Incentives

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MW24.2 Experimental Economics (SS2020)

Lecture Plan

- Incentivizing behavior in the lab
- Motivations and incentives
- Common incentive mechanisms

@ Nicholas Bardsley, Robin Cubitt, Graham Loomes, Peter Moffatt, Chris Starmer and Robert Sugden (2010). Experimental Economics: Rethinking the Rules, Princeton University Press [chapter 6]

@ Colin F. Camerer and Robin M. Hogarth (1999). The Effects of Financial Incentives in Experiments: A Review and Capital-Labor-Production Framework, Journal of Risk and Uncertainty 19: 7-42

@ Ralph Hertwig and Andreas Ortmann (2001). Experimental practices in economics: A methodological challenge for psychologists? Behavioral and Brain Sciences 24(3): 383-403

@ Holt, Charles A., and Susan K. Laury (2002). Risk Aversion and Incentive Effects, American Economic Review, 92(5): 1644-1655

Incentivizing behavior in the lab

- Experimental economics and experimental psychology have opposing perspectives on the issue
- Not a single experimental study in the American Economic Review, in which subjects were *not* paid according to performance (1970–1997)
- No more than 26% of experimental studies in the Journal of Behavioral Decision Making employ financial incentives (1988–1997)

Why use financial incentives:

* Hertwig and Ortmann (2001)

- Salient payoffs (rewards or punishment) reduce performance variability
- Financial incentives are easier to gauge and implement than most alternative incentives
- Something that subjects want more of, and there is no satiation over the course of an experiment
- Straightforward translation from economic theory

Motivations and Incentives

- *Motivations*: features of the *subjects* that determine their behavior under given conditions
- *Incentives*: features of the *experiment* that constitute an integral part of such conditions

- Observed behavior is eventually determined by the interaction between incentives and motivations

(!) To say anything about motivations, experimental design has to be *incentive compatible*

Incentive compatibility

$\sim$ mechanism is incentive-compatible if it is in the interest of the participants to reveal any private information truthfully

(!) Hard to achieve when there is no "correct" course of action, consistency of choice or instinctive judgments are studied etc.

- Becker–DeGroot–Marschak method, BDM (Becker et al., 1964):
  * The subject formulates a bid, which is then compared to a randomly generated price
  * If the bid is sufficient, then the price is paid and the item is transferred to the subject
  * Otherwise, nothing happens

Theories of incentives and motivations:

- Capital-labor-production framework
- Intrinsic and extrinsic motivation
- Affective state and prediction failure

Capital-labor-production (CLP) framework

* Camerer and Hogarth (1999)

- "Labor theory": cognitive effort is scarce; can be expended as a result of increased incentives to reduce variance in responses (Smith and Walker, 1993)

- Key features of the CLP framework:
  * Cognitive capital: natural ability, knowledge and experience
  * Cognitive effort is like physical effort: people dislike both and will do more (of both) if you pay them more
  * Subjects choose the amounts of effort and capital to meet the objective of a given task (i.e., to "produce")

Pay enough or don't pay at all

* Gneezy and Rustichini (2000)

- Solve 50 problems involving computation and logical reasoning
- (!) Participation fee of 60 NIS

TABLE I
SUMMARY STATISTICS FOR THE IQ EXPERIMENT, FOR THE DIFFERENT TREATMENTS
The Lower Fraction is the Fraction of Subjects Who Gave a Number of Correct Answers Less than 16

	No payment	10 cents	NIS 1	NIS 3
Average	28.4	23.07	34.7	34.1
Standard deviation	13.92	14.72	8.88	9.42
Median	31	26	37	37
Average top 20	39	34.9	42.35	41.6
Standard dev. top 20	5.25	6.79	3.63	4.18
Average bottom 20	17.8	11.25	27.05	26.6
Standard dev. top 20	11.56	10.22	5.07	6.82
20th quantile	40	35	44	43
80th quantile	20	0	26	25
Lower fraction	15%	27.5%	0%	0%

Incentivizing cognitive effort

Camerer and Hogarth (1999) review 74 exp. papers from AER:

