Cognition

PSYC 2040

L11: Judgment and Decision-Making

Part 1

logistics

- no monthly quiz #3 (monthly quiz #1 and #2 worth 7.5 points)
- will post ungraded practice questions for cumulative final
- cumulative final worth 30 points
  - 5 points (L11 + L12)
  - 15 points (L7-L10)
  - 15 points (L1-L6)

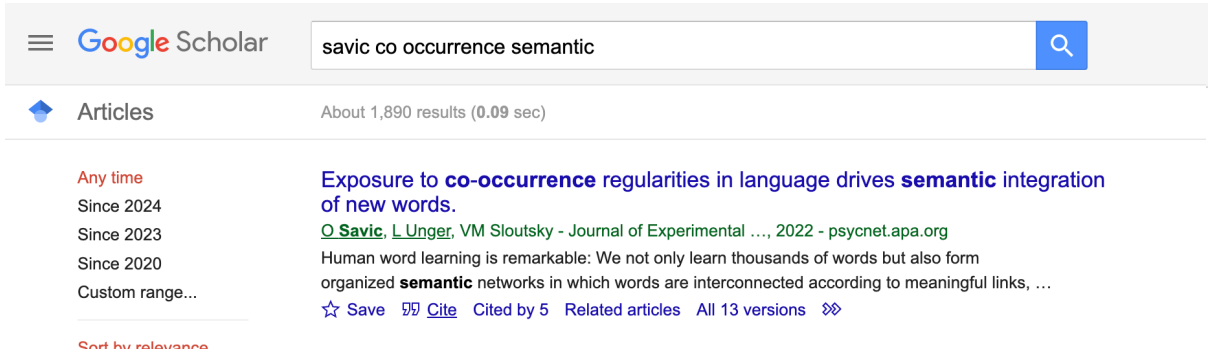
13	Tuesday: April 16, 2024	**Monthly Quiz 2**
13	Wednesday, April 17, 2024	L11: Judgment and Decision Making
13	Friday, April 19, 2024	L11 continued…
14	M: April 22, 2024	**Research Summary [QALMRI] due**
14	Wednesday, April 24, 2024	L12: Social Cognition
14	Friday, April 26, 2024	L12 continued…
15	Wednesday, May 1, 2024	L0-L12 review!
15	Friday, May 3, 2024	**Final**
16	Wednesday, May 8, 2024	Wrapping up!
16	M: May 13, 2024	**Research Reflection due**

