Pre-Analysis Plan for Overbidding and Beliefs in Common-Value Auctions

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1 Introduction

The traditional assumption in economics is that, in markets with incomplete information, all participants draw appropriate inferences about what the behavior of others implies, thereby correctly extracting their information (Akerlof, 1970; Milgrom and Stokey, 1982; Milgrom and Weber, 1982; Myerson and Satterthwaite, 1983). However, evidence from behavioral and experimental economics suggests that decision-makers often fail to properly account for the information contained in other people's actions or decisions, leading them to buy a low-quality product or overpay for an asset – the so-called "winner's curse" (Samuleson and Bazerman, 1985; Kagel and Levin, 1986; Holt and Sherman, 1994; Esponda and Vespa, 2014; Levin et al., 2016). While there has been some work identifying how mistaken inference affects bidding in auctions (Eyster and Rabin, 2005; Jehiel and Koésslér, 2008; Gagnon-Bartsch et al., 2021), the relative contribution of different causes of overbidding is unclear.

In the experiment described in this pre-analysis plan, we will study how beliefs affect behavior in common-value auctions. These are auctions in which all buyers have the same value for an object or set of objects (e.g. an oil field), but this value is unknown ex-ante and each buyer receives a different signal about the value. When there is only one object for sale, buyers should take into account the fact that if they win the auction, the other bidders are likely to have less positive beliefs about the value of the object. Previous work has suggested that the observed winner's curse (buyers paying more than an object is worth) in common-value auctions may be partially a result of buyers not taking this information into account (Eyster and Rabin, 2005). On the other hand, when there are multiple objects for sale, *losing* the auction should make the prospective buyer *more* optimistic about the value of the good, as it implies that several other bidders had positive information. Hence, in these auctions, the same model

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predicts that buyers underbid, leading to a "loser's curse". We will test these predictions using an incentivized laboratory experiment.

2 Experimental Design

We conduct a laboratory experiment to explore how information affects behavior differently across different types of decision problems. Subjects begin the experiment by reading through instructions in which they are informed about the structure of the games and decision problems they will participate in. They are then given an example of the information, choices, and payoffs that could arise within a single round of the experiment. Subjects complete a quiz, for which they are paid \$1 for each correct answer. After all subjects complete the quiz, they see the correct answers to each question. After reading the quiz answers, subjects continue on to the main body of the experiment. Screenshots of all instructions, the example, the quiz, quiz answers, and a decision round can be found in Appendix A.

Each subject in our experiment will participate in twenty rounds of decision problems. Within each round, each subject participates in three types of decision problems: 1) one-prize auctions, 2) four-prize auctions, and 3) purchase tasks.

On the first page of each round, subjects participate in the bidding stage. They are informed that their signal was drawn from a uniform distribution over discrete values between \$0 and \$5, in intervals of \$0.20 (i.e. \$0, \$0.20, \$0.40,..., \$4.80, and \$5). They are also told that the other four members of their group also received signals that were drawn independently from the same distribution, but that no member of the group knows anyone else's signal. They are told that the value of the "prize" in that round is equal to the *sum* of all five signals.

In the bidding stage, participants must decide how to bid in two auctions. They are given a bidding budget of \$30 out of which they will pay their bids. In the first auction, which we refer to as the "one-prize auction", the highest bidder wins the prize and pays a price equal to the second-highest bid. In the second auction, which we refer to as the "four-prize auction", the four highest bidders each receive the prize and pay a price equal to the lowest bid. The bids for these auctions are completed on the same screen, and bids are made using sliders. Bids in both auctions must be a multiple of \$0.20 and must lie between \$0 and \$30. An example of the bidding stage decision can be found in Figure 1.

