Instructions for Buyer:

Welcome to the experiment. Throughout this experiment, you will be the potential buyer of a container. 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, in cash, after the experiment.

If you have any questions before or during the experiment, please do not talk out loud. 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 two of the periods for payment – one from periods 1–10 and one from periods 11-20. The ECUs you earn in these periods will be converted to Dollars at the rate of

2 ECU= $1,

and will be immediately paid to you in cash. 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.

I. Overview of the experiment

This experiment is broken up into twenty 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 container. If there is disagreement about the price, an arbitrator may be called. The role of the arbitrator is played by the computer whose actions will be described below.

The experiment is divided into two phases of 10 periods. In the first 10 periods, you will be randomly matched with a <u>different</u> seller in each period. Thus, the seller that you interact with in this period will be different from the seller you interact with in future periods. As discussed below, we will randomly select two periods for payments. One of the payment periods will be from the first 10 periods and one will be from the second 10 periods.

Instructions for the second phase will be handed out at the end of period 10. The parameters for the second part of the experiment have been predetermined and thus your choices in the first 10 periods have no bearing on your role or potential choices in the second half of the experiment.

Each period of the experiment will be divided into two parts: The Allocation of Containers and the Report Game.

**Part I: The Allocation of Containers:**
Part II: The Report Game.

Part I: The Allocation of Containers

In each period, the computer will randomly select one of two possible containers and give it to the seller. One container is worth 70 ECU to you while the other container is worth 20 ECU. Each container is equally likely to be selected.

Each of the two containers has two compartments that are filled with red and blue balls. We will refer to the left compartment as the "buyer's compartment" and the right compartment as the "seller's compartment."

1. The buyer's compartment and the seller's compartment of the container worth 20 ECU is filled with 40 blue balls.

2. The buyer's compartment and the seller's compartment of the container worth 70 ECU is filled with 40 red balls.

| Buyer's Compartment | Seller's Compartment | Buyer's Compartment | Seller's Compartment |

Value to Buyer: 20 ECU   Value to Buyer: 70 ECU
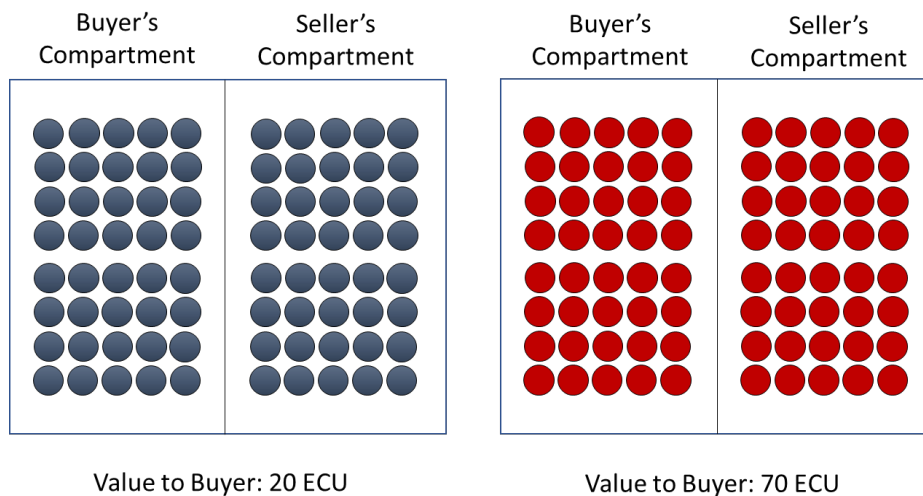
Both you and your matched partner will not initially know which container has been given to the seller while trading. However, one of the balls in the buyer's compartment will be randomly drawn and secretly shown to you. One of the balls in the seller's compartment will be drawn from the same container and secretly shown to the seller.

In the first 10 periods, since the container worth 70 ECU is filled with only red balls and the container worth 20 ECU is filled with only blue balls, the color of the ball will perfectly inform you about the container being traded. If you see a red ball, you have a 100% chance to be trading a container worth 70 ECU. If you see a blue ball, you have a 100% chance of trading a container worth 20 ECU.

The arbitrator, which is played by the computer, does not get to draw a ball from a container. Thus, the arbitrator cannot determine which container you are trading and will only take specific actions based on your actions in the next part of the experiment.

Part II: The Report Game

Part II of the experiment is divided into five stages:

Stage 1: The Report Stage:

In the report stage, you will be asked to report the value of the container under two scenarios: the scenario where you observe a red ball and the scenario where you observe a blue ball. For each scenario, you may report a value of 20 or a value of 70. Your reports on the two scenarios may be different or the same.

The seller will also be asked to make a report for the scenario where he or she sees a red ball and the scenario where he or she sees a blue ball.

Stage 2: The Signal Stage:

In the signal stage, you will randomly draw a ball out of the buyer's compartment of the container. After observing the color of the signal, you will make a report which corresponds to your decision in the report stage for that color signal.

The seller will draw a ball from the seller's compartment of the container. After observing the color of this signal, the seller will make a report which corresponds to the decision the seller made in the report stage for that color signal.

