Experimental Social Sciences Laboratory

Appendix II
List of Experiments and Activities

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I. Auctions

A. Buyer's Curse Acquisition Auction:

This program runs a set of two-person auctions in which one makes a bid to acquire an object that is owned by the other. The current owner knows the object's basic quality and the bidder only knows the distribution of possible quality levels. The bidder has a higher value per unit of quality, so economic efficiency would require that the bidder acquire the object. The bidder makes a single take-it-or-leave-it bid, which is either accepted or rejected by the owner. If the bid is accepted, the owner earns the bid amount, and the bidder earns the value (to the bidder) of the quality of the acquired object. If the bid is rejected, the bidder earns nothing, and the owner earns the (lower) value of the quality of the object. There is a potential "buyer's curse" since low-quality units are more likely to be sold by the owner, and hence the bidder may end up paying too much for the object, even though it is worth more to the bidder than to the current owner. The game highlights issues of bidding strategy and asymmetric information.

Parameters, Matchings, Rounds: The experimenter can specify the upper and lower limits of the (uniform) distribution of quality levels and/or choose a "multiplier" parameter that determines how much more a given level of quality is worth to the bidder. The total number of participants in the session is divided up into Proposer/Responder pairs. Matchings may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter may also specify role-specific fixed payments that go to each, independently of the bargaining outcomes. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

B. Common Value Auction:

This program implements a common value auction in which each bidder receives a random draw from a uniform distribution. The value of the prize is the average of these draws, so each bidder only sees a part of the common value. The participants are matched in groups of a size that the experimenter specifies. Each group represents a separate auction. Grouping may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter can vary the number of rounds. Payoff Parameters: specify the upper and lower bounds of the uniform distribution of value draws and the minimum bid (seller reserve price). There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

C. Private Value Auction

In private-value auctions, in each period, all bidders receive random private values that are independent draws from a uniform distribution (which permits a common deterministic value as a special case). After seeing their own values, bidders submit bids, and the high bidder earns the difference between the person's own value and the price paid. This price paid is the person's own bid if you run a "first-price auction." In a "second-price auction," the price paid by the winner is the second highest bid, i.e. the highest rejected bid. There is also an option to set up an "all-pay" auction in which the high bidder wins but all must pay their own bid prices, whether or not they win. The participants are arranged in groups of a size that you select. Each group represents a separate auction. Grouping may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter specifies the number of rounds.

Payoff Parameters: The experimenter chooses a minimum acceptable bid (seller reserve price) and the upper and lower bounds of the uniform distribution of private values. To set a common, deterministic value, set the upper and lower limits of the uniform distribution to be equal, and the instructions will adjust automatically. Another option is to set a fraction of the auction revenue that is returned to each bidder, i.e. a "Santa Clause" option that will raise equilibrium bids. This fraction should normally be less than 1/N, where N is the number of bidders. The revenue rebate option is not available for the all-pay auction. There may be two treatments with differing parameters; but a one treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

D. Auction with Mix of Common and Private Values

Experiments of this type involve an auction in which each bidder's value for a prize is a randomly determined common value, which is the same for all. You can choose between binary and uniform distributions of the common value. Bidders know the distribution that generates the common value, but they do not know the exact realization of the common value. Each bidder observes a signal that equals the sum of the true common value and an error that is uniformly distributed around zero. (The addition of individual-specific, random private values is being planned and tested.)

Auction Procedure: There are several alternate bidding procedures. In a first-price auction, bidders submit simultaneous "sealed" bids, and the prize is awarded to the highest bidder at that person's own bid price. In a second-price auction, the high bidder wins, but only pays the second-highest bid. The third procedure is an ascending-bid (English) auction, in which the bid price is raised sequentially until only one interested bidder remains. The English auction has a number of options, e.g., allowing hidden proxy bids as in an eBay auction. Alternatively, it is possible to allow public bids that raise the call price as in the FTC bandwidth spectrum auctions. The fourth procedure implements a descending-price (Dutch) auction. Finally, the Anglo-Dutch auction (being developed) begins with ascending bids, but switches to a Dutch auction when only two active bidders remaining.

Group Size, Matching, and Rounds: The participants are matched in groups of a size that you specify. Each group represents a separate auction. Grouping may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter specifies the number of rounds.

Payoff Parameters: The experimenter will select both the probability distribution that generates the common value and the range of the uniform random error associated with each bidder's noisy signal of this common value. A minimum bid (seller reserve price) can be set. It is possible to have two treatments with differing parameters, but a one treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

E. Water (Irrigation Reduction) Auction

Auctions of this type are those in which the bidders are "farmers" with multiple irrigation permits that can either be used (to earn money farming) or sold to the "state" at auction. The state has set aside funds to buy irrigation permits with the goal of reducing irrigation during a designated "draught" year. The state is interested in obtaining the maximum irrigation reduction for a given expenditure, so the lowest bids to sell permits are accepted. There may also be a maximum accepted bid, based on political or strategic considerations. Since permits pertain to various sized plots of land, all bids are submitted on a per-acre basis. As the experimenter, you represent the state. You can specify a target number of acres to be taken out of irrigation, a maximum amount of money to be spent, and a maximum bid. The program determines the permits which will be purchased, subject to the constraints of not acquiring more than the target number of acres, not accepting bids above the maximum, and not spending more than the budget. Bidding takes place in a series of "rounds." In each round, the state announces which permits would have been purchased had that been the final round (given the target acres, maximum bid, and budget constraints). Bidders do not know in advance which will be the final round. As the experimenter, you set the maximum number of rounds, but the auction may stop earlier if the acreage target can be met within budget (to disable this feature, set a high target).

