Ruling the Roost:
The Vicious Circle and the Emergence of Pecking Order

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Abstract

This paper constructs a new game—the "rule-the-roost game"—where players compete repeatedly for power ("chickens") and wealth ("eggs") in the laboratory. We find that a vicious circle develops where the powerful accumulate more power and wealth over time, leading to substantial inequality. At the same time, the powerless take actions to oppose the powerful, which meaningfully reduces inequality. Gender differences are small in early rounds of the game but grow over time. The ratio of the female win rate to the male win rate declines by 1.3 percent each round, or 37.7 percent over the entire game. We argue that the growing difference is due to the vicious circle, which compounds the effects of small style-of-play differences. These findings suggest that gender imbalances may be particularly large in contexts such as firms where men and women interact repeatedly.

JEL Classification: D02, D31, D72, J16, O10
Keywords: power, inequality, hierarchy, gender differences

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1 Introduction

According to Acemoglu and Robinson, political systems are susceptible to “vicious circles,” where power and wealth, once accumulated, can be leveraged to acquire even more, leading to a concentration of control in the hands of a few. History is replete with examples of this cycle. In the city-states of medieval Italy, for instance, the signoria was frequently dominated by wealthy families like the Medici, who acquired control and used it to advance their own commercial interests. These dynamics are not limited to the political sphere; similar cycles can be observed in organizations and firms, where those who hold influence or resources may use them to consolidate further power, shaping internal hierarchies and limiting access to opportunities for others. Today, such concerns remain prominent, as seen in practices like the widespread gerrymandering following the Republican Party’s success in the 2010 midterm elections, which was aimed at securing long-term control over key statehouses and congressional seats.[1]

However, counterforces can inhibit vicious circles. The cultural anthropologist Christopher Boehm suggests that followers may actively oppose and constrain leaders who attempt to amass excessive power and wealth, a phenomenon he terms “reverse dominance hierarchy” (see Boehm (1993, 1999)). A classic example is the assassination of Julius Caesar, whose refusal to disband his army after conquering Gaul spurred fears in the Roman Senate that he would crown himself king, prompting them to act against him.

To study these forces systematically, we construct a new game (the “rule-the-roost game”) and examine how subjects play it in the laboratory. This game allows us to look under the microscope at the forces shaping the distribution of power and wealth. It also provides a unique context in which to study gender dynamics—central to many real-world power structures—and examine how they are influenced by these forces. In the game, participants compete for (finitely-lived) chickens, which correspond to (finitely-tenured) positions of power; the eggs laid by chickens are the game’s currency. In each round of the game, a chicken is born and

[1] See, for instance, Mayer, Jane, “State Legislatures Are Torching Democracy,” *The New Yorker,* 6 August, 2022, Retrieved from `https://www.newyorker.com`.

an election takes place to determine its owner; subjects choose whether to run or vote in the election.

We consider two versions of the game. In the "patronage" version, candidates can pledge their freshly-laid eggs to voters in return for their votes. This feature captures the idea that politicians can, in many instances, use their offices to engage in patronage (i.e., bestow favors to acquire support). In the "no-patronage" version of the game, candidates cannot pledge eggs to voters.

We characterize the equilibria of the game under some stark assumptions: in particular, that players are risk-neutral egg maximizers. These outcomes serve as a benchmark against which to compare our results, and also suggest some mechanisms that may lead to unequal outcomes in the game. We show that, in the patronage version of the game, a vicious circle arises. Intuitively, the ability to pledge eggs gives an electoral advantage to candidates who are already chicken-rich. This vicious circle leads to an extreme pecking order, with one player capturing all of the chickens and all of the eggs. In the no-patronage version of the game, there is no vicious circle and inequality is lower in expectation.

In the laboratory, we had subjects play the patronage-version of the game in one treatment and the no-patronage version in a second treatment. In the patronage treatment, vicious circles indeed emerge. Exploiting two sources of randomness—election ties and lack-of-history in the first election—we find that winning a chicken today increases the likelihood of winning subsequent elections by between 12.8 and 15.8 percent. In the no-patronage treatment, there is no vicious circle and, in fact, winning a chicken today *decreases* the likelihood of winning chickens in the future.

In line with the model, there is also severe inequality in the patronage treatment. The top-ranked player (out of six) wins on average almost half of the chickens, while the bottom-ranked player wins just two percent. This gap between top and bottom narrows dramatically in the no-patronage treatment, with the top-ranked player winning 20 percent on average versus 13 percent for the bottom-ranked player.

At the same time, our results meaningfully deviate from the theoretical benchmarks. In particular, in the patronage treatment, neither inequality nor the vicious circle are as extreme as our theory would suggest. To investigate what is going on, we focus attention on subjects with outsize power. Specifically, we focus on *lords*: subjects who own at least 80 percent of the living chickens in a given round.

We find that lords are common in the patronage treatment—they arise in 40 percent of rounds—but they do not arise in every round, as the benchmark model predicts. Moreover, the average tenure of lords is only 40 percent of what the model predicts; lords are opposed in elections more often than expected: 87.7 percent of the time rather than zero; and lords pledge more of their eggs than expected: 35 percent rather than zero.

We consider two potential explanations for these deviations from benchmark. One possibility is that the deviations reflect *generosity of lords*: lords voluntarily give away eggs and choose to end their tenures. An alternative is that the deviations reflect, along the lines of Boehm, *opposition to lords*: lord tenures may end because other subjects oppose them; and lords may give away eggs as a means of holding onto power. We show that our findings are more in line with the opposition story. For instance, in 69.9 percent of cases where a lord tenure ends, it is because there is an opposing candidate whom voters favor even though they pledged *less* than the lord. It therefore appears that opposition plays an important role in mitigating inequality.