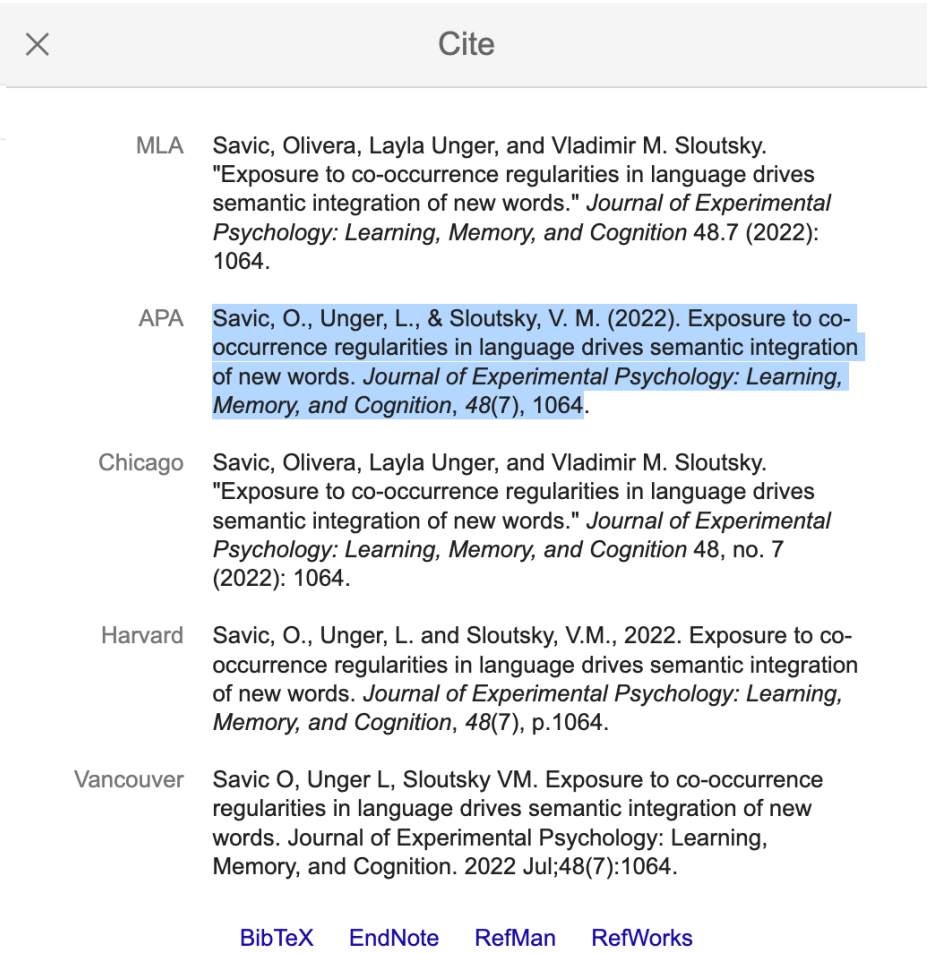
logistics

Component	Total
Weekly assignments	up to 30
Monthly quizzes	15
Midterm assessment	20
Final assessment	30
Research summaries	5
Extra credit	5
Total	105

Letter grade	Points
A	95 - 100+
A-	90 - 94.99
B+	87 - 89.99
B	83 - 86.99
B-	80 - 82.99
C+	77 - 79.99
C	73 - 77.99
C-	70 - 72.99
D	60 - 69.99
F	fewer than 60%

APA citations





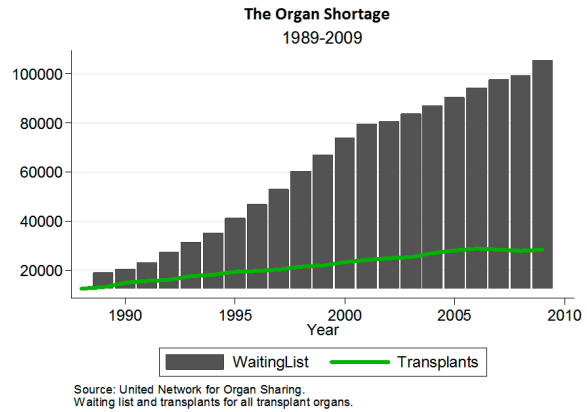
questions in decision-making

- how do people make choices/decisions?
- what factors influence these decisions?

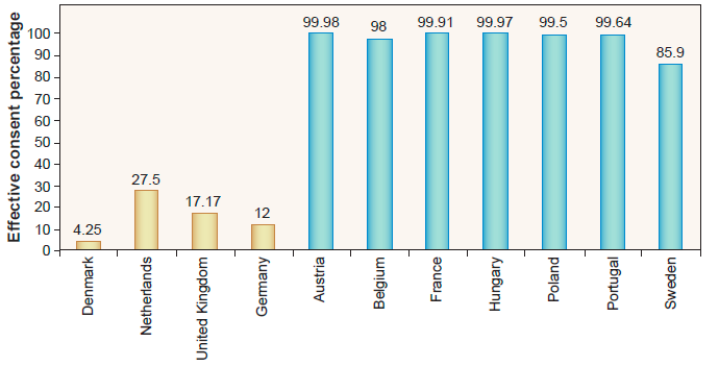
slides are adapted from Dr. Sudeep Bhatia

questions in decision-making

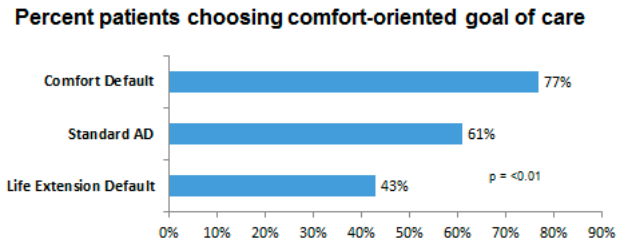
- organ donation
- end of life care



Source: United Network for Organ Sharing.
Waiting list and transplants for all transplant organs.



Effective consent rates, by country. Explicit consent (opt-in, gold) and presumed consent (opt-out, blue).



➢ **After debriefing, only 2% of patients wanted to switch**

The White House
Office of the Press Secretary

For Immediate Release September 15, 2015

Executive Order -- Using Behavioral Science Insights to Better Serve the American People

EXECUTIVE ORDER

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USING BEHAVIORAL SCIENCE INSIGHTS TO

BETTER SERVE THE AMERICAN PEOPLE

A growing body of evidence demonstrates that behavioral science insights -- research findings from fields such as behavioral economics and psychology about how people make decisions and act on them -- can be used to design government policies to better serve the American people.

