



# Scarcity Frames Value

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## Recap

- Economic theories of decision making assume that people are rational and have stable perceptions of value
- People's sense of value are framed by irrelevant contextual factors (Kahneman)



## Related Works

- A scarcity mindset emerges when resources are low relative to needs, and it changes how people make decisions
- Shah, A. K., Mullainathan, S., & Shafir, E. (2012). Some consequences of having too little. *Science*, 338, 682–685.
- Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impedes cognitive function. *Science*, 341, 976–980.



# Motivations

- Classic economic theory are derived from a deeper assumption that people treat resources as limited
- If scarcity mindset emerges, will people's decision making become closer to normative predictions?
- Important to policymakers for the poor



# Hypothesis

- Scarcity reduces certain irrelevant context cues
- Scarcity leads to more consistent valuation
- Scarcity induces better trade-off thinking



# Methodology

- Replicate previous experiment where irrelevant context cues proved to have effect on people's decision making
- Divide participants into scarcity and no-scarcity group, compare the effect of irrelevant context cues on both groups
- Replicate the experiment on multiple groups to prove consistency



## Beer-on-the-Beach

You are lying on the beach on a hot day. . . . you have been thinking about how much you would enjoy a nice cold bottle of your favorite brand of beer. A companion . . . offers to bring back a beer from the only nearby place where beer is sold (a fancy resort hotel) [a small, run-down grocery store]. He . . . asks how much you are willing to pay for the beer . . . he will buy the beer if it costs as much or less than the price you state. But if it costs more than the price you state he will not buy it. . . .there is no possibility of bargaining with the (bartender/store owner). What price do you tell him? (Thaler, 1985)



# Does Scarcity induce Trade-off thinking?

- What actually goes through your mind while making the decision?
- Comparison standards vary from person to person

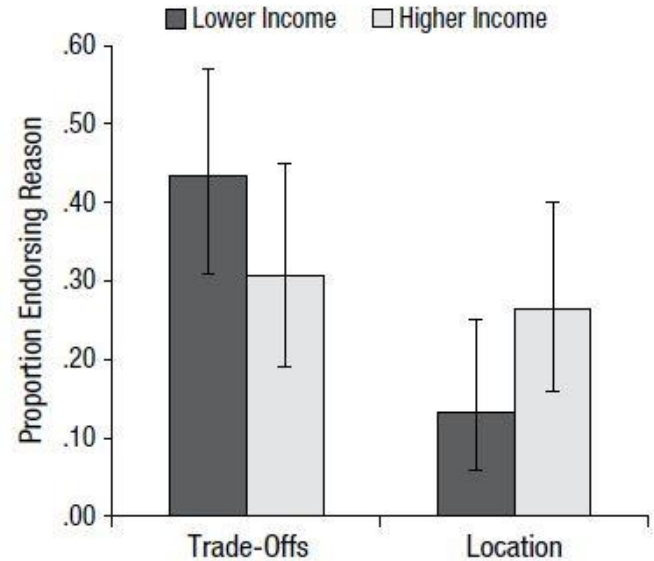


Fig 1: Beer-on-Beach Scenario

# Does Scarcity induce Consistent Valuations?

- What happened in the Beer-on-Beach scenario?

151 participants (mean age = 32.9years; 76 females, 75 males; median household size = 3 people; median household income = \$45,000)

- Higher-income participants

->resort (M= **\$6.09**, 95% CI = [\$5.21, \$6.98])

->grocery store (M = **\$4.21**, 95% CI = [\$3.64, \$4.79]).

- Lower income participants

->resort (M = **\$4.44**, 95% CI = [\$3.81,\$5.08])

->grocery store (M = **\$5.37**, 95% CI =[\$4.35, \$6.39]).