Payoff Parameters: The experimenter specifies the upper and lower bounds of the uniform distribution of private reservation values of the plots covered by each permit. The experimenter also specifies the upper and lower bounds of the uniform distribution of per-acre opportunity costs. Thus the sizes and opportunity costs of the permits are randomly determined. For each realization of these random values, the program calculates the "competitive price" range. This range represents the vertical overlap of demand and supply curves that would be relevant if individual bids equal reservation prices and if the government maximizes irrigation reduction given the budget, maximum bid, and target-acres constraints.

II. Bargaining/Fairness

A. Ultimatum/Dictator Bargaining Game

This experiment is a two-person, bargaining game. In the Dictator version, one person simply decides unilaterally how to split a fixed amount of money. In the Ultimatum version, the proposer makes an offer of how to split the money, which the responder either accepts or rejects. An acceptance implements the proposed split, and a rejection results in zero earnings for both. The game setup also allows a squish option, in which case the response to a proposal is a number on the unit interval, where 1 is full acceptance, 0 is rejection, and any fraction is a partial rejection that "squishes" both of the proposed payoffs down to that fraction of their original levels. The game highlights issues of fairness, equity, reciprocity, and strategy.

Group Size, Matching, Rounds: The total number of participants in the session is divided up into Proposer/Responder pairs. Matchings may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter may specify role-specific fixed payments that go to each, independently of the bargaining outcomes, which can accentuate fairness issues. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

B. Reciprocity Games

In "reciprocity" games, the first mover (employer) in each group makes a wage offer, and the second movers (workers) choose effort levels, which are costly to the workers but which benefit the employer. The Nash equilibrium for selfish preferences in a one-shot game is to offer the minimum possible effort, since the wage is paid irrespective of effort. Efforts may be higher with fixed matchings, but even then, increases in the number of workers per employer tend to increase the incentive that workers have to "free ride" on others' efforts. The game highlights issues of reciprocity and strategy.

Group Size, Matchings, Rounds: The participants are divided into groups with one employer and one or more workers in each group. Matchings may be fixed (same in all periods) or randomly reconfigured after each round. There is also a rotation option that can be used to achieve a "no-contagion" rotation where nobody is ever matched with anyone twice or with anyone who has been matched with anyone who has been matched with themselves. The experimenter may specify the (constant) marginal cost of effort for the worker and the (constant) marginal benefit of effort for the employer. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

C. Room Allocation Game

This experiment sets up a three-person game for the allocation of three prizes among three individuals via an auction-like bidding process. This experiment is motivated by the problem of prospective roommates who must decide which person is assigned to each bedroom in a jointly rented house, and how much of the rent must be paid by each. Individuals submit bids for each room that determine the assigned rooms and rent shares. This is a single-step allocation procedure proposed by Steven Brams; see Brams and Kilgour, "Competitive Fair Division," Journal of Political Economy, 2001, 109(2), 418- 443. It makes use of a "second-price" procedure in which the winning bidder pays a price that depends on someone else's bid. As experimenter, you specify the range of acceptable bids, the group size, and the number of repetitions ("rounds"). Groupings may be fixed (same in all periods) or randomly reconfigured after each round.

D. Trust Game

In (generally two-person) "trust games," the first mover decides how much money to pass to the second mover. All money passed is increased by a factor, $M > 1$, and the second mover then decides how much of this to return to the first mover. The Nash equilibrium for selfish preferences is to pass nothing, since a self-interested person would return nothing in the final stage. The game highlights issues of reciprocity and strategy.

Group Size, Matchings, Rounds: The participants are divided into Proposer/Responder pairs. Matchings may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter may specify the first-mover's endowment and the multiplier M that is used to transform the money that is passed. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

III. Decisions

A. Lottery Choice

This program sets up a series of single-person lottery choices designed to evaluate the effects of payoff scale variations. The probability of the higher payoff in each lottery is systematically varied in a manner that facilitates inferences about the degree of risk aversion. Lottery choices are arrayed in order as the probability of the high payoff is incremented. (An alternative lottery choice program that imposes less structure on the presentation of lottery choices is listed as the "Pair-wise Lottery Choice" (PLC) program from the Decisions Menu). Parameters: In a probability-based menu structure (LC), the experimenter can specify the payoffs for each lottery, and how these are to be scaled up or down in each successive choice menu or "round."

B. Lottery-Choice Experiment with Flexible Arrangement of Decision Problems:

This program sets up a series of single-person lottery choices designed to evaluate theories of decision making in risky situations. (An alternative lottery choice program that imposes a probability-based menu structure is listed as the "Lottery Choice," LC program from the Decisions Menu.)