Where Federal policies have been designed to reflect behavioral science insights, they have substantially improved outcomes for the

two key ideas

rationality

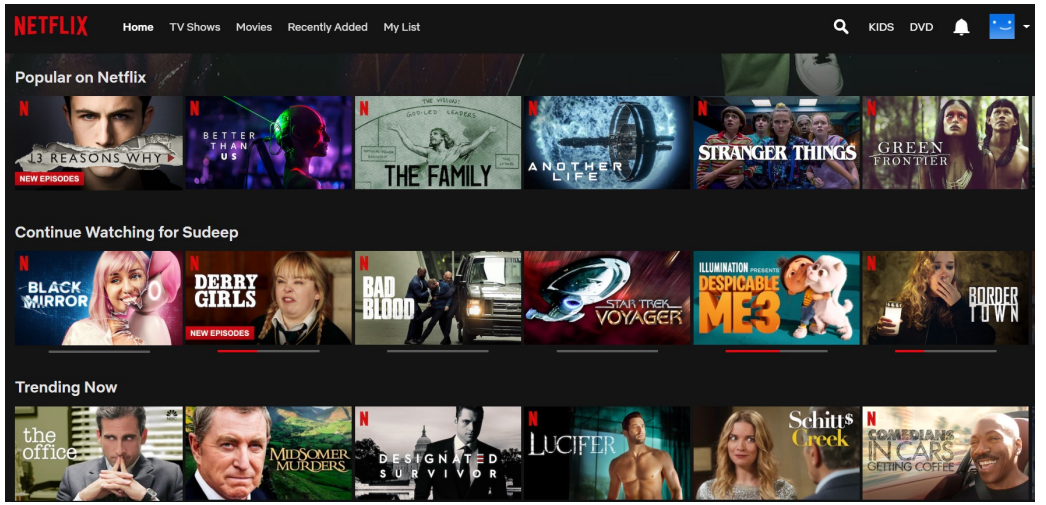
- people use logic, reasoning, and utility maximizing

irrationality

- people are “approximately rational”, prone to biases

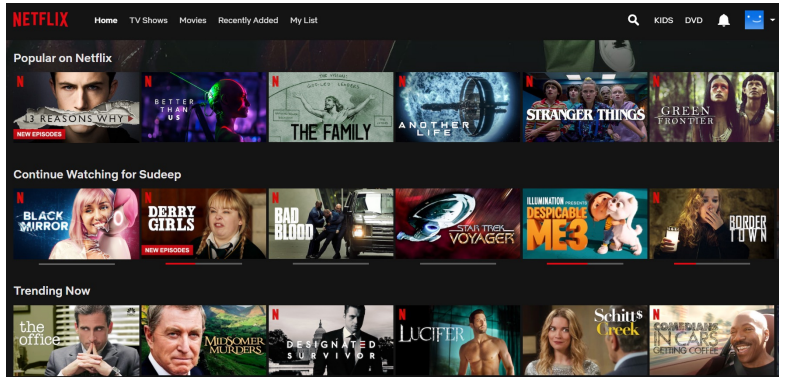
choice

- act involving the selection of a choice object from a set of available objects
- choice objects **can**:
  - have multiple attributes
  - involve risky or uncertain outcomes
  - involve outcomes distributed over time
  - involve outcomes that influence others



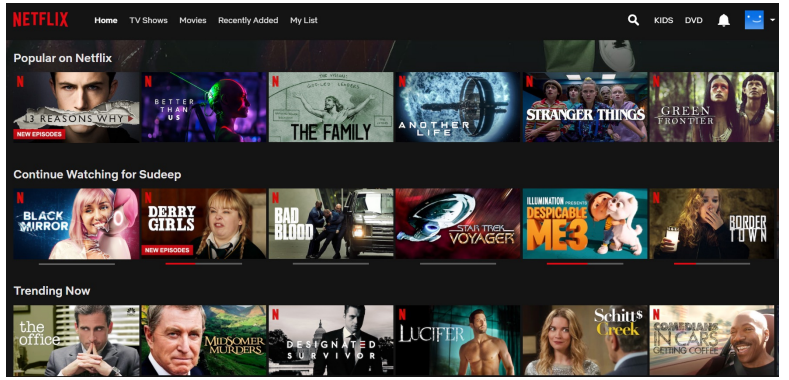
choice = preference satisfaction?

