

Behavioral Economics

Sepideh Modrek – Stanford University

Jenny Liu - UCSF

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“Economics”

- **Economics** is the study of how individuals and societies choose to use the scarce resources that have been provided.
- The key word is choose. Emphasis is on *behavior* of economic actors under resource constraints.

Assumptions of Neoclassical Economics: *Homo economicus*

- Behaviors are determined by:
 - **Rational** self-interest, responding to extrinsic incentives
 - Fully informed (knows all past information)
 - Forward-looking
 - Fixed and ordered preferences
- Thus: Maximize expected utility given constraints.

Mix in some insights from cognitive psychology

- Observed behaviors:
 - Mental models and perceptions
 - Framing matters
 - Cues can influence decisions (“nudges”)
 - Heuristics commonly used
 - Intrinsic emotions/attitudes
 - Self-control problems (hot/cold)
 - Fairness matters (social preferences)
 - Memory of past experiences
- Thus behavior is adaptive; it is dependent on the context, preferences, and *transitory* perceptual conditions.

So what is “Behavioral Economics” if economics is all about behavior?

- Unhelpful use: any analysis by economists of health behaviors
- Use by non-economists: interventions that use incentives to change behavior
- Economists: modification of neoclassical economic theory of behaviors to incorporate various insights from cognitive psychology

Types of Behavioral Responses

- Loss aversion and reference dependence
- Poor judgment of probabilities
- Heuristics & bounded rationality
- Time inconsistency
- Framing
- Fairness

(see Camerer & Loewenstein book chapter)

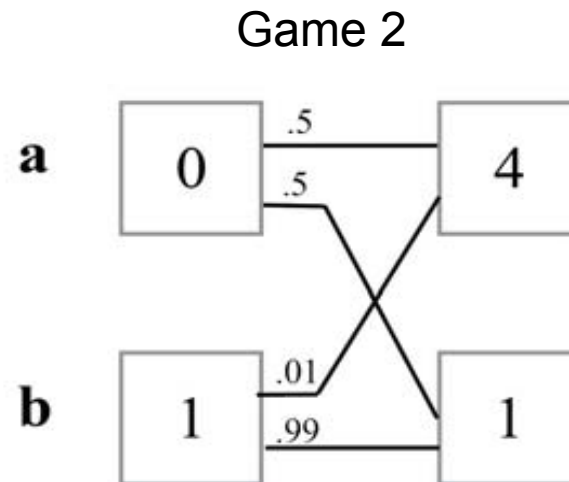
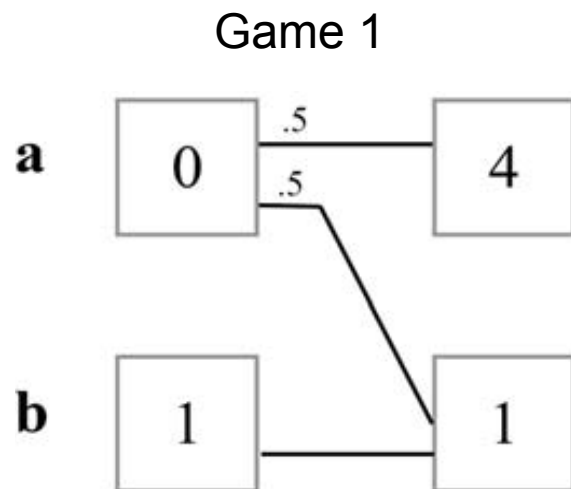
Classic papers on behavioral economics (Kahneman and Tversky)

- People judge probabilities poorly
 - Use “law of small numbers”: Over-emphasize lessons from small samples
 - “Availability”: give too much weight to personal experience
 - Use “heuristics” to process complex decisions; often systematically biased
- Prospect Theory:
 - Risk preferences depend on start point
 - Depends on “decision frame”: averse to risk in choices with gains, risk-loving in choices with losses

Examples of experiments (1)

Which path would you choose?