Example 1: In the report stage, you decide to report a value of 70 in the case of receiving the red signal and a value of 20 in the case of receiving a blue signal. In the signal stage you draw a blue ball. Thus, your report will be 20.

In the report stage, the seller decides to report a value of 70 in the case of receiving the red signal and a value of 20 in the case of receiving a blue signal. In the signal stage the seller draws a blue ball. The seller report will be 20.

Stage 3: The Verification Stage:

Your report will be compared to the report made by the seller. If the reports coincide, you will trade at a price that is based on your report:

Your Report	Trade Price
20	10
70	35

Your earnings will be the value of the container minus the trade price. The seller's earnings is equal to the trade price.

Example 2: *You receive the red signal. You report a value of 70. The seller also reports a value of 70. The reports coincide, and the trade price is 35. After opening the container, the value is 70 ECU. Your earnings would be 35 (70-35=35).*

_____ If Reports Match: _____

Your Earnings = Value - Trade Price

_____

The seller's earnings would be 35.

_____ If Reports Match: _____

Seller's Earnings = Trade Price

_____

Example 3: *You receive the red signal. You report a value of 20. The seller also reports a value of 20. The reports coincide and the trade price 10. After opening the container, the value is 70 ECU.   Your earnings would be 60 (70-10=60). The seller's earnings would be 10.*

If the reports do not coincide, you (i) pay an arbitration fee of 40 ECU and (ii) enter the Arbitration Stage.

Stage 4: The Arbitration Stage

As noted above, if you enter the arbitration stage, you will pay an arbitration fee of 40 ECU.

After paying the arbitration 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 1,2, or 3 (50% chance)	The Outcome if Dice Roll is a 4,5, or 6 (50% chance)
0	No Trade	No Trade
20	Trade at Price of 10	No Trade
70	Trade at Price of 10	Trade at Price of 35

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 fine the seller:

- If your second report is the same as the report that the seller made in the report stage, the seller will be <u>paid</u> a bonus of 40 ECU by the arbitrator.
- If your second stage report is different to the report made by the seller, the seller will also <u>pay</u> an arbitration fee of 40 ECU to the arbitrator.

Note that the seller will either receive an arbitration bonus or pay an arbitration fee. The bonuses and fines have been setup 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.

Example 4: *You have the red signal. You report a value of 70. The seller reports a value of 20. As the reports do not coincide, you enter arbitration. You make a second report of 70. The arbitrator rolls a 2 on the dice. The trade price is thus 10. If the true value of the container is 70 ECU, your earnings would be 20 (70 – 10 - 40 = – 20).*

_____If Trade Occurs in the Arbitration Stage:_____

Your Earnings = Value – Trade Price – Arbitration Fee

_____

As your second report did not match the seller's initial report, the seller must pay an arbitration fee of 40. The seller's earnings would be -30 (10 - 40 + 0 = -30).

_____If Trade Occurs in the Arbitration Stage:_____

Seller's Earnings = Trade Price – Arbitration Fee + Arbitration Bonus

_____

Example 5: *You have the blue signal. You report a value of 70. The seller reports a value of 20. As the reports do not coincide, you enter arbitration. You make a second report of 20. The arbitrator rolls a 5 on the dice. In this case, you do not trade. Your earnings would be -40 (0 – 0 - 40 = – 40).*

_____If Trade Does Not Occurs in the Arbitration Stage:_____

Your Earnings = – Arbitration Fee

_____

As your second report matched the seller's initial report, the seller receives an arbitration bonus of 40. The seller's earnings would be 40.

_____If Trade Does Not Occurs in the Arbitration Stage:_____

Seller's Earnings = – Arbitration Fee + Arbitration Bonus

_____

Stage 5: Calculating Earnings

At the end of each period, we will open the container and determine whether the value of the container is 70 or 20. The earnings you receive in a period are based on your earnings from trade and any fines that you pay from the arbitrator.

Buyer's Earnings = Value – Price – Arbitration Fee

The sellers earning is based on the trade price and any fines or bonuses he or she pays or receives

Seller's Earnings = Price– Arbitration Fee + Arbitration Bonus

Note that if you do not trade, the seller retains the container and thus your value is zero and the trade price is zero.

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 One Period:** We will randomly select **two** of the twenty periods for payment. One of these periods will be from periods 1-10 and one of these periods will be from periods 11-20. Your payment will be the earnings in these periods plus your One-off payment.

_____

   Your Payment = Earnings from two periods + Completion Payment

_____

What happens if I lose money in a period selected for payment?
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 10 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.

Quiz

Please answer the following 8 questions (you can write on these instructions). When you have completed the questions, raise your hand and a monitor will come to check your answers. When all participants have completed their instructions, the experiment will begin.

Question 1: You receive the blue signal:

What is the chance that the container is worth 20 ECU?

Question 2: You receive the blue signal. You report a value of 20. The seller reports a value of 20.

What is the trade price?

Upon opening the container, the value is 20. What are your earnings for the period?

What are the seller's earnings for the period?

Question 3: You receive the blue signal. You report a value of 70. The seller reports a value of 20.

