

### Different Belief Biases

- ▶ Some belief biases are about things that are *external* to the decision-maker
  - ▶ We have already seen hot hand and gambler's fallacy
- ▶ Other beliefs biases are about things that are *internal* to the decision-maker
  - ▶ Projection bias: biased belief about your utility
  - ▶ Overconfidence: biased belief in your ability

### More on Judgement and Belief Biases

### Motivation: Breakups

- ▶ Asked of people in romantic relationships: *Imagine that you and the person you're involved with break up within the next week. Using a scale from 1 to 7, where 1 is not happy and 7 is very happy, how do you think you would feel on a typical day two months from now?*
- ▶ Asked of people with recent breakups: *Using a scale from 1 to 7, where 1 is not happy and 7 is very happy, how happy would you say you are these days, on a typical day?*
- ▶ Average responses:
  - ▶ Anticipating breakup: 3.9
  - ▶ Recent breakup: 5.4
- ▶ Any potential problems with this design?

Source: Gilbert, Pinel, Wilson Blumberg, and Wheatley (1998)



## Interpretation

- ▶ People may be underestimating how adaptable their preferences are
- ▶ What other situations might have the same failure to predict your own resilience/adaptability?
- ▶ This failure to predict one's adaptability is a specific example of a more general bias:
  - ▶ *Projection bias*: the tendency to overestimate the degree to which future tastes will resemble current tastes

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## Shopping Lists

- ▶ Another manifestation of projection bias: current surroundings or state of mind have an undue impact on your planned consumption in the future
- ▶ Field experiment at grocery store
  - ▶ 135 people entering grocery store without a shopping list
  - ▶ Asked to fill out questionnaire with intended purchases
  - ▶ Some subjects chosen at random for "taste test" of a muffin (real purpose was to make some people less hungry)
  - ▶ After shopping, copies of receipts were collected
- ▶ Results: What was the percentage of items in shopping cart that were unplanned purchases?
  - ▶ Hungry shoppers:
  - ▶ Sated shoppers:
- ▶ Projection bias interpretation?

Source: Gilbert, Gill, and Wilson (1998)

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## Planning Ahead

- ▶ In the previous experiment, it is possible that hungry people are buying more because they are going to consume it right away
- ▶ We can get around this with a design that separates the purchasing and the consumption
- ▶ Experiment with 200 office workers:
  - ▶ Workers asked to pick a snack to be delivered one week later
  - ▶ Snacks could be either healthy or unhealthy (not described as such to participants, of course)
  - ▶ Choices made right before or right after lunch
  - ▶ Snacks delivered right before or right after lunch
- ▶ Results: percent choosing unhealthy option:

	Consume before lunch	Consume after lunch
Choose before lunch	78%	42%
Choose after lunch	56%	26%

Source: Read and Van Leewen (1998)

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## Winter Clothes

- ▶ Projection bias seems to affect small purchases with tempting items like food, but will it affect purchases of more expensive, practical goods?
- ▶ Data from 2.2 million catalog purchases of cold-weather gear
  - ▶ Note this is *not* an experiment
  - ▶ Also in data set: temperature deviation on day item was ordered, relative to historical average temperature for that day
  - ▶ Standard theory: current temperature deviations should not affect purchasing behavior, since gear would not arrive for several days
- ▶ Results: orders for winter gear went up on colder-than-normal days
- ▶ Any alternate explanations?

Source: Conlin, O'Donoghue, and Vogelsang (2005)

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## Theory Behind Projection Bias

- ▶ Individual has consumption  $c$  in state  $s$
- ▶ Utility is  $u(c|s)$ , ie utility of consumption (pool or no pool) depends on state (good or bad weather)
- ▶ Consumer tries to make prediction in state  $s'$  about utility in future state  $s$ :  $\bar{u}_{s'}(c|s)$
- ▶ Rational model:  $\bar{u}_{s'}(c|s) = u(c|s)$
- ▶ Projection bias model:  $\bar{u}_{s'}(c|s) = (1 - \alpha)u(c|s) + \alpha u(c|s')$
- ▶ Variable  $\alpha$  determines your deviation from standard model
- ▶ Note that projection bias *embeds* standard model when  $\alpha = 0$

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## Motivation: Perceived Driving Ability

- ▶ College students asked to rate both their driving safety and driving skill relative to other people in experiment
- ▶ Even if people's estimate are noisy, the average self-ranking should be 50%

- ▶ Results:

Self rating:	Below 50%	50% to 80%	80 to 90%	above 90%
Safety	12.5%	27.5%	37.5%	22.5%
Skill	7.2%	46.4%	26.8%	19.5%

- ▶ What could cause these patterns?

Source: Svenson (1981)

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## Motivation: Entrepreneurs

- ▶ Relatively few new businesses are successful
  - ▶ More than 60% of manufacturing businesses close within 5 years
  - ▶ More than 80% of manufacturing businesses close within 10 years
  - ▶ Note: it is possible that this results from completely rational risk-reward decision
- ▶ Survey of 3000 new business owners were asked to asses the probability of their business succeeding:
  - ▶ 81% said their chances were 70% or better
  - ▶ One third said their business was certain to succeed

Source: Cooper, Wu, and Dunkelberg (1988)

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## What Might Cause Overconfidence?