Parameters: If the experimenter decides to continue with the flexible design and arrangement of lottery choices permitted by this PLC program, she specifies the payoffs and probabilities for each choice option or prospect. These prospects are then grouped as alternatives, with each choice problem having up to three alternatives. In this manner, the experimenter can construct up to 10 lottery choice problems, which can be presented in any predetermined or random order in a series of "treatments." It is also possible to transform the reference points and scales of payoffs from one treatment to the next. Finally, the experimenter can choose between having a person's earnings be determined by each lottery chosen, or alternatively, by only one choice problem per treatment, elected ex post at random. Each of these payment methods has advantages and potential drawbacks, but the random-payoff method is often used to control for "wealth effects" when comparing a person's choices made within the same treatment.

Individual choice experiments have long been used to document violations of the predictions of standard expected utility theory. This is an ongoing research area, since no single alternative has gained wide acceptance.

C. Prediction Game (Probability Matching Experiment):

This program sets up an individual decision problem in which the subject must guess which of two random events will occur. The probability of the more likely event is specified by the experimenter but unknown to the subject, who learns through repeated trials. The program also allows specification of a monetary reward for a correct guess and a smaller reward (or penalty) for an incorrect guess. In addition, there is a hypothetical ("do your best") treatment option. Finally, you specify the number of trials and an initial fixed payment.

The discussion may focus on learning about the more likely event in initial periods, and on the extent to which people guess that event with probability one in later trials. "Probability matching" is the popularly accepted tendency for subjects to choose the more likely event with a probability that matches the probability of that event. Such behavior is clearly inconsistent with expected utility maximization. Some economists and psychologists have found that probability matching behavior is rare when financial incentives are used

D. Sequential Search Experiment

This program sets up a single-person decision problem in which the subject pays a cost for each random draw from a specified uniform distribution of prize values. This is a standard sequential search problem. The search sequence stops when a draw is accepted, and the payoff is the accepted draw minus the product of the search cost and the number of purchased draws. The exercise consists of three parts, each with a specified number of search sequences. The search cost and other treatment variables may be different for each part.

The experimenter can specify the search cost, the number of search sequences, the upper and lower bounds of the distribution of prize values, whether or not the nature of the raw distribution is revealed, the maximum number of searches (if any), the maximum number of participants, whether recall of previous draws is permitted, and the amount of an initial fixed payment (if any).

IV. Games

A. Coordination (Minimum Effort) Game:

Overview: This program sets up a game in which each person chooses an "effort". Players are matched in groups of a specified size, and the payoff for each person is the minimum effort made by people in their group (including themselves). There is a cost of effort, which is a constant amount per unit of effort, and each person must pay the cost of their own effort. Thus the payoff is the minimum effort minus a unit cost times one's own effort. Efforts are required to be greater than or equal to a specified lower bound, and to be less than or equal to an upper bound.

This is called a "coordination game" since any common effort is a Nash equilibrium as long as the unit cost is less than 1. To see this, note that unilateral increases in effort are costly and do not alter the minimum, and unilateral decreases lower the minimum by more than the cost saving. Although any common effort is a Nash equilibrium, all players are better off as the common effort increases. The coordination game has fascinated economists because of the possibility of "getting stuck" in a bad, low-effort equilibrium. In fact, such bad outcomes are commonly observed in experiments with many players and high effort costs.

Parameters: The total number of participants in the session is divided into groups of a size that the experimenter can specify, and each group represents a separate game. Grouping may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter also chooses the number of rounds, the range of feasible efforts, and the cost of effort. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

Results might shed light on the extent to which the outcome involves inefficiently low efforts, on equilibrium predictions, and on the intuition of why coordination is harder with high effort costs and large numbers of players. There are some interesting macroeconomic paradigms that have a similar structure, where an economy gets mired in a low-effort, low-output equilibrium, but nobody has an incentive to work harder given that others will not be doing the same.

B. Centipede Game (CPG):

This program sets up a centipede game in which two players make a series of decisions in alternating order. At each stage in the series, the player who has the decision must choose to Stop or Continue. The process continues until one person chooses to stop or until the final stage is reached. Payoffs are determined by the stage in which the process stops. The person who chooses Stop earns more than the other person, but payoffs typically increase with successive stages.

Pairings may be fixed (same in all periods) or randomly reconfigured after each round. In either case, a random device is used to determine players' roles (which one has even-numbered decisions and which one has the odd-numbered decisions). Each sequence of alternating decisions is referred to as a "round;" you specify the number of rounds, the maximum number of stages in each round, and the payoffs at each stage for the person who stops at that stage and for the other person. The experimenter has the option of switching to a second set of payoffs, so that each cohort of participants goes through two treatments. The matching method and the maximum number of stages may also be altered between treatments.

Guessing (Beauty Contest) Game

This program sets up an experiment in which each person is given a chance to guess a number on a specified range, e.g. from 0 to 100. Then the average of all guesses is calculated, and a money prize is awarded to the person who is closest to a pre-announced fraction of the average. For example, a prize of $5 may be awarded to the person whose guess is closest to one half of the average of all guesses, including that person's own guess.

The guessing game has fascinated economists because the Nash equilibrium is to guess the lowest point in the range, but the winning guess is typically not at that point. The results of this game provide insight into what people expect others to do, and perhaps into what they think others think they will do, etc.