- **question**: how do people make choices, and what objects do they choose?
- preference satisfaction: people have stable preferences, they make choices by satisfying these preferences, and they choose the object they prefer the most



preferences

- attitudes towards choice objects (liking/disliking)
- represented using “preference relations”:
  - $x_1 \succ x_2$ means x_1 preferred over x_2
  - $x_1 \sim x_2$ means x_1 and x_2 are preferred equally (indifference)



preferences: properties/assumptions

- stability: preferences are not sensitive to “context” and are independent of various irrelevant situational factors such as how the choice is presented
  - If $x_1 \succ x_2$ in one context then $x_1 \succ x_2$ in every other context
- transitivity: preferences have an ordering
  - if we have $x_1 \succ x_2$ and $x_2 \succ x_3$ then we have $x_1 \succ x_3$
- completeness: for any two objects either the decision maker likes one over the other or likes them both equally
  - we have either $x_1 \succ x_2$ or $x_2 \succ x_1$ or $x_2 \sim x_1$

choice = preference satisfaction?

- choice set: $X = \{x_1, x_2, x_3, x_4...\}$
- chosen option: $C(X) \in X$
  - $C(X) = x_1$ or $C(X) = x_2$
- if preferences are stable, transitive, and complete:
  - for any choice set X the decision maker can rank the objects in X in order of preference
  - for any choice set X the decision maker will choose the most preferred object

$X = \{$    $\}$

$C(X) =$ 

choice = utility maximization?

- preferences have magnitude or strength
- the utility of an object is the strength of preference for that object so that:
  - $x_1 \succ x_2$ if and only if $U(x_1) > U(x_2)$
  - $x_1 \sim x_2$ if and only if $U(x_1) = U(x_2)$
- If preferences can be described by utilities:
  - For any choice set X the decision maker can rank the objects in X in order of utility
  - For any choice set X the decision maker will choose the object with the highest utility

testing preference satisfaction

- how can we test this?
- by giving people choices!!!!
- all we need is a single counterexample to falsify the theory of choice as preference satisfaction!

testing transitivity

let's say we have four objects, and we observe:

- $x_1 \succ x_2$
- $x_1 \succ x_3$
- $x_4 \succ x_1$
- $x_3 \succ x_2$
- $x_4 \succ x_2$
- $x_4 \succ x_3$

Is this decision maker transitive?

testing transitivity

let's say we have four objects, and we observe:

- $x_1 \succ x_2$
- $x_1 \succ x_3$
- $x_4 \succ x_1$
- $x_3 \succ x_2$
- $x_4 \succ x_2$
- $x_3 \succ x_4$

Is this decision maker transitive?

violations of transitivity

- Tversky finds that people systematically violate transitivity in a variety of experiments
- other examples:
  - semantic relationships
  - non-linear configurations

Table 19.1
The Gambles Employed in Experiment I

Gamble	Probability of winning	Payoff (in $)
a	7/24	5.00
b	8/24	4.75
c	9/24	4.50
d	10/24	4.25
e	11/24	4.00

		Gamble				
Subject	Gamble	a	b	c	d	e
1	a	—	.75	.70	.45[a]	.15[a]
	b		—	.85	.65	.40[a]
	c			—	.80	.60
	d				—	.85
	e					—

stability and relativism

- you need to buy a new tablet and a wireless computer mouse, in preparation for the upcoming semester. You need them today and cannot order them online. Luckily there are two nearby stores that have the exact items you need in stock. However the prices in the stores are slightly different:
- Store 1: Tablet for $450 and Mouse for $20
- Store 2: Tablet for $450 and Mouse for $15
- You are at Store 1, and Store 2 is a 15 minute walk away. Will you go to Store 2?

stability and relativism

- Kahneman and Tversky randomly assigned participants to one of two conditions:
  - large relative discount: Imagine that you are about to purchase a jacket for $125 and a calculator for $15. The calculator salesman informs you that the calculator you wish to buy is on sale for $10 at another branch of the store, 20 minutes away. Would you make the trip to the other store?
  - small relative discount: Imagine that you are about to purchase a jacket for $15 and a calculator for $125. The calculator salesman informs you that the calculator you wish to buy is on sale for $120 at another branch of the store, 20 minutes away. Would you make the trip to the other store?

stability and relativism

- 68% of participants were willing to make an extra trip to save $5 on $15, but only 29% were willing to make this trip to save $5 on $125
- relative comparisons can influence choices even if all costs and benefits are held constant
  - saving $5 on $20 feels better than saving $5 on $450)

groups for today

group 1:	group 2:	group 3:
• Alex • Judith • Paul • Anushka • Nicholas • Emily • Eoin • Nate	• Thomas • Holliss • Miya • Naomi • Michelle • Sage • Mary • Emely • Yesfreily	• Laila • Amanda • Jane • Cole • Emilia • Muzi • Piper • May

group 1: write down a number

How much are you willing to pay for the following?

	Dictionary
Year of publication:	1993
Number of entries:	10,000
Any defects?	No, it's like new.

group 2: write down a number

How much are you willing to pay for the following?