- Incentives sometimes improve mean performance but often don't
- Higher levels of incentives have the largest effects in judgment and decision tasks
- Incentives can hurt if problems are too difficult or when simple intuition or habit provide an optimal answer
- Incentives often reduce variance in responses (especially in games, auctions and risky choices)
- Without a clear standard of performance, incentives often lead to less favorable "self-presentation" behavior (e.g., less generosity)
- Incentive effects are comparable in magnitude to other kinds of manipulation (e.g., intelligence, experience)

Intrinsic and extrinsic motivation

* Ryan and Deci (2000)

- To be intrinsically motivated: to pursue an activity for the *inherent satisfaction* of the activity itself
- To be extrinsically motivated: to pursue an activity in order to attain some *separable outcome* (e.g., financial gain)
- Examples:
  * Solving crossword puzzles
  * Virtually, any activity as a hobby as opposed to a paid job

Intrinsic versus extrinsic motivation

- Motivational crowding out (Frey and Stutzer, 2006):
  - Reduction in self-determination, shift of responsibility from oneself to an external intervention
  - Violation of reciprocity, an implicit contract based on mutual acknowledgement of one's engagement
- Cognitive dissonance (Festinger and Carlsmith, 1959):
  - Psychologically uncomfortable to hold contradictory cognitions
- Self-attribution theory (Bern, 1972):
  - Current behavior is used to make inferences about own motivation

Crowding out in blood donations

* Mellström and Johannesson (2005)

- Monetary compensation for donating blood might crowd out the supply of blood donors (Titmuss, 1970)

Table 2. Experimental results: the supply of blood donors in each treatment.

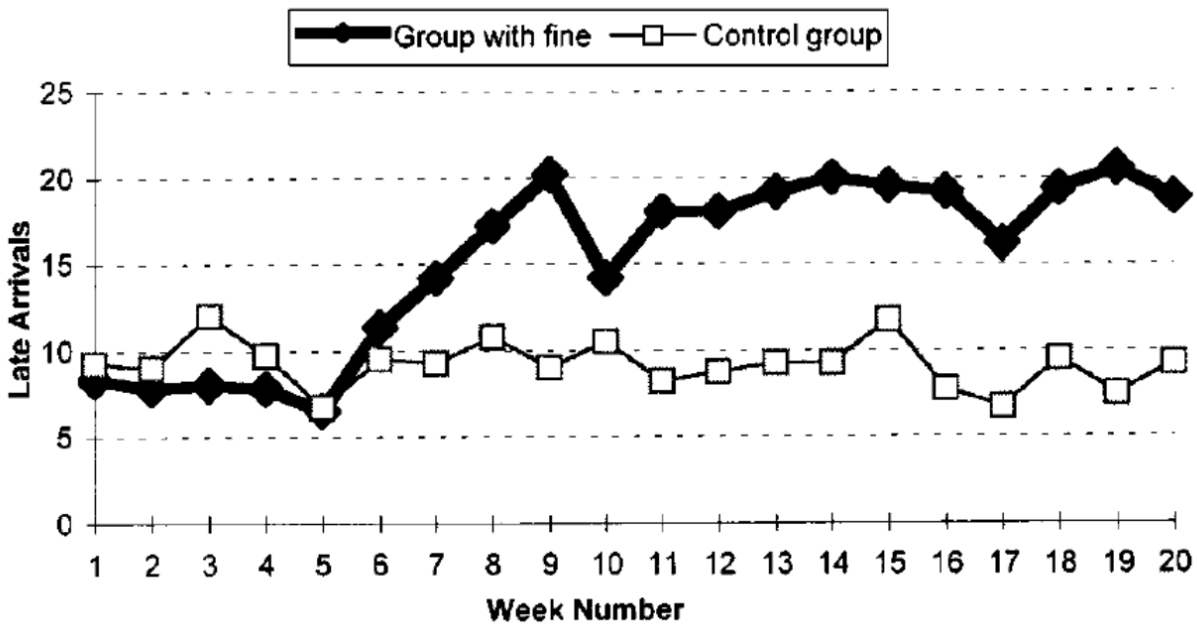
Treatment:	All subjects		Men		Women	
	Number	%	Number	%	Number	%
No payment (1)	38/89	42.70	10/35	28.57	28/54	51.85
SEK 50 payment (2)	28/85	32.94	13/35	37.14	15/50	30.00
SEK 50 payment with charity option (3)	39/88	44.32	13/39	33.33	26/49	53.06
Hypotheses tests (*p*-value of difference):*						
Crowding out hypothesis (treatment 1 versus 2)	0.185		0.445		0.024	
Charity option hypothesis (treatment 2 versus 3)	0.125		0.732		0.020	

* A Pearson chi-square test is used to estimate p-values.

