

Appendix: Instructions*

Instructions for experiment 1

In the following experiment you will be asked to answer some questions regarding order relations between elements. An order relation, as the term itself indicates, allows some elements of a set to be ordered according to a certain characteristic. For example, an order relation can be defined according to SIZE: given a set of rectangles, I can say whether rectangle X is bigger, smaller or equal to rectangle Y ; I can also order a set of rectangles from the smallest to the biggest, and vice-versa.

In the following experiment we will ask you to respond some questions about objects according to which two order relations can be defined: one on the basis of SIZE, the other on the basis of COLOR.

We will use the canonical symbols of order relations:

$$> \quad < \quad =$$

In the case of SIZE, the meaning of the three symbols is obvious and intuitive. For example, the expression $X > Y$ indicates that element X is bigger than element Y . In the case of COLOR, you will be proposed four colors: black, white, and two variations of gray. It will be set by convention that the symbol $>$ means “darker than”.

In the following tasks, SIZE will be indicated by the letter S , and COLOR by the letter C . Two objects can be defined according to both characteristics. For example, in the following case

*The following are English translations of the instructions used in the two experiments. Original instructions in Italian are available from the authors upon request.

= Fig. 1 here =

the left circle (X) is bigger than the right circle (Y), but the right circle is darker than the left circle. This double order relation will be expressed in the following way: $S(X) > S(Y)$, and $C(X) < C(Y)$.

Obviously, saying that $S(X) > S(Y)$ is equivalent to saying that $S(Y) < S(X)$. Therefore, the two notations will be used interchangeably.

In the experiment you will be presented four different pairs of order relations with regard to SIZE and COLOR, with each pair being defined over four elements (squares). The four squares will always be indicated with the letters X, Y, W and Z, while color and size will be denoted with C and S.

The task will be computerized. Your computer screen will visualize a set of **16** squares of different colors and sizes, and four empty cells. You will have to fill in the four empty cells with 4 squares (chosen out of the 16) which, according to you, satisfy the pair of order relations that will be provided to you. In order to accomplish the task, you will simply have to click with your mouse on the chosen squares and drag them to the empty cells in the TARGET. For each correct answer, you will be assigned 50 points, which will be converted in cash at the exchange rate of L. 100 per point and paid to you privately at the end of the experiment.

The four empty cells are numbered from 1 to 4 so that the software can recognize them. However, the specific position of the single squares in the cells is **irrelevant**. In other words, the four squares that you choose can be placed in the empty cells in any position you prefer. It is only important that they satisfy the pair of order relations assigned. Further, we ask you to carefully read the single pairs of relations given. In this type of experiments it is easy to commit mistakes by simply misreading the data.

In order to begin the experiment, you will have to insert your identification number in the “number” window on your screen and then click OK. After this, the screen will

display a set of squares on the left and some written text on the right. Before the actual experiment starts, you will go through a brief training session.

Please, we ask you to do the experiment in silence. Thank you.

Instructions for experiment 2

Today's experiment is divided in two parts. In the first part you will be asked to construct the representation of four interactive decision making situations, following a set of rules that will be explained to you shortly. This part of the experiment is strictly individual. Each of you will gain a fixed amount for any representation correctly constructed. In the second part of the experiment you will have to make a series of decisions, and your earnings will depend on your decisions and on the decisions of other participants. Your earnings in the second part of the experiment will be expressed in experimental points. One experimental point is worth .75 euros. At the end of the experiment your earnings in the first and second part will be summed up, converted in euros and paid to you privately in cash.

First part The experiment will regard interactive decision making situations called "games" (although the term is not to be intended in its everyday meaning in natural language: in our experiment a "game" is simply a decision situation in which earnings depend on the joint decisions of two players). You will be presented with four different "games", one at a time in sequence. All the games are two-player, and each player has always the choice between two moves, which are labelled with the two familiar symbols of *spades* and *clubs*. Therefore, for each game there are four possible combinations of moves of the two players: *spades-spades*, *spades-clubs*, *clubs-spades*, *clubs-clubs*. These four combinations generate four different scenarios labelled A, B, C and D, which differ in the payoffs that they imply for the players. The payoffs in each game range from a minimum of 1 point to a maximum of 4 points, and are represented as squares of

different size and different color. A darker square means a higher payoff for one player, while a bigger square means a higher payoff for the other player. Please, observe the screen in front of you: each of you can see a set of 16 squares of different size and color in the upper left portion of the screen. Each square represents a different pair of payoffs. In the lower left portion the four combinations of moves are displayed and, below each combination, the resulting scenario (A, B, C and D). At the bottom you can see four empty cells. For each game, you will be provided with the criteria specifying the relative ordering of your payoff and the other player's payoff in the four different scenarios. The criteria will appear to you in the text window in the right portion of the screen. You will have to select, among the 16 squares that are available to you, the 4 squares that according to you satisfy the ordering criteria given, and place each square in the corresponding cell. The criteria that you'll have to follow concern the relative ordering of the size and color of the squares, which correspond to the two players' payoffs.

