

E.3 Instructions for Experiment 3

A full set of instructions for Experiment 3 are available at tomwilkening.com. For convenience, we have included a copy of the buyer's instructions in the SR mechanism. The order of events in a session were as follows:

1. After being randomly assigned computers, subjects were given the first set of written instructions and were asked to read them at their own pace and complete the quiz.
2. After all quizzes were checked, the first verbal summary was read aloud.
3. Subjects played the first 8 periods.
4. We handed out additional instructions and gave participants 4 minutes to read them. We then read the second verbal summary aloud.
5. Subjects played the next 8 periods.
6. We displayed the instructions for the third set of 8 periods on screen and read them aloud. Subjects then played the last 8 periods.

Instructions for Buyer:

Welcome to the experiment. Throughout this experiment, you will be the potential buyer of a good. Half of the other participants in the experiment have been assigned to the role of sellers. If you read the instructions carefully, depending on your decisions and the decisions of others, you can earn a significant amount of money. You will receive this money privately, using PayID, after the experiment.

If you have any questions before or during the experiment, please do not talk out loud or to one another. Raise your hand and an experimenter will assist you.

During the experiment we shall not speak of Dollars, but of Experimental Currency Units (ECU). Your entire earnings will be calculated in ECUs. At the end of the experiment, we will randomly select three of the periods for payment – one from periods 1-8, one from periods 9-16, and one from periods 17-24. The ECUs you earn or lose in these periods will be converted to Dollars at the rate of

10 ECU = \$1.

In addition, if you stay to the end of the experiment, we will give you an additional one-off payment of **\$35** for completing the experiment. Any losses that you incur in the course of the experiment will be subtracted from this initial payment.

Please turn the page to begin the instructions.

I. Overview of the experiment

This experiment is broken up into twenty-four periods. In each period, you will be matched with a seller and have the task of deciding on a price at which to trade a good. An arbitration and verification system is being used in today's experiment to help you and your matched partner set prices. The arbitrator is being played by the computer.

Before deciding on a price, the seller will have the option of investing money to improve the joint surplus that can be gained from trading the good. The seller's investment will increase the value of the good to you.

We will explain the first 8 periods of the experiment in these instructions and will hand out additional instructions after period 8. The last 16 periods will have an additional stage where one party can send messages to the other party. Your actions in the first 8 periods will not influence the rules or matching used in the last 16 periods.

You will be randomly assigned to a different seller in each of the first 8 periods. Thus, the seller that you interact with in one period will be different from the seller you interact with in the next period.

(Please continue to the next page)

Each of the first 8 periods is divided into four stages:

1. **The Investment Stage:**
 - a. The seller will decide on an investment level. The investment level the seller chooses will determine the true value of the good for you.
2. **The Report Stage:** You and the seller will be informed of the investment decision made by the seller and the true value of the good.
 - a. You will be asked to report the value of the good to the computer.
 - b. The seller will be asked to report the value of the good to the computer.
3. **The Verification Stage:** Your report of the good's value will be compared to the report made by the seller.
 - a. If the reports coincide, you and the seller will trade at a price that is based on the agreed upon reports.
 - b. If there is a discrepancy in the reports, you will enter into the arbitration stage.
4. **The Arbitration Stage:** In the arbitration stage:
 - a. You will pay an arbitration fee.
 - b. You will then be asked to make a second report. Trade prices and additional seller fees or seller bonuses will be based on this second report.

(Please turn the page for more detailed instructions.)

II. The Stages of the Experiment: First 8 Periods

Investment Stage:

Seller's investment decision: At the beginning of each period, the seller has the option to invest to increase the value of the good to you. The seller can invest 0, 25, or 75 ECU. The true value of the good for each investment is as follows:

Seller's Investment	Your True Value
0	100
25	150
75	220

As can be seen, investment is costly for the seller but increases your true value.

Example 1: The seller invests 0 ECU. The true value of the good would be 100.

Example 2: The seller invests 75 ECU. The true value of the good would be 220.

The Value Report Stage:

You will be informed about the investment decision of the seller and asked to report your true value of the good to the computer. You may report any of the potential values.

The seller will also be asked to report the true value of the good to the computer. The seller can report any of the potential values.

You will be notified about the value report of the seller at the end of the stage after making your report.

The Verification Stage:

In the verification stage, we will compare your report with that of the seller. If your report coincides with those of the seller, you and the seller will trade at the following prices:

Reported Values	Trade Price if Reports Coincide
100	45
150	95
220	165

Example 3: The seller invests 0 ECU. The true value of the good is 100. You and the seller both report that the value of the good is 100. Using the table above, the trade price is 45. Your earnings would be 55 ($100 - 45$).

If Reports Match:

$$\text{Buyer's Earnings} = \text{Value} - \text{Trade Price}$$

The seller's earnings would be 45 ($45 - 0 = 45$).

If Reports Match:

$$\text{Seller's Earnings} = \text{Trade Price} - \text{Seller's Investment}$$

Example 4: The seller invests 75 ECU. The true value of the good is 220. You and the seller both report that the value of the good is 220. Using the table above, the trade price is thus 165. Your earnings would be 55 ($220 - 165 = 55$). The seller's earnings would be 90 ($165 - 75 = 90$.)

If your report does not coincide with the seller's report, the game will continue onto the arbitration stage discussed below.

The Arbitration Stage:

If your report does not coincide with the seller's report, you will pay a Buyer's Fee of 150 ECU to the arbitrator.

After paying the fee, you will be asked to make a second report of your value to the arbitrator. The arbitrator will take an action based on your report and a roll of a six-sided dice. Each outcome of the dice is equally likely.

Your Second Report	The Outcome if Dice Roll is a 1 or 2 (33.33% chance)	The Outcome if Dice Roll is a 3 or 4 (33.33% chance)	The Outcome if Dice Roll is a 5 or 6 (33.33% chance)
0	No Trade	No Trade	No Trade
100	Trade at 55	No Trade	No Trade
150	Trade at 55	Trade at 105	No Trade
220	Trade at 55	Trade at 105	Trade at 175

The arbitrator's actions are designed so that it is always in your material interests to make a second report that coincides with the true value.

Your second report will also be used by the arbitrator to reward or punish the seller:

- If your second report is the same as the report that the seller made in the report stage, the seller will be paid a Seller's Bonus of 150 ECU by the arbitrator.
- If your second stage report is different to the report made by the seller, the seller will pay a Seller's Fee of 150 ECU to the arbitrator.

These bonuses and fees have been set up so that the seller has a material interest to report the true value in the report stage if he or she believes that you will either (1) report the true value in the report stage or (2) report the true value in the arbitration stage.

Some Examples with the Arbitrator:

Example 5: The seller invests 75. The true value of the good is 220. You report a value of 100 and the seller reports a value of 220. Due to the different value reports, you enter the arbitration stage:

- You pay a buyer's fee of 150 ECU to the arbitrator.
- If you choose to make a second report of 220, a dice is rolled by the arbitrator:
 - If the dice comes up a 1 or 2, you will trade at a price of 55.
 - If the dice comes up a 3 or 4, you will trade at a price of 105.
 - If the dice comes up a 5 or 6, you will trade at a price of 175.
 - The seller will be paid a seller's bonus of 150 by the arbitrator.
- If you choose to make a second report of 150, a dice is rolled by the arbitrator:
 - If the dice comes up a 1 or 2, you will trade at a price of 55.
 - If the dice comes up a 3 or 4, you will trade at a price of 105.
 - If the dice comes up a 5 or 6, you do not trade.
 - The seller will pay a seller's fee of 150 to the arbitrator.
- If you choose to make a second report of 100, a dice is rolled by the arbitrator:
 - If the dice comes up a 1 or 2, you will trade at a price of 55.
 - If the dice comes up a 3, 4, 5, or 6 you do not trade.
 - The seller will pay a seller's fee of 150 to the arbitrator.
- If you choose to make a second report of 0, you do not trade. The seller will pay a seller's fee of 150 to the arbitrator.

Since the true value is 220, you would minimize your losses (and hence maximize your overall profits) by trading the good at a price of 55, 105, or 175 than not trading the good. Thus, you would maximize your overall profits by announcing the true value of 220 in the second report stage.

Example 5 continued: You follow your material interests and make a second report of 220. The arbitrator rolls a 5 on the dice. The trade price is thus 175. Your earnings would be -105 ($220 - 175 - 150 = -105$).

If Trade Occurs in the Arbitration Stage:

$$\text{Buyer's Earnings} = \text{Value} - \text{Trade Price} - \text{Buyer's Fee}$$

Your second report matches the seller's initial report. Thus, the seller receives a bonus of 150 from the arbitrator and does not have to pay a fee. The seller's earnings would be 250 ($175 - 75 + 150$).

If Trade Occurs in the Arbitration Stage:

$$\text{Seller's Earnings} = \text{Trade Price} - \text{Seller's Investment} - \text{Seller's Fee} + \text{Seller's Bonus}$$

Example 6: The seller invests 0. The true value of the good is 100. You report a value of 100 and the seller reports a value of 220. Due to the different value reports, you enter the arbitration stage:

- You pay a buyer's fee of 150 ECU to the arbitrator.
- If you choose to make a second report of 220, a dice is rolled by the arbitrator:
 - If the dice comes up a 1 or 2, you will trade at a price of 55.
 - If the dice comes up a 3 or 4, you will trade at a price of 105.
 - If the dice comes up a 5 or 6, you will trade at a price of 175.
 - The seller will be paid a bonus of 150 by the arbitrator.
- If you choose to make a second report of 150, a dice is rolled by the arbitrator:
 - If the dice comes up a 1 or 2, you will trade at a price of 55.
 - If the dice comes up a 3 or 4, you will trade at a price of 105.
 - If the dice comes up a 5 or 6, you do not trade.
 - The seller will pay a fee of 150 to the arbitrator.
- If you choose to make a second report of 100, a dice is rolled by the arbitrator:
 - If the dice comes up a 1 or 2, you will trade at a price of 55.
 - If the dice comes up a 3, 4, 5, or 6 you do not trade.
 - The seller will pay a fee of 150 to the arbitrator.
- If you choose to make a second report of 0, you do not trade and the seller will pay a fee of 150 to the arbitrator.

Since the true value is 100, you would earn money from exchanging the good at a price of 55 but would lose money from exchanging the good at a price of 105 or 175. Thus, you would make the most maximize his overall profits by announcing the true value of 100 in the second report stage.

Example 6 continued: You follow your material interests and make a second report of 100. The arbitrator rolls a 5 on the dice. Thus, no trade occurs. Your earnings would be -150.

If Trade Does Not Occurs in the Arbitration Stage:

$$\text{Buyer's Earnings} = - \text{Buyer's Fee}$$

Your second report does not match the seller's initial report. Thus, the seller pays an arbitration fee of -150 and does not receive a seller's bonus. The seller's earnings would be -150 ($-0 - 150 + 0 = -150$).

If Trade Does Not Occurs in the Arbitration Stage:

$$\text{Seller's Earnings} = - \text{Seller's Investment} - \text{Seller's Fee} + \text{Seller's Bonus}$$

Earnings:

Your earnings in a period are based on your earnings from trade and any fees that are imposed. If you trade in a period your earnings are equal to

$$\text{Buyer's Earnings with Trade} = \text{Value} - \text{Price} - \text{Buyer's Fee}$$

In cases where you do not trade, you must still pay the fee. Thus, your earnings are equal to:

$$\text{Buyer's Earnings without Trade} = - \text{Buyer's Fee}$$

The seller's earnings are based on his or her earnings from trade, his or her investment costs, and any fees that accrue. If the seller trades in a period, the seller's earnings are equal to:

$$\text{Seller's Earnings with Trade} = \text{Price} - \text{Seller's Investment} - \text{Seller's Fee} + \text{Seller's Bonus}$$

If the seller does not trade, he or she must still pay his or her investment cost and is responsible for any fees that accrue. Thus, when trade does not occur, the seller's earnings are equal to

$$\text{Seller's Earnings without Trade} = - \text{Seller's Investment} - \text{Seller's Fee} + \text{Seller's Bonus}$$

How will I be paid?

Your payment in this experiment is based on two things: Your participation payment and your earnings from the experiment.

- 1) **One-off Completion Payment:** If you stay to the end of the experiment, you will be awarded a one-off payment of **\$35** for your participation.
- 2) **Earnings from Three Periods:** We will randomly select **three** of the twenty-four periods for payment. One of these periods will be from periods 1-8, one of these periods will be from periods 9-16, and one for these periods will be from periods 17-24. Your payment will be the earnings in these periods plus your one-off completion payment.

$$\text{Your Payment} = \text{Earnings from Three Periods} + \text{Completion Payment}$$

What happens if I lose money in a period?

Depending on your actions and the actions of other participants, your earnings in the randomly selected period may be negative. If this is the case, we will subtract this total from the one-off payment. Thus, if you lose money in a period, your earnings may be below \$35.

How am I matched with Sellers?

In each of the first 8 periods you will be randomly matched with a different seller. Thus, the seller that you interact with this period will be different from the seller you are matched with in the next period.

Some things to note:

The following observations may be useful in deciding on your report.

- 1) The prices are set so that if everyone reports the true value, the trade prices will be set so that the seller receives all the benefits from his or her investment. This can be seen in examples 7 and 8 below.
- 2) If the seller reports the true value of the good in the report stage, you cannot improve your outcome by reporting a different value. This can be seen in example 9 on the next page.
- 3) If you report truthfully in the report and arbitration stage, the seller cannot improve his or her outcome by reporting a different value. This can be seen in example 10 on the next page.
- 4) If the seller believes that you will report truthfully in the arbitration stage, it is always in the seller's best interest to report the true value in the report stage even if he or she believes you will misreport in the report stage.

Additional Examples:

Example 7: The seller invests 0. The true value of the good is 100. You report a value of 100. The seller reports a value of 100. As the reports coincide, you trade at a price of 45.

- Using the formula above, your earnings would be $100 - 45 = 55$.
- Using the formula above, the seller's earnings would be $45 - 0 = 45$.

Example 8: The seller invests 75. The true value of the good would be 220. You report a value of 220. The seller reports a value of 220. As the reports coincide, you trade at a price of 165.

- Using the formula above, your earnings would be $220 - 165 = 55$.
- Using the formula above, the seller's earnings would be $165 - 75 = 90$.

Example 9: The seller invests 75. The true value of the good would be 220. You report a value of 100. The seller reports a value of 220. As the reports do not coincide, you enter into arbitration and pay a buyer's fee of 150. You make a second report of 220 in the arbitration stage and the arbitrator rolls a 1. Thus, you trade at a price of 55.

- Using the formula above, your earnings would be $220 - 55 - 150 = 15$.
- Using the formula above, the seller's earnings would be $55 + 150 - 75 = 130$.

Notice that you are better off reporting the true value of 220 in this example than repeating your original report of 100. Comparing the results of examples 8 and 9, you would be better off reporting the true value in the report stage than misreporting.

Example 10: The seller invests 0. The true value of the good would be 100. You report a value of 100. The seller reports a value of 220. As the reports do not coincide, you enter into arbitration and pay a buyer's fee of 150. You make a second report of 100 in the arbitration stage and the arbitrator rolls a 5. Thus, you do not trade. The seller must pay a seller's fee of 150 because your second report did not match the seller's report from the report stage.

- Using the formula above, your earnings would be $-150 = -150$.
- Using the formula above, the seller's earnings would be $0 - 150 = -150$.

Notice that in this example the seller has misreported in the report stage. By reporting the true value in the arbitration stage, the seller is charged an arbitration fee. As a result, the seller would have been better off reporting the true value in the report stage.

Quiz

Quiz: Please answer the following 4 questions. When you have completed the questions, raise your hand and a monitor will come to check your answers. When all the participants have completed their instructions, the experiment will begin. To help you on the quiz and in the main experiment, we have reprinted all the tables on the back of these instructions. You may pull the last page off the instructions if you wish.

Question 1: The seller invests 25 in the investment stage

What is the true value of the good to you?

Question 2: The seller invests 25 in the investment stage. You report that the value is 150. The seller reports that the value is 150:

- i) What is the trade price?
- ii) What are your earnings in this period?
- iii) What are the seller's earnings in this period?

Question 3: The seller invests 25 in the investment stage. You report that the value is 100. The seller reports that the value is 150.

- i) How much is the buyer's fee?
- ii) If you make a second report of 150, how much is the seller's arbitration fee or bonus?
- iii) If you make a second report of 150 and the dice comes up a "3", what are your earnings or losses in this period?
- iv) If you make a second report of 150 and the dice comes up a "3", what are the seller's earnings or losses in this period?

Question 4: The seller invests 25 in the investment stage. You report that the value is 150. The seller reports that the value is 220.

- i) How much is the buyer's fee?

- ii) If you make a second report of 150, how much is the seller's arbitration fee or bonus?

- iii) If you make a second report of 150 and the dice comes up a "1", what are your earnings or losses in this period?

- iv) If you make a second report of 150 and the dice comes up a "1", what are the seller's earnings or losses in this period?

Summary of Actions:



[All participants were given a copy of the following tables along with their main instructions]

Tables

Seller Investment

Seller's Investment	Your True Value
0	100
25	150
75	220

Trade Prices if Reports Coincide

Reported Values	Trade Price if Reports Coincide
100	45
150	95
220	165

Trade Prices Based on Second Reports if You Enter Arbitration:

Buyer's Second Report	The Outcome if Dice Roll is a 1 or 2 (33.33% chance)	The Outcome if Dice Roll is a 3 or 4 (33.33% chance)	The Outcome if Dice Roll is a 5 or 6 (33.33% chance)
0	No Trade	No Trade	No Trade
100	Trade at 55	No Trade	No Trade
150	Trade at 55	Trade at 105	No Trade
220	Trade at 55	Trade at 105	Trade at 175

[These Verbal Instructions were read after all participants finished their quiz and before the first 8 periods:]

In this experiment you will be playing the role of buyers and sellers and have the task of deciding on a price at which to trade a good. An arbitrator and verification system is being used in today's experiment to help you and your matched partner set prices.

Before deciding on a price, the seller will have the option of investing money to improve the joint surplus that can be gained from trading the good.

- The seller's investments will increase the value of the traded good to the buyer.

Prices will be set using an arbitration and verification system that is broken into three stages: a report stage, a verification stage, and an arbitration stage.

In the report stage:

- The buyer will be asked to report the value (and)
- The sellers will be asked to report the value

In the verification stage, we will compare the two reports. If they match, we will use them to set the trade price. If they do not match, the buyer will be charged an arbitration fee and continue to the arbitration stage.

In the arbitration stage, the buyer will be asked to make a second report. We will use this second report and the roll of a six-sided dice to determine the trade price. We will also compare the buyer's second report to the seller's report in the report stage. The seller will receive an arbitration bonus if they match and must pay an arbitration fee if they differ.

In each of the first eight periods you will be matched with a different person from the other side of the market. Thus the partner you are matched with in this period will be different than the one you are matched with in the next period.

We will hand out instructions for part two of the experiment after period 8 and instructions for part three of the experiment after period 17. The second and third parts will be very similar to the first part except for an additional stage where one party will be able to send messages the other party. The parameters for the second part of the experiment have been predetermined and your choices in the first 8 periods have no bearing on your role or potential choices in parts 2 or 3.

If there are any questions, please raise your hand? Ok, we will be begin.

[These instructions were handed out to participants after Period 8. After 4 minutes we read the Verbal Instructions for Part II:]

II. Part 2 of the Experiment

The second part of this experiment consists of 8 periods and is identical to the first except that the buyer will be able to send a message to the seller indicating which value report he plans to make in the report stage.

Each of the next 8 periods is divided into five stages:

1. **The Investment Stage:**
 - a. The seller will decide on an investment level. The investment level the seller chooses will determine the true value of the good for you.
2. **The Communication Stage:** The buyer will be informed of the investment decision made by the seller
 - a. The buyer may send a message to the seller indicating which of the value reports he or she is planning to make. The buyer may send any of the following messages:
 - i. "I plan on reporting a value of 100."
 - ii. "I plan on reporting a value of 150."
 - iii. "I plan on reporting a value of 220."
 - iv. "I have chosen not to send a message."
3. **The Report Stage:** The seller will receive the message chosen by the buyer. Next, the buyer and seller will make a report.
 - a. The buyer will be asked to report the value of the good to the arbitrator. This report may differ from the message sent in the communication stage.
 - b. The seller will be asked to report the value of the good to the arbitrator.
4. **The Verification Stage:** The buyer and seller reports will be compared.
 - a. If the reports coincide, the buyer and seller will trade at a price that is based on the agreed upon reports.
 - b. If there is a discrepancy in the reports, the buyer will enter into the arbitration stage.
5. **The Arbitration Stage:** In the arbitration stage, the buyer will pay an arbitration fee and will be asked to make a second report. Trade prices and additional seller fees or bonuses will be based on this report.

The buyer's message in the communication stage does not have to match what report he or she makes in the reporting stage. As before, you will be randomly assigned to a new partner in each of the next 8 periods. Thus, the person that you match with this period will be different from the person you match with in all future periods.

[These instructions were read after participants had finished reading the second set of instructions:]

Part II

The second part of this experiment is identical to the first except that the buyer will have an opportunity to send a message to the seller indicating the report he or she plans to make in the report stage. The buyer can send this message after learning about the true value of the good and before both parties make reports in the report stage.

The buyer may send a message indicating that he or she plans to report a value of 100, 150, or 220. He or she may also choose to not send a message. The buyer's message does not restrict the report he or she can make in the report stage.

Just as in the first 8 periods you will be matched with a different person on the other side of the market in each period. Thus, the person you trade with in this period will be different to the person you trade with in any other period.

We will hand out instructions for part three of the experiment after you have completed this part of the experiment. The third part will be similar to this part. The parameters for the third part of the experiment have been predetermined and your choices in the next 8 periods have no bearing on your role or potential choices in part 3.

If there are any questions, please raise your hand? Ok, we will be begin.

[These instructions were displayed on the screen of participants after completed period 16 and were read aloud before starting the last 8 periods:]

Part III

Part three of the experiment is identical to the second part of the experiment. You will be matched with a different person on the other side of the market in each period. Thus, the person you trade with in this period will be different to the person you trade with in all future periods.

Good luck.