1. she fears she will **give in** and eat the burger if it is available; or
2. she thinks she will **resist**, but resisting is **costly**.

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$$\text{Menu 1} = \{f, s\} \succ \text{Menu 2} = \{f, s, b\}.$$

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2. she thinks she will **resist**, but resisting is **costly**.

Both stories are captured by the model of Gul and Pesendorfer (2001).

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The Gul–Pesendorfer model

A menu is worth its best compromise between long-run and temptation utility, minus the cost of resisting its most tempting item.

The Gul–Pesendorfer (GP) representation

Representation

$$U(A) \;=\; \max_{p\in A}\big[u(p)+v(p)\big] \;-\; \max_{q\in A} v(q)$$

where u is **commitment** (“long-run”) utility and v is **temptation** utility.

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Interpretation

Equivalently,

$$U(A) = \max_{p\in A}\Big[\, u(p) \;-\; \underbrace{\big(\max_{q\in A} v(q) - v(p)\big)}_{\text{self-control cost} \,\geq\, 0}\Big].$$

- In the evening she chooses p to maximize $u(p)+v(p)$ (a **compromise**),
- and pays a **self-control cost**: the extra pull of the most tempting item.

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Unlike the standard model, a **strictly smaller** menu can be strictly better: $B \subset A$ with $B \succ A$.

Case 1: commitment (giving in)

Data

Dish	u	v
Salad s	4	0
Burger b	1	4

Question

Does she prefer $\{s\}$ or $\{s, b\}$?

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Computation

$U(\{s\}) = 4 + 0 - 0 = 4$
$U(\{s, b\}) = \max\{4 + 0,\ 1 + 4\} - \max\{0, 4\} = 5 - 4 = 1$
Hence $\{s\} \succ \{s, b\}$.

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Interpretation

From $\{s, b\}$ she would choose b, although s has the higher long-run utility:

$$u(b) + v(b) = 5 > 4 = u(s) + v(s), \qquad u(s) = 4 > 1 = u(b).$$

She avoids b **because she knows she would choose it**.

Case 1 in general

Assumption

Take p, q with

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$$\text{and} \quad u(p) > u(q).$$

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Menu utilities

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$$U(\{p\}) = u(p) + v(p) - v(p) = u(p),$$
$$U(\{p, q\}) = u(q) + v(q) - v(q) = u(q),$$
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(In $\{p, q\}$, q is the most tempting item: $v(q) - v(p) > u(p) - u(q) > 0$.)

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She **gives in** to q: $\{p\} \succ \{p, q\} \sim \{q\}$. Adding p to $\{q\}$ is worthless; removing q from $\{p, q\}$ is valuable.

Case 2: avoiding willpower costs

Data

Dish	u	v
Salad s	4	0
Fish f	2	1

Question

Does she prefer $\{s\}$ or $\{s, f\}$?

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Dish	u	v
Salad s	4	0
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Question

Does she prefer $\{s\}$ or $\{s, f\}$?

Computation

$U(\{s\}) = 4 + 0 - 0 = 4$

$U(\{s, f\}) = \max\{4 + 0,\ 2 + 1\} - \max\{0, 1\} = 4 - 1 = 3$

Hence $\{s\} \succ \{s, f\}$.

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Dish	u	v
Salad s	4	0
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Hence $\{s\} \succ \{s, f\}$.

Interpretation

This time she chooses s from **both** menus, since $u(s) + v(s) = 4 > 3 = u(f) + v(f)$.

- She still wants f removed because it is **more tempting**: $v(f) = 1 > 0 = v(s)$.
- She is able to exert **self-control**, but it costs her $v(f) - v(s) = 1$.

Case 2 in general

Assumption

Take p, q with

$$u(p) > u(q),$$
$$v(q) > v(p),$$
$$u(p) + v(p) > u(q) + v(q).$$

$\Longrightarrow$

Menu utilities

$$U(\{p\}) = u(p),$$
$$U(\{p, q\}) = u(p) - \big(v(q) - v(p)\big),$$
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Menu utilities

$$U(\{p\}) = u(p),$$
$$U(\{p, q\}) = u(p) - (v(q) - v(p)),$$
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Ranking

$U(\{p, q\}) > U(\{q\})$ because $u(p) + v(p) > u(q) + v(q)$. So

$$\{p\} \succ \{p, q\} \succ \{q\}.$$

She **resists** q, at a cost. The middle menu sits *strictly between* the two singletons.

Worked example: all menus from $\{s, f, b\}$

Utilities

	u	v
s	4	0
f	2	1
b	1	4

$u + v$: $s : 4$, $f : 3$, $b : 5$.