- ▶ Consider the process of learning about one's ability from observing your own successes and failures
- ▶ Decision makers may ascribe too much credit to their success and explain failures as bad luck
  - ▶ This is a kind of *attribution bias*: failure to correctly attribute causes to their effects
  - ▶ This is also a *self-serving bias*: a bias that makes the decision-maker feel better about themselves
    - ▶ In turn assumes that ego enters the utility function
    - ▶ Also call this *ego defense*

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## Defining Bounded Rationality

### Bounded Rationality

- ▶ *Bounded rationality* is the concept that people have cognitive or computational limits that prevent them from fully evaluating the consequences of their decisions
  - ▶ For example, when you decide what to buy for lunch, you are probably not looking at your bank account and the stock market to calculate your future expected income
- ▶ More likely you are using a *heuristic*
  - ▶ In the lunch example, maybe you just choose the best item that is under \$10
- ▶ These heuristics are often helpful in simplifying a complex problem
- ▶ But as we saw in our discussion of judgement and beliefs, these heuristics lead to persistent biases

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### Narrow Framing

- ▶ People engage in *narrow framing* when they consider only a small set of options for a decision problem rather than optimizing globally
- ▶ Back to the lunch example:
  - ▶ Suppose there are two options on the menu: a chicken sandwich for price  $p_c$  and a steak sandwich for price  $p_s$
  - ▶ You have amount  $m$  in your wallet
  - ▶ The narrow frame compares the “minimal” bundles: (chicken sandwich,  $m - p_c$ ) vs (steak sandwich,  $m - p_s$ )
  - ▶ In theory the bundles are much “larger” than that: (chicken sandwich,  $x_2, x_3, x_4, \dots, x_{1000}$ ) vs (steak sandwich,  $y_2, y_3, y_4, \dots, y_{1000}$ )
  - ▶ That is, you should consider how your choice of sandwich affects what you’ll get for dinner, whether you’ll watch a movie tonight, how much you’ll save for retirement when you get a job, etc

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### Mental Accounting

- ▶ So how do we determine the size of the frame?
- ▶ One possibility: people divide certain purchase decisions into different *mental accounts* or mental budgets
  - ▶ Eg a separate budget for lunches, a separate budget for dinners, a separate budget for movies, and so on
  - ▶ Another possible type of accounting is temporal, eg daily or weekly budgets
  - ▶ Since money is fungible, these budgets are totally artificial
- ▶ We call the act of assigning a consumption decision to a certain mental account *booking*
  - ▶ Eg when you buy the steak sandwich, you *book it* to your lunch budget

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## Example: Lost Tickets

- ▶ Consider the following vignettes:
  - ▶ Problem A: Imagine that you have decided to see a play where admission is \$10 per ticket. As you enter the theatre you discover that you have lost a **\$10 bill**. Would you still pay \$10 for a ticket to the play?
  - ▶ Problem B: Imagine that you have decided to see a play and paid the admission price of \$10 per ticket. As you enter the theatre you discover that you have lost the **ticket**. The seat was not marked and the ticket cannot be recovered. Would you pay \$10 for another ticket?
- ▶ How many people say yes to buying a ticket?
  - ▶ Problem A:
  - ▶ Problem B:

Source: Kahneman and Tversky (1981)

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## Mental Accounting Can Explain Tickets Vignettes

- ▶ Note that in either case you have to pay \$10 to see the play, and your total wealth is the same
- ▶ In Problem A, the lost \$10 does not get booked to the entertainment budget, for example
  - ▶ In this case, still have room in that budget to buy the ticket
- ▶ In Problem B, the originally purchased ticket may have maxed out to entertainment budget
  - ▶ In this case, no room in that budget to buy a second ticket

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## Example: Jacket and Calculator

- ▶ Consider the following two new vignettes:
  - ▶ Problem A: Imagine that you are about to purchase a jacket for \$125 and a calculator for \$15. The salesman informs you that the calculator you wish to buy is on sale for \$10 at the other branch of the store, located 20 minutes away. Would you make the trip to the other store?
  - ▶ Problem B: Imagine that you are about to purchase a **jacket** for **\$15** and a **calculator** for **\$125**. The salesman informs you that the calculator you wish to buy is on sale for \$120 at the other branch of the store, located 20 minutes away. Would you make the trip to the other store?
- ▶ What percentage in each treatment say yes to driving to other store?
  - ▶ Problem A:
  - ▶ Problem B:
- ▶ Any problems with the design?

