

# Subjects' Motivations

## Lecture 9

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EPS Lectures

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Financial Incentives, Theory Testing, and Validity: How Financial Incentives Work in Theory Testing

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- Moreover, the experimenter wants to populate her institution with actors who make coherent and interpretable decisions.
- **Doing so increases the construct validity of the experiment.**

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- We have already discussed how this works.

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- Some psychologists argue that when money is contingent on the actions of subjects within an experiment then the intrinsic motivation is replaced by extrinsic motivation and the performance of subjects will be negatively affected.
- Deci (1971, p. 108) comments: “If a person is engaged in some activity for reasons of intrinsic motivation, and if he begins to receive the external reward, money, for performing the activity, the degree to which he is intrinsically motivated to perform activity decreases.”

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- They studied the effects of a small payment, a sizeable one, and whether the payment was monetary or candy.
- They also ran the experiment without paying subjects for performance.

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- Further, when the incentive payment was not explicitly monetary, that is, candy, the performance was higher than in the small monetary payment condition. Increasing incentive payments of both types increased performance, although not always reaching the levels of task performance in the control condition with no payment.
- These results support the contention that financial incentives crowd out intrinsic motivations and lead to less task performance.

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- Financial incentives may cause subjects to think they should exert more effort than necessary when simpler decision processes such as heuristics are sufficient.

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- Financial incentives may cause subjects to think they should exert more effort than necessary when simpler decision processes such as heuristics are sufficient.
- According to this explanation we would expect that financial incentives are most harmful for simple, easy tasks or ones where cognitive shortcuts can be effective even in a situation that is complicated.

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- Sprinkle (2000) provides evidence in support of this hypothesis.

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- If workers are paid on an incentive basis such that lower performance lowers wages, they are less likely to internalize these firm goals and there is less voluntary cooperation in job performance [see Bewley (1999) and James (2005)].

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- Miller and Whitford (2002) make a similar argument about the use of incentives in general in principal agent relationships in politics.

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- Somewhat related is an explanation suggested by Heyman and Ariely (2004) based on their experimental analysis discussed above.
- That is, they contend that when tasks are tied to monetary incentives, individuals see the exchange as part of a monetary market and respond to the incentives monotonically but if the tasks are tied to incentives that do not have clear monetary value, individuals see the exchange as part of a social market and their response is governed by the internalization of social norms outside of the experiment.

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- Finally, a fourth explanation of crowding out is informational.
- Benabou and Tirole (2003) show that when information about the nature of a job is asymmetric, incentive based payments may signal to workers that the task is onerous and although increasing compensation increases the probability the agent will supply effort, it also signals to the agent that the job is distasteful and affects their intrinsic motivations to complete the task.

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- These last two explanations (the social norm perspective and the informational theory) also suggest a non-monotonic relationship between financial incentives and task performance.
- That is, when financial incentives are introduced, but are small, subjects' task performance is worsened as compared to the no payment condition (either because they now think of the exchange with the experimenter as a market one instead of a social one or because they see the task as more onerous than before), but as financial incentives are increased, task performance increases if the financial incentives are sizeable enough.

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- Studies by economists suggest that performance-based incentives lead to reductions in framing effects, the time it takes for subjects to reach equilibrium in market experiments, and mistakes in predictions and probability calculations.

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- List (2001) demonstrates that in a hypothetical bidding game bids were significantly higher than in one in which real payments were used.

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- Also, a number of systematic reviews of the literature demonstrate this.

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  - ③ If a reward medium is *private*, then interpersonal utility considerations will be minimized.
  - ④ If a reward medium is *dominant* then the choices made in the experiment are based solely on the reward medium and not some other factors such as the rewards earned by other subjects, i.e., a subject is not concerned about the utilities of other subjects.
- Smith did not specify that these four conditions were necessary conditions to control subject behavior but rather only sufficient conditions (Smith, 1982).