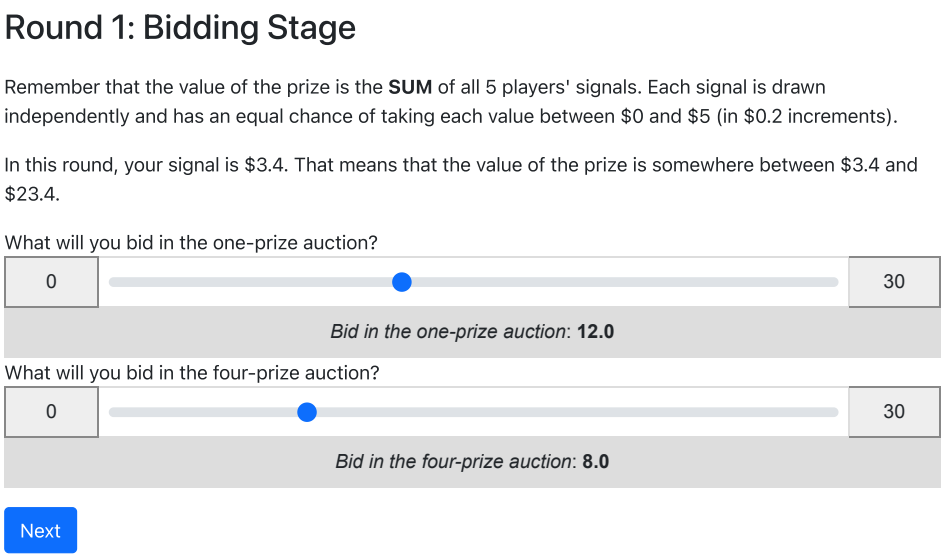

Figure 1: Bidding Decision

On the second page of each round, subjects participate in the purchase stage. Subjects are reminded of their signal, which does not change within a round. They are also reminded that the value of the prize is equal to the sum of all five signals. Subjects are then informed of the *rank* of their signal relative to other members of their group. Subjects whose signals are tied are assigned ranks randomly among those that are appropriate within their group (e.g. for a group with signals $5, $4, $4, $3.80, and $1.40, one of the subjects with a signal of $4 is selected at random to be told that they received the second-highest signal, while the other is told that they received the third-highest signal).

In the purchase stage, subjects must report the maximum price at which they would be willing to purchase the prize. They are given a purchase budget of $30, out of which they will pay the price if the prize is purchased. Similar to the bidding stage, the maximum price is chosen using a slider and must be a multiple of $0.20 between $0 and $30. Subjects are told that a random price will be selected between $0 and $30 and that if the randomly selected price is less than or equal to the reported maximum price, then the subject will receive the prize and pay the randomly selected price. An example of the purchase stage decision can be found in Figure 2.

The final page of each round shows the subjects the results of the round. They are informed of the value of the prize. They are told whether they are the winner of each auction, the payoffs they received from the auction, and the realized price from the auction. They are also told which price was randomly selected for their purchase stage and their payoffs from the purchase stage.

At the end of the experiment, one type of decision within one round is randomly selected to be the decision that counts for payoffs. All decision types in all rounds are equally likely to be selected. Subjects are informed of the decision that counts after all decisions are made but before they complete the survey.

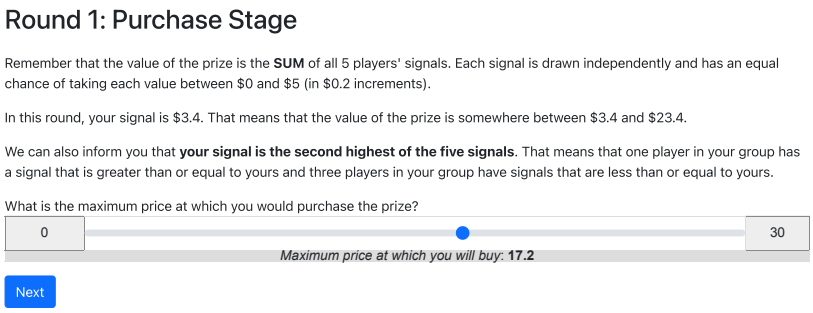

Figure 2: Purchase Decision

The experiment uses a completely within-subject design. Subjects are randomly reallocated to new groups before each round. Signals are assigned independently and randomly across rounds according to the described discrete uniform distribution.

2.1 Data Collected

In addition to choice data, we collect the decision time for each choice. We also collect standard demographic data including gender, age, whether they are an economics major, etc. We supplement these data with a short cognitive reflection test. At the end of the experiment, subjects answer questions about the study itself, including questions about their confidence in their decision-making, their strategy in the study, and what they thought the study was about.

3 Empirical Analysis

3.1 The Effect of Signals on Choice

The first focus of the study is how subjects' choices vary with the information they are given. We focus on the choices that are made in the three decision problems: 1) bids from the one-prize auction, 2) bids from the four-prize auction, and 3) reservation prices from the purchase stage. Subjects' choices will be used as dependent variables in regressions without pre-processing.