All seven menus

Menu A	chosen	$\max_A v$	$U(A)$
$\{s\}$	s	0	4
$\{s, f\}$	s	1	3
$\{f\}$	f	1	2
$\{b\}$, $\{s, b\}$, $\{f, b\}$, $\{s, f, b\}$	b	4	1

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$\{s\}$	s	0	4
$\{s, f\}$	s	1	3
$\{f\}$	f	1	2
$\{b\}$, $\{s, b\}$, $\{f, b\}$, $\{s, f, b\}$	b	4	1

Ranking

$$\{s\} \succ \{s, f\} \succ \{f\} \succ \{b\} \sim \{s, b\} \sim \{f, b\} \sim \{s, f, b\}.$$

$\{s, f\}$: **self-control** (Case 2). Any menu containing b: she **gives in** (Case 1).

Temptation and self-control: definitions

Definition

q **tempts** p if $\{p\} \succ \{p, q\}$.
The decision maker **exhibits self-control at** menu A if there are menus B, D with $B \cup D = A$ and

$$B \succ A \succ D.$$

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Claim

In the GP model, self-control at A means the most tempting item of A is not chosen.

Proof

- $B \succ A$: then $\max_A v > \max_B v$ (otherwise $U(A) \geq U(B)$, since $A \supseteq B$). So the most tempting item q^* of A is not in B; it is in D, and $\max_D v = \max_A v$.

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- $A \succ D$: if q^* were chosen from A, it would also be chosen from $D \subseteq A$, so $\max_A(u + v) = \max_D(u + v)$ and $U(A) = U(D)$: a contradiction.

Why call u “long-run” and v “temptation”?

u ranks singleton menus

With a single option there is nothing to resist:

$$U(\{p\}) = u(p) + v(p) - v(p) = u(p),$$

so $\quad \{p\} \succsim \{q\} \iff u(p) \geq u(q).$

u describes her preferences when she is **not tempted**, i.e. under commitment.

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v governs temptation: Proposition

In the GP model, q tempts $p \iff$ $u(p) > u(q)$ and $v(q) > v(p)$.

Temptation needs **both**: q is worse in the long run and more tempting.

Proof of the proposition

($\Rightarrow$)

Suppose $\{p\} \succ \{p, q\}$, i.e. $u(p) > U(\{p, q\})$.

- If $v(p) \geq v(q)$, then $\max_{\{p,q\}} v = v(p)$ and $U(\{p, q\}) \geq u(p) + v(p) - v(p) = u(p)$. Contradiction: so $v(q) > v(p)$.
- If $u(q) \geq u(p)$, then $u(q) + v(q) > u(p) + v(p)$, so $U(\{p, q\}) = u(q) + v(q) - v(q) = u(q) \geq u(p)$. Contradiction.

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($\Leftarrow$)

Suppose $u(p) > u(q)$ and $v(q) > v(p)$, so $\max_{\{p,q\}} v = v(q)$.

- **Case 1:** $u(q) + v(q) > u(p) + v(p)$. Then $U(\{p, q\}) = u(q) < u(p)$.
- **Case 2:** $u(p) + v(p) \geq u(q) + v(q)$. Then $U(\{p, q\}) = u(p) - \big(v(q) - v(p)\big) < u(p)$.

In both cases $\{p\} \succ \{p, q\}$. $\square$

Recap: the Gul–Pesendorfer model

What we have so far

- Preferences over **menus** reveal temptation: the standard model implies $B \subseteq A \Rightarrow A \succsim B$.
- GP: $U(A) = \max_A [u + v] - \max_A v$; evening choice maximizes $u + v$.
- u = ranking of singletons (commitment); q tempts p iff $u(p) > u(q)$ and $v(q) > v(p)$.
- Two patterns: **giving in** $\{p\} \succ \{p, q\} \sim \{q\}$; **self-control** $\{p\} \succ \{p, q\} \succ \{q\}$.

u and v are not observed. Which **choices over menus** does the model rule out?

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Axioms: set betweenness

Since u and v are not observed, the model is tested through its axioms; the new one is set betweenness.

Testing the GP model

The problem

- Like expected utility, the model has **unobservable** elements: u and v.
- To test it we want conditions on $\succsim$ that are **equivalent** to the representation.

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Axioms

Gul and Pesendorfer (2001) work with menus A of **lotteries** (compact sets) and mixtures of menus $\lambda A + (1-\lambda)B = \{\lambda p + (1-\lambda)q : \ p \in A, \ q \in B\}$. Their axioms:

1. **Weak order:** $\succsim$ is complete and transitive.
2. **Continuity** (in the menus).
3. **Independence:** $A \succ B \Rightarrow \lambda A + (1-\lambda)C \succ \lambda B + (1-\lambda)C$ for all C, $\lambda \in (0, 1]$.
4. **Set betweenness:** $A \succsim B \Rightarrow A \succsim A \cup B \succsim B$.

