

Experimental Instructions

Introduction

You are about to participate in an experiment in decision-making. The instructions are simple. If you follow them carefully and make good decisions, you can earn a considerable amount of money. You are awarded \$6 for showing up on time and participating in the experiment. Your additional earnings depend on your decisions, the decisions of other participants, and chance. You will be paid in cash at the end of the experiment. All payments will be made in private.

We will proceed as follows. First, I will review and explain the instructions. Then you will have a chance to ask any questions you might have. After that we will start with the experiment. **No talking during the experiment!**

General description of the experiment

You will interact anonymously with one another by reviewing some information on your computer screens and inputting answers in response to questions posed on your screen. At the start of the experiment, all participants will be randomly divided into two groups, labeled X and Y: there are exactly 10 members in each group. Your assignment to the X or to the Y group will be indicated on your computer screen and *will not change for the duration of this experimental session*.

The session today consists of 20 periods. Each period you and each of the other participants must decide whether to buy a token. For each participant, one token costs 18 cents. You can buy only one token each period. Your decision to buy or not buy a token is known only to you; no one in your group or the other group will know of your decision to buy/not buy a token in any period of this session, even after the session is over. After everyone has made their decision to buy or not buy a token, the total number of tokens bought by each group is calculated by the computer program and will appear on your computer screen. The group whose members bought the most tokens is declared the winner. If both groups have bought the same number of tokens – i.e., if there is a *tie* – then a predetermined tie-breaking rule (announced at the start of each period) is used to determine the winner. Each member of the winning group receives a payoff of \$1.00, and each member of the losing group earns \$0.00, regardless of whether or not they bought a token. Your *net* payoff depends on whether or not you bought a token, as buying a token costs you 18 cents. In addition to deciding whether or not to buy a token, we ask you to state your belief as to the probability that your decision to buy/not buy a token is *decisive*, i.e., that it makes a difference in the outcome. We will define what is meant by decisive more clearly below. You will also have the opportunity to earn a small amount of money (up to \$0.10 per period) according to the accuracy of your stated decisiveness probability as explained below.

Detailed description of a period

At the start of each period, the computer program randomly determines which of the two groups, X or Y wins a tie if there is one in that period. There is a .5 probability that X wins a tie and a .5 probability that Y wins a tie. The group that wins a tie each period will be indicated on the first stage screen of every individual's monitor, *before* decisions are made in that period.

On this first stage screen, you are asked to make two decisions, a prediction regarding the decisiveness of your token purchase decision and whether or not you want to buy a token.

First, you must state your prediction as to whether your decision to buy a token will be decisive for the period *outcome*, that is, which group wins/loses. In addition to your earnings the token purchase decision, we will pay you an extra amount depending on the accuracy of your decisiveness prediction.

Specifically, you are asked: “What is the probability that your token purchase decision is decisive for this period’s outcome (which group wins/loses)?” Underneath this question is an input box. In this box, please indicate your probability by entering any real number between 0 and 1 inclusive. A “0” means “I definitely will not be decisive” and “1” means “I definitely will be decisive”. For example, if you think there is a 10 percent chance that your decision will be decisive, enter 0.1 in the input box. If you think there is a 90 percent chance that your decision will be decisive, enter 0.9. If you think that there is a 33.3 percent chance that your decision will be decisive, enter 0.333, etc. The program will register your prediction with the preciseness of up to three decimal points (i.e. 0.001).

Defining decisiveness

At the end of each period, the computer program calculates the total number of tokens bought by the members of each group. The group with the most tokens is declared the winner of that period; everyone in the winning group has gross earnings of \$1 regardless of whether they bought a token or not. If there is a tie (equal numbers of tokens bought by each group), the group randomly chosen at the start of the period to win a tie is declared the winner that period. *You are decisive* if your decision to buy/not buy a token determines the outcome of the period that is, which group wins/loses, holding constant the decisions of all other players. In other words, you are decisive if, had you changed your decision to buy/not buy a token, the actual outcome of the period (the team that won) would have changed. Specifically, you are decisive under any of the following conditions.

Suppose that group X wins a tie.

1. If there is a tie then everyone in group X who *bought* a token is decisive.
2. If there is a tie then everyone in group Y who *did not buy* a token is decisive.
3. If group X loses by one token, then everyone in group X who *did not buy* a token is decisive.
4. If group Y wins by one token, then everyone in group Y who *bought* a token is decisive.

Suppose instead that Y wins a tie.

1. If there is a tie then everyone in group Y who *bought* a token is decisive.
2. If there is a tie then everyone in group X who *did not buy* a token is decisive.
3. If group Y loses by one token, then everyone in group Y who *did not buy* a token is decisive.
4. If group X wins by one token, then everyone in group X who *bought* a token is decisive.

If one of the above conditions does not hold, then you are *not* decisive.