The primary estimating equation for the effect of signals on bidding behavior in one-prize auctions will be

$$\text{One-Prize-Bid}_{it} = \beta_0 + \beta_1 \text{Signal}_{it} + \alpha_i + \gamma_t + \varepsilon_{it}, \tag{1}$$

while for four-prize auctions, the primary specification will be

$$\text{Four-Prize-Bid}_{it} = \beta_0 + \beta_1 \text{Signal}_{it} + \alpha_i + \gamma_t + \varepsilon_{it}. \tag{2}$$

The indices i and t refer to subject and round, respectively, so both specifications include subject- and round-level fixed effects. Signal_{it} refers to the signal received by subject i in round t.

The primary estimating equation for the effect of information on reservation prices will be

$$\text{Reservation Price}_{it} = \beta_0 + \beta_1 \text{Signal}_{it} + \sum_{k=1}^{5} \delta_k \mathbb{1}\{\text{Rank}_{it} = k\} + \alpha_i + \gamma_t + \varepsilon_{it}. \tag{3}$$

The indices i and t refer to subject and round, respectively, so this specification includes subject- and round-level fixed effects. Signal_{it} refers to the signal received by subject i in round t and Rank_{it} refers to the rank of the subject's signal, from one to five.

3.2 The Effect of Decision Problem on Choice

The second focus of the study is how subjects' choices vary with the type of decision problem they face. Within a single round, we will compare how the subject chooses in the one-prize auction, the four-prize auction, and the purchase stage.

$$\text{Choice}_{itp} = \beta_0 + \beta_1 \text{One-Prize}_{itp} + \beta_2 \text{Four-Prize}_{itp} + \alpha_{it} + \varepsilon_{itp}. \tag{4}$$

The indices i, t, and p refer to subject, round, and decision problem respectively, so the specification includes subject-round-level fixed effects. We will estimate this equation for each possible rank of a subject's signal. We will also estimate the pooled regression with all the data, but estimate separate coefficients for the decision problems for each rank.

3.3 Power Analysis

We ran a pilot with 10 subjects in October 2023. In Table 1, we show the results of estimating equations (1), (2), and (3) using the pilot data. In Table 2 we show the results of estimating equation (4).

	(1) One-Prize-Bid	(2) Four-Prize-Bid	(3) Reservation Price
Signal	0.82**	0.62***	1.44***
	(0.35)	(0.13)	(0.44)
Highest Signal			-4.74**
			(1.74)
Second Highest Signal			-3.92***
			(0.77)
Third Highest Signal			-1.17
			(0.91)
Fourth Highest Signal			-1.01*
			(0.45)
Constant	13.5***	15.5***	14.4***
	(0.86)	(0.31)	(0.68)
Observations	200	200	200

Notes: Linear regression with subject fixed effects and standard errors clustered at the subject level. Significance indicated by: *** p<0.01, ** p<0.05, * p<0.1.

Table 1: Choices

The results in Table 1 show that we can estimate the effects of signals on choice precisely enough to differentiate standard models with even the sample in our pilot. The average standard error over all decision-problem dummies in Table 2 is roughly 2.1. Under the assumption that with a sample size of N, the standard error of these coefficients will be roughly $2.1\sqrt{\frac{10}{N}}$, we would expect to be able to reject an effect size of 2 with roughly 80% chance when the sample size is over 100. Thus, in our main experiment, we expect to recruit 100-120 subjects in total.

	(1) Choice	(2) Choice	(3) Choice	(4) Choice	(5) Choice	(6) Choice
One-Prize (Highest Signal)	1.16					1.16
	(2.42)					(2.42)
Four-Prize (Highest Signal)	0.85					0.85
	(2.50)					(2.50)
One-Prize (Second Highest Signal)		1.37				1.38
		(1.44)				(1.44)
Four-Prize (Second Highest Signal)		3.34				3.34
		(3.04)				(3.04)
One-Prize (Third Highest Signal)			-2.81			-2.81
			(1.92)			(1.92)
Four-Prize (Third Highest Signal)			-0.49			-0.49
			(2.37)			(2.37)
One-Prize (Fourth Highest Signal)				-1.52		-1.52
				(1.66)		(1.66)
Four-Prize (Fourth Highest Signal)				1.12		1.12
				(2.81)		(2.81)
One-Prize (Lowest Signal)					0.32	0.32
					(1.20)	(1.20)
Four-Prize (Lowest Signal)					1.21	1.21
					(2.06)	(2.06)
Constant	16.6***	14.9***	17.3***	15.3***	15.3***	15.9***
	(1.60)	(1.33)	(1.33)	(0.89)	(0.92)	(1.03)
Observations	120	120	120	120	120	600

Notes: Linear regression with subject-round fixed effects and standard errors clustered at the subject level. Significance indicated by: *** p<0.01, ** p<0.05, * p<0.1.