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Theorem (Gul and Pesendorfer, 2001)

$\succsim$ satisfies 1–4 if and only if it has a GP representation with continuous, linear u and v.

Set betweenness

Definition

$\succsim$ satisfies **set betweenness** if for all menus A, B:

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Comparison

- **Standard model:** $A \succsim B \Rightarrow A \sim A \cup B$ (the best item of $A \cup B$ is in A).
- **Set betweenness** allows $A \succ A \cup B$: adding options can **hurt**, but the union is never worse than the worse menu.

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Example

$\{s\} \succ \{s, f\} \succ \{f\}$ and $\{s\} \succ \{s, b\} \sim \{b\}$ both satisfy it.

Set betweenness = “commitment can be valuable, but a bigger menu is never worse than **both** its parts”.

GP preferences satisfy set betweenness

Notation

Write $M(A) = \max_A(u + v)$ and $V(A) = \max_A v$, so $U(A) = M(A) - V(A)$. Note $M(A \cup B) = \max\{M(A), M(B)\}$ and $V(A \cup B) = \max\{V(A), V(B)\}$.

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Claim

$$\min\{U(A), U(B)\} \leq U(A \cup B) \leq \max\{U(A), U(B)\}.$$

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Claim

$$\min\{U(A), U(B)\} \;\leq\; U(A \cup B) \;\leq\; \max\{U(A), U(B)\}.$$

Proof

- *Upper bound.* Let $C \in \{A, B\}$ attain $M(A \cup B) = M(C)$. Then
$$U(A \cup B) = M(C) - V(A \cup B) \leq M(C) - V(C) = U(C).$$
- *Lower bound.* Let $C' \in \{A, B\}$ attain $V(A \cup B) = V(C')$. Then
$$U(A \cup B) = M(A \cup B) - V(C') \geq M(C') - V(C') = U(C').$$

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Write $M(A) = \max_A(u + v)$ and $V(A) = \max_A v$, so $U(A) = M(A) - V(A)$. Note $M(A \cup B) = \max\{M(A), M(B)\}$ and $V(A \cup B) = \max\{V(A), V(B)\}$.

Claim

$$\min\{U(A), U(B)\} \;\leq\; U(A \cup B) \;\leq\; \max\{U(A), U(B)\}.$$

Proof

- *Upper bound.* Let $C \in \{A, B\}$ attain $M(A \cup B) = M(C)$. Then
$$U(A \cup B) = M(C) - V(A \cup B) \leq M(C) - V(C) = U(C).$$
- *Lower bound.* Let $C' \in \{A, B\}$ attain $V(A \cup B) = V(C')$. Then
$$U(A \cup B) = M(A \cup B) - V(C') \geq M(C') - V(C') = U(C').$$

If $A \gtrsim B$, the claim reads $U(A) \geq U(A \cup B) \geq U(B)$: set betweenness. □

Discussion: what is willpower?

A meaningful statement?

The following statement seems meaningful:

- Ann and Bob have the **same** long-run preferences (u) and the **same** temptations (v),
- but Ann has **more willpower** than Bob.

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Alternative (Masatlioglu, Nakajima and Ozdenoren, 2020)

From menu A choose

$$\max_{p \in A} u(p) \quad \text{s.t.} \quad \max_{q \in A} v(q) - v(p) \ \leq \ w,$$

where $w \geq 0$ is the agent's **willpower stock**.

Discussion: what is willpower?

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Example (table above)

With $w = 2$, she picks s from $\{s, f\}$ (cost $1 \leq 2$) but b from $\{s, f, b\}$ (cost of s is $4 > 2$; of f is $3 > 2$). With $w = 4$ she picks s from both.

4

Preference for flexibility

When future tastes are uncertain, a bigger menu can be strictly better than both of its parts.

Three attitudes towards bigger menus

Two attitudes so far

- **Standard model:**
  $A \succsim B \Rightarrow A \cup B \sim A.$
- **Temptation (set betweenness):**
  $A \succsim B \Rightarrow A \succsim A \cup B.$

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Are these the only two possibilities?

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  $A \gtrsim B \Rightarrow A \gtrsim A \cup B$.

Are these the only two possibilities?

Your turn

Choose a drink menu **today**; you will drink from it **six months from now**:

$\{c\}$ (cocoa only), $\{l\}$ (lemonade only), $\{c, l\}$ (both).

Which do you prefer?

Why do you want both?

The reason

- You choose the menu **today**, but drink from it in six months.
- By then you will know more: e.g. whether the day is **windy** (cold) or **sunny**.
- **Uncertainty about future tastes** makes the option to choose later valuable.

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- **Uncertainty about future tastes** makes the option to choose later valuable.