Parameters: The total number of participants in the session is divided into groups of a size that you specify, and each group represents a separate game. Grouping may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter also chooses the number of rounds, the the range of possible guesses, the prize payoff, and the fraction of the average that determines the winner. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero. Finally, it is possible to specify an additive constant so that the winner is the one whose number is closest to a target determined as A + B*average, where A and B are specified. This permits one to move the target (and the Nash equilibrium) away from 0.

D. Matrix Game

This program sets up a two-player, two-decision matrix game. Pairings may be fixed (same in all periods) or randomly reconfigured after each round. You specify the number of rounds and each player's payoffs for each of the four possible outcomes. You also have the option of switching to a second set of payoffs, so that each cohort of participants goes through two treatments. The matching method may also be altered between treatments.

This structure can implement any of the standard 2x2 games: Prisoner's Dilemma, Coordination, Matching Pennies, Chicken, Battle of Sexes, etc..

E. Matrix Game

Overview: This program sets up a two-player, multi-decision matrix game. Pairings may be fixed (same in all periods) or randomly reconfigured after each round. You specify the number of rounds, numerical values of decisions or text names of decisions, and each player's payoffs for each of the possible outcomes. With large numbers of decisions, it is convenient to use some standard payoff formulas that permit linear, quadratic, and min/max structures. For example, payoffs can be set to correspond to matrix-game versions of Cournot or Minimum-effort Coordination Games. The experimenter has the option of switching to a second set of payoffs, so that each cohort of participants goes through two treatments. The matching method may also be altered between treatments.

F. Traveler's Dilemma Game

Overview: This program sets up a game in which each person chooses a "claim". Players are matched in groups of a specified size, and the payoff for each person is the minimum claim made by people in their group (including themselves). In addition, a reward of $R is added to the payoff of the person (or people) with the lowest claim(s), and an equal amount is deducted from the others' payoffs. There is no penalty or reward if all claims are equal. Claims are required to be greater than or equal to a specified lower bound, and to be less than or equal to an upper bound.

The reward for being low provides an incentive to "undercut" any common claim, so the only Nash equilibrium is for all to claim the minimum allowed level. This theoretical prediction is independent of the size of the penalty/reward parameter R. This game shows how behavior may deviate sharply from Nash predictions when R is relatively low.

Parameters: The participants are divided into groups of a size that you specify, and each group represents a separate game. Grouping may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter specifies the number of rounds. You also choose the range of feasible claims, and the penalty reward parameter. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

The experiment can be motivated by a story of two travelers who lose their luggage with identical contents, and the airline official tells them to fill out claim sheets independently. The representative promises to reimburse claims fully if they are equal, but to assume that higher claims are falsely inflated and in this case to only give each person the minimum of the claims. In addition, a reward of $R is given to the low claimant, and an equal penalty is deducted from the compensation for each of the others.

G. Two Stage Game

This program sets up a two-player, two-stage game in which one player moves first and the other follows. The experimenter specifies the number or rounds, with pairings that may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter also chooses numbers of decisions, their names for each player, and the players' payoffs for each of the possible outcomes. It is possible to control the information that the second mover has about the other player's prior decision. In particular, the first-mover's decisions are partitioned into information sets, with the number of second-mover decisions varying from one information set to another. Finally, the experimenters have the option of switching to a second setup (decisions, information sets, payoffs, matching method), so that each cohort of participants goes through two treatments.

V. Asymmetric Information

A. Information Cascade Experiment

This program sets up a sequential decision-making task in which each person obtains a private signal about which of two events has occurred ("Red" or "Blue") and must make a public prediction of the event. Predictions are made in sequence, with each person being able to observe the predictions but not the signals of those who preceded in the sequence. Earnings are higher if one's prediction turns out to be correct. This setup allows "information cascades" in which an individual may make a prediction that contradicts their own private signal, which is optimal if the information content of prior predictions exceeds that of one's own signal.

Parameters: The total number of participants in the session may be divided into groups of a size that you specify. Groups are fixed (same in all rounds), and you specify the number of rounds. The experimenter also specifies the probabilities of each event, the information structure of the signals, and the payoffs for correct and incorrect predictions.

B. Statistical Discrimination

Participants are divided into equal numbers of "workers" and "employers," with half of the workers being "green" and half "purple." At the beginning of each round, each worker sees a random cost of investment, which is an independent draw from a uniform distribution on [0, 100]. This cost draw is private information. Each worker then decides whether to incur this cost and "invest." Each worker is matched with an employer, who can see the worker's color, but not the cost or investment decision. The employer gives the worker a test which has bad (red) and good (blue) outcomes, with the good outcome being more likely if the worker invested. Seeing the worker's color (purple or green) and the test result, the employer must decide whether to hire the worker or not. If you use the default payoff parameters, the worker prefers to be hired, and a risk-neutral employer prefers to hire the worker as long as the probability that the worker invested is sufficiently high. This experiment implements the Coate/Loury model of statistical discrimination, which may have asymmetric equilibria in which the employers favor one color of worker, expecting them to invest more often, and these beliefs are self-confirming as workers of one color invest more often, in anticipation of better job assignments for those of their color. There may also be symmetric equilibria with no color effects.