Table 2: Choices

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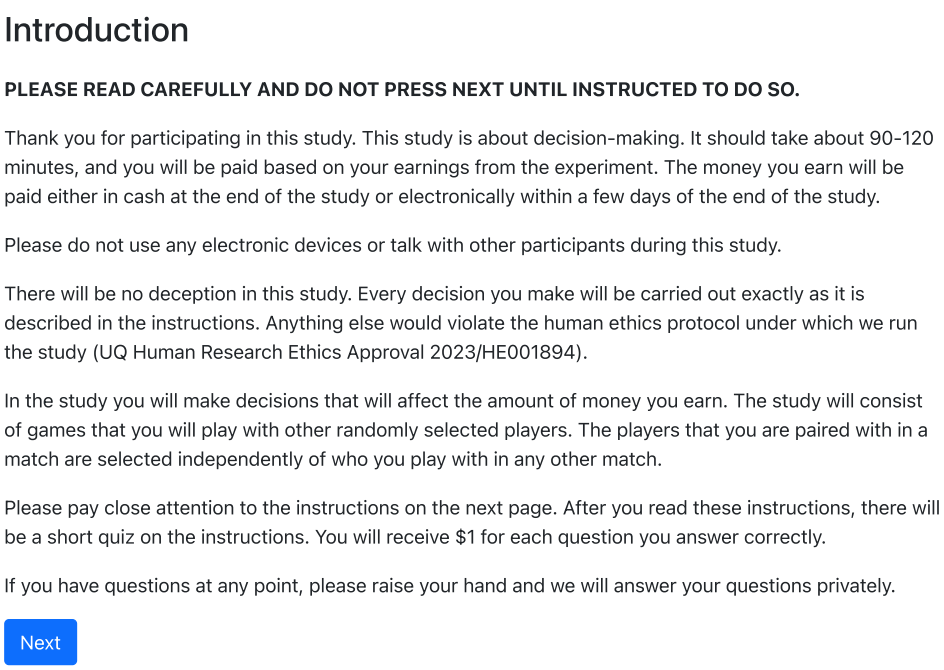
A Screen-shots/Instructions

Below, we include screenshots from the experiment.



Introduction

PLEASE READ CAREFULLY AND DO NOT PRESS NEXT UNTIL INSTRUCTED TO DO SO.

Thank you for participating in this study. This study is about decision-making. It should take about 90-120 minutes, and you will be paid based on your earnings from the experiment. The money you earn will be paid either in cash at the end of the study or electronically within a few days of the end of the study.

Please do not use any electronic devices or talk with other participants during this study.

There will be no deception in this study. Every decision you make will be carried out exactly as it is described in the instructions. Anything else would violate the human ethics protocol under which we run the study (UQ Human Research Ethics Approval 2023/HE001894).

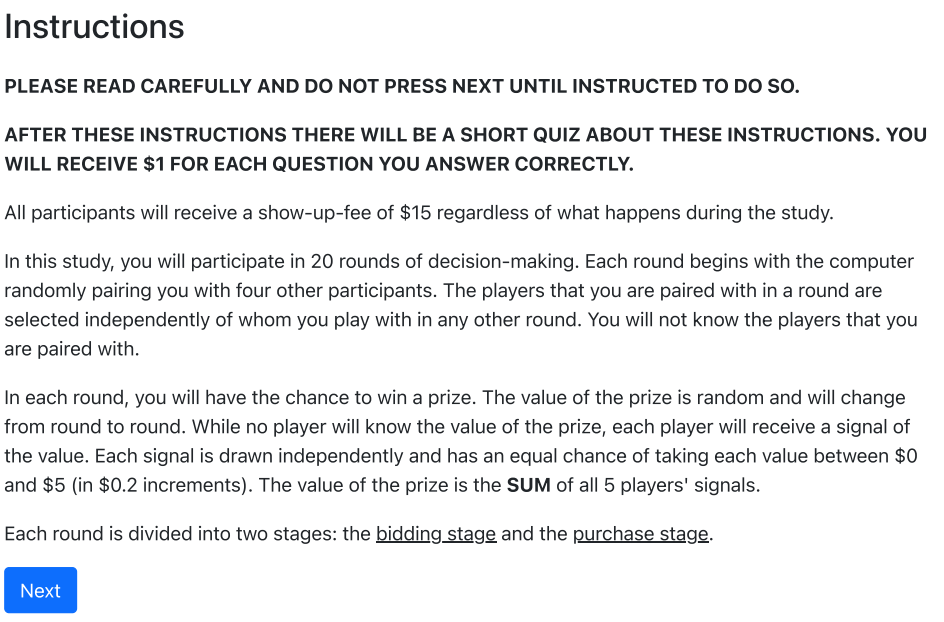
In the study you will make decisions that will affect the amount of money you earn. The study will consist of games that you will play with other randomly selected players. The players that you are paired with in a match are selected independently of who you play with in any other match.