Significance:  $F = 11.18, p < 0.01,$   
 $\eta_p^2 = 0.07$

- What could have been the possible reasons for the above outcome?
  - different expectations about how the price of beer varied between the locations
  - resort frame did not influence lower-income participants



## Translating Utility into Value under Scarcity

- People have difficulty in translating utility into value
- People have a sense of how much they would enjoy the beer, but they have difficulty representing this enjoyment with a price

Under scarcity, people base their price not merely on anticipated enjoyment, but also on anticipated trade-offs, and those are more **consistent guides for valuation**.



## Trend continues in Proportional vs Trade-off Thinking

- Higher-income participants were more likely than lower-income participants to use proportional thinking
- Lower-income participants were more likely than higher-income participants to use tradeoff thinking

*Scarcity leads people to generate their own comparison standards*



## Does the Trend continue to Valuing a Dollar?

No-loss gamble: 7/36 chance of winning \$9.

Loss gamble: 7/36 chance of winning \$9 and 29/36 chance of losing 5 cents.

- Higher-income individuals rated the loss gamble as significantly more attractive (M = 11.63, 95% CI = [10.56, 12.69]) than the no-loss gamble
- Difference was smaller for lower-income individuals (loss gamble: M = 10.38, 95% CI = [9.38, 11.38], no-loss gamble: M = 9.18, 95% CI = [8.31, 10.05])

*Lower income participants are less susceptible to context effects than higher-income participants are.*



## Accessible-accounts effect

People judge value against momentarily primed accounts rather than the backdrop of accessible trade-offs

**How do we deal with it?**



**Will scarcity mitigate this effect and induce a more consistent cognition?**



## View Nutrition Summary

490Cal.

Calories

23g

Total Fat (36% DV)



<https://www.mcdonalds.com/us/en-us/product/large-french-fries.html>

<https://www.businessinsider.com/trump-loves-mcdonalds-afraid-of-being-poisoned-2018-1>





## How fattening could a large fries be?

Consider Caloric Scarcity Study:

234 participants (mean age=31.8 years; 107 females, 127 males) were primed to think of either **a small caloric account** (calories consumed in a day) or **a large caloric account** (calories consumed in a week). They then rated how **fattening** a large order of McDonald's French fries felt on a scale from 1 (not fattening at all) to 11 (very fattening).



## Caloric Scarcity Study continued:

Finally, participants responded to two questions about their dieting habits:

How often do you go on a diet?

To what extent are you dieting right now?

Answers were on a 7-point scale, with higher numbers indicating greater dieting. Compared with non-dieters, dieters were expected to be less sensitive to which account was primed.



## Consider Caloric Scarcity Study:

- **Non-dieters** rated the fries as **more fattening** when they thought about calories consumed in a day than when they thought about calories consumed in a week
  - small account(day):  $M=8.64$ , 95% CI = [8.20, 9.07]
  - large account(week):  $M=7.80$ , 95% CI = [7.21, 8.38]
- **Dieters'** rating **did not differ** much:
  - small account(day):  $M=8.86$ , 95% CI = [8.29, 9.43]
  - Large account(week):  $M=9.13$ , 95% CI = [8.66, 9.60]



## Interaction between dieting status & condition

$F(1,230)=4.40$ ,  $p<0.05$ ,  $\eta p^2 = 0.02$

Treating dieting continuously:  $\beta = 0.43$ ,  $t(230) = 2.11$ ,  $p < 0.05$

The interaction is **significant**: the combination of dieting status and condition is determining how people behave.



# Greater scarcity elicits more consistent evaluation.

Other studies revealing the tendency:

- Consistent Accounting:
  - **higher-income** participants rated the DVD s **significantly more expensive** when they have a small mental account (M=5.74, 95% CI= [5.04, 6.44]) rather than a large account (M=4.47, 95% CI=[3.93,5.01])
  - **lower-income** participants **did not differ significantly** between two conditions (small account: M=5.55, 95% CI=[4.92,6.18]; large account: M=5.75, 95% CI = [5.03,6.48])
- Time Scarcity
  - **time-rich** (250s) participants rated the loss as **more expensive** when they thought about their time budget per round (M=8.31, 95 % CI=[7.78,8.84]) than when they thought about their overall time budget for the game (M=6.50, 95% CI=[5.42, 7.58])
  - **time-poor** (75s) participants' evaluations **did not differ** between small-account condition (M=8.33, 95% CI=[7.14,9.52]) and large account condition (M=8.83, 95% CI=[7.9,9.69])