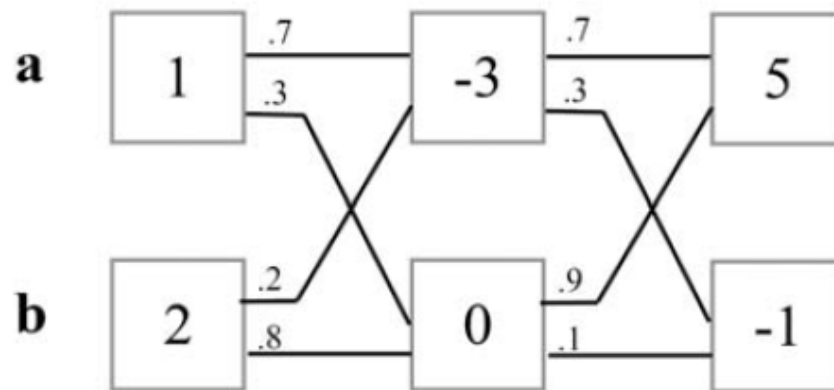
- Path a: Start at 0, with a 50% chance of gaining 4 and 50% chance of gaining 1.
- Path b: Start at 1, with a 100% chance of gaining 1.
- Path b: Start at 1, with 1% chance of gaining 4, 99% chance of gaining 1.



Which game do you prefer?

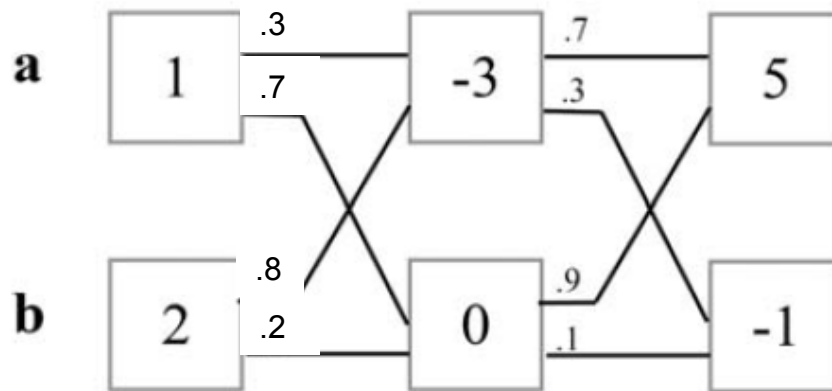
Example Experiment (2)

Which path do you prefer?



Example Experiment (3)

Which path do you prefer?



Some observations

- Even really smart people have a hard time making decisions under uncertainty.
- We rely on our “gut”, but is it right?
- And why are our “gut” reactions so consistent?

Time Inconsistency: “self control” problems

- Neoclassical model:
 - Trade-off present and future at fixed discount rate (e.g. 3%).
 - Thus: Indifferent between \$1 today and \$1.03 in one year and \$1.06 in two years.
- Quasi-hyperbolic discounting:
 - Tradeoffs same as neoclassical (so \$1.03 in one year still valued same as \$1.06 in two years).
 - But immediate gratification gets extra value. (biological cause?)
 - So to give up \$1 today would need say \$1.30 next year (instead of \$1.03 in neoclassical model).
 - Theory for binge eating, postponing tobacco quits to tomorrow, underuse preventive care such as vaccines, etc.
- Negative time discounting
 - Greater preference for future rewards
 - Postpone activities with the most gratification

Intervention:

Binding commitment contracts

- Example: tobacco cessation (Gine, Karlan, and Zinman, 2010):
 - Recruited 2000 smokers in Philippines wanting to quit (think about selection).
 - Randomized to:
 - Control group: smoking cessation pamphlets
 - Treatment group: deposit funds regularly, which would be returned at 6 months only if quit.
 - Results:
 - 11% take-up. Deposits average 3% income.
 - 9% controls quit, vs. 12.5% treatments.
 - Effects statistically significant but not large