Parameters: The number of participants must be a multiple of 4, which allows equal numbers of workers and employers, and equal numbers of green and purple workers. The matchings are randomly determined for each round, and you specify the number of rounds. The experimenter can also specify the payoffs associated with each outcome. There may be two treatments with differing parameters, but the experimenter can select a one-treatment setup by setting the number of rounds to be 0 for the second treatment. In order to promote an initial separation of behavior, one can let the distribution of investment costs be higher for one color worker than for the other in treatment 1, and then make the costs equal for both colors in treatment 2 to see whether separation persists after all opportunities are ex ante identical for both colors. The treatment change is not announced (to permit the introduction of such history effects), so one must announce it verbally if you want the subjects to notice that the setting has changed.

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Motivation: Even though the two types of workers are identical ex ante, initial randomness may cause the investment rates for the two colors to separate, and if this happens, the participants will notice, which can lead to a discussion of experience-based ("statistical") discrimination. The problems and potential benefits of various public policies to remedy the effects of discrimination can be discussed. For many symmetric setups, there will be a symmetric equilibrium with no color effects. If no separation occurs, you can discuss what investment and hiring strategies people used, and whether or not they considered color.

C. Signaling Game (a.k.a. Beer/Quiche Game)

This program runs a set of two-person signaling games in which one person (the proposer) observes the true state of nature and makes a decision. The other person (responder) sees the proposer's decision but not the state, and makes a response. The "beer/quiche" interpretation is that the proposer is either strong or weak, and knowing this, decides whether to drink beer or eat quiche for breakfast. The other person cannot observe strength directly but sees the breakfast, and decides whether to fight or retreat.

Parameters: There are two possible states and two proposer decisions, so there may be an equilibrium in which the proposer decision "signals" the state (e.g. the strong person drinks beer and the weak person eats quiche). There may also be "pooling" equilibria in which the signal is the same for both states, depending on the payoffs that you specify. As experimenter, one can also specify the probabilities of the states, and the number of responder choices. The menu of default parameter settings includes one with separation and another with two pooling equilibria, both of which are sequential but only one of which is "intuitive" in the sense of Cho and Kreps. The unintuitive pooling equilibrium has both types eating quiche, supported by beliefs that a deviant who drinks beer is likely to be weak, and hence encounter a "fight" response. Experimental evidence suggests that the behavior (with random matching) will converge to the intuitive pooling equilibrium in this game. But "reverse signaling" default provides a game in which behavior often converges to the unintuitive equilibrium, which is ruled out by all standard "refinements" of the sequential Nash equilibrium.

Parameters: The total number of participants in the session is divided into Proposer/Responder pairs. Matchings may be fixed (same in all periods) or randomly reconfigured after each round. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

Motivation: focuses on the signaling role of the proposer decisions and on how asymmetric information is transmitted ("separation") or hidden ("pooling"). Labor market examples and the role of education as a signal may be mentioned. Students should be able to come up with other examples. In a game-theory class, the (Bayesian) Nash equilibria can be computed and compared with observed choice patterns. There may, of course, be multiple equilibria, some of which are "unintuitive."

VI. Markets

A. Bertrand Price Competition Game: Admin Introduction

This program sets up a multi-person game in which each person chooses a price in a Bertrand game with linear demand and constant marginal cost. The game highlights severe competitive pressures when there are several sellers.

Parameters: The total number of participants in the session is divided up into groups of a size that one specify, and each group represents a separate market. Grouping may be fixed (same in all periods) or randomly reconfigured after each round. You specify the number of rounds. The experimenter can also specify the range of feasible prices, the marginal cost, and the demand function intercept and slope parameters. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero. Motivation: focus on the extent to which price competition drives prices to marginal-cost competitive levels. Some tacit collusion may be observed with small numbers and repeated matchings.

B. Call Market

This program runs a call market in which buyers and sellers submit bids and offers. These bids and offers are arrayed into "pseudo" demand and supply curves, which are "crossed" to determine a provisional trading price. The market is called and all provisional trades are finalized when the experimenter submits a close decision. At that time, all units with offers below the clearing price are sold, and all units with bids above the clearing price are purchased. The program calculates the theoretical competitive price for comparison.

Parameters: The experimenter sets the number of buyers, the number of sellers, and the number of "units" for each. Seller units are given costs and buyer units are given values; all values and costs are random draws from uniform distributions that you specify. Sellers earn money by selling above cost, and buyers earn money by buying below value; there are no earnings or costs incurred on untraded units. One can specify the number of rounds and whether unit values and costs are re-randomized after each round. The experimenter also may provide a fixed payment that is independent of any earnings from trade.

Motivation: focus on the relationship between the trading price and quantity and the competitive (supply and demand) predictions.

C. Cournot Quantity Competition Game

This program sets up one or more markets in which each person is a seller who chooses a production quantity. This is a Cournot game with linear demand and constant marginal cost. The game can be used to motivate discussion of the Nash/Cournot predictions. There may be tacit collusion with few sellers and fixed matchings, and there may be severe competitive pressures when there are several sellers.

Parameters: The total number of participants in the session is divided up into groups of a size that one can specify, and each group represents a separate market. A monopoly experiment can be run by setting the group size to 1. Grouping may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter specifies the number of rounds and the range of feasible outputs, the marginal cost, and the demand function intercept and slope parameters. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

Motivation: focus on the Nash/Cournot equilibrium and on the extent to which quantity competition drives prices to marginal-cost levels. Some tacit collusion may be observed with small numbers and repeated matchings.

