

# **Online Appendix**

## **Beyond Dividing the Pie:**

### **An Experimental Study on Bargaining over Multiple Issues**

By Olivier Bochet, Manshu Khanna and Simon Siegenthaler

This online appendix contains the experiment instructions for three of the twelve treatments discussed in the article. The instructions are representative as the instructions for the remaining nine treatments follow directly from them. Please contact the authors for the full set of instructions.

## ***[Treatment: Free-form Bargaining & Bundling & Intermediate Information]***

### **General Instructions**

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Welcome to the Laboratory for Research in Experimental Economics.

Your earnings from the experiment will largely depend on your decisions and the decisions of others. Therefore, it is important that you read the instructions carefully. The experiment consists of three parts that are independent of each other. The instructions for Part 1 can be found on the following pages. The instructions for Part 2 and Part 3 will be given on the computer screen.

In the experiment, we will not speak of EUR, but rather of ECU (Experimental Currency Units). At the end of the experiment the total amount of ECU you earned will be converted to EUR at the **exchange rate ECU 1 = EUR 0.25**. The final earnings will be rounded to the closest 10 cents. You will also receive a **show up fee** of **EUR 5**. You will be paid your earnings in cash, privately at the end of the session.

All interactions between you and other participants will occur through the computer terminals. Please do not talk directly to or attempt to communicate with other participants during the session. Please also do not ask questions aloud. If you have a question, raise your hand and a member of the experimenter team will come to you. All personal electronic devices should remain switched off until the end of the experiment.

Please now proceed to the instructions for Part 1.

# Instructions Part 1

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## General Description of the Experiment

At the beginning of the experiment, all participants in the room will be divided into groups of 10. We will refer to this group as your “matching group”. In each matching group, the computer will randomly determine **5 buyers** and **5 sellers**. You will be either in the role of a buyer or a seller. If you are buyer (respectively, a seller), you will be a buyer (respectively, a seller) for the entire experiment. At the start of Part 1, everyone will receive 8 ECU to begin with.

You will play **10 rounds** of a decision situation. At the start of each round, you will be **randomly matched** with another participant in your matching group. In particular, if you are a buyer, you will be matched at random to one of the 5 sellers in your matching group. If you are a seller, you will be matched at random to one of the 5 buyers in your matching group. Hence, the person you are matched with will typically change between rounds. You will never know the identity of the person with whom you are matched in a given round or of the people in your matching group.

## Decision Situation in each Round

We will now explain the decision situation you will face in each of the 10 rounds.

### Objects

In each round, there are **3 objects: object A, object B and object C**. For each object, the buyer has a **valuation**. A valuation is the worth a buyer assigns to an object. Similarly, for each object, the seller has a **production cost**. The production cost is the cost the seller incurs if producing an object in order to sell it to the buyer.

At the beginning of each round, the buyer’s valuations and the seller’s production costs for the 3 objects will be randomly chosen to be **0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32 or 33 ECU**. Any value between 0 ECU and 33 ECU is **equally likely**. All valuations and production costs are randomly determined by the computer and are independent of each other, that is, the buyer’s values for the different objects will typically not be the same and neither will the seller’s production costs.

### Information

The buyer’s valuations and the seller’s production costs are **private information**. In particular, the buyer will be told his or her valuations for the 3 objects and the seller will be told his or her production costs for the 3 objects. However, we will not tell the buyer what the seller’s production costs are and neither will we tell the seller the buyer’s valuations.

There is an additional piece of information that both the buyer and the seller will know: each participant will be told the **maximal surplus** the buyer and the seller could realize in a given

round. The maximal surplus corresponds to the maximal earnings the buyer and the seller can jointly realize in this round. In other words, the maximal surplus is the sum of the buyer's and the seller's earnings if they only trade the objects for which the buyer's valuation exceeds the seller's production cost. (An object generates a negative surplus if the buyer's valuation is smaller than the seller's production costs)

To understand what the maximal surplus is, it is easiest to look at an *example*:

Suppose the buyer's valuations are **15** for object A, **10** for object B and **5** for object C.

