Online Appendix to "Adverse and Advantageous Selection in the Laboratory"

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The appendix is organized as follows:

- Appendix A contains the proofs of Propositions 2 and 3.

- Appendix B contains summary statistics for Parts 1 and 2 in the HH treatment. Part 1 involved individual choices over lotteries and Part 2 involved a voting game without uncertainty about payoffs.

- Appendix C summarizes the choices for Part 1 in the HR treatment.

- Appendix D contains all choices in the Dictator game (Part 5 of the HH treatment).

- Appendix E contains the distribution of the number of deviations from our theoretical predictions in Proposition 1 for all of our treatments (HH, HR, PF, and FF).

- Appendix F contains demographic information on the subject pool in each treatment.

- Appendix G contains full experimental instructions and screenshots.

A   Omitted Proofs

Proof of Proposition 2. Without loss of generality, we can normalize utilities so that $u(10) = 0$ and $u(20) = 1$. With this normalization, (1) simplifies to $u(12) \geq \chi/2$ and (2) simplifies to $u(16) \geq 1 - \chi/2$. Let CE denote the certainty equivalent of a $50 - 50$ lottery on \$10 and \$20, which implies that $u(CE) = 1/2$. We now consider the three separate cases of risk-aversion, risk-neutrality, and risk-seeking behavior.

Let us first suppose that u is strictly concave and $CE \in [14, 15)$. It follows from the concavity of u that

$$u(CE) - u(12) > u(16) - u(CE),$$

which combined with $u(CE) = 1/2$ implies that $u(16) < 1 - u(12)$. But then if $u(12) \geq \chi/2$ because u and χ satisfy (1), it must be that $u(16) < 1 - \chi/2$, which implies that (2) cannot be satisfied.

Now consider risk-neutral preferences. The normalization implies that $u(16) = 3/5$ and $u(12) = 1/5$, which implies that (1) and (2) cannot be simultaneously satisfied.

Finally, suppose that u is strictly convex and $CE \in (15, 20]$. Because u is strictly convex,

$$\frac{u(16) - u(CE)}{16 - CE} < \frac{u(20) - u(CE)}{20 - CE} = \frac{1}{2(20 - CE)}.$$

which implies that $u(16) - u(CE) < \frac{16 - CE}{2(20 - CE)}$.

$$\frac{u(CE) - u(12)}{CE - 12} > \frac{u(CE) - u(10)}{CE - 10} = \frac{1}{2(CE - 10)},$$

which implies that $u(CE) - u(12) > \frac{CE - 12}{2(CE - 10)}$. Observe that for $CE > 40/3$,

$$\frac{16 - CE}{2(20 - CE)} < \frac{CE - 12}{2(CE - 10)},$$

and therefore, $u(16) - u(CE) < u(CE) - u(12)$. Since $u(CE) = 1/2$, it follows that $u(16) < 1 - u(12)$, and therefore, if $u(12) \geq \chi/2$, $u(16) < 1 - \chi/2$. $\square$

Proof of Proposition 3. First consider what happens if payoffs are negatively correlated. In any weakly undominated self-confirming equilibrium, the informed player always votes for the risky option if the informed player obtains h and the uninformed player obtains l and otherwise votes for the safe option. Suppose towards a contradiction that the uninformed player votes for the risky option with positive probability. Then his beliefs about the distribution of play on terminal nodes must be correct: the risky option is selected only when the uninformed player obtains l. Given these beliefs, his best-response is to vote for the safe option, leading to a contradiction.

Now suppose that payoffs are positively correlated. Suppose that the uninformed player believes that the informed player votes for the risky option when they both obtain l and votes for the safe option when they both obtain h. Given these beliefs, the best-response for the uninformed player is vote for the safe option. $\square$

B Analysis of Parts 1 and 2 in the HH treatment

B.1 Part 1 - lottery questions

In Part 1, subjects faces a series of 9 rounds of an individual decision-making task. In each round subjects had the choice between two Options. Option A was a fixed amount (that varied from round to round). Option B was a lottery that paid $10 with 50% chance, and $20 with 50% chance. For each subject, the fixed amounts were drawn randomly without replacement from the following list $11, $12, ..., $18, $19. After Part 1 was over, subjects were informed that from that point onwards, they would be matched into pairs with another player in the room.

Table 7 shows the fraction of subjects choosing the lottery for each round. A large majority of subjects (88.4%) have a single switching point. That is, there is a fixed amount above which they always forgo the lottery and below which they always choose the lottery. Almost all subjects prefer the lottery over the fixed amount of $12, and almost all prefer $16 to the lottery.

Table 7: Part 1 choices.

Round[a]	Option A	Option B[b]	Fraction choosing the lottery	Switching point (assuming single SP)
1	11	Lottery	97.7%	0%
2	12	Lottery	94.2%	5.3%
3	13	Lottery	90.7%	4%
4	14	Lottery	62.8%	26.3%
5	15	Lottery	15.1%	51.3%
6	16	Lottery	4.7%	11.8%
7	17	Lottery	1.2%	1.3%
8	18	Lottery	2.3%	0%
9	19	Lottery	0%	0%

Fraction (number) of subjects with a single switch point: 88.4% (76)

[a]The order of rounds was randomly determined for each subject in each session, so was which option appeared on the left or right of the screen.

[b]In all rounds, the lottery paid $10 with 50% chance and $20 with 50% chance.

B.2 Part 2 - voting, no uncertainty

In Part 2, subjects play 6 rounds of a game in which each player in a pair has to vote for one of two options that determine outcomes for both players. Just as in the Main Game, Option A is implemented so long as it receives at least one vote, while Option B requires two votes to be implemented. Unlike in the Main Game, Option B here consists of a fixed and known allocation. Table 8 presents the parameters that subjects faced in each round as well as the fraction of subjects who chose Option B in each of those rounds. The order in which rounds were presented to the subjects was randomly determined and thus varied from subject to subject.

Table 8: Part 2 choices.

Round[a]	A (1 vote)	B (2 votes)	Fraction Choosing Option B
1	($12 ; $12)	($10 ; $20)	0.198
2	($12 ; $12)	($20 ; $10)	0.686
3	($16 ; $16)	($10 ; $20)	0.023
4	($16 ; $16)	($20 ; $10)	0.419
5	($12 ; $16)	($16 ; $12)	0.872
6	($16 ; $12)	($12 ; $16)	0.058

[a]The order of rounds was randomly determined for each subject in each session.

C Analysis of Part 1 in the HR treatment

Part 1 was identical in the HH and HR treatments. Table 9 shows the fraction of subjects choosing the lottery for each round. A large majority of subjects (93.9%) have a single switching point. That is, there is a fixed amount above which they always forgo the lottery and below which they always choose the lottery. Almost all subjects prefer the lottery over the fixed amount of $12, and almost all prefer $16 to the lottery. Of those with a single switching point, over 70% of subjects have a switching point of $15, and close to 90% have a switching point of $14 or more.

Table 9: Part 1 choices.

Round[a]	Option A	Option B[b]	Fraction choosing Option B (of all subjects)	Switching point (of subjects with a single SP)
1	11	Lottery	100%	0%
2	12	Lottery	97.6%	1.3%
3	13	Lottery	86.6%	9.1%
4	14	Lottery	70.7%	19.5%
5	15	Lottery	11.0%	59.7%
6	16	Lottery	2.4%	9.1%
7	17	Lottery	1.2%	1.3%
8	18	Lottery	1.2%	0%
9	19	Lottery	1.2%	0%

Fraction (number) of subjects with a single switch point: 93.9% (77)

[a]The order of rounds was randomly determined for each subject in each session, so was which option appeared on the left or right of the screen.

[b]In all rounds, the lottery paid $10 with 50% chance and $20 with 50% chance.