For example, suppose group X wins a tie and members of this group buy 5 tokens this period while members of group Y buy 6 tokens this period. Then every member of group Y who has *bought* a token has been decisive, because if any one of them had not bought a token, their group would not have won. Further, every member of group X who *did not buy* a token has also been decisive, since if any one of them had bought a token, group X would have won.

Suppose again that group X wins a tie, but now suppose that members of this group buy 7 tokens while members of group Y also buy 7 tokens. Then everybody in group X who has *bought* a token has been decisive, because if one of the group X members buying tokens had not bought a token, group X would

not have won. Further, every member of group Y who *did not buy* a token is also decisive, since if one of them had bought a token, group Y would have won.

Finally, suppose again group X wins a tie and members of that group buy 9 tokens while members of group Y buy 8 tokens. In this case, *nobody* is decisive, because group X would still have won even if one of the token-buying members of group X didn't buy a token, and no single member of group Y who did not buy a token could have caused group Y to win by buying a token. So, you are decisive only if your decision to buy or not buy a token would have changed the outcome of the period (which team wins) assuming no change in the behavior of other the players. Notice that you can be decisive regardless of whether or not you buy a token.

Payment for decisiveness

Suppose you enter that the probability your token decision is decisive for your group is p , where p represents some number between 0 and 1 inclusive. We will pay you for your predictions as follows:

If your decision is decisive, you earn $10(2p - p^2)$ cents.

If your decision is not decisive, you earn $10(1 - p^2)$ cents.

Since p is always a number between 0 and 1, the maximum payoff from your decisiveness prediction is 10 cents while the minimum payoff is 0. A table of decisiveness payments using these two formulas is given below for ease of calculation –see Payoff Table 1. Note, however that this table presents payoffs for only a small set of possible probabilities, with a precision of 0.1; the actual payments will be based on calculations using the formulas above with a precision of 0.001.

Example. Suppose you predict that your probability of being decisive is 90%. Suppose further that your group wins a tie, but the token count is such that your group loses this period by one token. Since you bought a token, you and the other token-buying members of your group are not decisive. Therefore, the payoff you earn from your prediction is $10(1 - .9^2) = 1.9$ cents. This amount will be calculated for you and shown on your computer screen, but you can also look it up in the decisiveness table. Now suppose instead that all the facts in this example are the same except that you are among the players in your group who did not buy a token this period. Since you and every member of your group who did not buy a token this period are decisive, the payoff you earn from your prediction that you would be decisive is $10(2(.9) - .9^2) = 9.9$ cents. Again, this payoff amount will be calculated for you but you could also find this number in the decisiveness payoff table 1.

Since your decisiveness forecast is made before you know whether you have been decisive or not, the best thing you can do to maximize the expected size of your prediction payoff is to simply state your true beliefs about what you think the probability is that you will be decisive. Any other prediction will decrease the amount you can expect to earn as a prediction payoff.

Token purchase decision

After you have entered the probability that your decision is decisive, you will be asked whether or not you want to buy a token. Click on one of the radio buttons, labeled “yes” or “no”, to indicate your choice. When you are satisfied with your decision, click the “submit” button. You can change your choice any time prior to clicking the submit button.

Once everybody has clicked the submit button, the computer program will calculate the number of tokens bought by the X and Y groups. It will then determine the winner for the period (using the tie-breaking rule if necessary) and it will also determine which players have been decisive (if any). The program will also determine each individual's total earnings for the period. These include the net payoff from your decisions to buy/not buy a token plus the payoff from your decisiveness prediction.

The payoff tables 2 and 3 on your handouts present possible *gross* payoffs to you under different scenarios. In essence, if your group wins a tie this period and your group has bought at least as many tokens as the other group, then each member of your group wins \$1 (100 cents). In all other cases you win 0. If your group loses a tie and in this period your group has bought more tokens than the other group, then each member of your group wins \$1 (100 cents). In all other cases you win 0.

Remember, however, that buying a token costs you 18 cents! Thus, if you buy a token and your group *wins*, your earnings for the period from the token purchase decision consists of the gross payoff to each member of the winning team (100 cents) minus the cost of buying a token (18 cents), i.e., your net payoff is 82 cents. If your group wins but you did not buy a token, your gross payoff (100 cents) is the same as your net payoff for the period. If you buy a token and your group *loses*, the payoff for the period from your token purchase decision consists of the gross payoff from losing (0) minus the cost of buying a token (18 cents), i.e. your net payoff is -18 cents. If your group loses but you did not buy a token, your gross payoff (0) is the same as your net payoff for that period. Summarizing, your net earnings from the token purchase decision each period is either: 82 cents, 100 cents, -18 cents or 0 cents. In addition to your earnings from the token purchase decision you also get your earnings from your decisiveness prediction as explained above.

The computer will keep track of your total earnings from all 20 periods played. If your cumulative total from all periods played involves fractions of cents, this total will be rounded up to the nearest cent at the end of the session. You will earn this total amount plus the \$6 amount you have been awarded for showing up to today's experiment. Notice that it is possible for you to have a negative balance from token purchase decisions, for instance, if you buy a token in every period and your team loses every period. If you end the experiment with a negative balance, this amount is deducted from your \$6 show-up award.