The seller's production cost is **7** for each of the objects.

The possible surplus for object A is therefore  **$15 - 7 = 8$** .

The possible surplus for object B is  **$10 - 7 = 3$** .

The possible surplus for object C is **0**, because if the object is traded the buyer receives a valuation of 5 and the seller pays a production cost of 7, and  $5 - 7 = -2$  is negative. Trading object C generates a negative surplus.

Thus, in this example, the maximal surplus is  **$8 + 3 + 0 = 11$** . It is obtained if objects A and B are traded and object C is not traded.

We next describe the **bargaining process**. The bargaining process will determine which objects the buyer and the seller trade, and the price at which the objects are traded.

### Making Offers

The buyer and seller will both be able to make offers. **An offer includes a selection of objects and a price**. Thus, when you are buyer, an offer will specify which objects you would like to buy and the price for these objects. When you are a seller, an offer will specify which objects you would like to sell and the price of these objects.

Since there are 3 objects, there are **7 possible selections of objects: {A}, {B}, {C}, {A, B}, {A, C}, {B, C} and {A, B, C}**. An offer will be a selection of objects and a price at which you would like to trade the selected objects. **The price has to be a whole number between 0 and 33 ECU for a single object, between 0 and 66 ECU for a selection of two objects and between 0 and 99 ECU for an offer that includes all three objects**. The price is for the whole selection of objects, for instance, if a seller accepts to sell objects A and B at a price of 29 ECU, s/he receives 29 ECU for both objects together, and not 29 ECU per object.

Below you can see a screen shot of the experiment. The screen shows the situation of a buyer. Notice that the buyer can **see his/her valuations for each object on the left-hand side of the screen, but s/he does not know the production costs of the seller. You can see the maximal possible surplus in the bottom left corner of the screen**. You can further see the 7 possible selections of objects. To make an offer, you can enter a price in the box next to the selection of objects you wish to buy / sell and click on "Submit". You can make up to 7 simultaneous offers, one for each selection of objects. You can revise an offer by making a new offer for the same selection of objects. You can also cancel an offer, in which case this offer will be removed from your standing offers.

Instructions: You are a buyer. In the first column, you can find your information about the three objects. In the second column, you can make offers. You can see your standing offer(s) and the history of accepted offers in the top right panel. To accept / reject offers use the bottom right panel.

	Make New Offer	Your Standing Offer(s)	Trade History
<b>Object A</b>  Valuation: 5	Object A <input type="text"/> <input type="button" value="Submit"/>	No current offer	So far you have not traded any objects.
<b>Object B</b>  Valuation: 32	Object B <input type="text"/> <input type="button" value="Submit"/>		
<b>Object C</b>  Valuation: 17	Object C <input type="text"/> <input type="button" value="Submit"/>	Accept / Reject Seller's Offer(s)  No current offer	<input type="button" value="Agree to end negotiation"/>
<b>Maximal Possible Surplus</b>  14	Objects A & B <input type="text"/> <input type="button" value="Submit"/>		
	Objects A & C <input type="text"/> <input type="button" value="Submit"/>		
	Objects B & C <input type="text"/> <input type="button" value="Submit"/>		
	Objects A & B & C <input type="text"/> <input type="button" value="Submit"/>		

### Accepting and Rejecting Offers

You will also decide whether you would like to accept or reject the offers made by the other party. If an offer is accepted, the corresponding selection of objects is traded at the specified price. If an offer is rejected, the offer is removed from the list of offers. In a given round, **it is possible that the buyer and the seller agree to trade several different selections of objects**. For example, it is possible that objects {A, C} are traded first and then, later on, object B is traded as well. Of course, offers cannot include objects which have already been traded.

### Timing

The buyer and the seller can make, accept or reject offers at any time they wish to do so. In the top right corner of the screen, you will see how long the bargaining process has already lasted.

### When Does Bargaining End?

There are three ways the bargaining process can end.