D   Part 5 statistics in the HH treatment

Part 5 in the HH treatment was a Dictator game, where a subject's choice determined her payoff and the payoff of her partner. The payoffs were symmetric under Option A and asymmetric under option B, and Table 10 shows the fraction of subjects choosing option B in each round.

Table 10: Fraction Choosing Option B in the Dictator Game in the HH treatment.

Round	Option A	Option B	Fraction Choosing Option B
1	($12; $12)	($10, $20) or ($20, $10)	72.1%
2	($12; $12)	($10, $10) or ($20, $20)	82.6%
3	($16; $16)	($10, $20) or ($20, $10)	0%
4	($16; $16)	($10, $10) or ($20, $20)	7.0%
5	($12; $12)	($10, $20)	14.0%
6	($12; $12)	($20, $10)	94.2%
7	($16; $16)	($10, $20)	0%
8	($16; $16)	($20, $10)	70.9%
9	($12; $16)	($16, $12)	98.8%

E   Deviations from Predictions of Proposition 1

Figure 2 shows the number of deviations from Proposition 1 that subjects in the role of the uninformed player make in Part 4 of the HH and HR treatments, as well as in Part 5 of the PF and FF treatments (after the feedback rounds). The data show that of those subjects who are not fully consistent with these theoretical predictions, subjects are more likely to have two deviations rather than one deviation. We also see treatment effects from removing strategic uncertainty (in the Human-Robot Treatment) and introducing full feedback (in the Feedback Treatment).
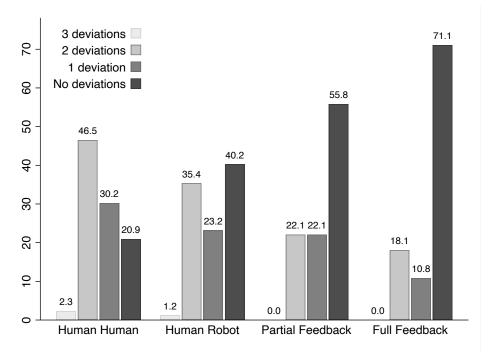
Figure 2: Distribution of the number of deviations from Proposition 1 by treatment.

F   Demographic Information

[Table 11](#) presents statistics on the demographic information that we collected from subjects via a questionnaire.

Table 11: Average demographic information.

	Human-Human Treatment	Human-Robot Treatment	Partial Feedback Treatment	Full Feedback Treatment
Female	55.8%	64.3%	64.0%	63.9%
Age	21.1	21.0	22.2	22.0
GPA	3.4	3.5	3.4	3.5
Number of Years at PSU	3.2	2.9	2.6	3.0
Number of subjects	86	82	86	83

A series of Fisher exact and Chi-squared tests (age, school/major at PSU), test of probability (female) and ranksum test (GPA) reject the hypotheses that subjects in the treatments come from different populations. We find that demographic details (sex, age, GPA, or other observables) have no significant effect on behavior. In all treatments, the most represented major/school was Business, with strong representation in the schools of

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Science, Engineering and Social Sciences. The fraction of subjects who are in those fields in each treatment represents 79.1%, 69.5%, 74.4%, and 79.5%, respectively.

G   Instructions

Here we present the instructions that subjects saw in the HH and HC treatments. We first show the instructions of the HH treatment (where subjects play against each-other), and then the instructions of the HR treatment (where subjects play against robot players). In each case, students completed choices for each part before obtaining instructions for the subsequent part.

G.1   First treatment: subjects face other subjects

INSTRUCTIONS

This study is in 5 Parts. Only one randomly chosen Part will count for payment. In addition to what you will earn in the study, you will be paid a $7 participation fee if you complete the study.

Importantly, all Rounds and Parts of this study are independent. In other words, nothing you do in any Round or Part of this study will have any impact on your opportunities or payment in any other Round or Part of this study. In addition, since only one randomly chosen Part will be chosen for payment, it is in your best interest to treat each Part as if it was the only one that mattered for payment.

We will now hand out the instructions for Part 1 of the study. We will give you the instructions for Part 2 of the study once you have completed Part 1, for Part 3 after you have completed Part 2, etc.

Part 1

In this Part of the Study you will make decisions over the course of 9 Rounds. In each Round, you will be asked to choose between two options that determine your payoff.

Below we list exact decision problems that you will all face.

The List of Rounds in Part 1

Decision Problem	Option 1		Option 2
1	Fixed amount of $11	Versus	Receiving $10 or $20 with equal chance of each.
2	Fixed amount of $12	Versus	Receiving $10 or $20 with equal chance of each.
3	Fixed amount of $13	Versus	Receiving $10 or $20 with equal chance of each.
4	Fixed amount of $14	Versus	Receiving $10 or $20 with equal chance of each.
5	Fixed amount of $15	Versus	Receiving $10 or $20 with equal chance of each.
6	Fixed amount of $16	Versus	Receiving $10 or $20 with equal chance of each.
7	Fixed amount of $17	Versus	Receiving $10 or $20 with equal chance of each.
8	Fixed amount of $18	Versus	Receiving $10 or $20 with equal chance of each.
9	Fixed amount of $19	Versus	Receiving $10 or $20 with equal chance of each.

These decision problems may appear in different order on your screen. In addition, for any given decision problem, which option appears on the left or the right of your screen may also differ from the examples above.

As you can see above, in each of the Rounds, one choice will be a fixed amount and the other will involve some uncertainty. The uncertainty can be described in the following

way. The computer flips a virtual coin that lands either on heads or tails, each with an equal 50% chance. The outcome of the virtual coin flip determines your payment if you chose the uncertain option.

- if the coin lands on tails (which happens with 50% chance) you will receive $10.

- if the coin lands on heads (which happens with 50% chance) you will receive $20.

Payment: If this Part is randomly selected to count for payment in this Study, one of the 9 Rounds will be chosen to count for payment. Your earnings would be determined in the following way:

- if you chose the fixed amount, then you will earn that fixed amount;

- if you chose the option with uncertainty, your earnings depend on the result of the virtual coin flip: you receive $10 if the coin lands on tails, and you receive $20 if the coin lands on heads.

Parts 2, 3 and 4 – Preamble

Each of Parts 2, 3 and 4 consist of 2 Blocks. In each of those Parts, Block 1 consists of a series of questions that test your understanding of the instructions that are relevant to the Part you are in. In each of those Parts, Block 2 consists of several Rounds of the game itself.

In Block 2, in each Round of Parts 2, 3 and 4, you will each be randomly matched into pairs. In each Round you and the person you are matched with will be asked to vote for one of two options that determine payoffs for both you and the person you are matched with. In each Part, who you are matched with will be randomly determined at the start of each Round and nothing you do or anyone else does can influence or impact how this matching occurs. At no point will you find out with whom you were matched, nor will your actions be revealed to anyone else nor will you find out the actions of the person with whom you were matched.

If Part 2 or Part 3 or Part 4 is randomly chosen to count for payment, then you will be paid for Block 1 or Block 2 of that Part.

If Block 1 of a Part is chosen for payment, then if you answered all the questions correctly, you will earn $10. If you make even one mistake, you will earn $2.

If Block 2 of a Part is chosen for payment, one of the Rounds in Block 2 will be randomly selected to determine your payment.

Part 2

Part 2 is in six Rounds. As described in the preamble, in each Round you will be randomly rematched with another person in this room. In each Round you and the person you are matched with will be asked to vote for one of two options that determine payoffs for both you and the voter you are matched with. Here is an example of such a choice you can encounter in one of the Rounds (the choices you face may be different and will vary from Round to Round). Please take a moment to look at this table.

Votes needed: 1	**Votes needed: 2**
Your earnings: $5	Your earnings: $5
Other voter's earnings: $10	Other voter's earnings: $5
vote for this option	vote for this option

Just as in the example above, each option will differ in terms of the amounts that you and/or the voter you are matched with can earn. The options also differ in how many votes are needed for that option to be the one that is selected for this Round. In each Round, one of the two options will require that both you and the voter you are matched with vote for it in order for it to be selected for this Round. The other option is selected for this Round so long as it receives at least one vote. Which option requires two votes and which option only requires at least one vote will be clearly stated before you and the voter you are matched with make your decisions.