Other Applications

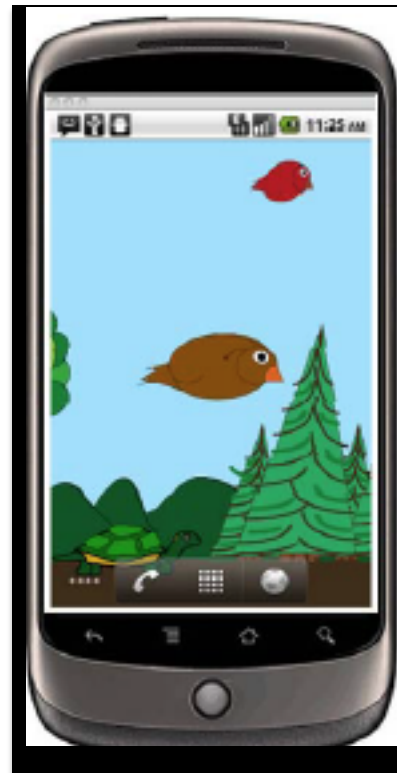
- Binding pre-commitments:
 - Prepay insurance premiums that include preventive care (PC) even if PC is low cost
 - Prepaid vouchers for bed net retreatment
 - Buy cigarettes in small numbers; use patch
 - Weight loss commitment contracts, gym memberships (see study by DellaVigna in NYT article)
- Non-binding commitments introduce cognitive dissonance if violate:
 - Pledge to take deworming drugs

Framing

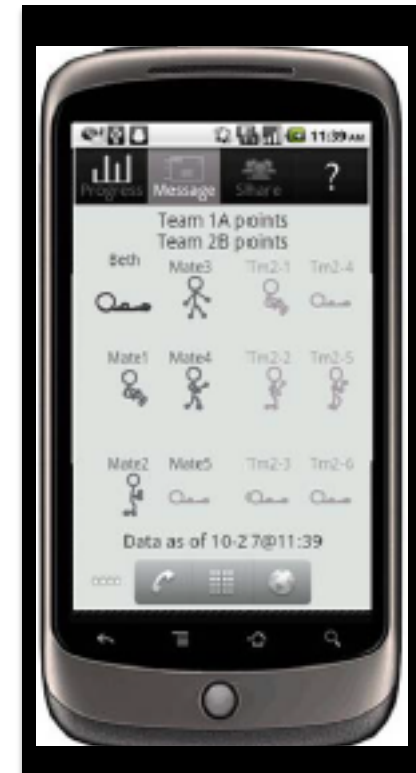
- Rational decisions should not depend on transitory stimuli, but they DO!
 - Active modifications of stimuli
 - E.g. “heat of the moment” (Ariely & Loewenstein 2006)
 - “foot-in-the-door” effects
 - Passive modifications
 - E.g. choice architecture programs