D. Double Auction Market

This program runs a double auction in which buyers and sellers submit bids and offers in any order. There is a bid-ask improvement rule: a new bid must be higher than the highest outstanding bid, and a new offer must be lower than the lowest outstanding offer. This is called a double auction because bids tend to increase as in an English auction (e.g. for antiques), and at the same time, offers tend to decrease. Thus the bid-ask spread will narrow until one of the bids or offers is accepted. Any buyer may accept the best available offer from any seller, and any seller may accept the best available bid from any buyer. The auction runs for a pre-announced period of time. Transactions prices and the bid-ask spread are made available to traders. The program calculates the theoretical competitive price for comparison. Market efficiency is measured as the fraction of maximum possible value created by the trading process, i.e. the ratio of the sum of all buyers' and sellers' earnings to the maximum possible value of this sum.

Parameters: The experimenter sets the number of buyers, the number of sellers, and the number of "units" for each. Seller units are given "costs" and buyer units are given "values". All values and costs are random draws from uniform distributions that one specifies, unless the choice is to enter your own values and costs. Sellers earn money by selling above cost, and buyers earn money by buying below value. There are no earnings or costs incurred on untraded units. The experimenter can specify the number of rounds and whether unit values and costs are re-randomized after each round. He also may provide a fixed payment that is independent of any earnings from trade.

Motivation: focus is on the relationship between the trading price and quantity and the competitive (supply and demand) predictions.

E. Market Entry Game

This program sets up a multi-person game in which each person chooses whether or not to enter a market. The payoff for all people who enter is a decreasing function of the number of entrants, and the payoff for not entering is a constant. The incentives are typically such that each person would prefer to enter if the others are unlikely to do so, and would prefer to stay out if the others are likely to enter.

Parameters: As the experimenter, one can specify the exit payoff and the parameters of the (linear) entry profit function. These parameters determine the Nash equilibrium probability of entry in a symmetric equilibrium. The experimenter also specifies the group size and the number of rounds. Groupings may be fixed (same in all periods) or randomly reconfigured after each round. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

Motivation: focus on whether entry or exit is more profitable, and on the way in which learning and adaptation can help people coordinate entry in such a manner that expected payoffs are approximately the same for entry and exit. This game is equivalent to the El Farol problem.

F. Posted Offer Double Market

This program runs a one-sided auction in which sellers post prices independently on a take-it-or-leave-it basis at the start of each market period or "round." Buyers then place orders at the posted prices. The program collects and displays price information. The "admin" module calculates the theoretical competitive price for comparison. Market efficiency is measured as the fraction of maximum possible value created by the trading process, i.e. the ratio of the sum of all buyers' and sellers' earnings to the maximum possible value of this sum.

Payoff Parameters: You set the number of buyers, the number of sellers, and the number of "units" for each. Seller units are given "costs" and buyer units are given "values". All values and costs are random draws from uniform distributions that you specify, unless you choose to enter your own values and costs. Sellers earn money by selling above cost, and buyers earn money by buying below value. There are no earnings or costs incurred on untraded units, so production is "to order." The experimenter can specify the number of rounds and whether unit values and costs are re-randomized after each round. You also may provide a fixed payment that is independent of any earnings from trade.

Motivation: Posted prices are characteristic of many markets where individual negotiation is not possible. This institution is often found where one side of the market is "thinner," as is the case with retail markets with large numbers of potential buyers.

VII. Public Choice

A. Common Pool Resource Game Program

This program sets up a multi-person game in which each person chooses an "effort" that represents a resource extraction activity (e.g. fishing). The resource is taken from a common pool in the sense that a person's share of the harvest equals their share of the total effort. The value of the total harvest is a quadratic function of total effort made by all people in a group, so that average harvest value is a decreasing, linear function of total group effort. There is an externality in the sense that individuals have no incentive to correct for the fact that an increase in one's own effort reduces the average product for the others.

Parameters: The total number of participants in the session is divided up into groups of a size that you specify, and each group represents a separate common pool resource game. Grouping may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter specifies the number of rounds. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero. She can also specify the range of feasible efforts, the cost of effort and the parameters of the harvest function. In particular, the average harvest (total harvest divided by total group effort) is equal to the intercept parameter minus the slope parameter times total group effort. Let the q represent an individual's effort, Q the group total effort, C the opportunity cost of effort, and E the maximum feasible effort (endowment). Then the individual's earnings in a round would be $(q/Q)*(A - BQ)Q + (Eq) C$, where q/Q is the share of total effort, $(A - BQ)Q$ is the quadratic total harvest value function, and $(E-q)C$ is the return from the part of the endowment used for non-extraction activities.

