

# Econ 211

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# Bounded Rationality

# Defining 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, what are possible heuristics? Example: just choose the best item that is under \$10
- ▶ Heuristics often helpful in simplifying complex problems, but can also lead to persistent biases
- ▶ Three heuristics/baises for this lecture:
  - ▶ Narrow framing and mental accounting
  - ▶ Coherent arbitrariness
  - ▶ Decoy effect

# Narrow Framing and Mental Accounting

# 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:
  - ▶ On menu: chicken sandwich for price  $p_c$  or steak sandwich for price  $p_s$
  - ▶ You have amount  $m$  in your wallet
  - ▶ In theory, 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
  - ▶ The narrow frame compares the “minimal” bundles: (chicken sandwich,  $m - p_c$ ) vs (steak sandwich,  $m - p_s$ )

# Mental Accounting

- ▶ 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

# 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: Image 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: 88%
  - ▶ Problem B: 56%

Source: Kahneman and Tversky (1981)

# 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
- ▶ So why different responses in the two cases?
- ▶ Problem A: lost \$10 does not get booked to the entertainment budget
  - ▶ Still have room in that budget to buy the ticket
- ▶ Problem B: original ticket may have maxed out to entertainment budget
  - ▶ No room in budget to buy a second ticket

## 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: 68%
  - ▶ Problem B: 29%

Source: Kahneman and Tversky (1981)

# 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
- ▶ What is mental accounting explanation of different responses?
  - ▶ 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

# Framing and Presentation Effects

# Framing/Presentation Effects: Coherent Arbitrariness

- ▶ So far 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

# Poetry Workshop

- ▶ Ariely, Loewentstein, 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

# Poetry Workshop: Results

## Results of Experiment 3

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

Willing to attend for US\$ = <i>Soc.Sec.No.</i> (%)	63
Would attend for free (%)	9
Mean valuation (st. error)	—US\$ 4.46 (.51)

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

Willing to pay US\$ = <i>Soc.Sec.No.</i> to attend (%)	20
Would attend for free (%)	49
Mean valuation (st. error)	—US\$ 1.13 (.59)

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- ▶ 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, Loewentstein, and Prelec (2006)

# Subjects Respond Coherently to Changes in Length of Experience

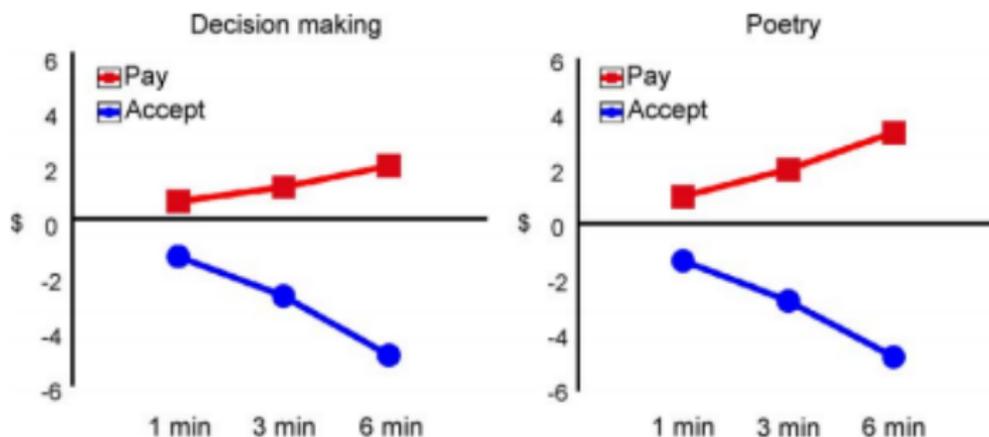


Fig. 1. *Experiment 2*: willingness to pay/accept money in US\$ for different durations of poetry (right) and experiment participation (left) as a function of whether the hypothetical question was for paying (squares) or accepting payment (circles).

Source: Ariely, Loewentstein, and Prelec (2006)

# 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

# The Decoy Effect

# Motivating Experiment

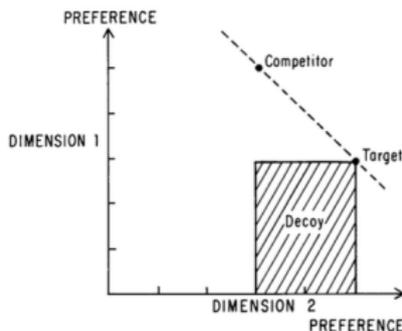
- ▶ In a lab experiment, 153 students were asked to make hypothetical choices between objects in several choice categories
  - ▶ Eg cars, TVs, restaurants
- ▶ Treatment variable: two or three options in choice set
- ▶ Two options: target and competitor, where neither clearly dominates the other
  - ▶ 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)

# 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)

# Decoy Effect in the Wild

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