- The bargaining process will be stopped if all **3 objects have been traded**.
- The bargaining process may also end at a random point in time before all objects have been traded. We will refer to this as a **bargaining breakdown**. This will not happen during the **first minute**. After the first minute, bargaining will be stopped with a probability of **4% every 10 seconds**. This means that bargaining breaks down at exactly 1 minute with a probability of 4%. With a probability of 96% bargaining continues beyond 1 minute. The next point in time at which bargaining could break down is 1 minute and 10 seconds, and so on. You do not need to calculate the breakdown probabilities. It is sufficient to know that this implies that bargaining never breaks down before 1 minute, bargaining does not break down before 2 minutes with a probability of 78%, before 3 minutes with 61%, before 4 minutes with 48%, before 5 minutes with 38%, before 6 minutes with 29%, before 7 minutes with 23%, before 8 minutes with 18%, before 9 minutes with 14%, before 10 minutes with 11%, before 11 minutes with 9%, and before 12 minutes with 7%. If bargaining has not ended after 12 minutes, we will stop at 12 minutes.
- The third way through which the bargaining process can end is if the buyer and the seller **agree to end negotiations**. In particular, there will be a button “agree to end negotiation”, and the bargaining process ends if both bargaining parties click the button. You will not observe if the other bargaining party has clicked the button, that is, to end bargaining both parties need to click the button independently.

### Earnings

As a buyer, your earnings will depend on your valuations and on the prices you agree to pay. For each object you buy, you will earn your valuation minus the agreed price.

**Buyer's Earnings = Sum of valuations of traded objects – Sum of prices for traded objects**

As a seller, your earnings will depend on your production costs and on the prices at which you agree to sell objects. For each object you sell, you will earn the agreed price minus your production cost.

**Seller's Earnings = Sum of prices for traded objects – Sum of production costs of traded objects**

Untraded objects do not affect your earnings. In other words, if the bargaining process ends before all three objects are traded, **the earnings for the untraded objects are zero.**

Below you can find five examples of how earnings are calculated. All examples are to help you understand better the experiment. They should not be considered as guides on how to behave in the experiment.

*Example 1:* You are a buyer and your valuation for object A is 26. You made an offer to buy object A at a price of 20 and the offer was accepted. No other offers were accepted. Then you will earn  $26 \text{ ECU} - 20 \text{ ECU} = 6 \text{ ECU}$ .

*Example 2:* You are a seller and your production costs are 8 for object A and 17 for object B. You offer to sell object A at a price of 13 and the buyer accepts the offer. You also accept an offer by the buyer to buy object B at a price of 19. Then you will earn  $13 \text{ ECU} + 19 \text{ ECU} - 8 \text{ ECU} - 17 \text{ ECU} = 7 \text{ ECU}$ .

*Example 3:* You are a buyer with valuations 33 for object B and 15 for object C. You buy objects B and C jointly at a price of 32. Then you will earn  $33 \text{ ECU} + 15 \text{ ECU} - 32 \text{ ECU} = 16 \text{ ECU}$ .

*Example 4:* You are a seller and your production costs are 17 for each object A and B and 28 for object C. You sell objects A, B and C jointly for a price of 57. Then you will earn  $57 \text{ ECU} - 17 \text{ ECU} - 17 \text{ ECU} - 28 \text{ ECU} = -5 \text{ ECU}$ . That is, you will lose 5 ECU.

*Example 5:* The buyer's valuations are 10 for object A, 20 for object B and 30 for object C. The seller's production costs are 24 for object A, 18 for object B and 12 for object C. If the buyer and the seller trade object A, the generated surplus is  $10 \text{ ECU} - 24 \text{ ECU} = -14 \text{ ECU}$ . The generated surplus if object B is traded is  $20 \text{ ECU} - 18 \text{ ECU} = 2 \text{ ECU}$ . The generated surplus if object C is traded is  $30 \text{ ECU} - 12 \text{ ECU} = 18 \text{ ECU}$ . In this example, the maximal possible surplus of  $2 \text{ ECU} + 18 \text{ ECU} = 20 \text{ ECU}$  is thus achieved if objects B and C are traded and object A is not traded.