A fine is a price

* Gneezy and Rustichini (2000)

- Monetary fine for arriving late to collect children from day-care centers in Haifa (10 NIS per child)
  $\Rightarrow$ adverse, persistent effect



Affective state and prediction failure

- Affect: an experienced emotion that affects behavior – e.g., hope, thrill, regret, fear, guilt
- Quite often, such affects are part of the situation of interest, and hence of the experiment
- Prediction failure: inability to anticipate affective responses
- Incentivizing tasks solves the problem of hypothesizing about one's emotions
- Ultimately, it's a choice between "hot" and "cold" decision making – i.e., between intuitive or gut feelings, and careful deliberation

Risk aversion and incentive effects

* Holt and Laury (2002)

- Effect of incentives on behavior under risk

Table 1. The Ten Paired Lottery-Choice Decisions with Low Payoffs

Option A	Option B	Expected Payoff Difference
1/10 of \$2.00, 9/10 of \$1.60	1/10 of \$3.85, 9/10 of \$0.10	\$1.17
2/10 of \$2.00, 8/10 of \$1.60	2/10 of \$3.85, 8/10 of \$0.10	\$0.83
3/10 of \$2.00, 7/10 of \$1.60	3/10 of \$3.85, 7/10 of \$0.10	\$0.50
4/10 of \$2.00, 6/10 of \$1.60	4/10 of \$3.85, 6/10 of \$0.10	\$0.16
5/10 of \$2.00, 5/10 of \$1.60	5/10 of \$3.85, 5/10 of \$0.10	-\$0.18
6/10 of \$2.00, 4/10 of \$1.60	6/10 of \$3.85, 4/10 of \$0.10	-\$0.51
7/10 of \$2.00, 3/10 of \$1.60	7/10 of \$3.85, 3/10 of \$0.10	-\$0.85
8/10 of \$2.00, 2/10 of \$1.60	8/10 of \$3.85, 2/10 of \$0.10	-\$1.18
9/10 of \$2.00, 1/10 of \$1.60	9/10 of \$3.85, 1/10 of \$0.10	-\$1.52
10/10 of \$2.00, 0/10 of \$1.60	10/10 of \$3.85, 0/10 of \$0.10	-\$1.85

- Treatments: low real, $\{20x; 50x; 90x\} \times \{real; hypothetical\}$

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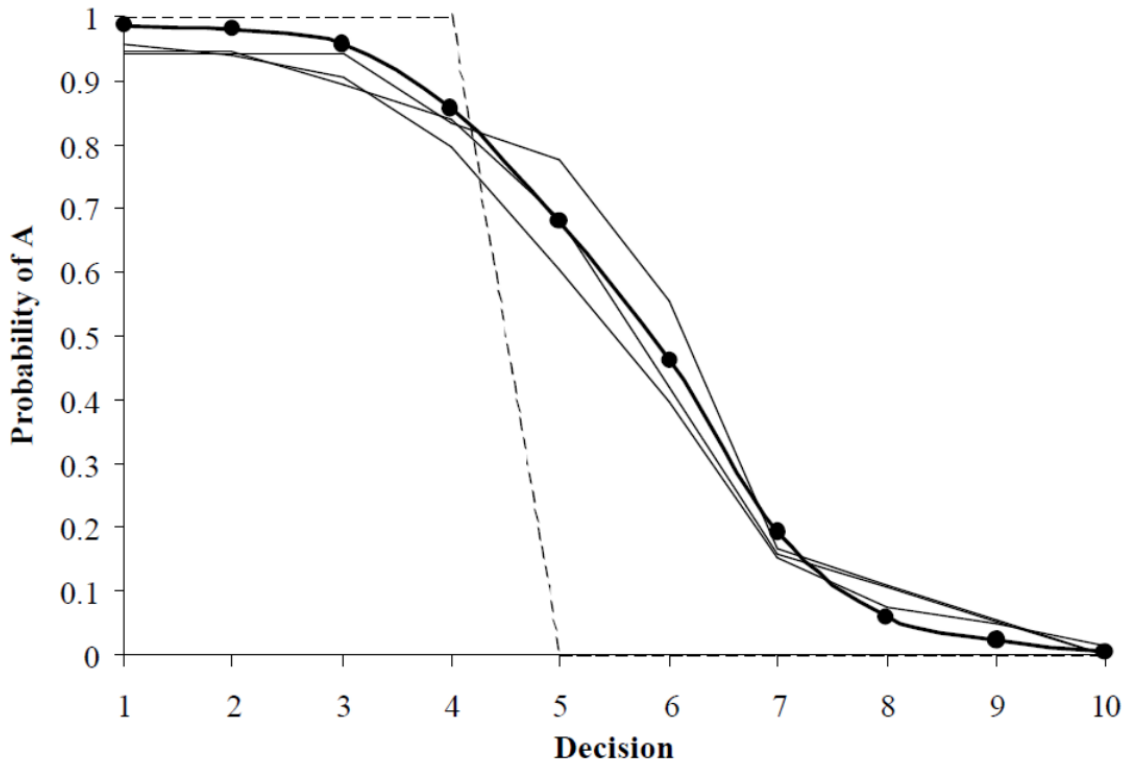