Suppose you make a second report of 20. How much money would you earn if the arbitrator rolls a 5?

Suppose you make a second report of 70. How much money would you earn if the arbitrator rolled a 5?

Suppose you make a second report of 20. What are the seller's earnings for the period if the arbitrator rolls a 5?

Question 4: You receive the blue signal. You report a value of 20. The seller reports a value of 70.

Suppose you make a second report of 20. What are the seller's earnings for the period if the arbitrator rolls a 5?

Question 5: You receive the red signal:

What is the chance that the container is worth 20 ECU?

Question 6: You receive the red signal. You report a value of 70. The seller reports a value of 70.

What is the trade price?

Upon opening the container, the value is 70. What is your earnings for the period?

What are the seller's earnings for the period?

Question 7: You receive the red signal. You report a value of 20. The seller reports a value of 70.

Suppose you make a second report of 20. How much money would you earn if the arbitrator rolled a 5?

Suppose you make a second report of 70. How much money would you earn if the arbitrator rolled a 5?

Suppose you make a secondary report of 70. What are the seller's earnings for the period if the arbitrator rolls a 5?

Question 8: You receive the red signal. You report a value of 70. The seller reports a value of 20.

Suppose you make a second report of 70. What are the seller's earnings for the period if the arbitrator rolls a 5?

Tables

Trade Prices If Buyer and Seller Reports Match

Your Report	Trade Price
20	10
70	35

Trade Prices Based on Second Reports if You Enter Arbitration:

Buyer's Second Report	The Outcome if Dice Roll is a 1,2, or 3 (50% chance)	The Outcome if Dice Roll is a 4,5, or 6 (50% chance)
0	No Trade	No Trade
20	Trade at Price of 10	No Trade
70	Trade at Price of 10	Trade at Price of 35

Arbitration Fees and Bonuses

- If Buyer Enters Arbitration: Buyer Pays Arbitration Fee of 40
- If Buyer's Second Report Matches Sellers Report: Seller Receives Arbitration Bonus of 40
- If Buyer's Second Report Does Not Match Sellers Report: Seller Pays Arbitration Fee of 40

Earnings Calculations:

If Reports Match:

Your Earnings = Value - Trade Price

Seller's Earnings = Trade Price

If Trade Occurs in the Arbitration Stage:

Your Earnings = Value – Trade Price – Arbitration Fee

Seller's Earnings = Trade Price – Arbitration Fee + Arbitration Bonus

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If Trade Does Not Occurs in the Arbitration Stage:

Your Earnings = – Arbitration Fee

Seller's Earnings = – Arbitration Fee + Arbitration Bonus

Verbal summary for Part 1 of SR Mechanism

In this experiment you will take on the roles of buyers and sellers who have the task of deciding on a price at which to trade a container. If there is disagreement about the price, an arbitrator may be called. The role of the arbitrator is played by the computer who takes specific actions based on the reports of the buyer and seller.

The experiment will be broken up into twenty periods. In each of the first ten 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.

Each of the first 10 periods is divided into two parts:

In part 1, the seller will be randomly given a container which is either worth 20 or 70 ECU to the buyer. Each of the two potential containers has a buyer's compartment and a seller's compartment. Each compartment is filled with 40 balls. In the first 10 periods:

1) Each compartment of the container worth 70 ECU is filled with 40 red balls and 0 blue balls
2) Each compartment of the container worth 20 ECU is filled with 40 blue balls and 0 red balls

In each period, a random ball from the buyer's compartment of the assigned container will be drawn and shown to the buyer. A random ball from the seller's compartment of the assigned container will be drawn and shown to the seller.

If you see a red ball, you have a 100% chance to be trading a container worth 70 ECU. If you see a blue ball, you have a 100% chance of trading a container worth 20 ECU. Note that since each container has only one ball color both you and your matched partner will observe the same color ball and thus know perfectly which container you are trading.

After observing a ball, called a signal in the experiment, you will then continue to part two. Part two of the experiment is divided into four stages: The report stage, the signal stage, the verification stage, and the arbitration stage.

In the report stage, both you and your matched partner will be asked to report the value of the container under the scenario of receiving the red ball and the scenario of receiving the blue ball. In the signal stage, we will draw a ball from the buyer's compartment of the container and the buyer will make a report which corresponds to his or her decision in the report stage for this color ball. We will draw a ball from the seller's compartment of the container and the seller will make a report which corresponds to his or her decision in the report stage for this color ball.

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. The seller will receive an arbitration bonus if they match and must pay an arbitration fee if they differ.

After 10 periods, we will hand out new instructions for phase 2. Phase 2 will be identical to Phase 1 except that the composition of red and blue balls in the container may change. The parameters for the second part of the experiment have been predetermined and your choices in the first 10 periods have no bearing on your role or potential choices in phase 2.

If anyone has any questions, just raise your hand… OK, we will begin.

Periods 11-20: The Allocation of Containers

The second part of this experiment is identical to the first except that some of the red and blue balls have been switched.

As before, in each period, the computer will randomly select one of two possible containers and give it to the seller. One container is worth 70 ECU to you while the other container is worth 20 ECU.   Each container is equally likely to be selected.

Each of the two containers is filled with red and blue balls. Now, however:

1. The buyer's compartment of the container worth 20 ECU is filled with 39 blue balls and 1 red ball. The seller's compartment of the container worth 20 ECU is filled with 35 blue balls and 5 red ball.

2. The buyer's compartment of the container worth 70 ECU is filled with 39 red balls and 1 blue ball. The seller's compartment of the container worth 70 ECU is filled with 35 red balls and 5 blue balls.
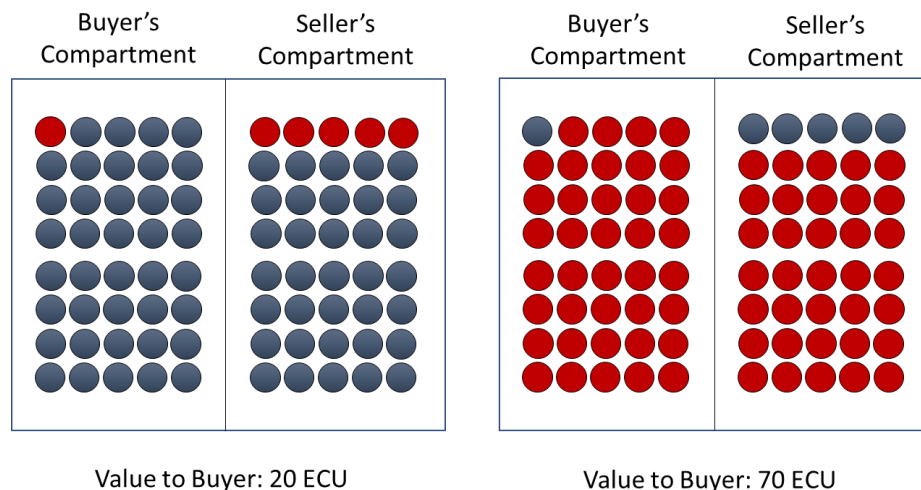
Buyer's Compartment	Seller's Compartment	Buyer's Compartment	Seller's Compartment

Value to Buyer: 20 ECU   Value to Buyer: 70 ECU

Both you and your matched partner will not initially know which container has been given to the seller while trading. However, one of the balls in the buyer's compartment will be randomly drawn and secretly shown to you.   Likewise, one of the balls in the seller's compartment will be drawn from the same container and secretly shown to the seller.

Please Turn the Page

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Unlike the first 10 periods, seeing a red or blue ball does not give you perfect information about the container being traded.

If you are a buyer and see a red ball, you have a 97.5% chance of trading a container worth 70 ECU. If you see a blue ball, you have a 2.5% chance of trading a container worth 70 ECU.

If you are a seller and see a red ball, you have a 87.5% chance of trading a container worth 70 ECU. If you see a blue ball, you have a 12.5% chance of trading a container worth 70 ECU.

The containers that you are trading contain both red and blue balls and thus there may be cases where the colour of the ball you observe is different than the colour of the ball that your matched partner observes. To help you make decisions, we have calculated the probability that different events occur.

Signal Combinations

If the container is worth 70:
- Both the buyer and the seller will receive a red signal 85.3125% of the time
- The buyer will receive a red signal and the seller will receive a blue signal 12.1875% of the time.
- The buyer will receive a blue signal and the seller will receive a red signal 2.1875% of the time
- Both the buyer and the seller will both receive a blue signal 0.3125% of the time.

If the container is worth 20:
- Both the buyer and the seller will receive a blue signal 85.3125% of the time
- The buyer will receive a blue signal and the seller will receive a red signal 12.1875% of the time.
- The buyer will receive a red signal and the seller will receive a blue signal 2.1875% of the time
- You will both receive the red signal 0. 3125% of the time.

Second Verbal Summary (Phase 2): The second part of the experiment is identical to the first part except that some of the blue and red balls have been swapped between the two containers.

In the container worth 70 ECU:
- The buyer's compartment is filled with 39 red balls and 1 blue ball
- The seller's compartment is filled with 35 red balls and 5 blue balls.

In the container worth 20 ECU:
- The buyer's compartment is filled with 39 blue balls and 1 red ball
- The seller's compartment is filled with 35 blue balls and 5 red balls.

Unlike the first 10 periods, seeing a red or blue ball does not give you perfect information about the container being traded.

If you are a buyer and see a red ball, you have a 97.5% chance of trading a container worth 70 ECU. If you see a blue ball, you have a 2.5% chance of trading a container worth 70 ECU.

If you are a seller and see a red ball, you have a 87.5% chance of trading a container worth 70 ECU. If you see a blue ball, you have a 12.5% chance of trading a container worth 70 ECU.

Note also that there may be cases where the colour of the ball you observe is different than the colour of the ball that your matched partner observes. We have included the probability of each of these events on the back of your new instructions.

As before, you will be matched with a different person on the other side of the market in each period. Thus the person you are matched with in this period will be different than the person you are matched with in all future periods.

If anyone has any questions, just raise your hand… OK, we will begin.

