Welcome and thank you for participating in this experiment.

Please read these instructions carefully as they explain how you can earn money from the decisions that you make. All payments will be made at the end of the session in cash and in private.

It is important that during the experiment you remain silent. If you have any questions or need assistance of any kind, please raise your hand. An experimenter will come to you and answer your questions.

You will be paid a show-up fee of $5, plus additional amounts based on the points you earn during the experiment. Experimental point is the currency used to denote your earnings during the experiment. Your earnings depend partly on your and other participants' decisions and partly on chance. At the end of the experiment, the total number of points you earn during the experiment will be exchanged at a rate of:

$$76 \text{ points} = 1 \text{ dollar}$$

General instruction

This experiment consists of 10 independent matches, each match consisting of 3 rounds.

At the beginning of each match, you will be randomly assigned to a 5-member group with a member ID (A, B, C, D, or E) that will be fixed for the duration of the match. Your group member ID is your only identification in the group. Thus, you will not know who your group members are at any point during or after the experiment.

You will remain in the same group (interact with the same 4 other participants) for 3 rounds. After the 3rd round, you will be reassigned randomly to a new group for the next match with a new member ID.

In each round, you will be asked to **predict** which of the two urns, labeled Red and Blue, has been chosen for your group. For each group of five, it is **equally likely** that urn Red or urn Blue will be chosen. For example, you can think of this as being determined by a coin toss. Urn Red contains 7 red balls and 3 blue balls. Urn Blue contains 7 blue balls and 3 red balls. A correct prediction gives you 140 points and a wrong one gives 40 points. Your prediction is **irreversible**. Once you have made your prediction, your payoff for this round is determined. Each round ends when all of your group members have made their predictions.

To help you predict which urn has been chosen, you can rely on two types of information:

- **Private Information**. Once the group urn is chosen, each of your group members will observe one ball, drawn at random, from the urn. *After each draw, the ball will be returned to the urn before making a private draw for the next group member. This is done by the computer.* The color of your ball is your private information, which is offered to you *immediately and at no cost*.
- **Network Information**. Potentially you can gather other group members' private information through a network. Your network information is *costly* and will *not be immediately observable*. You exchange your private information with your group members in a network. Only when you decide to make the prediction will this information be revealed to you.

1

Throughout the experiment, the network's structure (shown below) will remain the same:
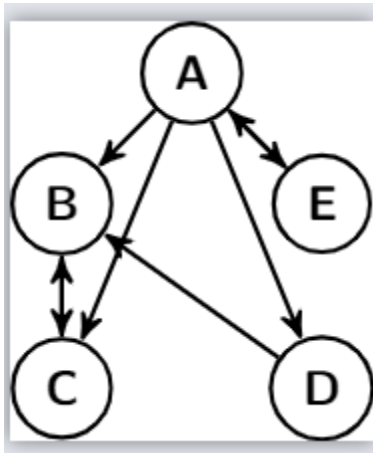
What changes in the network is your position, corresponding to your group member ID randomly assigned at the beginning of each match. In the network, an arrow from A to B indicates that B can gather information from A, but not vice versa.

Network Position

Each match starts by having the computer randomly form groups of five participants and assign group member IDs. The groups formed in each match depend on chance, but you are guaranteed to experience each position once in the first five matches.

In the experiment, your match number and group member ID will be shown in the left top section "Network position".

Software Interface: Network Position

Your position will be displayed as a solid blue circle while other participants will have solid white circles. The participant(s) from whom you can gather information will be marked with a blue outer ring. They are your potential sources of additional information.
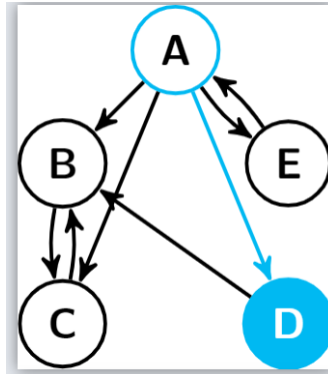
Screenshot for a participant with member ID D

Urn Selection

At the beginning of each round, the computer randomly chooses an urn for each group with equal probability. The urn chosen for each round depends only on chance and is independent of the urns chosen in any of the other rounds.
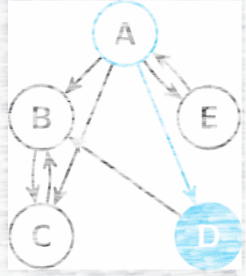

Software Interface: Urn Selection

Information summary

Private information: The color of your private draw will be immediately available to you at the beginning of each round.

Network information: At the beginning of each round, you start with no network information.

To gather information from the network, you need to delay your prediction. Upon waiting for one turn to make a prediction, you will gain access to the information of the participants who have an arrow pointing towards you. Waiting will cost you **1 point per turn**.

Information in the network will be updated once all five group members have indicated whether they want to **predict in this turn** or **wait for the next turn**. You have up to 60 seconds to make your choice in the left bottom section named "Decide: Predict or Wait". To submit your choice, you need to click the blue "Next" button. If you decide to predict in this turn, clicking "Next" will direct you to the prediction page. If you decide to wait for the next turn, after clicking "Next", you will return to this page with updated network information once all your group members have indicated their choices.
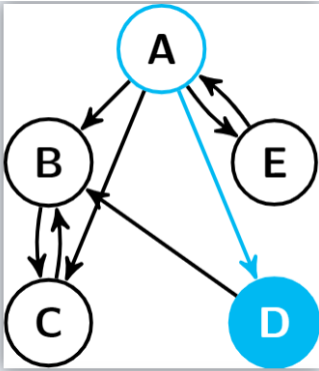
What happens if I "wait for the next turn"?

Suppose you choose to "wait for the next turn", in turn 1, you will gather information from the participant(s) with a blue outer ring. Your network information will be displayed as below.

Moreover, if you decide to wait for two turns or longer, you will be updated with any new information gathered by your information sources in the previous turn. For example, participant D will gather E's information if A waited for turn 1; but will not gather E's information if A predicted in turn 0. You will be able to see who has predicted in previous turns to help you decide whether you want to wait longer. You can wait for at **most 5 turns** per round.

Network Position	Network Information for D		
	Turn	If A Waited	If A did not wait
	0	**Network Information :** You haven't gathered any information from the network yet.	
	1	This is **Turn 1** . **Network Information :** The private information of participants with the following member ID(s) will display if you decide to "Predict in this turn". A **Group members who have predicted are :** Participant Predicted in Turn	This is **Turn 1** . **Network Information :** The private information of participants with the following member ID(s) will display if you decide to "Predict in this turn". A **Group members who have predicted are :** Participant Predicted in Turn A 0 *You can see that A predicted in turn 0.*
	2	This is **Turn 2** . **Network Information :** The private information of participants with the following member ID(s) will display if you decide to "Predict in this turn". A E **Group members who have predicted are :** Participant Predicted in Turn	This is **Turn 2** . **Network Information :** The private information of participants with the following member ID(s) will display if you decide to "Predict in this turn". A **Group members who have predicted are :** Participant Predicted in Turn A 0

What happens if I "predict in this turn"?

You will see the prediction page if you choose to "predict in this turn" or you have waited for 5 turns. Your network information will be revealed to you. You will have up to 120 seconds to submit your prediction by clicking the "Next" button. The timer will not show up until the last 15 seconds. If the time expires, your prediction will be regarded as incorrect.

Once you have made your prediction, you have completed your round and have up to 30 seconds to review your performance in this match. Your earnings in each round are calculated as: prediction earning-waiting cost. For example, if you make a correct prediction and wait for 1 turn in a round, your earning would be 140-1=139.

You have completed Round 1.

Your payoff for this round is 39 points. Here is the summary of your predictions in this match .

Round Number	Your Decision Turn	Information You Gathered	The Colors You Observed	Your Prediction	True Urn Chosen	Your Payoff
1	1	D	🔵	Time Expired	Red	39 points
		A	🔴			

Once all group members have completed the round by making a prediction, you will have up to 30 seconds to review all your group members' performances in this round.

Results for Match 1 Round 1 :

Network Position	Prediction in Turn	Predicted Urn	Payoff
B	0	Blue	140 points
C	0	Blue	140 points
D	0	Blue	140 points
E	0	Red	40 points
A	0	Blue	140 points

You were correct. The chosen urn was urn Blue.

Your payoff for this game is 140 points.

Now let's begin a new round. Remember, you are still matched with the same group members.

Next

Probability cheat sheet

In each round, you may observe at most 5 independent draws from the chosen urn. The following table shows you the probability of observing different combinations of colors. Please note, when you observe an even number of draws, there are chances that you observe half blue and half red.

If the chosen urn is **Red**:

Total Number of Observable Private Draws	Combination of Colors		Probability
1 ball	1 Red	🔴	70%
	1 Blue	🔵	30%
2 balls	2 Reds	🔴 🔴	49%
	1 Red 1 Blue	🔴 🔵	**42%**
	2 Blues	🔵 🔵	9%
3 balls	3 Reds	🔴 🔴 🔴	34%
	2 Reds 1 Blue	🔴 🔴 🔵	44%
	1 Red 2 Blues	🔴 🔵 🔵	19%
	3 Blues	🔵 🔵 🔵	3%
4 balls	4 Reds	🔴 🔴 🔴 🔴	24%
	3 Reds 1 Blue	🔴 🔴 🔴 🔵	41%
	2 Reds 2 Blues	🔴 🔴 🔵 🔵	**26%**
	1 Red 3 Blues	🔴 🔵 🔵 🔵	8%
	4 Blues	🔵 🔵 🔵 🔵	1%
5 balls	5 Reds	🔴 🔴 🔴 🔴 🔴	17%
	4 Reds 1 Blue	🔴 🔴 🔴 🔴 🔵	36%
	3 Reds 2 Blues	🔴 🔴 🔴 🔵 🔵	31%
	2 Reds 3 Blues	🔴 🔴 🔵 🔵 🔵	13%
	1 Red 4 Blues	🔴 🔵 🔵 🔵 🔵	3%
	5 Blues	🔵 🔵 🔵 🔵 🔵	<1%
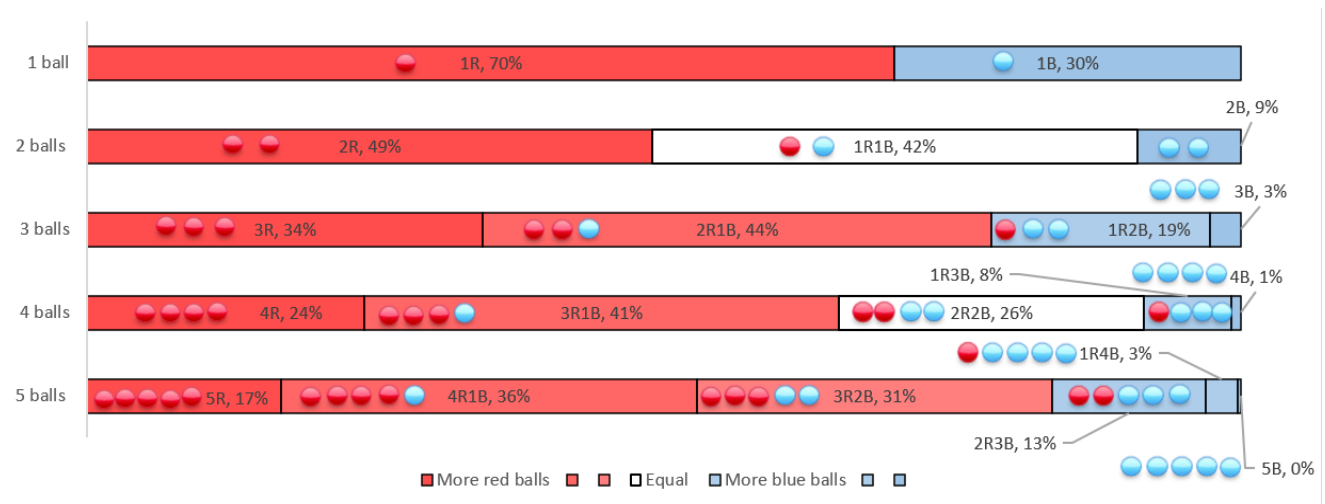
If the chosen urn is **Blue**:

Total Number of Observable Private Draws	Combination of Colors		Probability
1 ball	1 Blue	🔵	70%
	1 Red	🔴	30%
2 balls	2 Blues	🔵 🔵	49%
	1 Blue 1 Red	🔵 🔴	**42%**
	2 Reds	🔴 🔴	9%
3 balls	3 Blues	🔵 🔵 🔵	34%
	2 Blues 1 Red	🔵 🔵 🔴	44%
	1 Blue 2 Reds	🔵 🔴 🔴	19%
	3 Reds	🔴 🔴 🔴	3%
4 balls	4 Blues	🔵 🔵 🔵 🔵	24%
	3 Blues 1 Red	🔵 🔵 🔵 🔴	41%
	2 Blues 2 Reds	🔵 🔵 🔴 🔴	**26%**
	1 Blue 3 Reds	🔵 🔴 🔴 🔴	8%
	4 Reds	🔴 🔴 🔴 🔴	1%
5 balls	5 Blues	🔵 🔵 🔵 🔵 🔵	17%
	4 Blues 1 Red	🔵 🔵 🔵 🔵 🔴	36%
	3 Blues 2 Reds	🔵 🔵 🔵 🔴 🔴	31%
	2 Blues 3 Reds	🔵 🔵 🔴 🔴 🔴	13%
	1 Blue 4 Reds	🔵 🔴 🔴 🔴 🔴	3%
	5 Reds	🔴 🔴 🔴 🔴 🔴	<1%
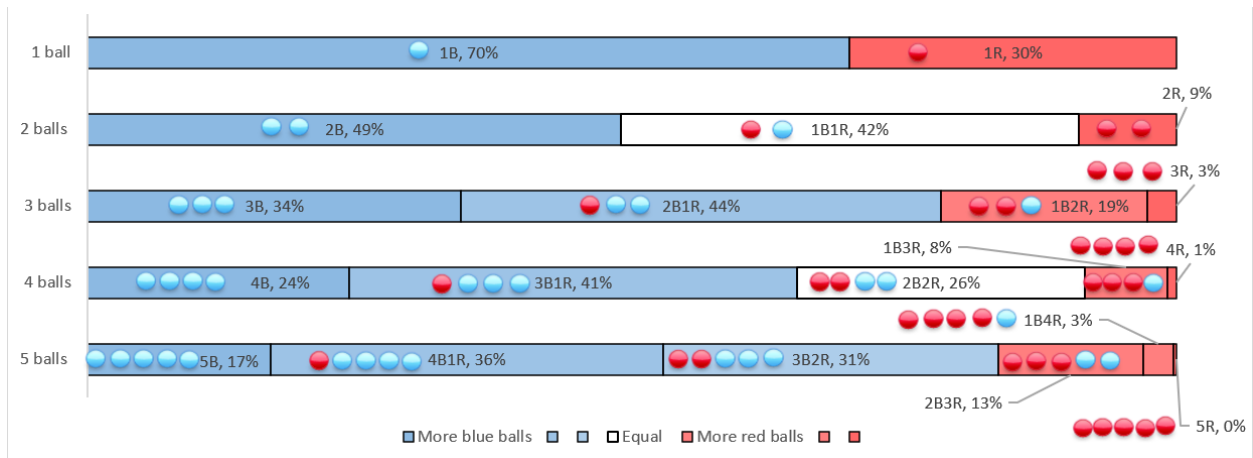
Practice session

You will play at each position (the order is A, B, C, D, E) with four computerized agents for two rounds. Computerized agents are equally likely to predict in any turn. That is, they guess in turn 0, 1, 2, 3, and 4 with a chance of 1/5 each. When making their predictions, they are equally likely to choose Red and Blue regardless of the information transmitted through the network.

If you have any questions in the practice session, please raise your hand. An experimenter will come to you and answer your question.

Comprehension test

After the practice sessions, you will complete a comprehension test with 10 questions. Each correct answer will count as 50 points for your payment.

Final payment

At the end of this experiment, the computer will randomly pick 1 round from each match and add up the experimental points. Alongside the points you earned in the comprehension test, the total will be converted to a dollar amount according to the exchange rate:

$$76 \text{ points} = 1 \text{ dollar}$$

This amount will then be added to the $5 show-up fee to give your final payment. Your payment will be rounded up to the nearest 25 cents. If you want, you may keep track of your payment in the "Payment Record".

Questionnaire

You will be asked to fill in a short questionnaire while the experimenters prepare for your payments. Please remain seated until the payment has taken place.

Your subject label is on the post-it note behind your seat card. Please type in the label (case sensitive) and begin the practice session.