Please pay close attention to the instructions on the next page. After you read these instructions, there will be a short quiz on the instructions. You will receive $1 for each question you answer correctly.

If you have questions at any point, please raise your hand and we will answer your questions privately.

Next

Figure 3: Introduction



Instructions

PLEASE READ CAREFULLY AND DO NOT PRESS NEXT UNTIL INSTRUCTED TO DO SO.

AFTER THESE INSTRUCTIONS THERE WILL BE A SHORT QUIZ ABOUT THESE INSTRUCTIONS. YOU WILL RECEIVE $1 FOR EACH QUESTION YOU ANSWER CORRECTLY.

All participants will receive a show-up-fee of $15 regardless of what happens during the study.

In this study, you will participate in 20 rounds of decision-making. Each round begins with the computer randomly pairing you with four other participants. The players that you are paired with in a round are selected independently of whom you play with in any other round. You will not know the players that you are paired with.

In each round, you will have the chance to win a prize. The value of the prize is random and will change from round to round. While no player will know the value of the prize, each player will receive a signal of the value. Each signal is drawn independently and has an equal chance of taking each value between $0 and $5 (in $0.2 increments). The value of the prize is the **SUM** of all 5 players' signals.

Each round is divided into two stages: the bidding stage and the purchase stage.

Next

Figure 4: Basic Instructions

Instructions: Bidding Stage

PLEASE READ CAREFULLY AND DO NOT PRESS NEXT UNTIL INSTRUCTED TO DO SO.

AFTER THESE INSTRUCTIONS THERE WILL BE A SHORT QUIZ ABOUT THESE INSTRUCTIONS. YOU WILL RECEIVE $1 FOR EACH QUESTION YOU ANSWER CORRECTLY.

In the bidding stage of each round, you will participate in two different types of auctions. We refer to them as the "one-prize auction" and the "four-prize auction". Before making bids in these auctions, all players will be told the value of their own signal (but will not be told anything about the other players' signals).

In the **one-prize auction**, all five players receive a bidding budget of $30 from which they make bids. The winner of the auction will be the player with the highest bid, with any ties broken randomly amongst the players with equally high bids. The winner receives the prize and pays a price equal to the second-highest bid. So their total payoff is the budget, plus the value of the prize, minus the price. All of the other players keep their full budget.

In the **four-prize auction**, all five players receive a bidding budget of $30 from which they make bids. The four highest bidders will win the auction, with any ties broken randomly amongst the players tied for the fourth highest bid. The winners receive the prize and pay a price equal to the fifth-highest bid. So their total payoff is the budget, plus the value of the prize, minus the price. The player that does not win keeps their full budget.

Next

Figure 5: Instructions: Bidding Stage

Instructions: Purchase Stage

PLEASE READ CAREFULLY AND DO NOT PRESS NEXT UNTIL INSTRUCTED TO DO SO.

AFTER THESE INSTRUCTIONS THERE WILL BE A SHORT QUIZ ABOUT THESE INSTRUCTIONS. YOU WILL RECEIVE $1 FOR EACH QUESTION YOU ANSWER CORRECTLY.

In the purchase stage of each round, you will be asked whether you would be willing to purchase one of the prizes from the bidding stage at various prices. No player's signal will change, and the value of the prize will still be equal to the sum of those signals. However, before making your purchase decisions you will be told how your signal ranks against other players' signals. For instance, if your signal is $3.2 and you are told it is the fourth highest, that means that one player has a signal that is no higher than $3.2 and three players have signals that are no lower than $3.2.

You will be asked for the maximum price at which you would be willing to purchase the prize. After you choose your maximum price, a random price will be drawn and compared to your maximum price. If the randomly drawn price is (weakly) lower than your maximum price, then you will purchase a prize at the randomly drawn price out of your budget of $30. Otherwise you will keep your full budget of $30, but will not receive a prize.

The price that you end up facing will be chosen randomly between $0.2 and $30, with each multiple of $0.2 being equally likely to be drawn. Your choices cannot affect the price that is selected. Therefore, it is in your best interest to answer each question as if you were facing that price with certainty.