Figure 1. Proportion of Safe Choices in Each Decision: Data Averages and Predictions.
Key: Data Averages for Low Real Payoffs (Solid Line with Dots), 20x, 50x, and 90x Hypothetical Payoffs (Thin Lines), and Risk Neutral Prediction (Dashed Line).

Risk aversion and incentive effects

* Holt and Laury (2002)

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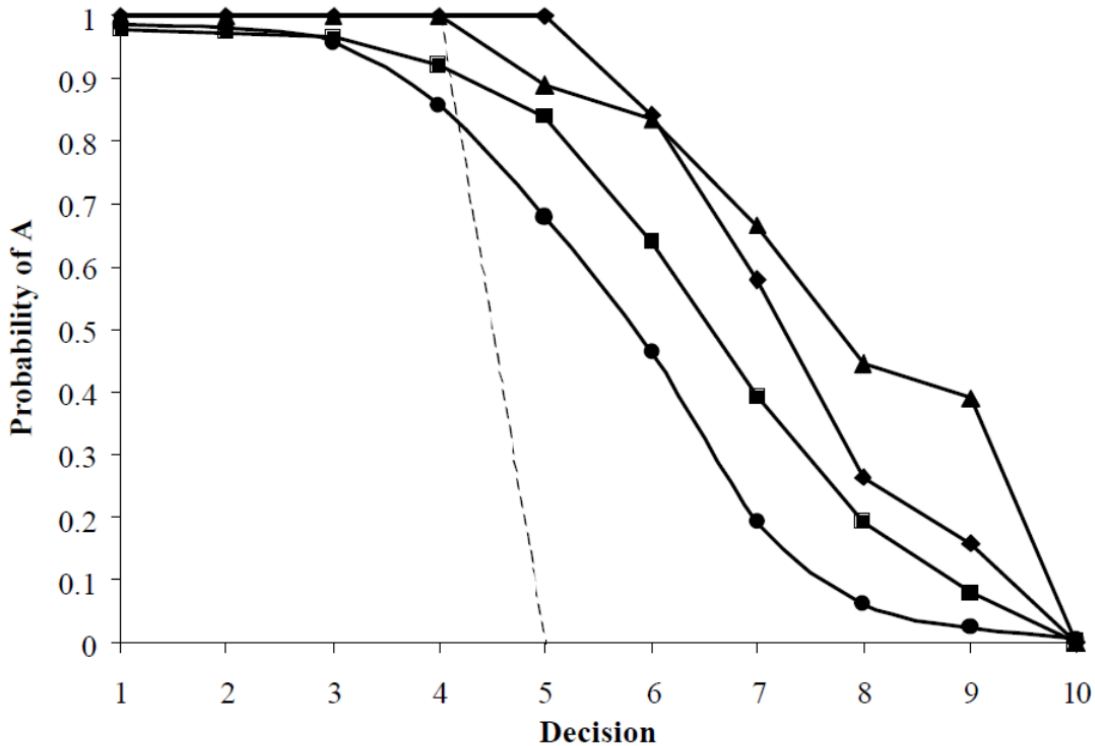

Figure 2. Proportion of Safe Choices in Each Decision: Data Averages and Predictions.
Key: Data Averages for Low Real Payoffs (Solid Line with Dots), 20x Real (Squares), 50x Real (Diamonds), 90x Real Payoffs (Triangles), and Risk Neutral Prediction (Dashed Line).