# Induced Value Theory

- Guala (2005, p. 233) points out that these conditions are not hardened rules but actually precepts or guidelines on how to control preferences in experiments. He states:

*“. . . first, the conditions identified by the precepts [of induced value theory] were not intended to be necessary ones; that is, according to the original formulation, a perfectly valid experiment may in principal be built that nevertheless violates some or all of the precepts. Second, the precepts should be read as hypothetical conditions (“if you want to achieve control, you should do this and that”) and should emphatically not be taken as axioms to be taken for granted. . . Consider also that the precepts provide broad general guidelines concerning the control of individual preferences, which may be implemented in various ways and may require ad hoc adjustment depending on the context and particular experimental design one is using.”*

# Monotonicity and Salience

## How Much Should Subjects be Paid on Average: Undergraduate Subject Pools

- When using undergraduate students the standard norm among experimental political economists is to structure the experimental payments so that they are on average subjects earn 50 to 100 percent above the minimum wage per hour (see Friedman and Sunder, 1994, p. 50).

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- Gneezy and Rustichini (2000) conducted experiments that considered how varying the reward medium affected student performance.
- They conducted an experiment in which students answered questions on an IQ test.

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- In all the treatments subjects were given a flat sum payment and treatments varied over an additional amount that the subjects could earn depending on whether they answered questions correctly.
- In the first treatment subjects were not given an additional opportunity to earn more, in the second treatment subjects were given a small amount for each questions they got correct, in the third treatment subjects were given a substantial amount for each question they answered correctly, and in the fourth treatments subjects were given three times the amount given in the third treatment for each correct question.

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- The authors found that essentially treatment one and two were the same and the performance on the IQ tests in those treatments were significantly worse than in treatments three and four.

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- Rather the subjects only have to perceive that the reward medium is sufficient. The authors foreshadow their conclusion with the title of their paper: “Pay enough or don’t pay at all.”
- This research suggests that the rule of thumb of “twice the minimum wage per hour” may be appropriate.

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- They found a monotonic relationship between financial incentives and the tendency of voters to choose as predicted by the game theoretic model.
- Found that this tendency was particularly strong in the complex game with incomplete information.
- These results suggest that in game theoretic experiments, particularly complex ones, increasing financial incentives does increase the attention to voters to the task.

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- Bassi, Morton, and Williams (2008) conducted an experiment on a voting game in which they varied the financial incentives paid to subjects.
- They found a monotonic relationship between financial incentives and the tendency of voters to choose as predicted by the game theoretic model.
- Found that this tendency was particularly strong in the complex game with incomplete information.
- These results suggest that in game theoretic experiments, particularly complex ones, increasing financial incentives does increase the attention to voters to the task.
- This analysis suggests that in complex games the researcher may want to pay subjects more than the standard twice the minimum wage.

# Monotonicity and Salience

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- In their experimental study of lobbying with professionals and students, Potters and Van Winden paid the student subjects the conventional amount, but paid the professional lobbyists four times that amount.
- **They consulted with a public relations firm in making this decision.**

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- Difference in payoffs of choices were extremely small.

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- Another option that many try is to use an artificial currency that is inflated.
- Experimental currency is useful for other reasons as well. Often times the experimentalist is not sure in the design phase of the experiment what would be the best rate at which to pay subjects. Using experimental currency allows the experimenter the flexibility of designing the experiment and even conducting a trial run or two with colleagues (non subjects) before making a final decision as to how much to pay actual subjects.

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- Furthermore, the researcher can also use different exchange rates for different treatments or subjects groups if the experimenter believes it is necessary while not changing the overall experimental design.

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- To ensure the saliency condition is fulfilled the subjects should explicitly know that they will be paid in cash earnings immediately after or given a cash voucher for which they can quickly receive reimbursement.

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- To further emphasize the saliency of money one strategy is to show the subjects the cash from which they will be paid.
- However, in the instructions it should be emphasized that the amount of money subjects will actually receive will depend partly on chance and partly on the decisions that they make during the experiment.

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- They note that “when subject’s earnings become negative (or threaten to become negative) you lose control over induced preferences because negative payments are not credible.”
- Although in personal anecdotes we have heard stories of experimentalists who actually have demanded subjects pay them at the end of the experiment when earnings have become negative, the enforcement of such procedures is likely to be difficult and raises ethical concerns.

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- For example, a subject could begin the experiment with ten dollars to play with in the experiment.
- Grether and Plott (1979) endowed subjects with a budget of seven dollars in a risk experiment.
- Subjects were told that they could only lose two dollars on a gamble so five dollars would be their minimum payment.

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- The experimenter loses experimental control.
- Thaler and Johnson (1990, p. 657) argue: “... after a gain, subsequent losses that are smaller than the original gain can be integrated with the prior gain, mitigating the influence of loss-aversion and facilitating risk-seeking.”