Cognitive

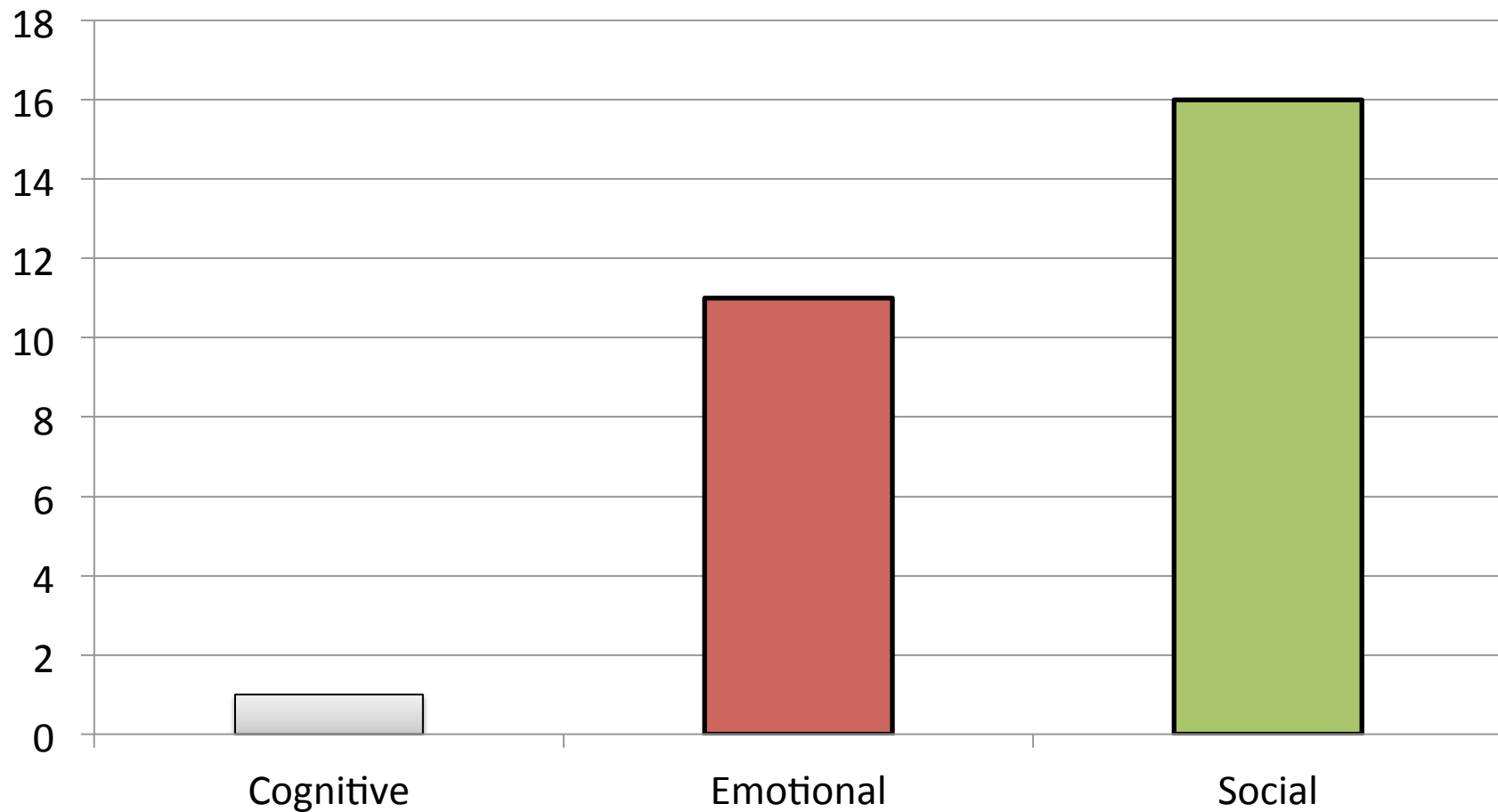


Emotional



Social

Increase in Physical Activity using a Smartphone Accelerometer (over 30 days)



King, Hekler et al, 2013

“Nudge” for malaria treatment

- Malaria treatment in Nigeria:
 - Introduce rapid diagnostic tests to people buying malaria drugs at drug shops
 - Most people presumptively treat themselves for malaria, so following diagnosis is a new behavior to learn
- Study question: Does sending a text message reminder of the diagnosis improve the likelihood that a person will take the right treatment action?
 - Randomly assign half of the respondents to receive a text message one day after their diagnosis.
- Possible confounding: With text message, respondent also has access to talk to an advice nurse.
 - This reduces the cost of seeking out additional advice (e.g. going back to the drug shop for another consultation)
- How to tell difference between “nudge” and traditional “price” effect?
 - Actual behavior: respondent call-backs to nurse, what treatment was taken
 - Ask questions in follow-up survey to determine whether respondent referred to the text message, liked having access to an advice nurse
- If “nudge” is effective, could lead to easy and cheap way to change treatment practices when RDTs are rolled out.

Adherence to Treatment Advice

Primary outcome	Percentage (No)		SMS Risk ratio (95% CI)	SMS Risk difference (95% CI)
	SMS Sent (n=213)	No SMS (n=206)		
Followed treatment advice	79.8% (170)	65.5% (135)	2.08 (1.44-3.01)	14.3% (6.68%-21.9%)
Followed treatment advice*			1.70 (1.20-2.42)	10.1% (3.66%-16.6%)
Followed treatment advice**			2.19 (1.50-3.18)	14.8% (8.14%-21.4%)
Followed treatment advice***			2.13 (1.45-3.12)	14.2% (7.33%-21.1%)

* Allowing for differences by site

** Allowing for differences by site and off protocol days

*** Allowing for differences by site and off protocol days, and accounting for off balance baseline variables (ppmv, bank account, can not read or write)

Confidence intervals clustered by survey site

Treatment on the Treated

39 participants who were sent the SMS reported in the follow-up that they did not see the text. Analysis excluding these participants.