A simple model

Two states, w (windy) and s (sunny), each with probability $\frac{1}{2}$ today. Utility depends on the drink and on the state:

	w (windy)	s (sunny)
cocoa c	3	1
lemonade l	1	2

When you choose **from** the menu, you know the state.

Worked example: the value of flexibility

Menu utility

$$U(A) = \tfrac{1}{2} \max_{p \in A} u(p \mid w) + \tfrac{1}{2} \max_{p \in A} u(p \mid s)$$

Worked example: the value of flexibility

Menu utility

$$U(A) = \tfrac{1}{2} \max_{p \in A} u(p \mid w) + \tfrac{1}{2} \max_{p \in A} u(p \mid s)$$

Computation

$$U(\{l\}) = \tfrac{1}{2} \cdot 1 + \tfrac{1}{2} \cdot 2 = 1.5$$

$$U(\{c\}) = \tfrac{1}{2} \cdot 3 + \tfrac{1}{2} \cdot 1 = 2$$

$$U(\{c,l\}) = \tfrac{1}{2} \cdot \underbrace{3}_{c \text{ if windy}} + \tfrac{1}{2} \cdot \underbrace{2}_{l \text{ if sunny}} = 2.5$$

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Ranking

So $\{c,l\} \succ \{c\} \succ \{l\}$: the union is **strictly better than both parts**.

Uncertainty about the future creates a **preference for flexibility**, the opposite of a preference for commitment.

Flexibility vs. commitment

Three models of menu choice

Model	Menu utility	If $A \succsim B$
Standard	$\max_A u$	$A \cup B \sim A$
Temptation (Gul and Pesendorfer, 2001)	$\max_A (u+v) - \max_A v$	$A \succsim A \cup B \succsim B$
Flexibility (Kreps, 1979)	$\sum_\omega \pi_\omega \max_A u(\cdot \mid \omega)$	$A \cup B \succsim A$

Monotonicity

- The flexibility model satisfies **monotonicity**: $B \subseteq A \Rightarrow A \succsim B$.
- Set betweenness + monotonicity $\Rightarrow$ the standard model's $A \cup B \sim A$.

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Preference uncertainty is a powerful force **against** a preference for commitment: a person may have temptation problems and still refuse to commit. We will see this in the data (Lecture 19).

Recap

Temptation

- Choice **between menus** makes temptation observable: the standard model never strictly prefers fewer options.
- **GP model:** $U(A) = \max_A [u + v] - \max_A v$. Commitment utility u, temptation utility v; the decision maker is sophisticated.
- Two patterns: **giving in** ($\{p\} \succ \{p, q\} \sim \{q\}$) and **costly self-control** ($\{p\} \succ \{p, q\} \succ \{q\}$).

Axioms and flexibility

- Key axiom: **set betweenness**; the union lies between its parts.
- **Preference for flexibility** (uncertain future tastes) pushes the other way: the union beats both parts.

Exercises

1. (Easy)

Apple a: $u = 6$, $v = 0$; nuts n: $u = 4$, $v = 1$; cake c: $u = 1$, $v = 7$. Compute U for all seven menus, rank them, and say at which menus she exhibits self-control and at which she gives in.

2. (Intermediate)

In the willpower model with the same u, v, what is the choice from $\{a, c\}$, $\{a, n, c\}$ and $\{n, c\}$ as a function of w? Can two people with the same u, v choose differently from $\{a, c\}$?

3. (Advanced)

Suppose $\{s\} \succ \{s, f\} \succ \{f\} \succ \{f, b\} \succ \{b\}$ and the GP model holds. Show that $\{s\} \succ \{s, b\} \succ \{b\}$. Is this "transitivity of self-control" plausible?

4. (Discussion)

Someone deletes a social-media app before the exam period. Is this evidence of temptation, or could a standard or flexibility-seeking agent do the same?

Final take-aways

1. **Preference for commitment** (paying to remove options) is choice-based evidence of temptation.
2. The **GP model** separates long-run utility u from temptation v and explains both **giving in** and **costly self-control**.
3. Its key testable axiom is **set betweenness**.
4. Uncertainty about future tastes creates a **preference for flexibility**, a force against commitment.
5. Next lecture: the second approach, **time inconsistency**, and how it also generates a demand for commitment.

References I

Ariely, D. and Wertenbroch, K. (2002). Procrastination, deadlines, and performance: Self-control by precommitment. *Psychological science*, 13(3):219–224.

Bryan, G., Karlan, D., and Nelson, S. (2010). Commitment devices. *Annual Review of Economics*, 2:671–698.

Gul, F. and Pesendorfer, W. (2001). Temptation and self-control. *Econometrica*, 69(6):1403–1435.

Kreps, D. M. (1979). A representation theorem for “preference for flexibility”. *Econometrica*, 47(3):565–577.