

Do individuals recognize cascade behavior of  
others?  
— An Experimental Study —

Instructions and Control Questions from the Lab  
Experiment

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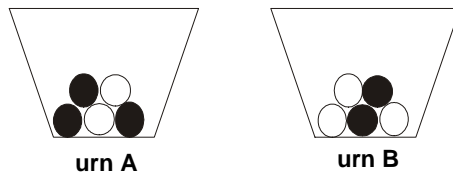
# 1. Instructions (English Translation)

Welcome to our experiment! Please read these instructions carefully. Do not talk to your neighbors during the experiment. If you have any questions, please raise your hand. We will come to you and help you.

The amount of money you will earn in this experiment depends on your decisions and on some random events. The instructions are the same for all participants. The currency is ECU (Experimental Currency Unit). 100 ECU equal 10 Euro.

The experiment is carried out in the following scheme:

There are two urns, A and B. In urn A there are five black balls and four white balls. In urn B there are five white and four black balls. One of these urns is chosen randomly. You have to find out which one of the urns has been chosen.



Up to five artificial agents act one after the other before you make your decision. Their actions are exactly determined by the following decision rules:

In case of an artificial agent's turn a ball is drawn out of the urn that has been chosen in the beginning of the experiment. The color of the ball is announced to the agent and the ball is put back into the urn. It is, furthermore, announced to each agent which urns has been predicted by the agents that acted before them.

Knowing the color of the drawn ball and the choices of the predecessor agents the agent predicts one of the urns according to the following decision rules.

- Generally all agents predict the urn which got the majority of all votes (including their own).
- "Votes of the predecessors" are their decisions for urn A or B. The acting agent's vote is added to these. It is only determined by the color of the ball drawn for him. A black ball means a vote for urn A. A white ball means a vote for urn B.

- If an agent decides first, his choice is only determined by his own vote, i.e. by the color of the ball which was drawn for him. If a black ball is drawn, he chooses urn A. If a white ball is drawn, he chooses urn B.
- If there is no majority of votes (equal number of votes in favor of A and B), the agents decide according to their own vote.

It can be your turn to decide at the positions 1 to 6. Also for you a ball is also drawn the urn that has been chosen randomly in the beginning of the experiment and you are told the color of the ball. Furthermore, you are told the urn predictions of all artificial agents that have acted at previous positions.

Depending on:

- the position at which you act (1 to 6),
- the color of the ball drawn for you (black or white) as well as on
- the predictions of urns of your artificial predecessors

there are 74 different situations for which you have to make your decisions.

These situations are given by the computer in random order. In every of these situations you have to decide:

- which one of the urns you predict
- what maximum price  $p_{\max}$  you are willing to pay to participate in the urn prediction with the according payoff chances.

At the end of the experiment one of the 74 situations will be chosen randomly and your pay off will be calculated according to your decisions in this situation.

#### Payoff calculation

Generally you obtain 100 ECU for every right urn prediction and nothing for a wrong prediction, i.e. 0 ECU. The following mechanism determines, whether and to what price you will participate in the urn prediction.

The maximum price  $p_{\max}$  you have submitted is compared to a random price  $p_z$ , which is randomly drawn from all integer prices between 0 and 100 ECU. The probability with which a certain price is drawn is the same for each price.

	Correct urn prediction	False urn prediction
$p_r \leq p_{\max}$	100 ECU - $p_r$ (+100 ECU)	0 ECU - $p_r$ (+100 ECU)
$p_r > p_{\max}$	0 ECU (+100 ECU)	0 ECU (+100 ECU)

Table 1.1: Income Calculation.

- If the random price exceeds your maximum price ( $p_z > p_{\max}$ ) you do not participate in the payment. Then your payoff is 0, regardless whether your urn prediction was right or wrong.
- If the random price is lower or equal to your maximum price ( $p_z \leq p_{\max}$ ), you obtain your payment according to your urn prediction (100 or 0 ECU) minus the random price  $p_z$ .

Your submitted maximum price  $p_{\max}$  thus determines how much you are willing to pay at maximum to participate in the urn prediction and the according payment. It is always optimal for you to submit your real maximum price (also see “The optimal choice of  $p_{\max}$ ”).

Additionally all participants obtain a general payment of 100 ECU which is set off against the earned income. The resulting payments are summarized in the following table.

#### Random processes

The choice of the payment relevant situation with all according random mechanisms is carried out live in the laboratory.