In the example above, for the option on the right to be selected for this Round, both you and the voter you are matched with have to vote for it. On the other hand, for the option on the left to be selected for this Round, only one voter has to vote for it. In other words, if you vote for the option on the left, then it is selected for this Round regardless of what option the voter you are matched with votes for. Similarly, if the voter you are matched with votes for the option on the left it is selected for this Round regardless of which option you vote for.

Note that the option that requires one vote will always be on the left and the option that requires two votes will always be on the right hand side.

Payment: If this Part is randomly chosen to count for payment, then one Round will be randomly chosen to count for payment. In the example above, if the option on the left is selected for this Round, then you would receive $5 and the voter you are matched with would receive $10. If the option on the right is selected for this Round, then you would receive $5 and the voter you are matched with would receive $5. Which of the two options is selected for this Round will depend on what happens during the Round.

Also note that you will go through the Rounds of Part 2 without knowing what the voter you are matched with has chosen.

Do you have any questions?

We will now begin Block 1 in which you will be asked questions that test your understanding of this game. If Block 1 of Part 2 is randomly chosen to count for payment, then you earn $10 if you answer ALL the questions correctly. If you make even one mistake you will earn only $2.

After Block 1 is over, you will play the 6 Rounds of the Part 2 game.

Part 3

Part 3 is in four Rounds. As described in the preamble, in each Round you will be randomly rematched with another person in this room. In each Round you and the person you are matched with will be asked to vote for one of two options that determine payoffs for both you and the voter you are matched with. The game in Part 3 of this study is very similar to the game you played in Part 2. The difference lies in the kinds of options you face. In this part of the study, one of the options involves uncertainty. An example of a choice with an uncertain outcome is shown below. Please take a moment to look at the table below before I describe it.

Votes needed: 1	**Votes needed: 2**
Your earnings: $11	HEADS: Your earnings: $5
	Other voter's earnings: $15
Other voter's earnings: $9	TAILS: Your earnings: $15
	Other voter's earnings: $5
vote for this option	vote for this option

In this particular example, there is no uncertainty regarding the option on the left (the one requiring only 1 vote): if this option is the one that is selected for this Round, you would receive $11 and the voter you are matched with would receive $9. However, there is uncertainty regarding the option on the right (the one requiring two votes).

The uncertainty can be described in the following way. The computer throws a fair virtual coin that lands either heads or tails, each with an equal 50% chance. If it lands on heads, then the option on the right is: $5 for you and $15 for the voter you are matched with. If, on the other hand, it lands on tails, the option on the right is: $15 for you and $5 for the voter you are matched with. In other words, there is uncertainty in terms of which of the payoff pairs correspond to the option on the right: you do not know whether the payoff pair will be $5 for you and $15 for the voter you are matched with, or whether it will be $15 for you and $5 for the voter you are matched with. All you know is that the outcomes in the "uncertain" options are equally likely, each having 50% chance. In each Round the computer will flip that virtual coin before you and the voter you are matched

with make your choices, but what side the coin landed on and which payoff pair that corresponds to will not be revealed to anyone.
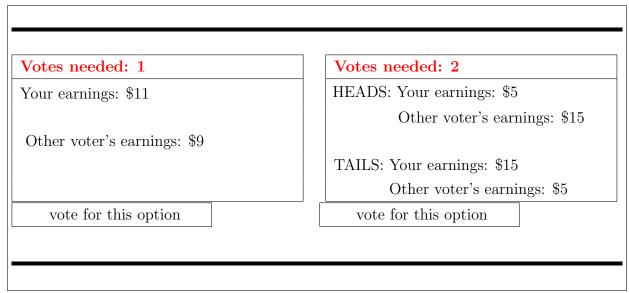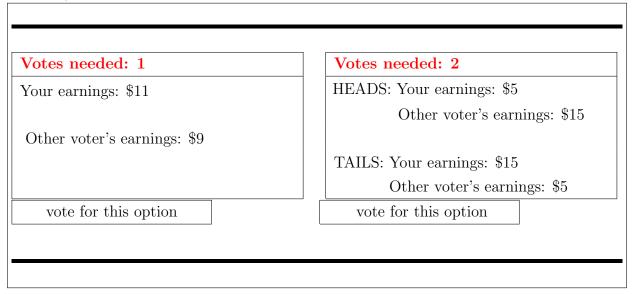
Do you have any questions?

We will now begin Block 1 in which you will be asked questions that test your understanding of this game. If Block 1 of Part 3 is randomly chosen to count for payment, then you earn $10 if you answer ALL the questions correctly. If you make even one mistake you will earn only $2.

After Block 1 is over, you will play the 4 Rounds of the Part 3 game.

Part 4

Part 4 is in eight Rounds. As described in the preamble, in each Round you will be randomly rematched with another person in this room. In each Round you and the person you are matched with will be asked to vote for one of two options that determine payoffs for both you and the voter you are matched with. The game in Part 4 of this study is very similar to the game you played in Part 3. The difference lies in that you OR the voter you are matched with will learn what the outcome of the virtual coin flip is before either of you vote. In other words, either you OR the voter with whom you are matched will observe whether the coin lands on heads or tails **before you have to cast a vote.** Recall the example of the previous Part in which the option requiring two votes (the one on the right) had uncertainty in terms of outcomes:

Votes needed: 1	**Votes needed: 2**
Your earnings: $11	HEADS: Your earnings: $5
	Other voter's earnings: $15
Other voter's earnings: $9	
	TAILS: Your earnings: $15
	Other voter's earnings: $5
vote for this option	vote for this option

Using the example above, this means that one voter in each pair will know whether the option requiring two votes leads to $5 for you and $15 for the other voter, or whether that option leads to $15 for you and $5 for the other voter.

If you are the one who learns the result of the coin flip, it means the voter you are matched with has not learned the result of the coin flip. That means before you and the other voter vote, you know exactly what happens if the option on the right is selected for this round, but the voter you are matched with does not have this information. If, on the other hand, you don't learn the result of the coin flip, it means that the voter you are matched with does know the result of the coin flip. That means before you and the other voter vote, the voter you are matched with knows exactly what happens if the option on the right is selected for this Round, but you do not have this information.

On the screen for each Round, you will know whether it is you or the voter you are

matched with who has learned the result of the coin flip.

If you are the one who learns the result of the coin flip, your screen will display the relevant payoffs in black and the other payoff will be crossed out and in a lighter color. Below is an example of a Round in which you are the one who learned the result of the coin flip. In this example, you learned that the coin landed on Heads. As you can see, the payoff for Tails has been crossed out. Please take a moment to look at this example.

Votes needed: 1

Your earnings: $11

Other voter's earnings: $9

vote for this option

Votes needed: 2

HEADS: Your earnings: $5

Other voter's earnings: $15

TAILS: Your earnings: $15

Other voter's earnings: $5

vote for this option

If you do not know the result of the coin flip, your screen will not have anything crossed-out. Instead, you will face a screen like the one below, where you are reminded that the voter you are matched with has learned the result of the coin flip. Your screen would look like the following:

Recall that the other voter has learned the result of the coin flip.

Votes needed: 1	Votes needed: 2
Your earnings: $11	HEADS: Your earnings: $5
	Other voter's earnings: $15
Other voter's earnings: $9	
	TAILS: Your earnings: $15
	Other voter's earnings: $5
vote for this option	vote for this option

Do you have any questions?

We will now begin Block 1 in which you will be asked questions that test your understanding of this game. If Block 1 of Part 4 is randomly chosen to count for payment, then you earn $10 if you answer ALL the questions correctly. If you make even one mistake you will earn only $2.