	Dictionary
Year of publication:	1993
Number of entries:	20,000
Any defects?	Yes, the cover is torn; otherwise it's like new.

group 3: write down two numbers

How much are you willing to pay for the following?

	Dictionary A	Dictionary B
Year of publication:	1993	1993
Number of entries:	10,000	20,000
Any defects?	No, it's like new.	Yes, the cover is torn; otherwise it's like new.

stability violations

- joint vs. separate evaluations

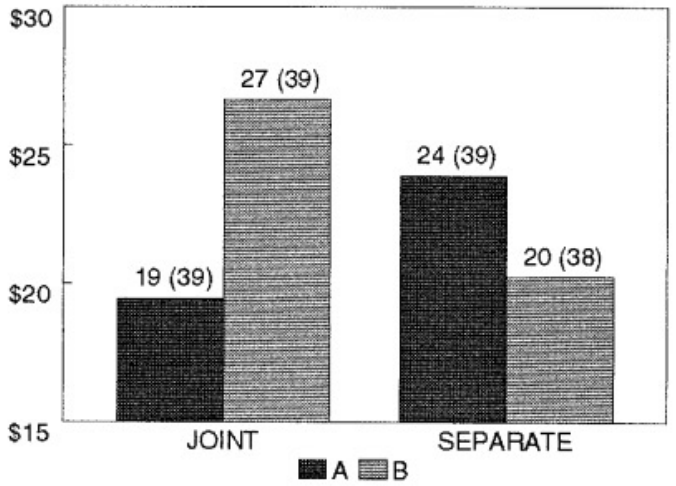


FIG. 1. Mean WTP values for Dictionary A and Dictionary B in Study 1. The numbers in parentheses indicate numbers of participants.

How much are you willing to pay for the following?

	Dictionary A
Year of publication:	1993
Number of entries:	10,000
Any defects?	No, it's like new.

How much are you willing to pay for the following?

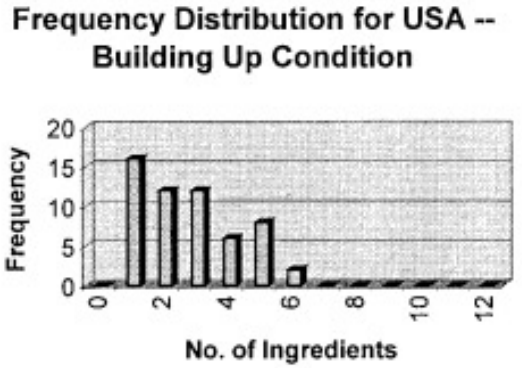
	Dictionary B
Year of publication:	1993
Number of entries:	20,000
Any defects?	Yes, the cover is torn; otherwise it's like new.

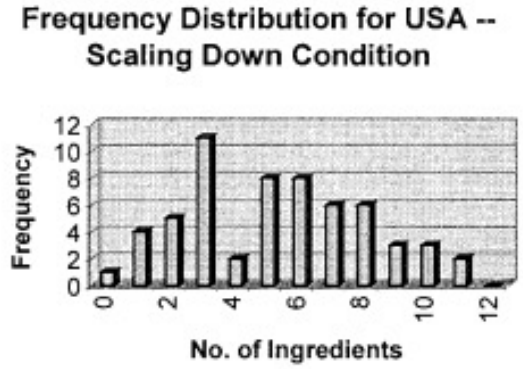
How much are you willing to pay for the following?

	Dictionary A	Dictionary B
Year of publication:	1993	1993
Number of entries:	10,000	20,000
Any defects?	No, it's like new.	Yes, the cover is torn; otherwise it's like new.

stability violations: task framing

- Levin et al. asked subjects to build their own pizzas, with a fixed cost per ingredient. Participants were randomly assigned to one of two experimental conditions:
  - building up: Pizzas were bare and subjects could add ingredients
  - scaling down: Pizzas were fully loaded and subjects could remove ingredients
- what would preference satisfaction predict?





stability violations: summary

- relative comparisons
- joint vs. separate evaluations
- task and attribute framing