Your earnings from each of the 10 rounds will be summed up and paid to you at the end of the session. If your earnings in a given round are below 0 ECU, the amount will be subtracted from your previous earnings. If your earnings at the end of the experiment are below 5 EUR, you will receive the minimum of 5 EUR. As a buyer, you should thus be careful to not accept or make offers for which you pay more for an object than your valuation. As a seller, you should be careful to not accept or make offers for which your production cost for an object exceed the selling price.

All 10 rounds of this part of the experiment will be the same, except that your valuations (as a buyer) or productions costs (as a seller) for the objects are randomly determined at the beginning of each round, and the participant you are matched with will change between rounds.

This completes the description of the instructions. If you have any questions, please raise your hand. Otherwise, please proceed to answer the questions that will be shown on your computer. The purpose of the questions is to make sure that you understand the different elements of the experiment. Any unclear points will be explained by the experimenter.



## ***[Treatment: Free-form Bargaining & Item-by-item & Full Information]***

### **General Instructions**

---

Welcome to the Laboratory for Research in Experimental Economics.

Your earnings from the experiment will largely depend on your decisions and the decisions of others. Therefore, it is important that you read the instructions carefully. The experiment consists of three parts that are independent of each other. The instructions for Part 1 can be found on the following pages. The instructions for Part 2 and Part 3 will be given on the computer screen.

In the experiment, we will not speak of EUR, but rather of ECU (Experimental Currency Units). At the end of the experiment the total amount of ECU you earned will be converted to EUR at the **exchange rate ECU 1 = EUR 0.25**. The final earnings will be rounded to the closest 10 cents. You will also receive a **show up fee** of **EUR 5**. You will be paid your earnings in cash, privately at the end of the session.

All interactions between you and other participants will occur through the computer terminals. Please do not talk directly to or attempt to communicate with other participants during the session. Please also do not ask questions aloud. If you have a question, raise your hand and a member of the experimenter team will come to you. All personal electronic devices should remain switched off until the end of the experiment.

Please now proceed to the instructions for Part 1.

# Instructions Part 1

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## General Description of the Experiment

At the beginning of the experiment, all participants in the room will be divided into groups of 10. We will refer to this group as your “matching group”. In each matching group, the computer will randomly determine **5 buyers** and **5 sellers**. You will be either in the role of a buyer or a seller. If you are buyer (respectively, a seller), you will be a buyer (respectively, a seller) for the entire experiment. At the start of Part 1, everyone will receive 8 ECU to begin with.

You will play **10 rounds** of a decision situation. At the start of each round, you will be **randomly matched** with another participant in your matching group. In particular, if you are a buyer, you will be matched at random to one of the 5 sellers in your matching group. If you are a seller, you will be matched at random to one of the 5 buyers in your matching group. Hence, the person you are matched with will typically change between rounds. You will never know the identity of the person with whom you are matched in a given round or of the people in your matching group.

## Decision Situation in each Round

We will now explain the decision situation you will face in each of the 10 rounds.

### Objects

In each round, there are **3 objects: object A, object B and object C**. For each object, the buyer has a **valuation**. A valuation is the worth a buyer assigns to an object. Similarly, for each object, the seller has a **production cost**. The production cost is the cost the seller incurs if producing an object in order to sell it to the buyer.

At the beginning of each round, the buyer’s valuations and the seller’s production costs for the 3 objects will be randomly chosen to be **0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32 or 33 ECU**. Any value between 0 ECU and 33 ECU is **equally likely**. All valuations and production costs are randomly determined by the computer and are independent of each other, that is, the buyer’s values for the different objects will typically not be the same and neither will the seller’s production costs.

### Information

**The buyer and the seller will be informed about all valuations and production costs.** In particular, at the beginning of a round, the buyer will be told his/her valuations as well as the seller’s production costs for each of the 3 objects. The same applies to the seller.

We next describe the **bargaining process**. The bargaining process will determine which objects the buyer and the seller trade, and the price at which the objects are traded.

### Making Offers

The buyer and seller will both be able to make offers. **An offer includes an object and a corresponding price.** Thus, when you are buyer, an offer will specify the object you would like to buy and the price for this object. When you are a seller, an offer will specify which object you would like to sell and the price of the objects. **The price has to lie between 0 and 33 ECU and has to be a whole number.** For instance, a seller could offer to sell object A at a price of 29 ECU, or a buyer could offer to buy object B at a price of 4 ECU.