E.2   Instructions for Experiment 2

A full set of instructions for Experiment 2 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 allowed. In these verbal instructions we announced the six periods against the computer.

3. Subjects played the six periods against the computer

4. An additional verbal summary was read that reminded players that they were now playing against a different human in each of the next 10 period.

5. Subjects then played the first ten periods of the experiment.

6. We displayed instructions for phase 2 and gave the subjects four minutes to read them before beginning the second verbal summary.

7. The second verbal summary was read aloud.

At the time of conducting the experiment, our subject pool consisted of roughly 6000 individuals who had voluntary signed up for experiments. Invitations for each session were sent randomly to a subset of the sample. Subjects who had participated in any other experiment on implementation were excluded.

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, in cash, 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 the total amount of ECUs you have earned will be converted to Dollars at the rate of

35 ECU= $1,

and will be immediately paid to you in cash. In addition, we will give you a one-off initial payment of **$22** (i.e. 770 ECU). 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 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.

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

We will explain the first 10 periods of the experiment in these instructions and will hand out additional instructions after period 10. The last 10 periods will have an additional stage where you can choose not to use the verification system. Your actions in the first 10 periods will not influence the rules or matching used in the last 10 periods.

You will be randomly assigned to a <u>different</u> seller in each of the first ten periods. Thus, the seller that you interact with in this period will be different from the seller you interact with in future periods.

(Please continue to the next page)

Each of the first 10 periods is divided into four stages:

1. **The Investment Stage:**

   a. In the investment stage, you will decide on an investment level. The investment level you choose will determine the true cost of producing the good for the seller.

   b. The seller will also 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 other party and the true cost and true value of the good.

   a. You will be asked to report the value and the cost of the good to the arbitrator.

   b. The seller will be asked to report the value and the cost of the good to the arbitrator.

3. **The Verification Stage**: Your reports of the good's value and the good's cost will be compared to the reports 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 and the seller will enter into the arbitration stage.

4. **The Arbitration Stage:** In the arbitration stage, either you or the seller will be asked to make a second report.

   a. If in the verification stage there was a discrepancy in the reports of value, you will be fined by the arbitrator. You will then enter the arbitration stage where you will be asked to make a second report. Trade prices and additional seller fines or seller bonuses will be based on this second report.

   b. If in the verification stage, there was a discrepancy in the reports of cost, the seller will be fined. The seller will then enter the arbitration stage where he or she will be asked to make a second report. Trade prices and additional buyer fines or buyer bonuses will be based on this second report.

   c. If in the verification stage both reports do not coincide, both you and the seller will be fined. We will then flip a coin. If the coin comes up heads, you will enter the arbitration stage and be asked to make a second report. If the coin comes up tails, the seller will enter the arbitration stage and will be asked to make a second report.

(Please turn the page for more detailed instructions.)

II. The Stages of the Experiment: First 10 Periods

Investment Stage:

Your investment decision: At the beginning of each period, you will have an opportunity to invest to reduce the cost that the seller will incur when producing the good. You can choose to invest 0, 25, or 75 ECU. The true cost for producing the good for each investment is as follows:

Your Investment	Seller's True Cost
0	130
25	80
75	10

As can be seen, investing is costly for you but reduces the seller's true costs.

Seller's investment decision: Just as you have the option to invest to reduce the cost of producing the good, the seller has the option to invest to increase the value of the good to you. The seller can also 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	200
25	250
75	320

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

Example 1: You invest 25 ECU and the seller invests 0. The true value of the good would be 200 and the true cost of production would be 80.

Example 2: You invest 75 ECU and the seller invests 75 ECU. The true value of the good would be 320 and the true cost of production would be 10.

The Value and Cost 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 arbitrator. You may report any of your potential values.

You will also be asked to report the true cost of production to the arbitrator. You may report any of the potential costs.

The seller will also be informed of your investment decision and will be asked to report the true value and the true cost of the good to the arbitrator. The seller can again report any of the potential values and the potential costs.

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

The Verification Stage:

In the verification stage, we will compare your costs and values with those reported by the seller. If your reports coincide with those of the seller, you and the seller will trade at the following prices:

		Reported Cost		
		130	**80**	**10**
Reported Value	**200**	165	115	45
	250	215	165	95
	320	285	235	165

**Trade price if your reports
coincide with seller's reports**

Example 3: You invest 25 ECU and the seller invests 0. The true value of the good is 200 and the true cost of production is 80. You and the seller both report that the value of the good is 200 and the cost of production is 80. Using the table above, the trade price is 115.

Example 4: You invest 75 ECU and the seller invests 75 ECU. The true value of the good is 320 and the true cost of production is 10. You and the seller both report that the value of the good is 320 and the cost of production is 10. Using the table above, the trade price is thus 165.

If your reports <u>do not</u> coincide with those of the seller, the game will continue onto the arbitration stage discussed below.

The Arbitration Stage:

If your reports do not coincide with those of the seller, an arbitrator will be brought in and either you or the seller will enter into the arbitration stage.

- If there is a discrepancy in reported values but the cost reports are the same, you will be <u>fined</u> 300 ECU by the arbitrator. You will then enter the arbitration stage.
- If there is a discrepancy in reported costs but the value reports are the same, the seller will be <u>fined</u> 300 ECU by the arbitrator. The seller will then enter the arbitration stage.
- If there is a discrepancy in both the value reports and the cost reports, both you and the seller will be <u>fined</u> 300 ECU by the arbitrator. We will then flip a fair two-sided coin. If the flip comes up heads, you will enter the arbitration stage. If the coin flip comes up tails, the seller will enter the arbitration stage. The coin is equally likely to come up heads and tails.

If you enter the arbitration stage:

As noted above, if you enter the arbitration stage, you will be <u>fined</u> 300 ECU by the arbitrator.

After you are fined, 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 1,2, or 3 (50% chance)	The Outcome if Dice Roll is a 4,5, or 6 (50% chance)
200	No Trade	No Trade
250	Trade at 205	No Trade
320	Trade at 205	Trade at 255

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 fine the seller:

- If your second report is the same as the report that the seller made in the report stage, the seller will be <u>paid</u> a bonus of 300 ECU by the arbitrator.
- If your second stage report is different to the report made by the seller, the seller will also <u>pay</u> a fine of 300 ECU to the arbitrator.

These bonuses and fines have been setup 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 your second report.

If the Seller enters the arbitration stage:

As noted above, if the seller enters the arbitration stage, the seller will be <u>fined</u> 300 ECU by the arbitrator.

After the seller is fined, the seller will be asked to make a second report of the cost of production. The arbitrator will take an action based on the seller's report and a roll of a six-sided dice. Each outcome of the dice is equally likely.

Seller Second Report	The Outcome if Dice Roll is a 1,2, or 3 (50% chance)	The Outcome if Dice Roll is a 4,5, or 6 (50% chance)
130	No Trade	No Trade
80	Trade at 125	No Trade
10	Trade at 125	Trade at 75

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

The seller's second report will also be used by the arbitrator to reward or fine you:

- If the seller's second report is the same as the report that you made in the report stage, you will be <u>paid</u> a bonus of 300 ECU by the arbitrator.
- If the seller's second report is different than the report that you made in the report stage, you will be <u>fined</u> 300 ECU by the arbitrator.

These bonuses and fines have been setup so that you have a material interest to report the true cost in the report stage if you believe that the seller will either (1) report the true cost in the report stage or (2) report the true cost in the second report stage.

Some Examples with the Arbitrator:

Example 5: You invest 75 ECU and the seller invests 75. The true value of the good is 320 and the true cost of production is 10. You report a value of 200 and the seller reports a value of 320. You both report a cost of 10. Due to the value reports, you enter the arbitration stage:

- You are fined 300 by the arbitrator.
- If you choose to make a second report of 320, a dice is rolled by the arbitrator. If it comes up a 1, 2, or 3 you will trade at a price of 205. If it comes up a 4, 5, or 6 you will trade at a price of 255. The seller will be paid a bonus of 300 by the arbitrator.
- If you choose to make a second report of 250, a dice is rolled by the arbitrator. If it comes up a 1, 2, or 3 you will trade at a price of 205. If it comes up a 4, 5, or 6 you will not trade. The seller will be fined 300 by the arbitrator.
- If you choose to make a second report of 200, trade will not happen. The seller will be fined 300 by the arbitrator.

You would make the most money announcing the true value of 320 in the second report stage.

Example 6: You invest 75 ECU and the seller invests 75. The true value of the good is 320 and the true cost of production is 10. You report a cost of 10 and the seller reports a cost of 130. You both report a value of 320. Due to the disagreement in cost reports, the seller enters the arbitration stage:

- The seller's fine is 300.
- If the seller chooses to report 10, a dice is rolled by the arbitrator. If it comes up a 1, 2, or 3 you will trade at a price of 125. If it comes up a 4, 5, or 6, you will trade at a price of 75. You will be paid a bonus of 300 by the arbitrator.
- If the seller chooses to report 80 a dice is rolled by the arbitrator. If it comes up a 1, 2, or 3 you will trade at a price of 125. If it comes up a 4, 5, or 6, you will not trade. You will be fined 300 by the arbitrator.
- If the seller chooses to report 130, trade will not happen. You will be fined 300 by the arbitrator.

The seller would make the most money in this case by announcing the true value of 10 in the second report stage. In this case you would be paid a bonus of 300 by the arbitrator.

Earnings:

The earnings you receive in a period are based on your earnings from trade, your investment costs, and any fines or bonuses that you pay or receive from the arbitrator.

Buyer Earnings = Value – Price – Buyer's Investment – Buyer's Fine + Buyer's Bonus

Note that in some cases you may not trade. In these situations you still must pay for your investments and any fines that accrue. You will also be paid any bonuses that you receive from the arbitrator.

The sellers earning is equal to:

Seller's Earnings = Price –True Cost – Seller's Investment – Seller's Fines +Seller's Bonus

In cases where you do not trade, the seller must still pay for his or her investments and is responsible for any fines that accrue. The seller may also receive bonuses from the arbitrator.