First the position at which you act is determined randomly by dice (points = position). An urn is chosen randomly. Then balls are drawn from the chosen (and put back) for your artificial predecessors and their decisions determined according to the decision rules defined above. Finally, a ball is drawn from the urn for you and the color announced to you. By this way exactly one situation is determined for which your decisions are payment relevant. The random price is drawn from an urn which contains exactly 101 chips numbered 0 to 100.

The experiment starts with a “warm-up” round to demonstrate the course. Before the experiment starts we ask you to answer some control questions. The participants who answer all questions receive an extra payment of 50 ECU additionally to their experimental outcome. The experiment starts after all questions have been answered correctly by all participants. After the decisions for all 74 situations have been made by all participants the payoff relevant situation will be determined according to the random process described above. Your payment will be calculated and paid out in Euro.

## 2. Supplementary sheet: The optimal choice of $p_{\max}$ (English Translation)

In the price mechanism used in this experiment it is always the best strategy to submit your real maximum price. It is neither profitable to exaggerate nor to understate the price.

Example:

Assume that you are willing to pay a maximum price  $p_{\max}$  of € 5 for a bottle of wine. The price mechanism in this experiment (with the uniformly distributed random price  $p_Z$  out of the interval between 0 and 100) determines whether and at which price you obtain the bottle of wine.

If you understated the price e.g. by submitting a price  $p_U$  of € 3 as your maximum price, the following cases could arise:

- $p_Z > p_{\max} > p_U$ . The random price exceeds the real maximum price, e.g. € 6. You would not buy the bottle, no matter if you understate the price or if you submit your actual maximum price (€ 5).
- $p_Z \leq p_U$ . The random price is lower than the submitted understated price, e.g. € 2. You would buy the wine for € 2, no matter if you submit your actual maximum price (€ 5) or if you understate the price (€ 3).
- $p_U < p_Z \leq p_{\max}$ . The random price lies in between the submitted and your real maximum price e.g. 4€. In this case you could not buy the wine although you were willing to pay € 5 and would only have to pay € 4.

As you can see, understatement does not pay.

Nor does exaggeration.

Assume that you would exaggerate and submit a price  $p_{\ddot{U}}$  of € 7. Three scenarios are possible in this case as well:

- $p_Z \leq p_{\max} \leq p_{\ddot{U}}$ . The random price is lower or equals the real maximum price, e.g. € 4. You would buy the wine at a price of € 4, no matter if you submit your real maximum price (€ 5) or if you exaggerate (€ 7).
- $p_Z > p_{\ddot{U}}$ . The random price exceeds the exaggerated price e.g. € 8. You would not buy the wine, no matter if you submit your actual maximum price (€ 5) or if you exaggerate (€ 7).

number	agents' position	predictions of predecessors	color of the privately drawn ball	correct answer
1	1		black	A
2	3	AB	white	B
3	4	ABB	black	A
4	4	AAA	white	A
5	3	BA	white	B
6	1		white	B
7	3	BB	black	B
8	2	B	black	A

- $p_{Max} < p_Z \leq p_{\ddot{u}}$ . The random price lies in between your real maximum price and the submitted exaggerated price, e.g. € 6. In this case you had to pay € 6 for the bottle although you actually wanted to pay only € 5 for it at maximum.

Obviously, neither understatement nor exaggeration do pay!

### 3. Pre-experimental control questionnaire

By the computer subjects were asked to answer questions to both artificial agents as well as to the work of BDM-mechanism. Only after all participants in a session answered all questions correctly the experiment was started. Additionally, participants who answered all questions correctly at the first time received a extra payment of € 5. As follows the questions regarding artificial agents and BDM-mechanism are summarized.

#### Artificial agents

Participants were asked to state the right urn prediction (A or B) of artificial agents for the situations (characterized by agents position, decision of her predecessors and color of the privately drawn ball) that are summarized in the following table:

#### Price mechanism

Participants were asked to state whether they would participate in the urn prediction and the according payment chances (Yes or No) and to calculate the resulting income from the experiments assuming the situations (characterized by

max. price $p_{\text{Max}}$	random price $p_Z$	urn prediction (wrong or correct)	participation (correct answer)	resulting income (correct answer)
60	71	correct	No	0
50	35	wrong	Yes	- 35
70	50	correct	Yes	50

Table 3.1: Income Calculation.

maximum price, random price and correctness of the urn prediction) summarized in Table 3.1

We additionally asked subjects to state the optimal choice of the maximum price under the assumption that they are willing to pay 50 ECU at maximum (correct answer: 50 ECU).