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- Yet, subjects may still see the endowments as not really their own money.
- An alternative solution is to have subjects either receive (or earn) the endowments some period prior to the experiment with the understanding that subjects will be expected to use the endowments in the subsequent experiment.

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- The exact date of the second session was left unspecified.

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- They suggest that such a procedure can help reduce the “house money” effect and allow researchers to conduct experiments in which subjects can lose money.

# Dominance and Privacy

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- In its simplest interpretation, dominance is the requirement that subjects are only concerned with their own payoff and privacy is the enforcement mechanism that prevents subjects from knowing about the payoffs of other subjects.
- Thus, privacy seems to be an important prerequisite for payoffs to be dominant.
- What does it mean for subjects' payoffs to be private information?

## Definition (Privacy)

Each subject in an experiment is only given information about his or her own payoffs.

# Dominance and Privacy

## Single Blind Privacy

### Definition (Privacy)

Each subject in an experiment is only given information about his or her own payoffs.

### Definition (Identities Anonymous to Other Subjects or Single Blind Privacy)

A subject may know the choices that have been made during the experiment by others and the payoffs they received, but not the particular identity of the subjects who made each choice and received each payoff with the exception of the choices he or she made and the payoffs he or she received.

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- Another reason for maintaining single blind privacy is to prevent subjects from collaborating with each other to circumvent an experiment’s goal.
- That is, if subjects are mutually aware of each others’ actual earnings they may attempt to establish an agreement to share earnings after the experiment.
- When payments are made privately, subjects have less ability to enforce such agreements and are arguably more influenced by their own private payoffs.

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- Other extensions as well.
- Koch and Norman conclude (page 229): “Overall, these experiments [previous research of Hoffman et al] and our results suggest that about half of dictator giving observed in standard experiments with exogenously given pie size is internally motivated, and the other half is driven by external factors such as experimenter observability or regard by receivers.”

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- Eckel and Wilson (2006) present the results from an experiment where subjects were paired with partners in a laboratory at another university via the internet.
- Interestingly, Eckel and Wilson found that the subjects choices were significantly different between the two treatments.

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- With CRRA, for a given sum of money  $x$ , the utility to the subject can be represented as follows:  $u(x) = x^{1-r}$ , for  $x > 0$
- where  $r$  is the risk parameter. If  $r < 0$ , the individual is risk seeking, if  $r = 0$ , the individual is risk neutral, and if  $r > 0$ , the individual is risk averse.

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- In their experiments they presented subjects were presented with a series of choices between lotteries.
- Subjects were forced to make choices and one lottery was drawn as the choice for which they were paid.
- From these lottery choices Holt and Laury were able to estimate that subjects' risk parameters.

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- They found that there is a wide variation in risk preferences across subjects but that subjects were on average risk averse even for small differences in lottery choices and that the parameter of risk aversion was in the 0.3-0.5 range.

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- Furthermore they found that when they increased payoffs substantially, risk aversion increased significantly.
- They also compared real payoffs to hypothetical payoffs; they found that increasing hypothetical payoffs did not have a significant effect on risk preferences.
- Their research validates the results of high rates of risk aversion found by previous scholars such as Cox and Oaxaca (1996), Goeree et al (1999), Chen and Plot (1998)].

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- Berg et al (2005) demonstrate that risk preferences of subjects can vary significantly according to the experimental game.
- They had the same subjects participate in three distinctive games involving uncertain outcomes and for which they could easily estimate the subjects' risk preferences.
- They find that all the subjects acted as if they were risk seeking in one of the games but risk averse in another, while in the third subjects split between risk seeking and risk aversion.

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  - 1 Incorporate a procedure in the experiment that can transform subjects to be risk neutral.
  - 2 Generate a measure of the risk attitude of subjects during the experiment.
  - 3 Do nothing but treat the assumptions about risk aversion as technical assumptions in the model. The experimenter can then observe the data and determine for him or herself the impact of risk attitudes for each subject.

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## Making Subjects Risk Neutral During the Experiment

### Definition (Binary Lottery Payoff Mechanism or BLPM)

When subjects in an experiment earn lottery tickets which are accumulated and increase the probability that the subject wins some subject specific prize or other payoff at the end of the experiment.

- Binary lotteries theoretically eliminate subjects' individual risk preferences.