Consistent Accounting: money

Caloric Scarcity: calories

Time Scarcity: time

**Scarcity is not limited to money, but can be applied on other resources.**



## Key Conclusions

- This paper relates economics to psychology, which is very important in any business domain in global market
- Under scarcity, when people translate utility into value, they also think more about anticipated trade-offs
- Under scarcity, the valuation for a dollar amount or other utilities (like time) is more consistent
- Under scarcity, people are less susceptible to external contextual effects and they focus more on the internally generated standards



# Applications

- Policymakers:
  - Framing and subtle contextual changes might not have as much effect on the poor
- Computer scientists:
  - If developing applications for general audience, price the app/subscription fee while keeping in mind that some audience experiencing scarcity might engage in more trade-off thinking





# What didn't work

- Mental budgeting (lost-ticket)
  - doesn't frame perceptions of value
  - instead becomes a re-purchase problem
- Anchoring
  - doesn't draw on accessible trade-offs, but think about other items or reasons to pay
  - doesn't shift the representation of value, but only distort the scale



# Strengths

- Consistency of results are proven by replicating the experiments across multiple groups with different median income and using scenarios that the participants can relate to.
- Part of the studies are based on previous papers and experiments, making the result more thorough and robust.
- Paper is well-organized and easy to follow; flow and structure is clear.



## Weaknesses

- Result for the beer-on-the-beach and discount experiment may be more accurate (or change) if all response options are taken into account.
- The result for the two effects that didn't reveal a difference between high and low income groups were not elaborated enough.



# Mini-experiment

We asked three questions:

- Proportional vs. trade-off thinking with discount
- Modified version of beer-on-beach
- Average monthly budget

## Question 1

Imagine that you go to Best Buy to buy a tablet computer that costs \$300. The clerk informs you that a different Best Buy store 15 minutes away sells the same tablet computer for \$50 less. Would you go to the other store to buy the tablet computer or would you buy it at the current store?

## Question 2

You just went back to your hotel after having a very long and tiresome day on a business trip. You laid down on your bed and you suddenly start to crave for some Coca-Cola (or Pepsi). Your coworker Bob offers to bring back a bottle (500ml) of Coca-Cola (or Pepsi) from the only nearby place where it is sold, which is the mini store in the hotel lobby. Bob asks how much you are willing to pay for the drink. He will buy the drink if it costs as much or less than the price you state. But if it costs more than the price you state he will not buy it. There is no possibility of bargaining with the hotel clerk. What price, in USD, do you tell him? (Please exclude the dollar sign)





## Mini-experiment

- 27 responses
- Median average monthly budget = \$2000
- Divide into “high” budget group ( $\geq 2000$ ) with 14 participants and “low” budget group ( $< 2000$ ) with 13 participants



## Proportional thinking result

	Price of tablet		
	\$300	\$500	\$1000
“high” budget group	4, 1	3, 0	4, 2
“low” budget group	3, 0	1, 0	7, 2

green = participants who would go to other store for \$50 discount

red = participants who would buy at current store



# Modified beer-on-beach result

Hotel lobby:

- “High”: [2, 3, 3, 4, 5, 5, 10, 10, 10], mean=5.78
- “Low”: [1, 2, 3, 3, 5, 6], mean=3.33

Grocery store:

- “High”: [3, 3, 5, 5, 5], mean=4.2
- “Low”: [0.5, 1, 2, 2, 3, 3, 8], mean=2.79





## References

- A. K. Shah, E. Shafir, and S. Mullainathan. Scarcity frames value. *Psychological Science*, 26(4):402–412, 2015.
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- Thaler, R. H. (1985). Mental accounting and consumer choice. *Marketing Science*, 4, 199–214.