Source: Kahneman and Tversky (1981)

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## Jacket/Calculator Vignette: Explanations

- ▶ Note that in both versions, you have already decided to buy both items for total of \$140, and will get discount of \$5 on the bundle if you drive
- ▶ One possible explanation:
  - ▶ The calculator and jacket are in two different mental accounts: school supplies and clothes, for example
  - ▶ Evaluate the size of the discount within the narrow frame of the good being discounted
  - ▶ Discount is 33% for problem A and only 4% for problem B

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## Framing and Presentation Effects

- ▶ In the previous subsection, we used the word *framing* (in the context of narrow framing) to mean how the subject presented the information to herself
- ▶ There is another meaning for the word framing: how information is presented to the subject by an outside party (eg an experimenter or an advertiser)
  - ▶ Here, bounded rationality still plays a role, however
  - ▶ A different heuristic is used: the decision-maker looks for clues or shortcuts in the information provided
  - ▶ Can lead to bias when some of the information at hand is totally irrelevant

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## Poetry Workshop

- ▶ Ariely, Loewenstein, and Prelec (2006) run experiment to elicit student's willingness to pay to attend a poetry workshop
- ▶ Started by writing down the last digit of their social security number (call this digit  $n$ )
- ▶ If  $n$  is odd, asked "Would you attend the poetry reading for  $\$n$ ?"
- ▶ If  $n$  is even, asked "Would you pay  $\$n$  to attend the poetry reading?"
- ▶ Additionally, willingness to attend elicited for both groups in same way: price list from being paid  $\$10$  to attend to paying  $\$10$  to attend

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## Poetry Workshop: Results

### Results of Experiment 3

Odd social security number digit (hypothetical question about being paid to attend) ( $N=46$ )

Willing to attend for $\text{US\$} = \text{Soc.Sec.No.}$ (%)	63
Would attend for free (%)	9
Mean valuation (st. error)	— $\text{US\$} 4.46 (.51)$

Even social security number digit (hypothetical question about paying to attend) ( $N=35$ )

Willing to pay $\text{US\$} = \text{Soc.Sec.No.}$ to attend (%)	20
Would attend for free (%)	49
Mean valuation (st. error)	— $\text{US\$} 1.13 (.59)$

- ▶ Both treatment groups require payment to attend on average
- ▶ But the odd group, which was asked initially if they would attend for payment, has a much more negative valuation
- ▶ Authors propose that these results are due to *coherent arbitrariness*
  - ▶ Value of an experience is determined somewhat arbitrarily (eg by looking SSN)
  - ▶ Once value is established, however, subsequent valuations are coherent with first

Source: Ariely, Loewenstein, and Prelec (2006)

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## Subjects Respond Coherently to Changes in Length of Experience

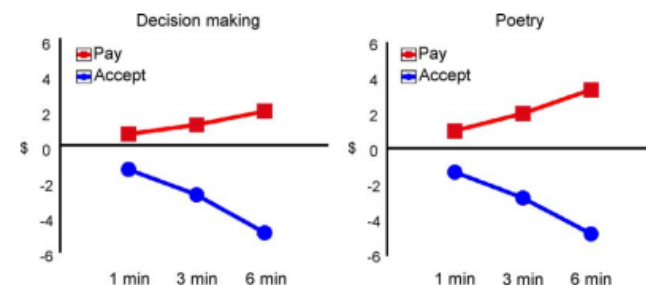


Fig. 1. Experiment 2: willingness to pay/accept money in US\$ for different durations of poetry (right) and experiment participation (left) as a function of whether the hypothetical question was for paying (squares) or accepting payment (circles).

Source: Ariely, Loewenstein, and Prelec (2006)

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## Methodological Aside: Price Lists

- ▶ When trying to determine how much a participant values something, we often ask them a series of questions where we systematically vary the price:
  - Would you pay \$9 to attend the poetry reading? Yes No
  - Would you pay \$8 to attend the poetry reading? Yes No
  - Would you pay \$7 to attend the poetry reading? Yes No
  - etc . . .
- ▶ This is called a *price list*
- ▶ Note that subjects should switch from No to Yes at most once on this list
- ▶ Price lists are a specific example of the *strategy method*
  - ▶ Elicit decision (ie “strategy”) from subject for many possible outcomes
  - ▶ Only one outcome will actually be implemented

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## Motivating Experiment

- ▶ In a lab experiment, 153 students were asked to make hypothetical choices between objects in several choice categories
  - ▶ Eg cars, TVs, restaurants
- ▶ Treatment variable: two or three options in choice set
- ▶ Two options: target and competitor, where neither clearly dominates the other
  - ▶ Eg, 35-inch TV for \$400 or 27-inch TV for \$300
- ▶ Three options: add a decoy option, which is dominated by target option
  - ▶ Eg, add 29-inch TV for \$450 as third option
- ▶ Results:

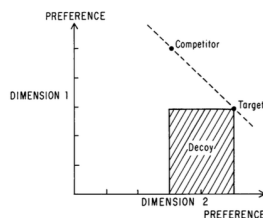
	Target	Competitor	Decoy
Two options	51.5%	48.5%	—
Three options	65.3%	32.7%	2.0%

Source: Huber, Payne, and Puto (1982)

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## What is Going On Here?

- ▶ Classically, adding a third option should not make the purchase frequency of other options go *up*
- ▶ Authors propose a *decoy effect*
  - ▶ Participants have difficulty making comparison directly between target and competitor
  - ▶ However, can clearly see that target is better than decoy
  - ▶ Thus they presume that target is likely to be better deal overall



Source: Huber, Payne, and Puto (1982)

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## Decoy Effect in the Wild

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