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- Binary lotteries theoretically eliminate subjects' individual risk preferences.
- Unfortunately, the evidence that these lotteries work, that they actually control for risk aversion, is, as Samuelson concludes, "not entirely encouraging."

# Risk Aversion

## Making Subjects Risk Neutral During the Experiment

### Definition (Binary Lottery Payoff Mechanism or BLPM)

When subjects in an experiment earn lottery tickets which are accumulated and increase the probability that the subject wins some subject specific prize or other payoff at the end of the experiment.

- Binary lotteries theoretically eliminate subjects' individual risk preferences.
- Unfortunately, the evidence that these lotteries work, that they actually control for risk aversion, is, as Samuelson concludes, "not entirely encouraging."
- Nevertheless many experimental economists use binary lotteries, although such use is somewhat rare among political economists.

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When subjects in an experiment earn points which are accumulated and the subject who earns the most points at the end of the experiment receives a reward or prize.

- One problem with this type of reward scheme is that it can violate the dominance condition since the expectation of winning some prize is dependent on how other subjects in the experiment are performing.

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- The tournament reward mechanism may also lead to less construct validity for the experiment as the competition creates a supergame for the subjects which may have different equilibria than the model the experiment is supposedly designed to evaluate.
- However, if the competition does not have these problems and dominance is not an issue, then such a payoff mechanism might be attractive.

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- **Alternatively, can use financial incentives**

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## Measuring Risk Preferences During the Experiment

### Definition (Becker DeGroot Marschak Procedure, BDM)

A procedure used to measure subjects' risk preferences by having them buy and/or sell lotteries to the experimenter using a random mechanism.

- In the selling version of BDM the subject starts out with owning the proceeds of a lottery with a known probability  $p$  of a payment of a fixed sum and a probability  $1 - p$  of zero payment.

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- If the number chosen is less than the subject's offer, the subject keeps the rights, but if the number is greater, the subject must sell the rights to the experimenter for an amount equal to the number drawn.
- **After this, the lottery takes place and payments are distributed.**

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- Furthermore, the evidence of Berg et al that risk preferences can vary significantly with institution would suggest that such a procedure is not useful for all types of games [BDM is one of the institutions that Berg et al investigate].

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- **An alternative to the BDM procedure is to use the procedure of Holt and Laury, which does not rely on the buying and selling frames.**

# Risk Aversion

## Measuring Risk Preferences During the Experiment

- In an interesting study, Eckel and Wilson (2003) compare the risk preferences estimated from a survey instrument, the Zuckerman Sensation-Seeking Scale, a replication of the Holt and Laury experiment, and a third choice between a certain amount and a risky bet with the same expected value.

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- They find that the overall Zuckerman scale is only weakly correlated with the Holt/Laury measure.
- They find that neither the Zuckerman and Holt/Laury measures are correlated with the gamble choices.
- These results suggest that estimating risk preferences from one particular institution or a survey for analysis of data in a second is problematic.

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- However, James (2007) contends that these results may also reflect a lack of sufficient opportunity for subjects to “learn” the institution.
- He conducts both buying and selling versions of the BDM procedure for a longer period than previous experiments (52 periods).
- He finds that overtime the risk preferences of subjects in the buying and selling procedures converge, suggesting that the results about risk preference instability may be partly a function of subject errors.

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- They then estimate from the data the subjects' risk parameters after making particular assumptions about how subjects make errors and their utilities.
- Their estimates show stability across a variety of these types of games and are comparable to those estimated by Holt and Laury.

# Risk Aversion and Repetition

## Payoff Mechanisms and Repetition

### Definition (Accumulated Payoff Mechanism (APM))

Where subjects participate in an experiment with repetition and are paid the accumulated sum of their payoffs across periods.

- In this case subjects' wealth will increase during the experiment and their risk preferences may also change.

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- What is the solution to this potential problem?
- One solution is to control for the increase in wealth subjects experience in the data analysis.

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### Definition (Random Round Payoff Mechanism, RRPM)

Where a subjects' performance in one or a few rounds of an experiment with repetition are randomly chosen as the basis for their payments.

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- Again, this procedure depends on the assumption that subjects maximize expected utility as in the BLPM [see Holt (1986)].
- Nevertheless there is some evidence that this procedure does work to separate the tasks for subjects and by suggestion eliminate wealth effects [see Hey and Lee (2005a,b), Cubitt, Starmer, and Sugden (1998), and Starmer and Sugden (1991)].