Primary outcome	Percentage (No)		SMS Risk ratio (95% CI)	SMS Risk difference (95% CI)
	SMS Sent (n=174)	No SMS (n=206)		
Followed treatment advice	81.6% (142)	65.5% (135)	2.33 (1.62-3.36)	16.1% (8.89%-23.2%)
Followed treatment advice*			1.84 (1.19-2.85)	11.3% (3.76%-18.9%)
Followed treatment advice**			2.34 (1.46-3.74)	15.5% (7.86%-23.2%)

* Allowing for differences by site

** Allowing for differences by site and off protocol days

Confidence intervals clustered by survey site

By Drug Type

Primary outcome for RDT negative participants who bought both antimalarial & symptom medication	Percentage (No)		SMS Risk ratio (95% CI)	SMS Risk difference (95% CI)
	SMS Sent (n=117)	No SMS (n=123)		
Took anti-malarial	21.4% (25)	41.5% (51)	0.38 (0.23-0.62)	-20.1% (-30.7% to -9.46%)
Took anti-malarial**			0.36 (0.20-0.63)	-21.1% (-31.8% to -10.5%)
Took symptom drug	73.5% (86)	80.5% (99)	0.67 (0.37-1.20)	-7.0% (-17.3% to 3.31%)
Took symptom drug**			0.89 (0.42-1.90)	-2.1% (-15.2% to 11.1%)

** Allowing for differences by site and off protocol days

Confidence intervals clustered by survey site

Why did it work?

What did patients say?

What about the text message did you find helpful?

Reminded me of test result	111
Reminded me of treatment	63
Access to nurse	23
Other	9
No reason	14

SMS consistent easy “Nudges”

- SMS improves adherence to RDT test result by 14% similar to what’s been found in other settings
 - Sunscreen (26% increase in adherence),
 - Remembering diabetes drugs (opt-in design; 8% increase in adherence),
 - General drug adherence (11% increase in adherence; received SMS if forgot pill),
 - HIV ART treatment (13% increase in adherence),
 - Asthma treatment (17% increase in adherence),
 - Even savings!

Neoclassical or Behavioral?

- Incentives for specific health-related behaviors:
 - HIV in Malawi: \$3 incentive to pick-up of HIV test results
 - ARV adherence text message reminders
 - Is there a limit to the “nudge”?
- Incentives for reducing risky behaviors / improving outcomes:
 - Smoking cessation: \$750 incentive raised quitting (after >1 year) from 3.6% to 9.4% (Volpp).
 - Stay HIV negative: Tanzania study offered \$4-\$16 if HIV negative after one year. Results show no effect.

Incentives to Reduce STI Incidence in Tanzania (Dow et al.)

- On-going randomized prevention trial
 - Controls: STI testing every 4 months, free treatment, counseling
 - Treatments: adds incentive payments for negative STI tests.
- Pathways:
 - **Neoclassical price effect:**
incentives raise “price” (lost incentive payment) of risky sex.
 - **Neoclassical time discounting:**
bring rewards of risk reduction closer to present, rather than AIDS reduction far in future. (Not necessarily an aid to self-control problems in “hot state”; instead exploits high discount rates in setting.)
 - **Nudge:**
cash provides a nudge/excuse to alter conventional practices and norms. Qualitative data suggest this is particularly helpful to women in getting their husbands to reduce risky behavior.

Homework

1. Conditional cash transfer programs (Fernald et al. 2008)
 - Mexico's Oportunidades: Large cash transfers to poor mothers conditional on preventive health care and child school enrollment.
 - Compare neoclassical and behavioral economics pathways.
2. Selecting one specific behavioral area in your field, how would you expect an incentive-based program to affect your outcome?
 - Would you be able to tell the difference between neoclassical or behavioral economics pathways?
 - Are there measures that could be collected to help distinguish between these mechanisms?