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) **Participation Payment:** For participating, you have automatically earned **770 ECU**
2) **Earnings from the Experiment:** You will be paid on the total ECU that you earn across all 20 periods of the experiment.

_____

Your Payment = Earnings + Participation Payment
_____

What happens if I lose money in a period?

Depending on your actions and the actions of other participants, your earnings in a period may be negative. If, after any period, your total amount of ECU is negative, your participation payment will be converted into points and will act as additional funds. If you run out of your participation payment you will be removed from the experiment.

How am I matched with Sellers?

In each of the first 10 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 your investment and reports.

1) The prices in the verification stage are set so that if everyone reports the true value and true cost, the trade price will adjust so that you receive all the benefits from your investment. This can be seen in examples 7 and 8 below.

2) The prices are set so that if everyone reports the true value and true cost, the trade prices will adjust so that the seller receives all the benefits from his or her investment.

3) 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.

4) If you report the true cost of the good in the verification stage, the seller cannot receive any additional payments by announcing a different cost

Additional Examples:

Example 7: You invest 25 ECU and the seller invests 0. The true value of the good is 200 and the true cost of production is 80. You report a value of 200 and a production cost of 80. The seller reports a value of 200 and a production cost of 80. As the reports coincide, you trade at a price of 115.
- Using the formula above, your earnings would be $200 - 115 - 25 - 0 - 0 = 60$.
- Using the formula above, the seller's earnings would be $115 - 80 - 0 - 0 - 0 = 35$.

Example 8: You invest 75 ECU and the seller invests 0. The true value of the good would be 200 and the true cost of production would be 10. You report a value of 200 and a production cost of 10. The seller reports a value of 200 and a production cost of 10. As the reports coincide, you trade at a price of 45.
- Using the formula above, your earnings would be $200 - 45 - 75 - 0 - 0 = 80$.
- Using the formula above, the seller's earnings would be $45 - 10 - 0 - 0 - 0 = 35$

Example 9: You invest 75 ECU and the seller invests 75 ECU. The true value of the good would be 320 and the true cost of production would be 10. Both you and the seller report a value of 320 and a cost of production of 10. As the reports coincide, you trade at a price of 165
- Using the formula above, your earnings would be $320 - 165 - 75 - 0 - 0 = 80$.
- Using the formula above, the seller's earnings would be $165 - 10 - 75 - 0 - 0 = 80$.

Example 10: You invest 75 ECU and the seller invests 75 ECU. The true value of the good would be 320 and the true cost of production would be 10. You report a value of 200 and the seller reports a value of 320. You both report a cost of production of 10. Due to the difference in reports, you are fined 300 and are asked to make a secondary report.

If you report a value of 200, you and the seller do not trade. The seller will also be fined 300.
- Using the formula above, your earnings would be 0 – 75 – 300 = -375
- The seller's earnings would be 0 – 75 – 300 = -375

If you report the true value of 320, you and the seller will trade at either 205 or 255. The likelihood of each of these outcomes is .5:
- Using the formula above, your earnings would be .5*(320 – 205) + .5*(320 – 255) – 75 – 300 = -285.
- The seller's earnings would be .5*(205-10) + .5*(255-10) – 75 – 0 + 300 = 445.

Notice that you are better off reporting the true value of 320 then repeating your report of 200. Comparing the results of examples 9 and 10, you would be better reporting the truth in the report stage than misreporting.

Example 11: You invest 75 ECU and the seller invests 75 ECU. The true value of the good would be 320 and the true cost of production would be 10. You report a value of 320 and the seller reports a value of 320. You report a cost of 130 and the seller reports the true cost of 10. Due to the difference in reports, the seller is fined 300 and asked to make a second report.

The seller reports the true cost of 10. The arbitrator's dice comes up a "2". This implies that you would trade at a price of 125. As the seller's second report does not match your report, you are fined 300.
- Using the formula above, your earnings would be 320 – 125 – 75 – 300 = -180
- The sellers expected earnings would be 125- 10 – 75 – 300 = -260

As can be seen by comparing your earnings in this example to Example 9, you would be better off reporting the true cost in the report stage.

Quiz

Quiz: Please answer the following 3 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: You invest 25 in the investment stage. The seller invests 25 in the investment stage

      What is the true value of the good to you?

      What is the seller's true cost?

Question 2: You invest 25 in the investment stage. The seller invests 25 in the investment stage. You report that the value is 250 and the cost is 80. The seller reports that the value is 250 and the cost is 80:

    i)   What is the trade price?

    ii) What is your earnings?

    iii) What is the seller's earnings?

Question 3: You invest 25 in the investment stage. The seller invests 25 in the investment stage. You report that the value is 250 and the cost is 80. The seller reports that the value is 250 and the cost is 130:

    i)   How much is the seller's fine?

    ii) If the seller makes a second report of 80, how much is your bonus?

    iii) If the seller makes a second report of 80 and the dice comes up a "3", what are the seller's earnings?

    iv) If the seller makes a second report of 80 and the dice comes up a "4", what are your earnings?