Below you can see a screen shot of the experiment. The screen shows the situation of a buyer. Notice that **the buyer can see his or her valuations as well as the seller's production costs on the left-hand side of the screen.** You can also see the **maximal possible surplus**, which is given by the sum of the buyer's and the seller's earnings when trading all objects for which the buyer's valuation exceeds the seller's production cost. The screen will be the same for the seller, except that s/he will see his/her production costs instead of the valuations (s/he will also see the buyer's valuations). As you can see, there are 3 objects. To make an offer, you can enter a price in the box next to the object you wish to buy / sell and click on "Submit". You can make up to 3 simultaneous offers, one for each object. You can revise an offer by making a new offer for the same object. You can also cancel an offer, in which case this offer will be removed from your standing offers.

Round 1 of 10		Time Passed [sec]: 20	
Instructions			
You are a buyer. In the first column, you can find your information about the three objects. In the second column, you can make offers. You can see your standing offer(s) and the history of accepted offers in the top right panel. To accept / reject offers use the bottom right panel.			
<b>Object A</b>  Your valuation: <b>5</b> Seller's production cost: <b>11</b>	<b>Make New Offer</b>  Object A <input type="text"/> <input type="button" value="Submit"/>  Object B <input type="text"/> <input type="button" value="Submit"/>  Object C <input type="text"/> <input type="button" value="Submit"/>	<b>Your Standing Offer(s)</b>  No current offer	<b>Trade History</b>  So far you have not traded any objects.
<b>Object B</b>  Your valuation: <b>32</b> Seller's production cost: <b>20</b>			<input type="button" value="Agree to end negotiation"/>
<b>Object C</b>  Your valuation: <b>17</b> Seller's production cost: <b>15</b>		<b>Accept / Reject Seller's Offer(s)</b>  No current offer	
<b>Maximal Possible Surplus</b>  <b>14</b>			

### Accepting and Rejecting Offers

You will also decide whether you would like to accept or reject the offers made by the other party. If an offer is accepted, the corresponding object is traded at the specified price. If an offer is rejected, the offer is removed from the list of offers. In a given round, **it is possible that the buyer and the seller agree to trade several objects**. For example, it is possible that object A is traded first and then, later on, object B is traded as well. Of course, offers cannot include objects which have already been traded.

### Timing

The buyer and the seller can make, accept or reject offers at any time they wish to do so. In the top right corner of the screen, you will see how long the bargaining process has already lasted.

### When Does Bargaining End?

There are three ways the bargaining process can end.

- The bargaining process will be stopped if all **3 objects have been traded**.
- The bargaining process may also end at a random point in time before all objects have been traded. We will refer to this as a **bargaining breakdown**. This will not happen during the **first minute**. After the first minute, bargaining will be stopped with a probability of **4% every 10 seconds**. This means that bargaining breaks down at exactly 1 minute with a probability of 4%. With a probability of 96% bargaining continues beyond 1 minute. The next point in time at which bargaining could break down is 1 minute and 10 seconds, and so on. You do not need to calculate the breakdown probabilities. It is sufficient to know that this implies that bargaining never breaks down before 1 minute, bargaining does not break down before 2 minutes with a probability of 78%, before 3 minutes with 61%, before 4 minutes with 48%, before 5 minutes with 38%, before 6 minutes with 29%, before 7 minutes with 23%, before 8 minutes with 18%, before 9 minutes with 14%, before 10 minutes with 11%, before 11 minutes with 9%, and before 12 minutes with 7%. If bargaining has not ended after 12 minutes, we will stop at 12 minutes.
- The third way through which the bargaining process can end is if the buyer and the seller **agree to end negotiations**. In particular, there will be a button “agree to end negotiation”, and the bargaining process ends if both bargaining parties click the button. You will not observe if the other bargaining party has clicked the button, that is, to end bargaining both parties need to click the button independently.

