



## Instructions

### Preamble

Welcome to this experiment. Thank you for coming. We would be grateful if you would turn off your mobile phone. We would ask you not talk to the other participants during the experiment.

Please read carefully these Instructions. They are to help you to understand what you will be asked to do in the experiment. You are going to earn money for your participation in the experiment, and you will be paid in cash immediately after the completion of the experiment. All data from the experiment will be stored anonymously.

### Introduction

The participants in this experiment will be randomly divided up into *two-person groups*. You will never know the identity of the other member of your group. Both of you will be presented with a series of *repetitions* of a series of *problems*. Each problem has the same structure. The other member of your groups will stay the same throughout all the repetitions of a particular problem. Pairs will be randomly changed *between* problems.

### The structure of a problem

As a consequence of the decisions made by you and the other member of your group, you will each receive a payoff on any particular problem. You should imagine that you and the other member of your group are providing two inputs into some production process. The output that you jointly produce has value. The value is determined by your decisions. The value will be divided equally between the providers of the two inputs, and then distributed between you and the other member of your group on the basis of the fraction of each input that you each provided.

Each of you has to make an allocation decision. Your allocation decision will determine how much of the two inputs you will provide. The other member of your group will also make an allocation decision. His or her allocation decision will determine how much of the two inputs he or she will provide. What you decide and what the other member of your group decides will determine the total amounts of the two inputs you jointly provide. These, in turn, will determine the output and hence your payments. Let us give an example. The payoffs here are expressed in Experimental Currency units (ECU). **10 ECU corresponds to £2.** The example below is a screen shot from the experiment.

This was repetition 1 out of 7 of problem 1

The next round will start in:

0:00

In this repetition your group produced output valued at 51.8 ECU

Your payment would be 24.4 ECU

	I1	I2	Payoff Input 1	Payoff Input 2	Payoff
Participant 1	31	19	20.1	7.3	27.4
Participant 2 (You)	9	48	5.8	18.6	24.4
TOTAL	40	67	25.9	25.9	51.8

Type your message here:

Let us explain. In this example you provided 9 units of Input 1 and 48 units of Input 2; the other member of your group provided 31 units of Input 1 and 19 units of Input 2; between the two of you, 40 units of Input 1 and 67 units of Input 2 were provided; these produced output valued at 51.8 ECU (we shall explain later how this is calculated). Dividing this equally between the two inputs implies 25.9 ECU for each input. **Note that figures may differ slightly because of rounding.**

For Input 1, as you provided 9 out of the total of 40 units that were provided you get a fraction  $9/40$  of the 25.9 ECU ( $=5.8$ ) for Input 1. This gives you a payment of 5.8 ECU for Input 1.

For Input 2, as you provided 48 out of the total of 67 units that were provided you get a fraction  $48/67$  of the 25.9 ECU ( $=18.6$ ) for Input 2. This gives you a payment of 18.6 ECU for Input 2.

So you get a total payment of  $5.8+18.6=24.4$  ECU.

There are three formulae used here: the first to determine what inputs each of you can provide; the second to determine the value of the output produced by your joint provisions; and the third to determine the payoff to each of you. As the formulae look rather forbidding (see them later in the Instructions), we provide the information on the computer screen.

As to the first, you will see on your screen a figure like the figure below. This screen is interactive and you can move the slider to see what combination of the two inputs that you can provide. Given the slider's present position the implied inputs are 15 and 37. When you have decided on your chosen provision you should click on the 'OK' button. This will not become active for 10 seconds. If you have

not clicked on 'OK' by the time that 60 seconds has elapsed it will be assumed that you do not want to provide any inputs.

The second formula is to determine the value of the output produced by your joint provisions. Once again the formula is rather forbidding, but you will be able to see the implications on your screen. Examine the figure above, where the value of the output is shown in the bottom right-hand cell of the table. **Note that if the total amount provided of any of the inputs is zero, then the value of output will be zero.**

The third formula is to determine your individual payoffs. As we have stated above, the value of the output will be divided equally between the providers of the two inputs, and then allocated to you and the other member of your group on the basis of the fraction of each input that you each provided.

#### Communication

In between repetitions you will be able to communicate with the other member of your group through a 'chat box'. You will see this at the foot of the screen-shot above. If you want to send your partner a message, you should type it into this box and then click on 'Send'. He or she will also be able to send messages to you. The message will appear in the bottom right-hand box. There will be a time limit of 90 seconds for exchanging messages.

#### Timing

As you will see, there is a timer at the top right of the screen. As we have already noted, the 'OK' button will not become active until 10 seconds have elapsed. If you have not clicked on 'OK' by the time that 60 seconds has elapsed, it will be assumed that you do not want to provide any inputs. In such a case you will receive zero payoff for that repetition.

#### Number of repetitions and number of problems

There will be 3 problems and 7 repetitions of each. Between problems you will change partners.

#### Payment

After all 7 repetitions of all 3 of the problems have been completed, the experiment will be over. **You will be paid the payoff on a randomly-selected one of the *final repetitions* of one of the 3 problems in the experiment (converted into pounds at the rate 10 ECU=£2) plus a show-up fee of £2.50. You will be paid in cash, asked to sign a receipt, and then be free to leave.**

Thank you for your participation in this experiment

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## Formulae

*Please note that it is not necessary to understand these formulae: all information will be given on your screen. They are here purely for reference for those who like formulae.*

Let  $x_{ij}$  denote the amount of Input  $i$  that member  $j$  of your group provides. Let  $X_i$  denote the total amount of Input  $i$  that your group provides. Then

$$X_i = \sum_{j=1}^2 x_{ij} \text{ for } i=1..2$$

1. The possibilities open to member  $j$ :

$$\sum_{i=1}^2 x_{ij}^{0.5} = 100^{0.5}$$

2. The implied value of output,  $V$  in ECU:

$$\prod_{i=1}^2 x_i^{1/2}$$

**Note that if the total amount provided of *any* of the inputs is zero, then the value of output will be zero.**

3. The payoff to member  $j$ :

$$\frac{V}{2} \sum_{j=1}^2 \frac{x_{ij}}{X_i}$$

Figure