Motivation: explores the extent to which total effort exceeds the socially optimal level, and whether the resource is overused (dissipated) to the extent that the average harvest value is driven down to levels that approximate the opportunity cost of effort. Rent dissipation can be related to externalities, and an appropriate use tax can be discussed

B. Public Goods (Voluntary Contributions) Game

This program sets up an experiment in which each person is given an endowment of tokens that may either be kept or contributed to a public good. The value of a token kept is typically specified to be greater than the "internal return" that the individual receives from making the contribution, so there is a private incentive not to contribute, the strength of which depends on the size of the internal return. However, each token contributed produces an "external return" to the others in the group, and contributions are socially optimal in the sense that the sum of the external returns to others and one's own internal return is greater than the private value. The public goods game has fascinated social scientists because the conflict between social and private incentives provides a platform for studying other-regarding preferences (e.g. altruism) or reciprocity, and how motives for contributions are sensitive to demographic and treatment variables. The fear that "free riding" behavior may generate inefficiently low levels of public good provision has been on economists' minds at least since Adam Smith's famous observations about streetlights.

Parameters: The total number of participants in the session is divided into groups of a size that you specify, and each group represents a separate game. Grouping may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter may also choose the number of rounds, the token endowment, and the internal and external returns for contributions to the public good. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

Motivation: exploring the extent and trends in free riding behavior. Speculation about effects of changing group size and the economic incentives (the returns) can be answered by doing two treatments. It is also interesting to try to discern gender or other demographic effects, but experimental evidence on these things is mixed.

C. Rent Seeking Lobbying Game

This program sets up a multi-person game in which each person chooses a lobbying "effort" that represents real resources used in an attempt to obtain a prize (e.g. a broadcasting license). The prize value is a specified dollar value, and the probability of obtaining the prize is equal to one's lobbying effort as a proportion of the total effort for the group as a whole. Rent seeking activity entails real resource costs that dissipate the amount of value transferred to the recipient of the prize.

The total number of participants in the session is divided up into groups of a size that you specify, and each group represents a separate competition for a prize. Grouping may be fixed (same in all periods) or randomly reconfigured after each round. The experimenter specifies the range of feasible efforts, the cost of effort, and the prize value. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

D. Volunteer's Dilemma Game

This program sets up a multi-person game in which each person chooses whether or not to "volunteer." The payoff for all people in a group is higher if at least one of them volunteers, but a volunteer incurs a cost that cannot be shared. The incentives are such that each person would prefer to volunteer only if it is likely that nobody else will do so. The experimenter may specify the cost of volunteering and the individual payoffs when there is at least one volunteer and when there is no volunteer. The experimenter also can specify the group size and the number of rounds. Groupings may be fixed (same in all periods) or randomly reconfigured after each round. There may be two treatments with differing parameters; but a one-treatment setup is obtained by setting the number of rounds in treatment 2 to be zero.

Motivation: applications such as a situation in which each legislator hopes that someone else will be the one to propose a legislative pay increase and take the political heat (the cost of volunteering) when it passes by a role call vote. Students should be able to come up with other examples of this type of game, perhaps as a homework assignment. The probability of volunteering should be a decreasing function of group size, as can be derived from the mixed-strategy Nash equilibrium prediction in advanced classes. A less intuitive Nash prediction is that the probability of getting at least one volunteer is a decreasing function of group size. This prediction is generally contradicted by data.

E. Voting Game

This program sets up a situation in which each person is a voter in a committee meeting or election. The voters must choose between a fixed number of alternatives. These alternatives can be thought of as either candidates or committee decisions. The alternatives will be labeled A, B, etc., unless you specify other labels.

Voting Sequence: There are several ways of configuring the voting process. In the plurality setup, the option with the most votes wins, with ties decided at random. The plurality/runoff setup puts all options on the ballot in the first stage, with a second-stage runoff in the event that no option obtains a majority. In the two-stage agenda, voters choose between two or more "challengers" in the first stage, with the winner being matched against an "incumbent" option in the second stage. It is also possible to have a vote be preceded by a non-binding opinion poll or by a decision of whether to incur a cost of voting. In the latter (participation-cost) setup, the costs may either be fixed or they may differ randomly from voter to voter, being drawn from a uniform distribution with a range that you specify. Finally, under approval voting, each person enters a vote of "approve" or "not approve" on each option, and the one with the most approval votes is selected. The experimenter can choose among various voting setups: Plurality, Plurality/Runoff, Two-Stage Agenda, Opinion Poll, Participation Cost or Approval Voting.

Payoffs: The experimenter has the flexibility to select the number of alternatives and each voter's payoffs for the various alternative outcomes. This specification is accomplished by indicating the number of "voter types", the number of voters in each type, and the payoffs that people in a given type receive in the event that the committee selects each of the possible alternatives.

Parameters: Participants are divided into groups of a size that you specify, and each group represents a separate committee or electorate. Grouping may be fixed (same in all periods) or randomly reconfigured after each voting round. The experimenter also chooses the number of rounds and the other parameters mentioned above. There are two treatments, and any of the parameters, including the two-stage voting process, may be changed between treatments.

Motivation: The various options allow one to evaluate the effects of preferences, voting costs, agenda structure, polls, and runoffs on voting outcomes. Voting is often "naive" or "sincere" at first, although more strategic behavior may sometimes emerge.

VIII. Surveys

Survey (questionnaire) experiments in which participants either sit at a terminal and answer a variety of questions or write their responses on paper

Examples

Time Perception

Subjects read scenarios manipulating factors hypothesized to affect time perception, such as time of a delay (early versus later) and measure the perceived length of the total journey. Subjects experience factors that influence time perception using a computer interface where delays occur in real time. Subjects take part in computer based simulated "games" (e.g., they might drive a car and experience traffic delays varying in cause, number, length, and timing). Afterwards, subjects would rate the experience on a number of dimensions using a computer interface.