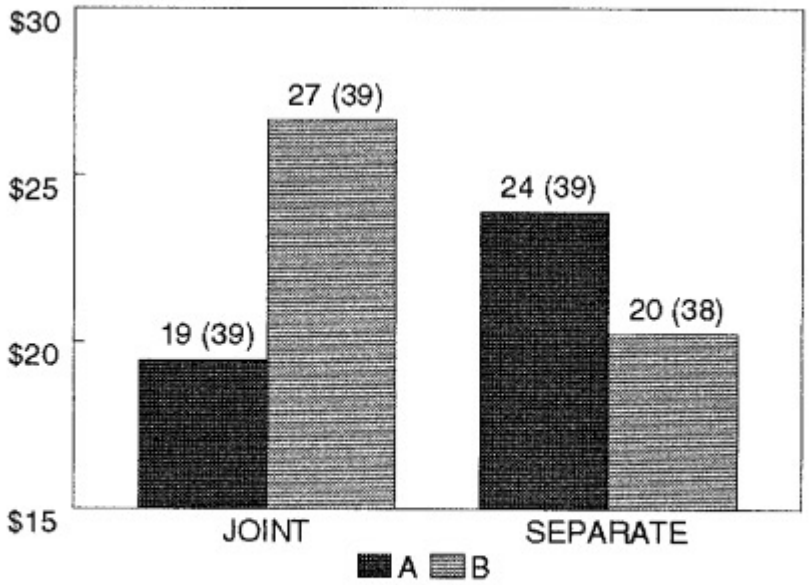


FIG. 1. Mean WTP values for Dictionary A and Dictionary B in Study 1. The numbers in parentheses indicate numbers of participants.

activity: will you choose the gamble?

- x_1: \$110 if a coin flips heads and -\$100 if tails (gamble)
- x_2: \$0 for certain (not a gamble)

choice: expected value maximization

- expected value maximization: people choose the gamble with the highest expected value
- a gamble x_1 offers outcome x_{11} with probability p_{11}, outcome x_{12} with probability p_{12}, outcome x_{13} with probability p_{13}, and so on…
- $EV(x_1) = p_{11} \cdot x_{11} + p_{12} \cdot x_{12} + p_{13} \cdot x_{13} + \ldots$
- a gamble x_1 offers outcome x_{1i} with probability p_{1i}

$$EV(x_1) = \sum x_{1i} \cdot p_{1i}$$

choice: expected value maximization

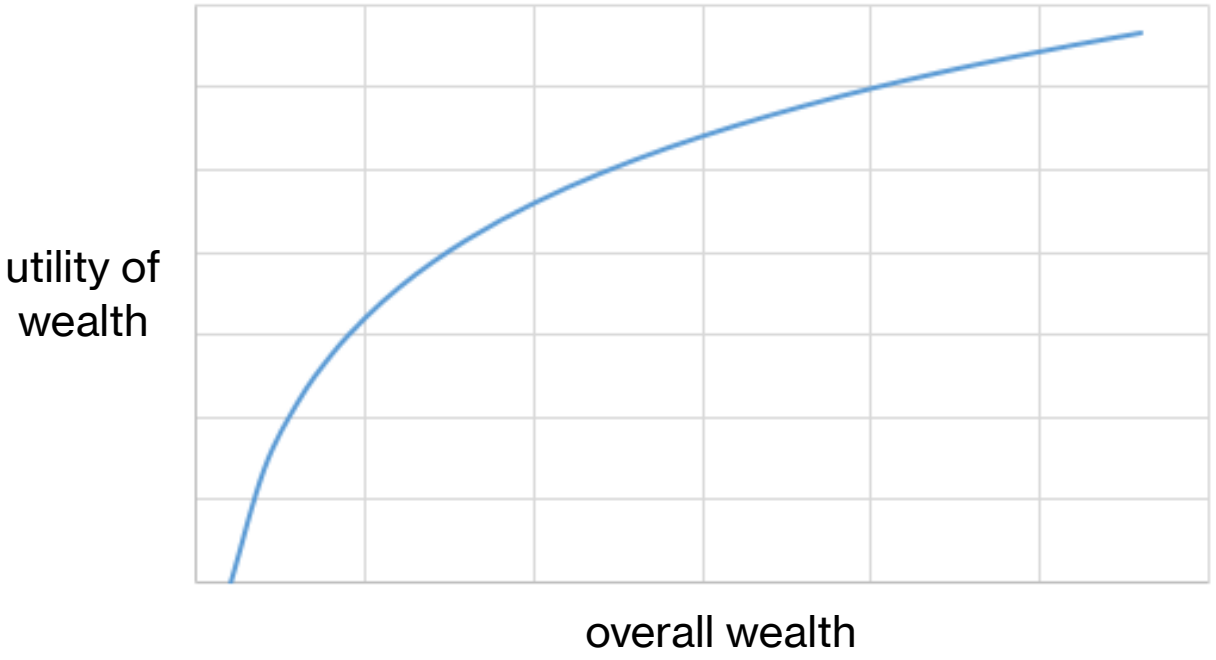
- will you choose the gamble?
  - x_1: $110 if a coin flips heads and -$100 if tails (gamble)
  - x_2: $0 for certain (not a gamble)
- what will an expected value maximizer do?
  - $EV(x_1)$= 0.5 *110 + (0.5)(-100) = 55 – 50 = 5
  - $EV(x_2)$=0
- if people made choices by maximizing expected value they would always choose the gamble over a certain payoff (no matter how large that payoff is!)