Summary of Actions:

	Buyer's Actions	**Seller's Actions**
Investment Stage	**Investment** Decreases Seller's Cost **True Value**	**Investment** Increases Buyer's Value **True Cost**
Report Stage	**Report Value And Cost**	**Report Value And Cost**
Verification Stage	**Trade if reports coincide**	
Arbitration Stage	**If Value Reports Differ:** **Buyer Fines** **Buyer Second Report** **Seller Bonus/Fines**	**If Cost Reports Differ:** **Seller Fines** **Seller Second Report** **Buyer Bonus/Fines**
Exchange Stage	**Buyer's Payoff: True Value – Price – Buyer's Investment – Buyer's Fine + Buyer's Bonus** **Seller's Payoff: Price – True Cost – Seller's Investment – Seller's Fine + Seller's Bonus**	

Tables

Buyer Investments

Your Investment	Seller's True Cost
0	130
25	80
75	10

Seller Investment

Seller's Investment	Your True Value
0	200
25	250
75	320

Trade Price

		Reported Cost		
		130	80	10
Reported Value	200	165	115	45
	250	215	165	95
	320	285	235	165

Trade Prices Based on Second Reports if You Enter Arbitration:

Your Second Report	The Outcome if Dice Roll is a 1,2, or 3 (50% chance)	The Outcome if Dice Roll is a 4,5, or 6 (50% chance)
200	No Trade	No Trade
250	Trade at 205	No Trade
320	Trade at 205	Trade at 255

Trade Prices Based on Second Reports if Seller Enters Arbitration:

Seller Second Report	The Outcome if Dice Roll is a 1,2, or 3 (50% chance)	The Outcome if Dice Roll is a 4,5, or 6 (50% chance)
130	No Trade	No Trade
80	Trade at 125	No Trade
10	Trade at 125	Trade at 75

Protocol for Simultaneous MR Mechanism: 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, both you and your matched partner will have the option of investing money to improve the joint surplus that can be gained from trading the good.

- The buyer's investments will reduce the production cost of the traded good.
- The seller's investments will increase the value of the traded good.

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:
- Buyers will be asked to report the value and cost
- Sellers will be asked to report the value and cost

In the verification stage we will compare your reports with that of your matched partner:
- If the reports of the buyer and seller match, we will use them to set the trade price.
- If the value reports differ, the buyer will be fined and enter into the arbitration stage.
- If the cost reports differ, the seller will be fined enter into the arbitration stage.
- Finally, if both the value and costs differ, both parties will be fined and we will flip a coin to determine whether the buyer or seller will enter into the arbitration stage.

In the arbitration stage the buyer or seller who enters into arbitration will be asked to make a secondary report. The arbitrator will use these reports along with a fair six-sided dice to set prices.

The secondary report will also be used to set fines or rewards for the other member of the group who didn't enter into arbitration.

Before we get to the main experiment, we will play six practice rounds where you will be matched with a computer who will play the role of the other player. The computer will always take the following actions:

In the report stage:
- The computer will always announce the true value and the true cost.

If the computer enters into the verification stage it will always announce the true value or the true cost.

You will play six total rounds against the computer

- The first three rounds will be unpaid and you can use them to experiment with your decisions.
- The next three rounds will be paid just like in the main experiment. This means that you can both gain or lose money when playing against the computer in these periods.

Are there any questions?

[Participants now played the six periods against the computer. Once these were complete, we read the Part 1 verbal instructions:]

Part I

We will now play the first 10 periods. In each period you will be matched with a different person on the other side of the market. 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 two of the experiment after period 10. The second part will be very similar to the first part except for an additional stage where you and your partner can choose to remove the verification system. Note that your actions in the first half will not impact your potential decisions or matching in the second half so don't worry about anything like that.

Remember also that there is a potential to go bankrupt in the experiment. At the beginning of the experiment you started with 770 ECU and have gained or lost additional ECU based on your interactions with the computer.

If you fall below zero you will be removed from the experiment and paid your show-up fee. In cases where an individual is removed and you are matched with them, the computer will put in high effort and always report the true cost and value in the report stage and the arbitration stage.

Are there any questions?

II. Part 2 of the Experiment

The second part of this experiment is identical to the first except that both you and your matched partner can opt to remove the verification system and instead trade at a fixed price of 165.

You will be asked whether you wish to remove the verification stage prior to the investment stage. If the verification stage is removed, both parties will be informed prior to making their investments.

If the verification stage is removed, you will trade at a price of 165 regardless of the investments made by the two parties.

As with the first 10 periods, we will be randomly matching you to a different partner in each of the 10 periods of the session. Thus, the person you are matched with in one period will always be different than the person you are matched with in all future periods.

[These verbal instructions were read 4 minutes after the main treatment ended:]

Verbal Summary for Part II of SR Mechanism

The second part of this experiment is identical to the first except that both you and your matched partner will have the option of dismissing the arbitrator. If the arbitrator is dismissed, there will be no reports or verification stage and you will always trade at a price of 165.

If either you or your matched partner choose to dismiss the arbitrator, the arbitrator will not be available for the round. You will be notified about whether the arbitrator has been kept or dismissed before making your investment decisions.

Just as in the first 10 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.

Are there any questions?