After Block 1 is over, you will play the 8 Rounds of the Part 4 game.

Part 5 Preamble

In this final Part of the study you will be assigned a Type. You will be a Type A Player or a Type B Player. Your Type will remained fixed throughout this last Part.

Each Type A Player will be randomly rematched with a Type B Player. You will not know who you are matched with. In this final Part of today's study, only Type A players make decisions that matter for payment, and these decisions affect the payoff of both the Type A Player and the Type B Player he/she is matched with.

Even though your Type will remain fixed for the rest of this study, you will not know which Type of Player you are. Since you do not know which Type of Player you are assigned to be, and since only Type A Players make decisions that matter for payment, we will ask everyone to make decisions as if they were Type A players.

Please note that your Type will remain fixed and at no point will you change roles. Your "true" Types have already been determined by the computer, and your decisions when acting as Player A CANNOT affect you or anyone else in this room if your "true" Type turns out to be Type B. In other words, if it turns out you are a Type B Player, no decision you make here can affect anyone's payoff, including your own. If it turns out your "true" Type is A, there is nothing that anyone else can do that will affect your payoff, and your decisions affect both your payoff and the payoff of the Type B Player you are matched with. Therefore, when making decisions, you should act as Player A. Further, since only "true" Type A Players make decisions that matter for payment in this study, in the remainder of the instructions we will assume you are a Type A Player.

Part 5

In this Part of the study, you will make decisions over the course of 9 Rounds.

In each Round you will have the choice between two options that determine earnings for you and the Type B player you are matched with. These choices will look like the following:

Your earnings: $6 Type B player's earnings: $12	Your earnings: $11 Type B player's earnings: $9

Here are how your payments would be determined if this were the Round that mattered for payment:

- If you chose the option on the left, then you would earn $6 and the Type B player you are matched with would earn $12.

- If instead you chose the option on the right, then you would earn $11 and the Type B player you are matched with would earn $9.

In each Round, you are the one whose decision will matter. That is, it is your choice of option that will be selected for each Round.

Remember that you will not change roles. So as a Type A Player, your payoff will never be determined by someone else in this room. Also remember that only one Part of the study will be chosen to count for payment. If this Part is chosen to count, only *one* Round will matter for payment. So it is in your best interest to treat each Round as if it were the one that mattered for payment.

Do you have any questions?

G.2 HR treatment: subjects face robot players

<div align="center">INSTRUCTIONS</div>

This study is in 5 Parts. Only one randomly chosen Part will count for payment. In addition to what you will earn in the study, you will be paid a $7 participation fee if you complete the study.

Importantly, all Rounds and Parts of this study are independent. In other words, nothing you do in any Round or Part of this study will have any impact on your opportunities or payment in any other Round or Part of this study. In addition, since only one randomly chosen Part will be chosen for payment, it is in your best interest to treat each Part as if it was the only one that mattered for payment.

We will now hand out the instructions for Part 1 of the study. We will give you the instructions for Part 2 of the study once you have completed Part 1, for Part 3 after you have completed Part 2, etc.

Part 1

In this Part of the Study you will make decisions over the course of 9 Rounds. In each Round, you will be asked to choose between two options that determine your payoff.

Below we list exact decision problems that you will all face.

The List of Rounds in Part 1

Decision Problem	Option 1		Option 2
1	Fixed amount of $11	Versus	Receiving $10 or $20 with equal chance of each.
2	Fixed amount of $12	Versus	Receiving $10 or $20 with equal chance of each.
3	Fixed amount of $13	Versus	Receiving $10 or $20 with equal chance of each.
4	Fixed amount of $14	Versus	Receiving $10 or $20 with equal chance of each.
5	Fixed amount of $15	Versus	Receiving $10 or $20 with equal chance of each.
6	Fixed amount of $16	Versus	Receiving $10 or $20 with equal chance of each.
7	Fixed amount of $17	Versus	Receiving $10 or $20 with equal chance of each.
8	Fixed amount of $18	Versus	Receiving $10 or $20 with equal chance of each.
9	Fixed amount of $19	Versus	Receiving $10 or $20 with equal chance of each.

These decision problems may appear in different order on your screen. In addition, for any given decision problem, which option appears on the left or the right of your screen may also differ from the examples above.

As you can see above, in each of the Rounds, one choice will be a fixed amount and the other will involve some uncertainty. The uncertainty can be described in the following

way. A virtual coin is flipped, that lands either on heads or tails, each with an equal 50% chance. The outcome of the virtual coin flip determines your payment if you chose the uncertain option.

- if the coin lands on tails (which happens with 50% chance) you will receive $10.

- if the coin lands on heads (which happens with 50% chance) you will receive $20.

Payment: If this Part is randomly selected to count for payment in this Study, one of the 9 Rounds will be chosen to count for payment. Your earnings would be determined in the following way:

- if you chose the fixed amount, then you will earn that fixed amount;

- if you chose the option with uncertainty, your earnings depend on the result of the virtual coin flip: you receive $10 if the coin lands on tails, and you receive $20 if the coin lands on heads.

Parts 2, 3 and 4 – Preamble

Each of Parts 2, 3 and 4 consist of 2 Blocks. In each of those Parts, Block 1 consists of a series of questions that test your understanding of the instructions that are relevant to the Part you are in. In each of those Parts, Block 2 consists of several Rounds of the game itself.

In Block 2, in each Round of Parts 2, 3 and 4, you will each be matched with a computer player. In each Round you and the computer player you are matched with will vote for one of two options that determine your payoff. How the computer player has been programmed to vote will be described to you in each Part before you cast your vote. How the computer player has been programmed to vote will vary from Part to Part.

If Part 2 or Part 3 or Part 4 is randomly chosen to count for payment, then you will be paid for Block 1 or Block 2 of that Part.

If Block 1 of a Part is chosen for payment, then if you answered all the questions correctly, you will earn $10. If you make even one mistake, you will earn $2.

If Block 2 of a Part is chosen for payment, one of the Rounds in Block 2 will be randomly selected to determine your payment.

Part 2

Part 2 is in six Rounds. As described in the preamble, in each Round you will be matched with a computer player. In each Round you will be asked to vote for one of two options that determine how much you will earn. It will also determine how many virtual (imaginary) dollars the computer will earn.

Note that how many virtual (imaginary) dollars the computer player earns will have no impact on you or anyone else at any point, ever. We will describe how the computer player is programmed to cast its vote in this Part of the Study, only after describing the kinds of choices you will face.

We will describe the kinds of choices you will face by using an example. Below is an example of a choice you can encounter in one of the Rounds (the choices you face may be different and will vary from Round to Round). Please take a moment to look at this table.

Votes needed: 1	**Votes needed: 2**
Your earnings: $5 Computer player: $10 virtual (imaginary) dollars	Your earnings: $6 Computer player: $5 virtual (imaginary) dollars
vote for this option	vote for this option

Just as in the example above, each option will differ in terms of the amount that you and/or the computer player can earn. The options also differ in how many votes are needed for that option to be the one that is selected for this Round. In each Round, one of the two options will require that both you and the computer player you are matched with vote for it in order for it to be selected for this Round. The other option is selected for this Round so long as it receives at least one vote. Which option requires two votes and which option only requires at least one vote will be clearly stated before you make your decisions.

In the example above, for the option on the right to be selected for this Round, both you and the computer player you are matched with have to vote for it. On the other hand, for the option on the left to be selected for this Round, only one voter has to vote for it. In other words, if you vote for the option on the left, then it is selected for this Round

regardless of what option the computer player you are matched with votes for. Similarly, if the computer player you are matched with votes for the option on the left it is selected for this Round regardless of which option you vote for.

Note that the option that requires one vote will always be on the left and the option that requires two votes will always be on the right hand side.

Payment: If this Part is randomly chosen to count for payment, then one Round will be randomly chosen to count for payment. In the example above, if the option on the right is selected for this Round, then you would receive $6 and the computer player would receive 5 virtual (imaginary) dollars. If the option on the left is selected for this Round, then you would receive $5 and the computer player would receive 10 virtual (imaginary) dollars. Which of the two options is selected for this Round will depend on what happens during the Round.

Recall that the virtual (imaginary) dollars the computer player earns will have no impact on you or anyone else at any point, ever.

Before telling you how the computer player has been programmed to vote, we will ask you 6 questions that test your understanding of these instructions. After you have answered these 6 questions, we will tell you how the computer player has been programmed to vote in Part 2 and then ask you one additional understanding question.

Do you have any questions?

We will now begin Block 1 in which you will be asked questions that test your understanding of this game. If Block 1 of Part 2 is randomly chosen to count for payment, then you earn $10 if you answer ALL the questions correctly. If you make even one mistake you will earn only $2.

[*Note: subjects received what follows after the Part 2 Block 1 questions.*]

In Part 2 the computer player has been programmed to **ALWAYS choose the option that gives it the highest number of virtual (imaginary) dollars.** That is, the computer player will look at which option gives it the highest number of virtual (imaginary) dollars, and will vote for that one.

Additional understanding question:

1. Which option will the computer player vote for? [the one that requires 1 vote only; the one that requires 2 votes; it will randomly choose which option to vote for, each option having an equal chance; it will vote for the option that gives it the highest amount of virtual (imaginary) dollars.]

Part 3

Part 3 is in four Rounds. As described in the preamble, in each Round you will be matched with a computer player. In each Round you will be asked to vote for one of two options that determine how much you will earn. It will also determine how many virtual (imaginary) dollars the computer will earn. Note that how many virtual (imaginary) dollars the computer player earns will have no impact on you or anyone else at any point, ever.

In this Part of the Study, the way the computer player has been programmed to vote is different than in Part 2. Before we describe how the computer player is programmed to cast its vote in this Part of the study, we'll start by showing you an example of what you might see in a Round.

The game in Part 3 of this study is very similar to the game you played in Part 2. The difference lies in the kinds of options you face. In this part of the study, one of the options involves uncertainty. An example of a choice with an uncertain outcome is shown below. Please take a moment to look at the table below before I describe it.

Votes needed: 1	**Votes needed: 2**
Your earnings: $11	HEADS: Your earnings: $5
	Computer player: $15 virtual (imaginary) dollars
Computer player: $9 virtual (imaginary) dollars	TAILS: Your earnings: $15
	Computer player: $5 virtual (imaginary) dollars
vote for this option	vote for this option

In this particular example, there is no uncertainty regarding the option on the left (the one requiring only 1 vote): if this option is the one that is selected for this Round, you would receive $11 and the computer player you are matched with would receive $9 virtual (imaginary) dollars. However, there is uncertainty regarding the option on the right (the one requiring two votes).

The uncertainty can be described in the following way. As before, a coin is flipped and lands either heads or tails, each with an equal 50% chance. If it lands on heads, then the option on the right is: $5 for you and $15 virtual (imaginary) dollars for the computer player you are matched with. If, on the other hand, it lands on tails, the option on the right is: $15 for you and $5 virtual (imaginary) dollars for the computer player you are matched with. In other words, there is uncertainty in terms of which of the payoff pairs correspond to the option on the right: you do not know whether the payoff pair will be $5 for you and $15 virtual (imaginary) dollars for the computer player you are matched with, or whether it will be $15 for you and $5 virtual (imaginary) dollars for the computer player you are matched with. All you know is that the outcomes in the "uncertain" options are equally likely, each having 50% chance. In each Round the coin will be flipped before you and the computer player you are matched with make your choices, but what side the coin landed on and which payoff pair that corresponds to will not be revealed to anyone.

Recall that the virtual (imaginary) dollars the computer player earns will have no impact on you or anyone else at any point, ever.

Do you have any questions?

Before telling you how the computer player has been programmed to vote, we will ask you 4 questions that test your understanding of these instructions. After you have answered these 4 questions, we will tell you how the computer player has been programmed to vote in Part 3, and then ask you one additional understanding question.

We will now begin Block 1 in which you will be asked questions that test your understanding of this game. If Block 1 of Part 3 is randomly chosen to count for payment, then you earn $10 if you answer ALL the questions correctly. If you make even one mistake you will earn only $2.

After Block 1 is over, you will play the 4 Rounds of the Part 3 game.

[*Note: subjects received what follows after the Part 3 Block 1 questions.*]

In Part 3 the computer player has been programmed to **ALWAYS choose the option on the right**. That is, it will vote for the option on the right (the one requiring 2 votes) no matter what.

Part 4

Part 4 is in four Rounds. As described in the preamble, in each Round you will be matched with a computer player. In each Round you will be asked to vote for one of two options that determine how much you will earn. It will also determine how many virtual (imaginary) dollars the computer will earn. Note that how many virtual (imaginary) dollars the computer player earns will have no impact on you or anyone else at any point, ever.

The game in Part 4 of this study is very similar to the game you played in Part 3 except for two things:

1. The first difference lies in that the computer player you are matched with will learn what the outcome of the coin flip is before it votes. You, however, will not know what the outcome of the coin flip is and will have to cast your vote without knowing the outcome of the coin flip.

2. The second is that the computer player has been programmed to vote for the option that gives it the highest number of virtual (imaginary) dollars. That is, after learning the outcome of the coin flip, it will look at which option gives it the highest amount of virtual (imaginary) dollars and vote for that one.

The kind of screen you face will look very similar to the kind of screen you faced in Part 3, except that you will be reminded that the virtual player knows the outcome of the coin flip AND always votes for the option that gives it the highest amount of virtual (imaginary) dollars:

**Recall that the computer player has learned the result of the coin flip
and always votes for the option that gives it the
highest amount of virtual (imaginary) dollars.**

Votes needed: 1

Your earnings: $11

Computer player: $9 virtual (imaginary) dollars

vote for this option

Votes needed: 2

HEADS: Your earnings: $5
         Computer player: $15 virtual (imaginary) dollars

TAILS: Your earnings: $15
         Computer player: $5 virtual (imaginary) dollars

vote for this option

Recall that the virtual (imaginary) dollars the computer player earns will have no impact on you or anyone else at any point, ever.

Do you have any questions?

We will now begin Block 1 in which you will be asked questions that test your understanding of this game. If Block 1 of Part 4 is randomly chosen to count for payment, then you earn $10 if you answer ALL the questions correctly. If you make even one mistake, you will earn only $2.

After Block 1 is over, you will play the four Rounds of the Part 4 game.

Part 5

Part 5 also consists of two Blocks. In Part 5, Block 1 consists of 4 questions about the game you just played in Part 4. These questions will appear on a series of separate screens. If Block 1 of Part 5 is chosen for payment, you will be paid $10 if you answer all these questions correctly. If you make even one mistake, you will only earn $2.

Recall that in Part 4, in each Round, the computer player learned the outcome of the coin flip before it voted, and then always voted for the option that gave it the highest amount of virtual (imaginary) dollars.

After Block 1 is over, we will hand out instructions for Block 2.
[*Note: subjects received what follows after the Part 5 Block 1 questions.*]

Block 2:

You now are going to play 4 additional Rounds, just like the ones you played in Part 4. Recall that in those Rounds, the computer player you are matched with ALWAYS knows the result of the coin flip before it votes, and then ALWAYS votes for the option that will give it the highest number of of virtual (imaginary) dollars.

G.3 Full Feedback treatment: subjects face robot players and receive partial feedback in Part 4 over 20 rounds

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The instructions are identical to the HR treatment except for what happens in Part 4. Below we present the Part 4 instructions for this treatment.

Part 4

Part 4 is in 20 Rounds. As described in the preamble, in each Round you will be matched with a computer player. In each Round you will be asked to vote for one of two options that determine how much you will earn. It will also determine how many virtual (imaginary) dollars the computer will earn.

Note that how many virtual (imaginary) dollars the computer player earns will have no impact on you or anyone else at any point, ever.

The game in Part 4 of this study is very similar to the game you played in Part 3 except for three things:

1. The first difference lies in that the computer player you are matched with will learn what the outcome of the coin flip is before it votes. You, however, will not know what the outcome of the coin flip is and will have to cast your vote without knowing the outcome of the coin flip.

2. The second is that the computer player has been programmed to vote for the option that gives it the highest number of virtual (imaginary) dollars. That is, after learning the outcome of the coin flip, it will look at which option gives it the highest amount of virtual (imaginary) dollars and vote for that one.

3. The third is that in each round, <u>after you have cast your vote</u>, you will receive information on what the outcome of the virtual coin flip was, and you will be told which option the computer player voted for. In addition, you will be told which option was selected for each round and you will be told how much you would earn if that were the round randomly chosen for payment.

The kind of screen you face will look very similar to the kind of screen you faced in Part 3, except that you will be reminded that the virtual player knows the outcome of the coin flip AND always votes for the option that gives it the highest amount of virtual (imaginary) dollars:

Recall that the computer player has learned the result of the coin flip and <u>always</u> votes for the option that gives it the <u>highest amount of virtual (imaginary) dollars.</u>

Votes needed: 1	**Votes needed: 2**

Your earnings: $11
 	
 Computer player: $9 virtual (imaginary) dollars
	HEADS: Your earnings: $5
	        Computer player: $15 virtual (imaginary) dollars
	
	 TAILS: Your earnings: $15
	        Computer player: $5 virtual (imaginary) dollars

vote for this option	vote for this option

Recall that the virtual (imaginary) dollars the computer player earns will have no impact on you or anyone else at any point, ever. So, the only thing that determines your earnings in this study are the number of dollars you earn in the option that is selected for a Round.

Do you have any questions?

We will now begin Block 1 in which you will be asked questions that test your understanding of this game. If Block 1 of Part 4 is randomly chosen to count for payment, then you earn $10 if you answer ALL the questions correctly. If you make even one mistake, you will earn only $2.

After Block 1 is over, you will play the 20 Rounds of the Part 4 game.

G.3.1   Screen Shot - Example of Feedback Screen

Figure 3: Full Feedback Example.

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G.4 Partial Feedback treatment: subjects face robot players and receive partial feedback in Part 4 over 20 rounds

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The instructions are identical to the HR treatment except for what happens in Part 4. Below we present the Part 4 instructions for this treatment.

Part 4

Part 4 is in 20 Rounds. As described in the preamble, in each Round you will be matched with a computer player. In each Round you will be asked to vote for one of two options that determine how much you will earn. It will also determine how many virtual (imaginary) dollars the computer will earn.

Note that how many virtual (imaginary) dollars the computer player earns will have no impact on you or anyone else at any point, ever.

The game in Part 4 of this study is very similar to the game you played in Part 3 except for three things:

1. The first difference lies in that the computer player you are matched with will learn what the outcome of the coin flip is before it votes. You, however, will not know what the outcome of the coin flip is and will have to cast your vote without knowing the outcome of the coin flip.

2. The second is that the computer player has been programmed to vote for the option that gives it the highest number of virtual (imaginary) dollars. That is, after learning the outcome of the coin flip, it will look at which option gives it the highest amount of virtual (imaginary) dollars and vote for that one.

3. The third is that in each round, after you have cast your vote, you will be told how much you would earn if that were the round randomly chosen for payment.

The kind of screen you face will look very similar to the kind of screen you faced in Part 3, except that you will be reminded that the virtual player knows the outcome of the coin flip AND always votes for the option that gives it the highest amount of virtual (imaginary) dollars:

Recall that the computer player has learned the result of the coin flip and <u>always</u> votes for the option that gives it the <u>highest</u> amount of virtual (imaginary) dollars.

Votes needed: 1

Your earnings: $11

Computer player: $9 virtual (imaginary) dollars

| vote for this option |

Votes needed: 2

HEADS: Your earnings: $5
        Computer player: $15 virtual (imaginary) dollars

TAILS: Your earnings: $15
        Computer player: $5 virtual (imaginary) dollars

| vote for this option |

Recall that the virtual (imaginary) dollars the computer player earns will have no impact on you or anyone else at any point, ever. So, the only thing that determines your earnings in this study are the number of dollars you earn in the option that is selected for a Round.

Do you have any questions?

We will now begin Block 1 in which you will be asked questions that test your understanding of this game. If Block 1 of Part 4 is randomly chosen to count for payment, then you earn $10 if you answer ALL the questions correctly. If you make even one mistake, you will earn only $2.

After Block 1 is over, you will play the 20 Rounds of the Part 4 game.

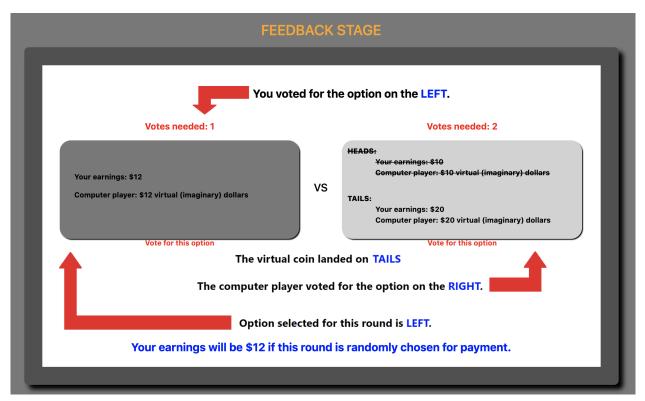### G.4.1   Screen Shot - Example of Feedback Screen

Figure 4: Partial Feedback Example.

G.5   Understanding Questions

Below we present screen shots for each of our understanding questions.

G.5.1   Treatment 1: subjects play against each other

Suppose this is what you see on your screen in one of the Rounds:

Votes needed: 1

Your earnings: $15

Other voter's earnings: $12

VS

Votes needed: 2

Your earnings: $22

Other voter's earnings: $10

Vote for this option   Vote for this option

Question 1: If you vote for the option on the left and the other voter votes for the option on the right, which option is selected for this Round?

○ The one that requires 1 vote only
○ The one that requires 2 votes
○ It is randomly selected

Question 2: If you vote for the option on the left and the other voter votes for the option on the left, which option is selected for this Round?

○ The one that requires 1 vote only
○ The one that requires 2 votes
○ It is randomly selected

Question 3: If you vote for the option on the right and the other voter votes for the option on the right, which option is selected for this Round?

○ The one that requires 1 vote only
○ The one that requires 2 votes
○ It is randomly selected

Question 4: If you vote for the option on the right and the other voter votes for the option on the left, which option is selected for this Round?

○ The one that requires 1 vote only
○ The one that requires 2 votes
○ It is randomly selected

Question 5: If you vote for the option on the right, which option is selected for this Round?

○ The one that requires 1 vote only
○ The one that requires 2 votes
○ It depends on the other player's vote

Question 6: If you vote for the option on the left, which option is selected for this Round?

○ The one that requires 1 vote only
○ The one that requires 2 votes
○ It depends on the other player's vote

Figure 5: Part 2 Understanding questions.

Part 3 Block 1

Suppose this is what you see on your screen in one of the Rounds:

Votes needed: 1

Votes needed: 2

Your earnings: $10

Other voter's earnings: $15

VS

HEADS:

Your earnings: $5

Other voter's earnings: $15

TAILS:

Your earnings: $15

Other voter's earnings: $5

Vote for this option

Vote for this option

Question 1: Suppose the option on the right is selected for this Round. What are the chances that you earn $15?

- ○ No chance
- ○ 100% chance
- ○ 50% chance

Question 2: Suppose the option on the right is selected for this Round. What are the chances that both you and the other voter earn $15?

- ○ No chance
- ○ 100% chance
- ○ 50% chance

Question 3: If you vote for the option on the left and the other voter votes for the option on the right, what will your earnings be?

- ○ $5
- ○ $10
- ○ $15
- ○ It depends on the coin toss

Question 4: If you vote for the option on the right and the other voter votes for the option on the left, what will the other person's earnings be?

- ○ $5
- ○ $10
- ○ $15
- ○ It depends on the coin toss

Figure 6: Part 3 Understanding questions.

Part 4 Block 1

Suppose this is what you see on your screen in one of the Rounds:

Votes needed: 1

Your earnings: $15

Other voter's earnings: $5

VS

Votes needed: 2

HEADS:

Your earnings: $5

Other voter's earnings: $20

TAILS:

Your earnings: $20

Other voter's earnings: $5

Vote for this option   **Vote for this option**

Question 1: In a given Round, how many voters learn the result of the coin flip?

○ 1 voter

○ Both voters

○ Neither voter

○ How many voters receive information is randomly determined

Question 2: In the example above, you have learned that the coin flip landed on HEADS. At what point did you learn this?

○ Before you vote

○ After you vote

Question 3: In the example above, you have learned that the coin flip landed on HEADS. What does the other voter know about the coin flip?

○ That it has landed on Heads

○ That it has landed on Tails

○ The other voter is not told the result of the coin flip but knows that you know the result of the coin flip

Question 4: In the example above, you have learned that the coin flip landed on HEADS. If the option requiring two votes is selected for this Round, how much will the other voter earn?

○ $5

○ $20

○ Equal chances of $5 and $20 but you can't say which one
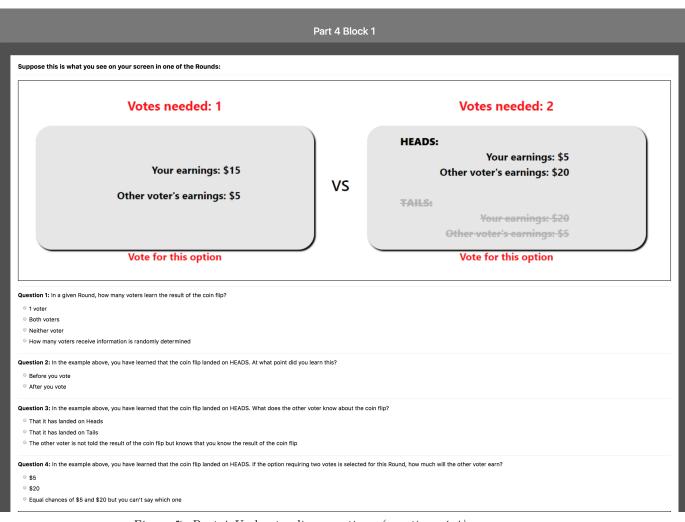
Figure 7: Part 4 Understanding questions (questions 1-4).
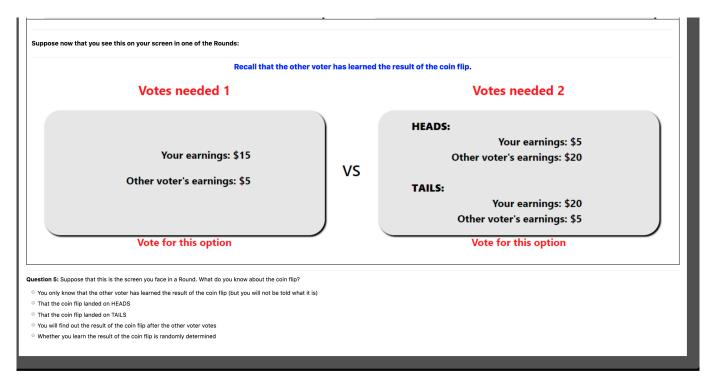
Figure 8: Part 4 Understanding questions (question 5).

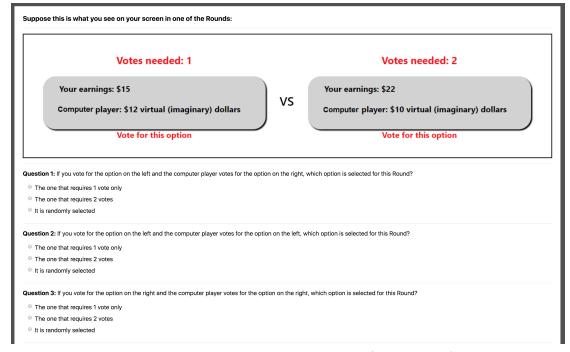## G.5.2   Treatment 2: subjects play against a computerized robot player

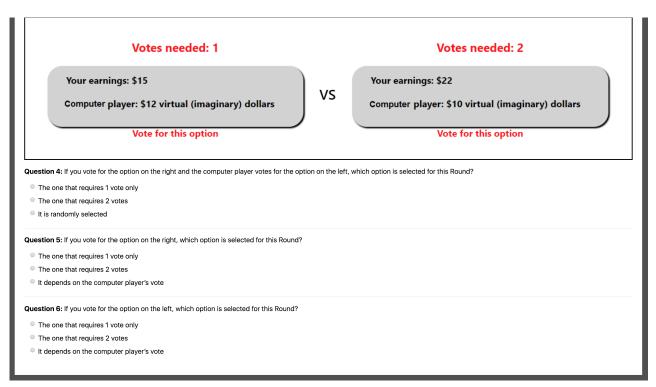*Figure 9: Part 2 Understanding questions (questions 1-3).*

Votes needed: 1

Your earnings: $15

Computer player: $12 virtual (imaginary) dollars

Vote for this option

VS

Votes needed: 2

Your earnings: $22

Computer player: $10 virtual (imaginary) dollars

Vote for this option

Question 4: If you vote for the option on the right and the computer player votes for the option on the left, which option is selected for this Round?

- ○ The one that requires 1 vote only
- ○ The one that requires 2 votes
- ○ It is randomly selected

Question 5: If you vote for the option on the right, which option is selected for this Round?

- ○ The one that requires 1 vote only
- ○ The one that requires 2 votes
- ○ It depends on the computer player's vote

Question 6: If you vote for the option on the left, which option is selected for this Round?

- ○ The one that requires 1 vote only
- ○ The one that requires 2 votes
- ○ It depends on the computer player's vote

Figure 10: Part 2 Understanding question (questions 4-6).

Suppose this is what you see on your screen in one of the Rounds:

Votes needed: 1

Your earnings: $15

Computer player: $12 virtual (imaginary) dollars

Vote for this option

VS

Votes needed: 2

Your earnings: $22

Computer player: $10 virtual (imaginary) dollars

Vote for this option

Question 1: Which option will the computer player vote for?

- ○ The one that requires 1 vote only
- ○ The one that requires 2 votes
- ○ It will randomly choose which option to vote for, each option having an equal chance

Figure 11: Part 2 Understanding question (question 7).

Suppose this is what you see on your screen in one of the Rounds:

Votes needed: 1

Your earnings: $10

Computer player: $15 virtual (imaginary) dollars

VS

Votes needed: 2

HEADS:
Your earnings: $5
Computer player: $15 virtual (imaginary) dollars

TAILS:
Your earnings: $15
Computer player: $5 virtual (imaginary) dollars

Vote for this option   Vote for this option

Question 1: Suppose the option on the right is selected for this Round. What are the chances that you earn $15?

○ No chance
○ 100% chance
○ 50% chance

Question 2: Suppose the option on the right is selected for this Round. What are the chances that both you and the computer player earn $15?

○ No chance
○ 100% chance
○ 50% chance

Figure 12: Part 3 Understanding questions (questions 1-2).