Important: Your outcome from the purchase stage will not depend on what other players choose. The price that is implemented will be chosen randomly from all prices, and will not depend on what other players choose. Furthermore, there are no restrictions on the number of players that can receive prizes: it is possible that everyone receives a prize, but it is also possible that no one receives a prize.

Next

Figure 6: Instructions: Purchase Stage

Instructions: Payoffs

PLEASE READ CAREFULLY AND DO NOT PRESS NEXT UNTIL INSTRUCTED TO DO SO.

AFTER THESE INSTRUCTIONS THERE WILL BE A SHORT QUIZ ABOUT THESE INSTRUCTIONS. YOU WILL RECEIVE $1 FOR EACH QUESTION YOU ANSWER CORRECTLY.

At the end of the study, one round will be chosen at random to be the one that counts. Within the round that counts, either the **one-prize auction**, the **four-prize auction**, or the **purchase stage** will be chosen to determine your payoffs, each with a one-in-three chance.

On the next page, you will find an example round to help you better understand the rules. Please go through it at your own pace. After you have reviewed the example, click next again to begin the quiz.

Next

Figure 7: Instructions: Payoffs

Example

PLEASE READ THE EXAMPLE CAREFULLY AND CLICK NEXT WHEN YOU ARE READY TO BEGIN THE QUIZ.

The table below shows an example of the players' (A, B, C, D, and E) signals and decisions in each task.

Player	Signal	One-Prize Auction Bid	Four-Prize Auction Bid	Purchase Stage Choice
A	$1.40	$4.80	$9.00	$3.40
B	$0.80	$3.60	$3.80	$2.80
C	$4.00	$23.00	$12.40	$20.00
D	$1.40	$9.20	$9.60	$6.40
E	$3.40	$9.00	$8.20	$9.80

In this example, the value of the prize (for all players and every decision) is: $1.40+$0.80+$4.00+$1.40+$3.40=$11.

In the **one-prize auction**, Player C is the winner as she bid the highest; hence, she gets the prize and pays $9.20 for it, as this was the value of the second-highest bid. Player C's payoff from this auction is $30+$11-$9.20=$31.80, while all other players' payoffs are $30.

In the **four-prize auction**, Players A, C, D and E are the four highest bidders; hence, they each get the prize and pay $3.80 for it, as this was the value of the lowest bid. The four winners' payoffs are $30+$11-$3.80=$37.20, while Player B's payoff is $30.

For the **purchase stage**, suppose that the randomly drawn price is $4. Consider first Player B who was told that she had the lowest signal and indicated that she was willing to purchase the prize at any price lower than or equal to $2.80. In this case, given that the randomly drawn price is higher than her maximum purchase price, she would not purchase the prize and she would receive a payoff of $30. Next, consider Player E who was told that he had the second-highest signal and indicated that he was willing to purchase the prize at any price lower than or equal to $9.80. In this case, given that the randomly drawn price is lower than his maximum purchase price, he would purchase the prize at a price of $4 and he would receive a payoff of $30+$11-$4=$37.

Next

Figure 8: Example

Quiz

You will now be given a series of questions to check your understanding of the instructions and examples. You will be paid $1 for each answer you get correct.

Suppose that your signal is $2.2, and the other four signals are $1.6, $3.4, $4.8, and $5. What is the value of the prize?

- ○ $11
- ○ $13
- ○ $15
- ○ $17

How many players are in each group?

- ○ Two.
- ○ Three.
- ○ Four.
- ○ Five.

Suppose that in the one-prize auction, you bid $8 and the other bids are $4, $5, $11, and $12. What is true about the outcome?

- ○ You win a prize. The price in the auction is $11.
- ○ You win a prize. The prize in the auction is $4.
- ○ You do not win a prize. The price in the auction is $11.
- ○ You do not win a prize. The price in the auction is $4.

Suppose that in the four-prize auction, you bid $8 and the other bids are $4, $5, $11, and $12. What is true about the outcome?

- ○ You win a prize. The price in the auction is $11.
- ○ You win a prize. The prize in the auction is $4.
- ○ You do not win a prize. The price in the auction is $11.
- ○ You do not win a prize. The price in the auction is $4.

Suppose that in the one-prize auction, you bid $12 and the other bids are $5, $6, $10, and $16. What is true about the outcome?

- ○ You win a prize. The price in the auction is $12.
- ○ You win a prize. The price in the auction is $5.
- ○ You do not win a prize. The price in the auction is $12.
- ○ You do not win a prize. The price in the auction is $5.