### Earnings

As a buyer, your earnings will depend on your valuations and on the prices you agree to pay. For each object you buy, you will earn your valuation minus the agreed price.

**Buyer's Earnings = Sum of valuations of traded objects – Sum of prices for traded objects**

As a seller, your earnings will depend on your production costs and on the prices at which you agree to sell objects. For each object you sell, you will earn the agreed price minus your production cost.

**Seller's Earnings = Sum of prices for traded objects – Sum of production costs of traded objects**

Untraded objects do not affect your earnings. In other words, if the bargaining process ends before all three objects are traded, **the earnings for the untraded objects are zero.**

Below you can find five examples of how earnings are calculated. All examples are to help you understand better the experiment. They should not be considered as guides on how to behave in the experiment.

*Example 1:* You are a buyer and your valuation for object A is 26. You made an offer to buy object A at a price of 20 and the offer was accepted. No other offers were accepted. Then you will earn  $26 \text{ ECU} - 20 \text{ ECU} = 6 \text{ ECU}$ .

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*Example 3:* You are a buyer with valuations 33 for object B and 15 for object C. You buy object B at a price of 20 and object C at a price of 12. Then you will earn  $33 \text{ ECU} + 15 \text{ ECU} - 20 \text{ ECU} - 12 \text{ ECU} = 16 \text{ ECU}$ .

*Example 4:* You are a seller and your production costs are 17 for each object A and B and 28 for object C. You sell object A at a price of 20, object B at a price of 20 and object C at a price of 17. Then you will earn  $57 \text{ ECU} - 17 \text{ ECU} - 17 \text{ ECU} - 28 \text{ ECU} = -5 \text{ ECU}$ . That is, you will lose 5 ECU.

*Example 5:* The buyer's valuations are 10 for object A, 20 for object B and 30 for object C. The seller's production costs are 24 for object A, 18 for object B and 12 for object C. If the buyer and the seller trade object A, the generated surplus is  $10 \text{ ECU} - 24 \text{ ECU} = -14 \text{ ECU}$ . The generated surplus if object B is traded is  $20 \text{ ECU} - 18 \text{ ECU} = 2 \text{ ECU}$ . The generated surplus if object C is traded is  $30 \text{ ECU} - 12 \text{ ECU} = 18 \text{ ECU}$ .

Your earnings from each of the 10 rounds will be summed up and paid to you at the end of the session. If your earnings in a given round are below 0 ECU, the amount will be subtracted from your previous earnings. If your earnings at the end of the experiment are below 5 EUR, you will receive the minimum of 5 EUR. As a buyer, you should thus be careful to not accept or make offers for which you pay more for an object than your valuation. As a seller, you should be careful to not accept or make offers for which your production cost for an object exceed the selling price.

All 10 rounds of this part of the experiment will be the same, except that your valuations (as a buyer) or productions costs (as a seller) for the objects are randomly determined at the beginning of each round, and the participant you are matched with will change between rounds.

This completes the description of the instructions. If you have any questions, please raise your hand. Otherwise, please proceed to answer the questions that will be shown on your computer. The purpose of the questions is to make sure that you understand the different elements of the experiment. Any unclear points will be explained by the experimenter.

## *[Treatment: Take-it-or-leave-it Offer & Bundling & No Information]*

### **General Instructions**

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Please now proceed to the instructions for Part 1.

# Instructions Part 1

---

## General Description of the Experiment

At the beginning of the experiment, all participants in the room will be divided into groups of 10. We will refer to this group as your “matching group”. In each matching group, the computer will randomly determine **5 buyers** and **5 sellers**. You will be either in the role of a buyer or a seller. If you are buyer (respectively, a seller), you will be a buyer (respectively, a seller) for the entire experiment. At the start of Part 1, everyone will receive 8 ECU to begin with.

You will play **10 rounds** of a decision situation. At the start of each round, you will be **randomly matched** with another participant in your matching group. In particular, if you are a buyer, you will be matched at random to one of the 5 sellers in your matching group. If you are a seller, you will be matched at random to one of the 5 buyers in your matching group. Hence, the person you are matched with will typically change between rounds. You will never know the identity of the person with whom you are matched in a given round or of the people in your matching group.