Experiment history

The program automatically records what happens in each period. The table at the bottom of your screen reminds you of your recent history of play (all past periods). Specifically, you are reminded of:

Period numbers.

Group you belong to (X or Y), which is the same in all periods.

Did your group win that period?

Number of tokens bought by your group that period.

Number of tokens bought by the other group that period.

Your decisiveness probability that period.

Were you decisive that period?

Did you buy a token that period?

Your period earnings.

Your cumulative earnings (sum from all periods played so far).

Data from the most recent periods are shown on your screen; you can use the scroll bar to scroll down to see the history information from all previous periods.

Payoff Table 1: Decisiveness prediction (you can enter probabilities up to 3 decimal places: .xxx)

	Your Purchase of a Token is Not Decisive	Your Purchase of a Token is Decisive
Probability You Are Decisive:	Cents earned	Cents earned
0	10.0	0.0
0.1	9.9	1.9
0.2	9.6	3.6
0.3	9.1	5.1
0.4	8.4	6.4
0.5	7.5	7.5
0.6	6.4	8.4
0.7	5.1	9.1
0.8	3.6	9.6
0.9	1.9	9.9
1	0.0	10.0

Payoff Table 2: Gross payoff to members of your group *if your group wins a tie*. Payoffs are given in cents. **Remember, buying a token costs you 18 cents!**

		Number of tokens bought in your group											
		0	1	2	3	4	5	6	7	8	9	10	
Number of tokens bought in the other group	0	100	100	100	100	100	100	100	100	100	100	100	100
	1	0	100	100	100	100	100	100	100	100	100	100	100
	2	0	0	100	100	100	100	100	100	100	100	100	100
	3	0	0	0	100	100	100	100	100	100	100	100	100
	4	0	0	0	0	100	100	100	100	100	100	100	100
	5	0	0	0	0	0	100	100	100	100	100	100	100
	6	0	0	0	0	0	0	100	100	100	100	100	100
	7	0	0	0	0	0	0	0	100	100	100	100	100
	8	0	0	0	0	0	0	0	0	100	100	100	100
	9	0	0	0	0	0	0	0	0	0	100	100	100
	10	0	0	0	0	0	0	0	0	0	0	100	100

Payoff Table 3: Gross payoff to members of your group *if your group loses a tie*. Payoffs are given in cents. **Remember, buying a token costs you 18 cents!**

		Number of tokens bought in your group											
		0	1	2	3	4	5	6	7	8	9	10	
Number of tokens bought in the other group	0	0	100	100	100	100	100	100	100	100	100	100	100
	1	0	0	100	100	100	100	100	100	100	100	100	100
	2	0	0	0	100	100	100	100	100	100	100	100	100
	3	0	0	0	0	100	100	100	100	100	100	100	100
	4	0	0	0	0	0	100	100	100	100	100	100	100
	5	0	0	0	0	0	0	100	100	100	100	100	100
	6	0	0	0	0	0	0	0	100	100	100	100	100
	7	0	0	0	0	0	0	0	0	100	100	100	100
	8	0	0	0	0	0	0	0	0	0	100	100	100
	9	0	0	0	0	0	0	0	0	0	0	100	100
	10	0	0	0	0	0	0	0	0	0	0	0	100

Quiz.

Before we start playing, we ask you to answer the following questions in the space provided. This quiz does not affect your payoffs in any way – it is simply to give you some practice with various scenarios and ensure that you have a good understanding of the rules of play. The numbers in the example below are illustrative only; actual numbers in the experiment may differ. Please feel free to consult the instructions and payoff tables in answering these questions. We will come around to make sure that your answers to these questions are right before we start playing. If you have questions, please raise your hands and we will assist you.

1. You belong to group X. Group X wins a tie. You have bought a token. In total, group X has 9 tokens and group Y has 8 tokens. Have you been decisive?

2. You belong to group Y. Group Y wins a tie. You have not bought a token. In total, group X has 7 tokens and group Y has 6 tokens. Have you been decisive?

3. You belong to group Y. Group Y wins a tie. You believe that there is a probability of 0.7 that your decision to buy/not buy a token will be decisive. You buy a token. In total, group X has 7 tokens and group Y has 8 tokens. What is your payoff from the decisiveness prediction?

What is your *net* payoff from buying a token?

What is your total payoff for the period?

4. You belong to group Y. Group Y wins a tie. You believe that there is a probability of 0.4 that your decision to buy/not buy a token will be decisive. You do not buy a token. In total, group X has 7 tokens and group Y has 8. What is your payoff from the decisiveness prediction?

What is your *net* payoff from not buying a token?

What is your total payoff for the period?

Please raise your hand when you have finished writing down your answers to this quiz and one of the experimenters will come around to review your answers. Then sit quietly until the experiment begins.