choice: expected utility theory

- expected utility theory: people have "utilities" for different wealth states, and choose the gamble that offers them the highest expected utility
- the average utility after playing the gamble for someone with initial wealth *w*

$$EU(x_1) = p_{11} \cdot U(w + x_{11}) + p_{12} \cdot U(w + x_{12}) \ldots$$

$$EU(x_1) = \sum p_{1i} \cdot U(w + x_{1i})$$

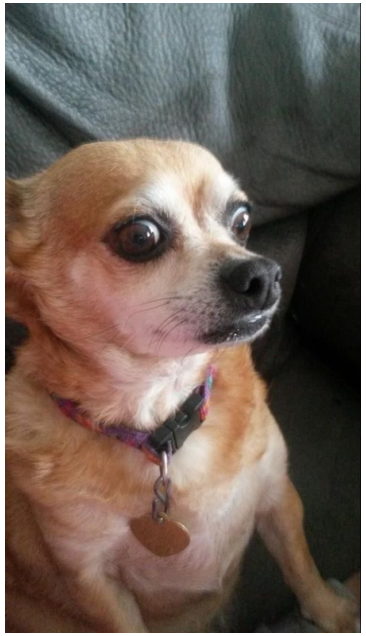


violations: risk aversion vs. seeking

- expected utility theory suggests that people should always try to maximize their expected utility, but people do not always do so
- risk aversion vs. risk seeking vs. risk neutral
- inconsistent preferences

how do we make choices?

- *not* using stable and transitive preferences
- *not* by maximizing expected value
- *not* by maximizing expected utility

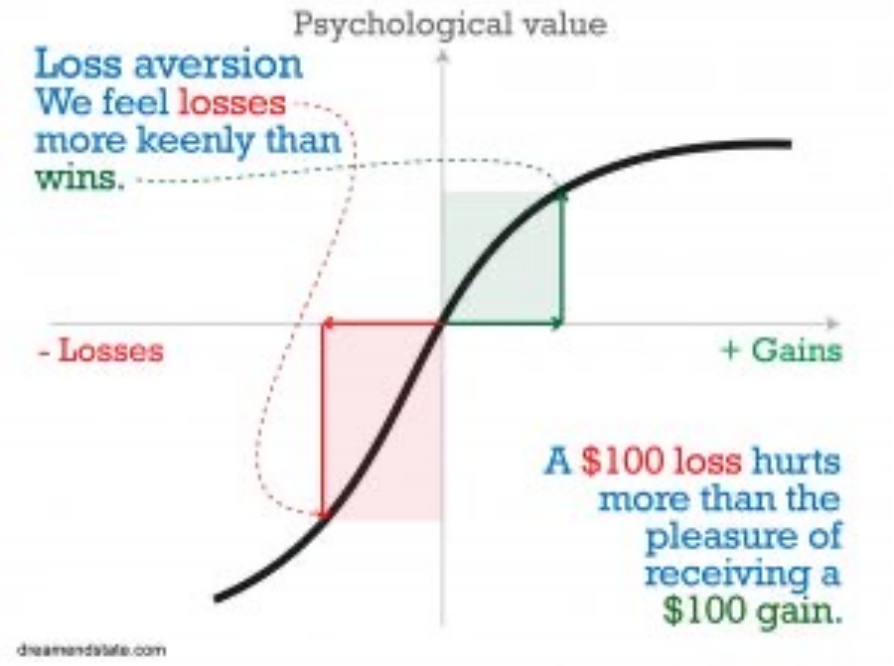


activity

- Option A: offers a guaranteed return of $1000.
- Option B: a gamble with a 50% chance of winning $2000 and a 50% chance of winning nothing.

prospect theory

- behavioral theory to capture how humans make risky choices
- behavioral utility function: people prefer more certain gains rather than the prospect of larger gains with more risk
- overweight small probabilities and underweight large probabilities