# Risk Aversion and Repetition

## Payoff Mechanisms and Repetition

- Lee (2008) directly compares the two mechanisms and finds evidence that under APM there are wealth effects on subjects' choices that are not observed under RRPM, suggesting that RRPM is a superior payoff mechanism when the experiment involves repetition.

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- RRPM also has an additional advantage.
- Using this method the experimenter can increase the monetary payoffs by period for each subject.
- This may increase the salience to subjects of their choices.

# Other Incentive Mechanisms

## Home-Grown Values

### Definition (Home-Grown Values)

When an experimenter does not assign outcomes in the experiment with particular financial values. The experimenter might assign the outcomes values in terms of a specific commodity or simply rely on intrinsic values that subjects may place on the outcomes. The intrinsic values subjects assign to the outcomes are unknown to the experimenter.

- May be desirable in order to determine how subjects respond to nonmonetary incentives.

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- Bassi, Morton, & Williams consider party identities as an incentive.

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## Grades

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- They find little difference between the two incentive mechanisms.

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- Another concern is that in many experiments that involve randomization luck is a critical element.
  - Some subjects might be randomly assigned to positions in the experiment where the assignment will determine their successfulness and eventual grade [Stodder (1998)].
  - This type of grading criterion might be considered to be unethical since it is not based on merit.

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- Kam et al considered alternative framing for recruitment letters with nonstudent subjects, one that was neutral – simply stating the money that would be earned (\$30), a second that emphasized the social utility of participation, and a third that emphasized self interest of participation (emphasized the \$30 more than in the neutral letter).

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- They found that the neutral letter was the most effective and that the self interest framing was least effective.

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- The evidence suggests that prepaid monetary incentives tends to have positive effects on survey responses – increasing the response rates for face-to-face interviews, mail, and telephone surveys [see Church (1993), Fox, Crask, and Kim (1989), James (1997), Kulka (1992), Singer et al (1999), Warriner et al (1996), Yammarino, Skinner, and Childers (1991)].

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- There is also evidence that these prepaid incentives increase the quality of the data generated from the surveys [see Davern, et al (2003), Shaw et al (2001), Shettle and Mooney (1999), Singer, Van Hoewyk, and Maher (2000)].

# Motivating Subjects Without Explicit Incentives

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- One of the arguments against the bill is that such regulation is a limitation of “free speech,” while one of the arguments in favor of the bill is that the regulation would reduce the influence of “special interests.”
- Constructed two “fake” newspaper articles from the *New York Times*, each reporting on one of these two arguments.

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- In the framing treatments, subjects read one of these articles and a subset were assigned to discussion groups of four, some where all subjects in the group had read the same article and others where the subjects in the group had read different articles.

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- Subjects were paid a flat fee for participating.
- It does not make sense to reward them based on their opinions or to attempt to place some value on expressing a particular opinion.

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# Motivating Subjects Without Explicit Incentives

## Experimental Relevance and Validity

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- Camerer and Hogarth (1999) note that in experiments incentives interact with many other aspects of an experimental environment to motivate subjects.
- Druckman and Nelson (2003), by conducting their experiments at a point in time when campaign finance reform was much in the news and constructing articles that appeared “real” endeavored to give the subjects the motivation to “care” sufficiently about the issue that they would want to report their true preferences.
- The premise behind the experiment is that the subjects’ reported their opinions accurately because they were internally motivated to do so.

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- Yet, creating the articles to be real actually increases the internal validity of the results since they increase the probability that subjects were motivated to take the issue and discussion seriously and thus make it easier for the researchers to establish causal inferences.
- The realness reduces experimental effects which can interfere with drawing causal inferences.
- Whether the design of the newspaper articles leads to more external validity is unclear since having the articles appear real in themselves does not necessarily mean that the results are robust to changing the treatment parameters or the target population, etc.

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Tversky & Kahneman's Study of the Availability Heuristic

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- If subjects' perceptions and consequently motivations are contrary to what the experimenter is assuming, then the results from the experiment may not have meaning for the experimenter's hypotheses, a failure of internal validity.
- Moreover, the results may not have meaning for other contexts in which the perceptions and motivations of individuals are very different from those of the subjects in the experiment, a failure of external validity.

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- Interestingly, could use financial incentives but do not know of such experiments.