Common Incentive Mechanisms

- Paying for each task:
  - Expensive
  - Isolation problems (e.g., wealth effects, hedging of risks)
- Random lottery incentive (RLI):
  - Single task is *randomly* selected as payoff relevant
  - Potential limitations:
    - (?) Independence axiom violation
    - (?) Payoff dilution
  - Empirical evidence is rather positive (Cubitt et al., 1998, Laury, 2005)

Common Incentive Mechanisms

- Conditional information lottery (Bardsley, 2000):
  - Similar to RLI but the payoff relevant task is determined *endogenously*, not randomly
- Randomized reward (Bolle, 1990):
  - Random subset of subjects gets paid
- Tournament type payment (Tullock, 1980):
  - Best performing subset of subjects gets paid

Strategy method

* Selten (1967)

- Under the *direct decision* method (also, play method), observed decisions only reveal part of the strategy
- *Conditional* response allows to elicit the whole strategy
- Reasons to use the strategy method:
  * Richer data, especially for rare outcomes (e.g., in games)
  * Elicits considerate views rather than affective responses
- From the game-theoretic point of view, there should be no difference
- Empirical evidence is rather positive (Brandts and Charness, 2011)

Are people conditionally cooperative?

* Fischbacher et al. (2001)

- Willingness to contribute given the average contribution of others

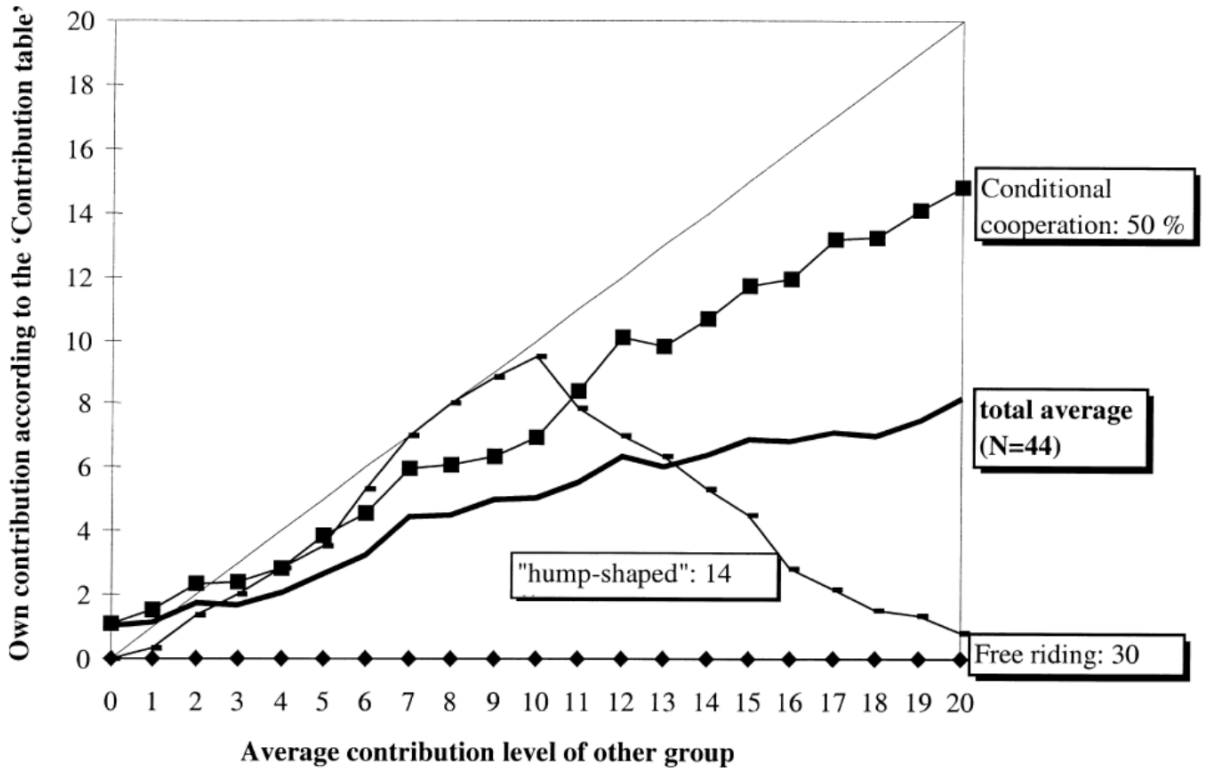

Fig. 1. Average own contribution level for each average contribution level of other members (diagonal = perfect conditional).

The *hot* versus *cold* effect

* Brosig and Weimann (2003)

- Strategy method versus play method

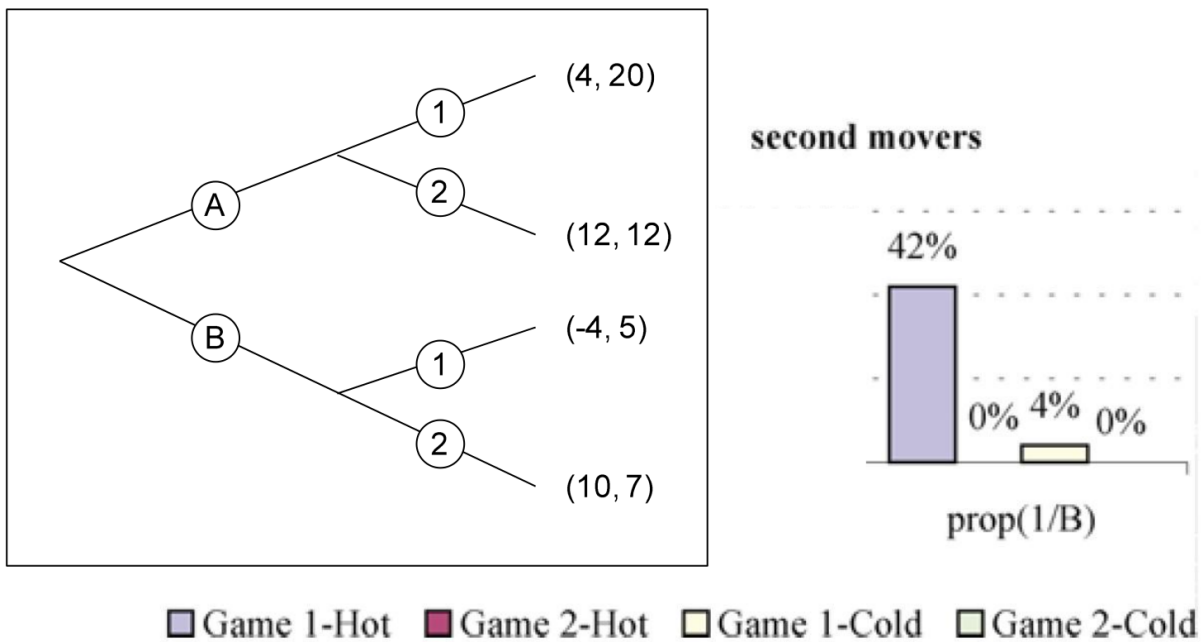

Figure 2. Proportions of off-SPE moves: First versus second movers.

Logistics of task-related incentives

- Task-related incentives are often combined with a flat payment:
  - Participation incentive (i.e., a show-up fee)
  - Ruling out bankruptcy in the lab

- Presentation of task-related incentives:
  - Actual currency
  - Experimental currency units (ECU), tokens etc.
    - Can be easier to handle
    - Exchange rates can be varied across subjects
    - Focal payoff points can be controlled
    - Can have behavioral consequences (e.g., money illusion, artificial competitiveness)
    - Seem to be harmless (Drichoutis et al., 2013)

Lecture Summary

- Why economists incentivize behavior
- Incentive compatibility
- Motivations and incentives
  - Capital-labor-production framework
  - Intrinsic versus extrinsic motivation
  - Affective state and prediction failure
- Incentive mechanisms
  - Random lottery incentive
  - Strategy method