Contextual Effects and Response Mode Effects

The manner in which a question is asked often influences perceptions and subsequently judgments and choices. In addition, the surrounding stimulus distribution can also influence perceptions and judgments of the same stimuli nested in different contexts. An example of a survey that investigates response mode effects is one in which self perceptions of risk of depression are measured with different formats. Such studies have found that the use of subjective frequency scales leads to perceptions of higher risk than the use of check-lists; and exclusion of the extreme "thoughts of suicide/ death" question leads to perceptions of higher risk.

Justice

What are the roles of self-interest and identity-threat on the interpretation of others' injustices? When an injustice has occurred within an organization, what action can the wrongdoer take to restore justice? To answer these questions, we would give participants different scenarios and ask them which behavioral responses are most unfair and how might the actors restore justice?

Perceptions of justice and fairness will also be investigated in other studies where participants will be asked to fill out questionnaires that explore the conditions under which it might be appropriate for employees to break rules at work. This research program draws on theories of fairness and of heuristics and biases, as well as ethnographic studies from industrial sociology, anthropology and industrial relations to identify rules people use to evaluate when sabotage is appropriate. The research will explore the heuristics for fairness by asking different respondents about the fairness of employee behaviors in slightly different cases.

Good Intentions

In many situations a person tries to do something nice for another, but the effort is not that effective. Under what circumstances do people pay attention to outcomes, and under what circumstances they focus on intentions? Subjects are given scenarios about business situations in which an outcome arises from good intentions (specifically, a high wage that is costly for the manager to pay) coupled with bad luck or an outcome arises from neutral intentions (a low wage that saves the firm money) coupled with good luck. If outcomes matter, the employees' responses should be similar regardless of how the situation arose. If intentions matter, employees should be more likely to work hard and less likely to sabotage the employer when the employer's intentions were good.

Taste Tests

Marketers are often interested in the situations in which people want to consume food. Under what circumstances do people want to consume healthy versus unhealthy and indulgent foods? How do moods interact with consumption. Subjects are screened for food allergies and asked to watch a film clip or perform another task. Then they are invited to consume foods (carrots versus chocolates). The experimenter then examines the degree of consumption in different contexts. Subjects also answer a variety of questions presented to them in a survey format.

A. Individual Behavior

Purchase Behavior

What is the effect of payment mode on spending? When does the mode of payment affects the amount of payment? Is a US dollar really worth 7.8 HK dollars or 0.4 Bahraini Dinars? Is a $10 item perceived to be cheaper or more expensive when one pays for it with a $10 note versus sliding a debit card, credit card, or using a Safeway "scrip" gift certificate? Is a coin treated the same way as a note (e.g., what are the implications for popularizing the $1 coin)? Is a unit of higher denomination (e.g., $5) treated the same as an equivalent amount of money in smaller denominations (e.g., 5 notes of $1)? To answer these questions, experiments will be conducted in which money (in various modes) will be distributed to subjects, and purchase behavior will be examined.

Evaluating the Quality of Web Site Design

Despite the abundance of design recommendations and guidelines, web site usability, especially for information-centric sites, continues to be a pressing human-computer interaction issue. Tools and methodologies are needed to accelerate and improve the web site design.. How can the web site design process be improved by the application of automated evaluation techniques? Participants would sit down at a computer and use an interactive tool to provide information about individual reactions to websites.

Evaluating Search Engines

Researchers at SIMS are interested in evaluating search engines that allow users to move through large databases in a flexible manner without feeling lost. One idea is that hierarchical formats will help the process by guiding the user toward possible choices, and organizing the results of searches.

B. Group Behavior

Examples:

Negotiations

Many of the traits that are associated with negotiation effectiveness (assertiveness, rationality, control over emotionality) are stereotypically masculine in nature.. What are the effects of gender stereotypes on performance in competitive tasks? Do women who experience stereotypes do worse? One hypothesis is that any situational variable that lowers one's expectations and creates self-doubt— regardless of whether there is a consensual stereotype about the category— should produce performance effects that mirror those already documented in the context of stereotype threat research.

Group decision making

These experiments investigate the effects of variables such as counterfactual mindsets, or thoughts about "what might have been." on group decisions. Do counterfactual mindsets increase the thoroughness with which groups seek and share information? If so, why? Groups will be given information that puts them in different mental frameworks and their performance on tasks will be measured and compared across mindsets.

Personal decision making versus advising

When are there discrepancies individual decisions and advice given to others? When interacting with others, people often balance accuracy against impression management. Their advice appears to be influenced by a wide variety of established judgment and decision making biases, such as framing effects, overconfidence, and choosing versus rejecting effects. In these experiments, participants will be asked to make decisions for themselves and then provide advice about similar choices to others.

Organizational Culture

How is the culture of an organization influenced by social norms, gender, diversity, etc? How does the culture of an organization influence productivity? How does prior competitiveness influence present cooperation? Groups will work in isolation and then together on a variety of performance tasks. Performance is measured as well as responses to a number of questions about group interactions and dynamics.