For example, you will be asked to represent the payoffs of a game in which the squares associated with the different scenarios satisfy the following ordinal criteria regarding size and color:

1. COL: $A > B > C > D$
2. SIZE: $B > A > D > C$

The first condition states that the square of scenario A must be darker than the square of scenario B, which must be darker than the C square, and so forth (we establish by convention that the symbol ">" means "darker than"). The second condition states that the square of scenario B must be greater than the square of scenario A, etc. Remember that SIZE and COLOR of the squares represent the two players' payoffs.

Your task in each game is to select the 4 squares, among the 16 you have, that satisfy

the two conditions simultaneously and place each square in the corresponding cell.

Technically, to place a square in a cell you must click with the mouse on the square and then click on the cell in which you want to place it, as we will show you now. To change your choice, you just have to click once on the new square and on the cell again. When you have finished, click with your mouse on the “choice” button.

There will be four different games which will appear to you in sequence. For each game correctly constructed, you will earn a payoff of 3 euros. For each pair of conditions, there is only one correct solution.

The four games are the same for all of you, but in the first part of the experiment they will appear to each of you in a different order, determined randomly by the computer program.

IMPORTANT: you will have a time limit of 120 seconds to complete each task (the passing of time will be visualized by a bar at the bottom of the screen). If you haven't completed a representation when the two minutes have elapsed, the task will be completed arbitrarily by the computer program, and your payoff for the task will be zero. In order to register your choice, remember to click on “choice” when you are done.

Second part In the second part of the experiment you will have to play the four games in sequence; i.e., for each game that you have represented in the first part, you will have to choose a move among the two available, *spades* and *clubs*. The screen will display each game exactly as you represented it in the first part. In each game, the computer program will connect you with another participant chosen randomly, and your earnings will be determined by the combination of yours and the other's choices. At the beginning of each game, you will also be assigned randomly to the variable associated with your payoff (COLOR or SIZE of the squares). Therefore, in some of the games, your payoff may be associated with the squares' size, in other games with their color.

Clearly, if you have been assigned to COLOR in a game, the other player you are paired with has been assigned to SIZE and vice-versa. By convention, we establish that the COLOR player will always be the first player of the couple, whereas the SIZE player will be the second. The pairings between participants will be determined randomly and will be presumably different in each game. For each game, you will see on your screen the representation that you have constructed in the first part. Please, have a look at the screen: on top of the game there will be the indication of your payoff variable for that game (SIZE or COLOR); below that you will see the four possible combinations of moves, and below that your two possible moves: the bottom part of the screen will report the squares representing your and your opponent's payoffs in each scenario. To make the reading of the game easier, your moves are circled in red so that you can distinguish them from your opponent's moves. You have to be aware that your payoffs will be calculated as a function of both players' choices *on the basis of the correct game representation*. We remind you that for any pair of criteria there is only one correct representation. You can make your choice by simply clicking on the corresponding symbol. You will not be allowed to know the other player's choices or your payoffs until the whole experiment is over.

WARNINGS:

For technical reasons, all participants in the experiment must proceed synchronized. Therefore, if you finish a task before the others, please wait in silence that all have completed theirs. When you have completed a task and have clicked on the *choice* button, please pay attention to the lower left corner of the screen: you will read either "wait" or "new round: make your choices". If you have questions, please raise your hand and somebody will come to you. Finally, you are not allowed to use paper and pencil. Are there any questions?

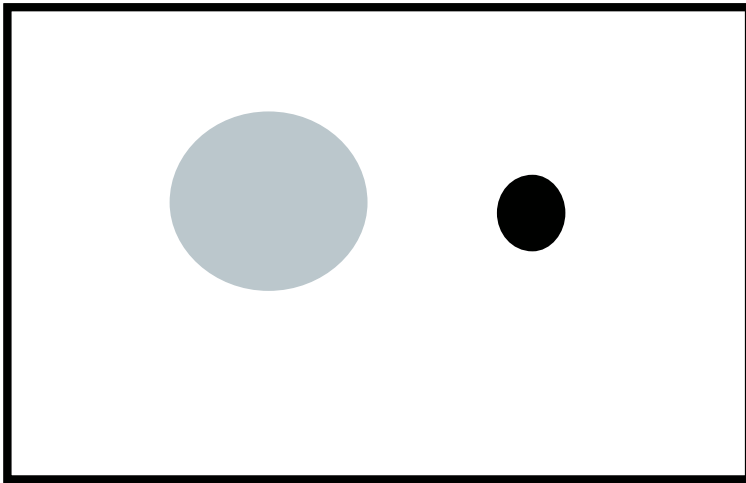


Figure 1: