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?

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- 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

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Narrow Framing

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- 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

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  - 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?

Source: Kahneman and Tversky (1981)

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  - 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?

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- 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?

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?

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  - 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?

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- 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?

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	
Odd social security number digit (hypothetical question about being paid to attend) ($N=46$)	
Willing to attend for US\$ = *Soc.Sec.No.* (%)	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\$ = *Soc.Sec.No.* to attend (%)	20
Would attend for free (%)	49
Mean valuation (st. error)	—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, Loewentstein, and Prelec (2006)

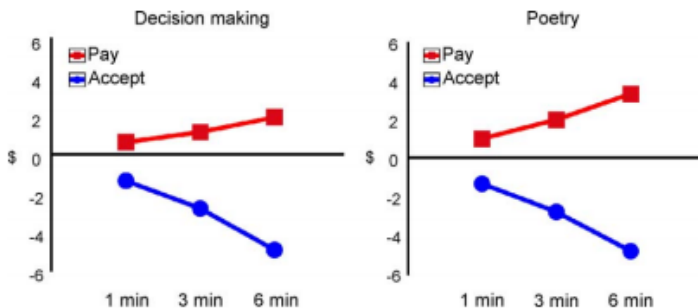# Subjects Respond Coherently to Changes in Length of Experience

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
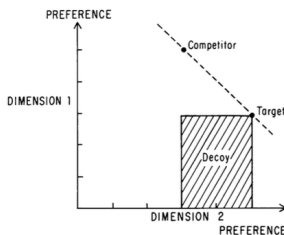
The Decoy Effect

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