## Decision Situation in each Round

We will now explain the decision situation you will face in each of the 10 rounds.

### Objects

In each round, there are **3 objects: object A, object B and object C**. For each object, the buyer has a **valuation**. A valuation is the worth a buyer assigns to an object. Similarly, for each object, the seller has a **production cost**. The production cost is the cost the seller incurs if producing an object in order to sell it to the buyer.

At the beginning of each round, the buyer’s valuations and the seller’s production costs for the 3 objects will be randomly chosen to be **0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32 or 33 ECU**. Any value between 0 ECU and 33 ECU is **equally likely**. All valuations and production costs are randomly determined by the computer and are independent of each other, that is, the buyer’s values for the different objects will typically not be the same and neither will the seller’s production costs.

### Information

The buyer’s valuations and the seller’s production costs are **private information**. In particular, the buyer will be told his or her valuations for the 3 objects and the seller will be told his or her production costs for the 3 objects. However, we will not tell the buyer what the seller’s production costs are and neither will we tell the seller the buyer’s valuations.



We next describe the **bargaining process**. The bargaining process will determine which objects the buyer and the seller trade, and the price at which the objects are traded.

#### Proposer or Responder

In each round, you will be a **proposer** or a **responder**. This will be determined randomly. That is, either the buyer will be the proposer and the seller the responder or vice versa, both with probability 50%.

#### Making Offers

The proposer will make offers. **An offer includes a selection of objects and a price.** Thus, when you are buyer, an offer will specify which objects you would like to buy and the price for these objects. When you are a seller, an offer will specify which objects you would like to sell and the price of these objects.

Since there are 3 objects, there are **7 possible selections of objects: {A}, {B}, {C}, {A, B}, {A, C}, {B, C} and {A, B, C}**. An offer will be a selection of objects and a price at which you would like to trade the selected objects. The price has to be a whole number between 0 and 33 ECU for a single object, between 0 and 66 ECU for a selection of two objects and between 0 and 99 ECU for an offer that includes all three objects. The price is for the whole selection of objects, for instance, if a buyer offers objects A and B at a price of 29 ECU and the seller accepts, the buyer will pay 29 ECU for both objects together, and not 29 ECU per object.

Below you can see a screen shot of the experiment. The screen shows the situation of a buyer who is also a proposer. Notice that the buyer can **see his/her valuations for each object on the left-hand side of the screen, but s/he does not know the production costs of the seller.**

Round 1 of 10 Time Remaining [sec]: 285

Instructions  
 You are a buyer. In this round, you will propose an offer. In the first column, you can find your information about the three objects. In the second column, you can make your offer.

	Your offer(s) to the seller:
Object A Valuation: 5	Object A <input style="width: 100px;" type="text"/>
Object B Valuation: 32	Object B <input style="width: 100px;" type="text"/>
Object C Valuation: 17	Object C <input style="width: 100px;" type="text"/>
	Objects A & B <input style="width: 100px;" type="text"/>
	Objects A & C <input style="width: 100px;" type="text"/>
	Objects B & C <input style="width: 100px;" type="text"/>
	Objects A & B & C <input style="width: 100px;" type="text"/>
	<input type="button" value="Submit Offer"/>

Here you can see your valuation for object B.

For instance, here you can make an offer for the bundle of objects {B, C}.

The screen will be the same for the seller, except that s/he will see his/her production costs instead of the valuations. As you can see, there are 7 possible selections of objects. To make an offer, you can enter a price in the box next to the selection of objects you wish to buy / sell. You can make up to 7 offers, one for each possible selection of objects. If you do not enter a price for a selection of objects, no offer will be made for this combination of objects. Once you are done entering offers, you need to click on “Submit Offer”. The responder will then receive the offers and choose which ones s/he would like to accept. **Notice that once you click on submit, you cannot revise your offers in this round anymore.**

Accepting and Rejecting Offers

As a responder, you will decide whether you would like to accept or reject the offers made by the other party. To do so, you will **select the offers you would like to accept by clicking the respective checkbox** (see the screen shot below). Once you have selected all offers you would like to accept, confirm your choice by clicking on “Submit”. **A responder can accept several offers, as long as no two accepted offers contain the same object.** For instance, you can accept the offer for {A} and {C}, or the offer for {C} and {A, B}. But you cannot accept the offer for {A} as well as the offer for {A, B}, because object A cannot be traded more than once.