What is true about how the price is determined in the purchase stage?

- ○ The price that is selected will be higher if the value of the prize is higher.
- ○ Each possible value of the price is equally likely to be chosen.
- ○ Another player will choose your price.
- ○ The price is determined by the outcome of the four-prize auction.

What is true about the how prizes are distributed in the purchase stage?

- ○ Either everyone wins the prize, or no one does.
- ○ One player in each group will win a prize.
- ○ Four players in each group will win a prize.
- ○ Other players' choices do not affect your chances to receive a prize.

When you believe you have answered all questions correctly, press next to check your answers.

Next

Figure 9: Quiz

Quiz Answers

The answers for the quiz are given below. Please review the answers and note any mistakes you have made.

Question 1: Suppose that your signal is $2.2, and the other four signals are $1.6, $3.4, $4.8, and $5. What is the value of the prize?
Correct Answer: $17
Your Answer: $15

Question 2: How many players are in each group?
Correct Answer: Five.
Your Answer: Four.

Question 3: Suppose that in the one-prize auction, you bid $8 and the other bids are $4, $5, $11, and $12. What is true about the outcome?
Correct Answer: You do not win a prize. The price in the auction is $11.
Your Answer: You do not win a prize. The price in the auction is $11.

Question 4: Suppose that in the four-prize auction, you bid $8 and the other bids are $4, $5, $11, and $12. What is true about the outcome?
Correct Answer: You win a prize. The prize in the auction is $4.
Your Answer: You do not win a prize. The price in the auction is $11.

Question 5: Suppose that in the one-prize auction, you bid $12 and the other bids are $5, $6, $10, and $16. What is true about the outcome?
Correct Answer: You do not win a prize. The price in the auction is $12.
Your Answer: You do not win a prize. The price in the auction is $12.

Question 6: What is true about how the price is determined in the purchase stage?
Correct Answer: Each possible value of the price is equally likely to be chosen.
Your Answer: Another player will choose your price.

Question 7: What is true about the how prizes are distributed in the purchase stage?
Correct Answer: Other players' choices do not affect your chances to receive a prize.
Your Answer: Four players in each group will win a prize.

You earned $2.0 from your correct answers. Please review any questions you answered incorrectly. When you are ready to begin the first round, click the next button.

Next

Figure 10: Quiz Answers

Round 1: Bidding Stage

Remember that the value of the prize is the **SUM** of all 5 players' signals. Each signal is drawn independently and has an equal chance of taking each value between $0 and $5 (in $0.2 increments).

In this round, your signal is $3.4. That means that the value of the prize is somewhere between $3.4 and $23.4.

What will you bid in the one-prize auction?

0 — 30

Bid in the one-prize auction: **12.0**

What will you bid in the four-prize auction?

0 — 30

Bid in the four-prize auction: **8.0**

Next

Instructions

In the **one-prize auction**, all five players receive a bidding budget of $30 from which they make bids. The winner of the auction will be the player with the highest bid, with any ties broken randomly amongst the players with equally high bids. The winner receives the prize and pays a price equal to the second-highest bid. So their total prize is the budget, plus the value of the prize, minus the price. All of the other players keep their full budget.

In the **four-prize auction**, all five players receive a bidding budget of $30 from which they make bids. The four highest bidders will win the auction, with any ties broken randomly amongst the players tied for the fourth highest bid. The winners receive the prize and pay a price equal to the fifth-highest bid. So their total prize is the budget, plus the value of the prize, minus the price. The player that does not win keeps their full budget.

Figure 11: Bidding Stage

Round 1: Purchase Stage

Remember that the value of the prize is the **SUM** of all 5 players' signals. Each signal is drawn independently and has an equal chance of taking each value between $0 and $5 (in $0.2 increments).

In this round, your signal is $3.4. That means that the value of the prize is somewhere between $3.4 and $23.4.

We can also inform you that **your signal is the second highest of the five signals**. That means that one player in your group has a signal that is greater than or equal to yours and three players in your group have signals that are less than or equal to yours.

What is the maximum price at which you would purchase the prize?

0 — 30

Maximum price at which you will buy: **17.2**

Next

Instructions

You will be asked for the maximum price at which you would be willing to purchase the prize. After you choose your maximum price, a random price will be drawn and compared to your maximum price. If the randomly drawn price is (weakly) lower than your maximum price, then you will purchase a prize at the randomly drawn price out of your budget of $30. Otherwise you will keep your full budget of $30, but will not receive a prize.