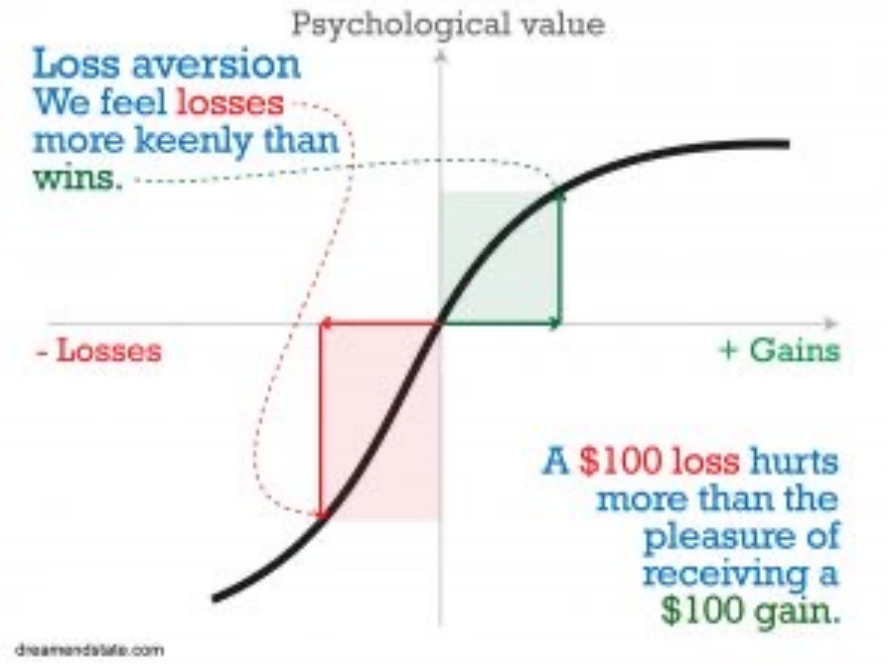
https://www.dreamendstate.com/2021/02/15/prospect-theory-why-we-feel-losses-more-intensely-than-gains/

prospect theory: example

- Option A: offers a guaranteed return of $1000.
- Option B is a gamble with a 50% chance of winning $2000 and a 50% chance of winning nothing.

prospect theory: example

- expected value?
  - 0.5 (2000) + 0.5 (0) = 1000
- both options are the same for an expected value maximizer
- people are more risk averse to losses

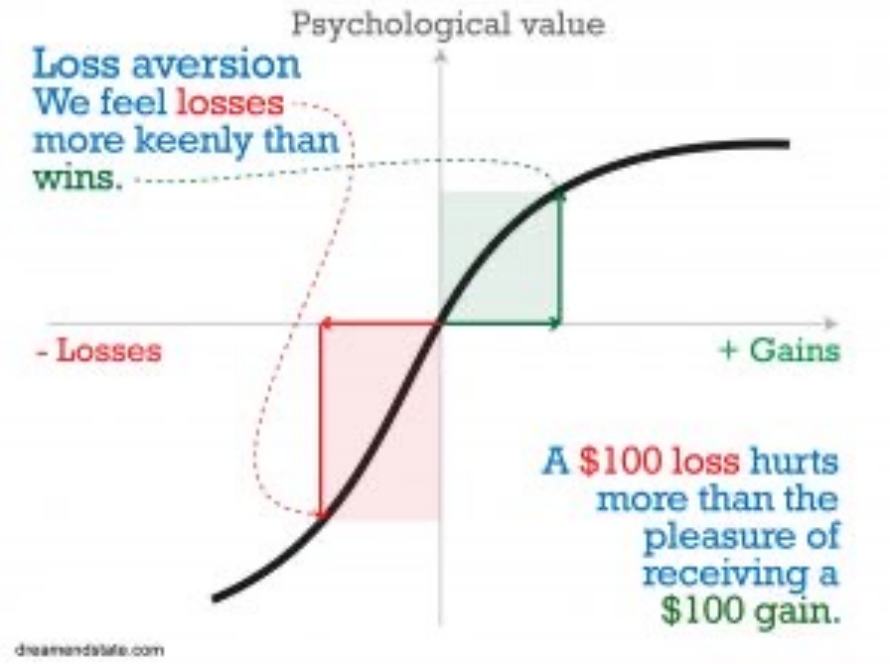


prospect theory: example

- Option A offers a guaranteed loss of $1000.
- Option B is a gamble with a 50% chance of losing $2000 and a 50% chance of losing nothing.

prospect theory: example

- expected value?
  - 0.5 (-2000) + 0.5 (0) = -1000 loss
- both options are the same for an expected value maximizer
- people perceive the gamble as a chance to avoid the guaranteed loss, even if it means taking on additional risk.



prospect theory: phases

editing phase

- your initial response, likely using heuristics and prone to biases

evaluation phase

- compute utility and proceed accordingly

next class

- **before** class:
  - *review:* reading
  - *work on*: QALMRIs
- **next time:**
  - prospect theory + heuristics & biases!
  - social decision making / game theory