Votes needed: 1

Your earnings: $10

Computer player: $15 virtual (imaginary) dollars

VS

Votes needed: 2

HEADS:
Your earnings: $5
Computer player: $15 virtual (imaginary) dollars

TAILS:
Your earnings: $15
Computer player: $5 virtual (imaginary) dollars

Vote for this option   Vote for this option

Question 3: If you vote for the option on the left and the computer player votes for the option on the right, what will your earnings be?

○ $5
○ $10
○ $15
○ It depends on the coin toss

Question 4: If you vote for the option on the right and the computer player votes for the option on the left. What will the computer player's earnings be?

○ $5 virtual (imaginary) dollars
○ $10 virtual (imaginary) dollars
○ $15 virtual (imaginary) dollars
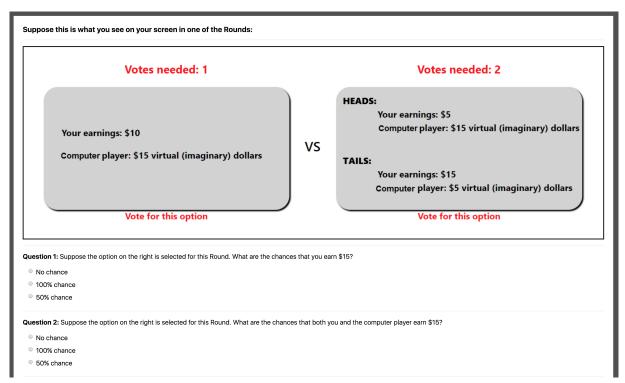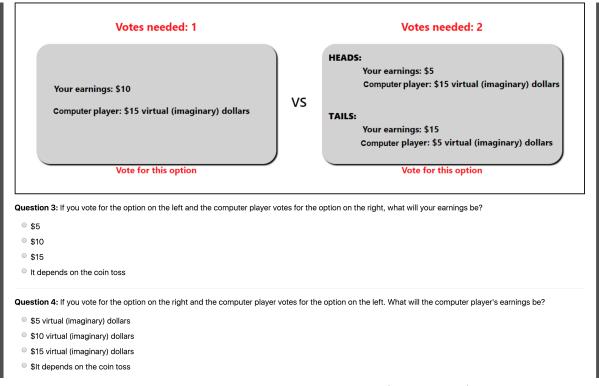○ $It depends on the coin toss

Figure 13: Part 3 Understanding questions (questions 3-4).
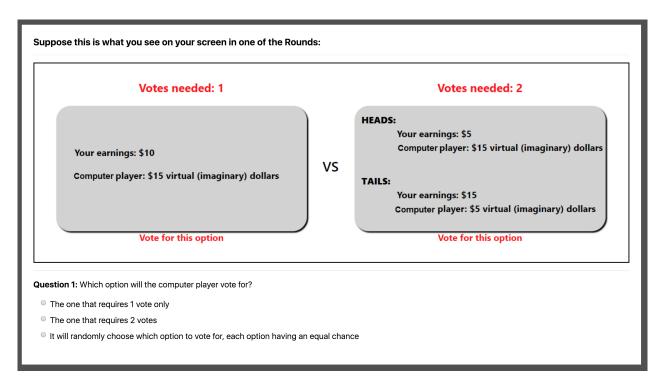
Figure 14: Part 3 Understanding questions (question 5).
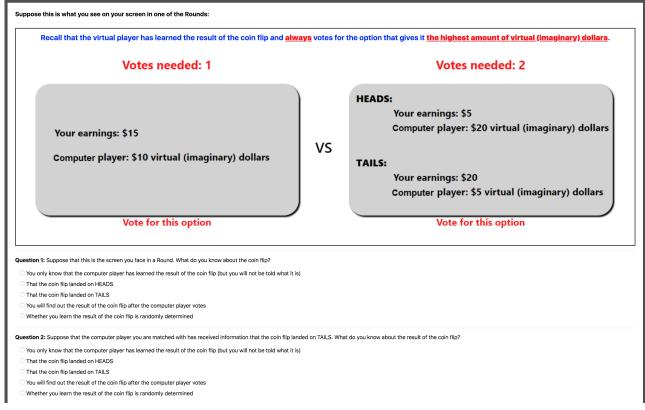

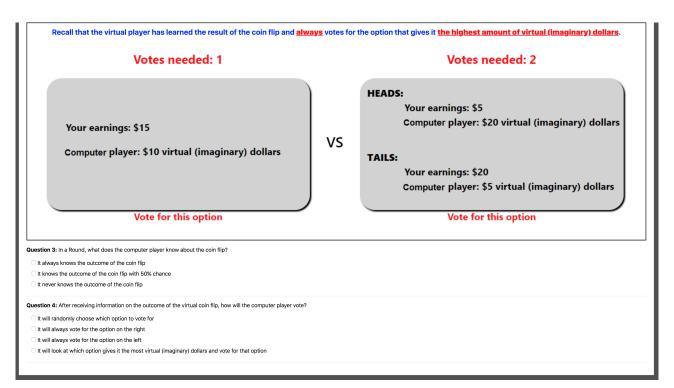*Figure 15: Part 4 Understanding questions (questions 1-2).*

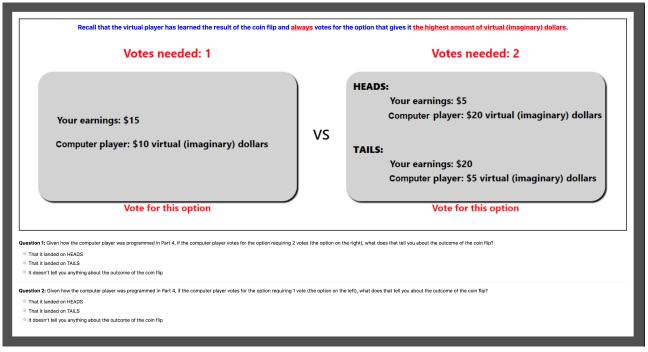*Figure 16: Part 4 Understanding questions (questions 3-4).*

Figure 17: Part 5, Contingent-Reasoning Understanding questions (questions 1-2).
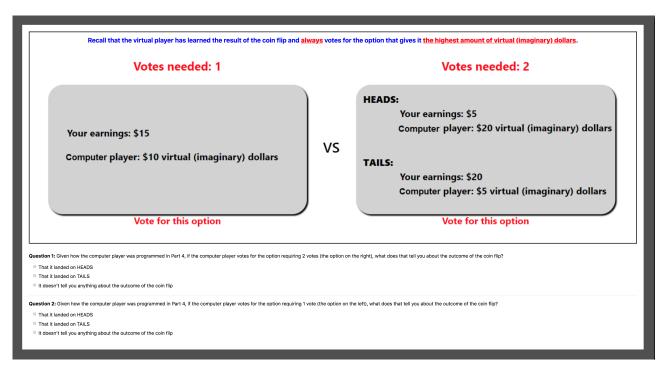
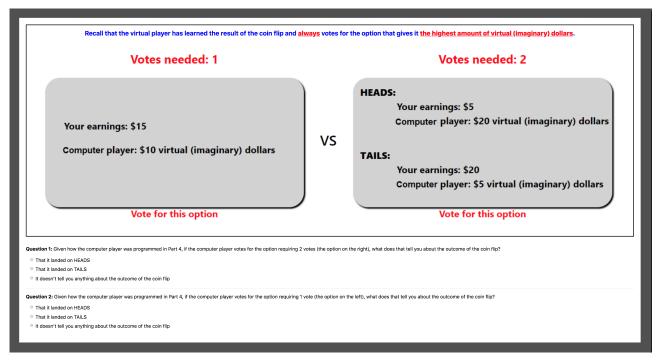Figure 18: Part 5, Contingent-Reasoning Understanding questions (question 3).

Figure 19: Part 5, Contingent-Reasoning Understanding questions (question 4).