Once the responder clicks on “Submit”, all selected offers are traded at the specified prices.

Round 1 of 10

Instructions

You are a seller. In this round, you will respond to an offer. In the first column, you can find your information about the three objects. In the second column, you can see the offer. Please select the offer(s) you would like to accept. You can accept multiple offers. Once you are done, please click on submit. Please make your decision within less than 4 minutes.

Object	Production cost	Offer
Object A	11	3
Object B	20	--
Object C	15	16
Objects A & B		25
Objects A & C		--
Objects B & C		--
Objects A & B & C		37

Please select the offer(s) you would like to accept. You can select multiple offers.

Here you can see your production cost for object A.

If this checkbox is selected when you click submit, then you will sell object C at a price of 16.

In this case, the proposer did not make an offer for bundle {B, C}.

Submit

### Earnings

As a buyer, your earnings will depend on your valuations and on the prices you agree to pay. For each object you buy, you will earn your valuation minus the agreed price.

**Buyer's Earnings = Sum of valuations of traded objects – Sum of prices for traded objects**

As a seller, your earnings will depend on your production costs and on the prices at which you agree to sell objects. For each object you sell, you will earn the agreed price minus your production cost.

**Seller's Earnings = Sum of prices for traded objects – Sum of production costs of traded objects**

Untraded objects do not affect your earnings.

Below you can find four examples of how earnings are calculated. All examples are to help you understand better the experiment. They should not be considered as guides on how to behave in the experiment.

*Example 1:* You are a buyer and your valuation for object A is 26. You made an offer to buy object A at a price of 20 and the offer was accepted. No other offers were accepted. Then you will earn  $26 \text{ ECU} - 20 \text{ ECU} = 6 \text{ ECU}$ .

*Example 2:* You are a seller and your production costs are 8 for object A and 17 for object B. Your offers to sell object A at a price of 13 and object B at a price of 19 are accepted. Then you will earn  $13 \text{ ECU} + 19 \text{ ECU} - 8 \text{ ECU} - 17 \text{ ECU} = 7 \text{ ECU}$ .

*Example 3:* You are a buyer with valuations 33 for object B and 15 for object C. You accept an offer of the seller and buy objects B and C jointly at a price of 32. Then you will earn  $33 \text{ ECU} + 15 \text{ ECU} - 32 \text{ ECU} = 16 \text{ ECU}$ .

*Example 4:* You are a seller and your production costs are 17 for each object A and B and 28 for object C. You accept an offer of the buyer and sell objects A, B and C jointly for a price of 57. Then you will earn  $57 \text{ ECU} - 17 \text{ ECU} - 17 \text{ ECU} - 28 \text{ ECU} = -5 \text{ ECU}$ . That is, you will lose 5 ECU.

Your earnings from each of the 10 rounds will be summed up and paid to you at the end of the session. If your earnings in a given round are below 0 ECU, the amount will be subtracted from your previous earnings. If your earnings at the end of the experiment are below 5 EUR, you will receive the minimum of 5 EUR. As a buyer, you should thus be careful to not accept or make offers for which you pay more for an object than your valuation. As a seller, you should be careful to not accept or make offers for which your production cost for an object exceed the selling price.

All 10 rounds of this part of the experiment will be the same, except that your valuations (as a buyer) or productions costs (as a seller) for the objects are randomly determined at the beginning of each round, the participant you are matched with will change between rounds, and in some rounds you will be a proposer while in others you will be a responder.

This completes the description of the instructions. If you have any questions, please raise your hand. Otherwise, please proceed to answer the questions that will be shown on your computer. The purpose of the questions is to make sure that you understand the different elements of the experiment. Any unclear points will be explained by the experimenter.