The price that you end up facing will be chosen randomly between $0.20 and $30, with each multiple of $0.20 being equally likely to be drawn. Your choices cannot affect the price. Therefore, it is in your best interest to answer each question as if you were facing that price with certainty.

Price	Purchase?	Price	Purchase?	Price	Purchase?	Price	Purchase?	Price	Purchase?	Price	Purchase?
$0.20	✔	$5.20	✔	$10.20	✔	$15.20	✔	$20.20	✗	$25.20	✗
$0.40	✔	$5.40	✔	$10.40	✔	$15.40	✔	$20.40	✗	$25.40	✗
$0.60	✔	$5.60	✔	$10.60	✔	$15.60	✔	$20.60	✗	$25.60	✗
$0.80	✔	$5.80	✔	$10.80	✔	$15.80	✔	$20.80	✗	$25.80	✗
$1.00	✔	$6.00	✔	$11.00	✔	$16.00	✔	$21.00	✗	$26.00	✗
$1.20	✔	$6.20	✔	$11.20	✔	$16.20	✔	$21.20	✗	$26.20	✗
$1.40	✔	$6.40	✔	$11.40	✔	$16.40	✔	$21.40	✗	$26.40	✗
$1.60	✔	$6.60	✔	$11.60	✔	$16.60	✔	$21.60	✗	$26.60	✗
$1.80	✔	$6.80	✔	$11.80	✔	$16.80	✔	$21.80	✗	$26.80	✗
$2.00	✔	$7.00	✔	$12.00	✔	$17.00	✔	$22.00	✗	$27.00	✗
$2.20	✔	$7.20	✔	$12.20	✔	$17.20	✔	$22.20	✗	$27.20	✗
$2.40	✔	$7.40	✔	$12.40	✔	$17.40	✗	$22.40	✗	$27.40	✗
$2.60	✔	$7.60	✔	$12.60	✔	$17.60	✗	$22.60	✗	$27.60	✗
$2.80	✔	$7.80	✔	$12.80	✔	$17.80	✗	$22.80	✗	$27.80	✗
$3.00	✔	$8.00	✔	$13.00	✔	$18.00	✗	$23.00	✗	$28.00	✗
$3.20	✔	$8.20	✔	$13.20	✔	$18.20	✗	$23.20	✗	$28.20	✗
$3.40	✔	$8.40	✔	$13.40	✔	$18.40	✗	$23.40	✗	$28.40	✗
$3.60	✔	$8.60	✔	$13.60	✔	$18.60	✗	$23.60	✗	$28.60	✗
$3.80	✔	$8.80	✔	$13.80	✔	$18.80	✗	$23.80	✗	$28.80	✗
$4.00	✔	$9.00	✔	$14.00	✔	$19.00	✗	$24.00	✗	$29.00	✗
$4.20	✔	$9.20	✔	$14.20	✔	$19.20	✗	$24.20	✗	$29.20	✗
$4.40	✔	$9.40	✔	$14.40	✔	$19.40	✗	$24.40	✗	$29.40	✗
$4.60	✔	$9.60	✔	$14.60	✔	$19.60	✗	$24.60	✗	$29.60	✗
$4.80	✔	$9.80	✔	$14.80	✔	$19.80	✗	$24.80	✗	$29.80	✗
$5.00	✔	$10.00	✔	$15.00	✔	$20.00	✗	$25.00	✗	$30.00	✗

Figure 12: Purchase Stage

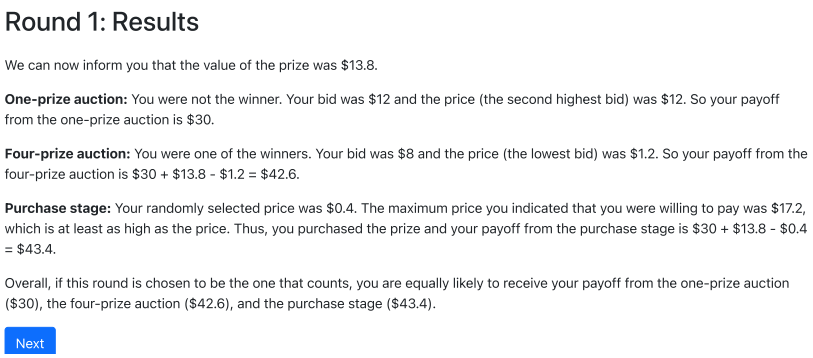


Figure 13: Results