We then turn to examine gender differences in outcomes. The rule-the-roost game offers a unique context in which to look in detail at gender dynamics and the forces shaping power relations between men and women. We find that the patronage has a profound effect on gender disparities. In the no-patronage treatment, there are no significant gender differences in outcomes. By contrast, in the patronage treatment, gender differences are small in early rounds of the game but grow over time. For instance, the ratio of the female win rate to the male win rate declines by 1.3 percent each round, or 37.7 percent over the entire game. This leads to large differences in final outcomes. Women obtain only 84.7 percent as many eggs and win elections only 70.4 percent as often. Differences in the tail of the distribution are especially striking: women are only 56.3 percent as likely as men to have the most eggs and they are lords only 31.9 percent as often.

Because subjects do not know each other's genders, style-of-play differences are the only possible explanation for these differences in outcomes. We argue that these style-of-play differences are actually quite small. This is why men and women have similar win rates in early rounds of the game. However, over time, the vicious circle compounds the effect of these small style-of-play differences, leading to larger and larger imbalances.

To further explore the role of gender, we ran a follow-up experiment. This experiment replicates the results of our first experiment and yields two additional findings. First, in a treatment where subjects know each other's genders, gender differences are of slightly lower magnitude but not significantly different. Second, traits that account for gender differences in some other experiments (competitiveness, confidence, risk aversion, and altruism) do not account for the differences in our context.

Our paper relates most closely to Acemoglu and Robinson's work on political institutions and their concept of vicious circles (see, for instance, Acemoglu and Robinson, 2005, 2012). Vicious circles have also been explored by Zingales (2017) in the context of rent-seeking by large firms; and Glaeser et al. (2003) have pointed out that subversion of institutions by the wealthy—specifically, the courts—can exacerbate inequality. Our paper also fits into a broader literature on institutions as a driver of growth and a determinant of inequality (see, for instance, Glaeser and Shleifer (2002), Rodrik et al. (2004), La Porta et al. (2008), and Acemoglu et al. (2005)).[2]

The literature on clientelism is also concerned with vote buying by politicians (see Dixit and Londregan 1996; Wantchekon 2003; Stokes 2005, 2009; Finan and Schechter 2012; and Robinson and Verdier 2013). Issues that have been studied include: whether politicians buy votes from marginal or core supporters, the policy consequences of clientelism, and why clientelism is associated with poverty and inequality. Our experiment contributes to this literature

[2]In our experiment, we allow certain institutions to evolve (i.e., who holds power) but we take others as fixed. In particular, we impose democratic elections. In so doing, we suppress a force that Acemoglu and Robinson highlight as exacerbating vicious circles: democratic institutions tend to erode when power and wealth are concentrated. Even absent this force, we observe vicious circles—an outcome that Acemoglu and Robinson (2008) refer to as "captured democracy."

by showing how clientelism can, over time, lead to concentration of power.

Our paper fits into an experimental literature on elections (see Palfrey, 2006 for a review). Topics studied include voter turnout, strategic voting, and candidate competition.

Finally, our paper shows how small initial differences between individuals or groups—such as gender differences in style of play—can lead to large outcomes differences. In this sense, our work relates to Cunha and Heckman (2007), who show that small differences in early childhood education can lead to large disparities in later life, as well as Frank and Cook (2010), who argue that winner-take-all markets can magnify differences between stars and other market competitors.

The remainder of the paper is organized as follows. Section 2 describes the rule-the-roost game. Section 3 characterizes the equilibria of the game under some stark assumptions; these equilibria serve as a natural benchmark against which to compare our experimental results. Section 4 details our experimental design. Section 5 reports our results on the vicious circle and inequality. Section 6 examines the ways in which our results deviate from benchmark and discusses possible mechanisms. Section 7 considers gender inequality and gender dynamics in the game, as well as our follow-up experiment. Section 8 concludes.

2 The Rule-the-Roost Game

Here, we propose a new game—the "rule-the-roost game"—that captures important elements of political competition. It is also simple enough that it can be played by subjects in a laboratory setting. In the game, players compete for chickens in elections. Chickens correspond to positions of power and the eggs they lay are the game's currency.

The game has a basic structure and many potential variations. Our focus here will be on two versions: one in which election candidates can engage in patronage and one in which they cannot. These versions correspond to our two experimental treatments. We suggest some other potential variants of interest at the end of the section.

Basic Structure of the Game

The game has $N \geq 2$ players and $R \geq 2$ rounds. In each round, except the very last, an election takes place (the details of which we will expand on shortly). The election winner receives a newborn chicken at the start of the next round. Chickens live for T rounds (or until the game ends). While alive, they lay E eggs per round for their owners. In the final round of the game, no election takes place and players simply collect the eggs laid by their chickens.

Eggs are the currency of the game; the objective of the game for self-interested players is to maximize the total number of eggs acquired. (In our experiment, subjects exchange their eggs for money at the end of the session). Players can keep the eggs laid by their own chickens; they can also (potentially) transfer them to other players during elections. The game is zero-sum, with a fixed surplus of eggs. As such, the principal outcome of interest will be the division of eggs between players.

Notice that the number of living chickens grows at the start of the game—from zero in Round 1 to T in Round $T+1$—as more chickens are born. From Round $T+1$ onward, however, the number of living chickens is fixed at T, since each chicken birth is offset by a retirement.

Elections

We will consider two versions of the rule-the-roost game, whose election procedures differ in one respect. In the first version, election candidates can engage in patronage; in the second version, they cannot. These versions correspond, respectively, to our "patronage" and "no patronage" experimental treatments.

Patronage Version

In each election, a randomly-selected deciding voter determines the election winner. Elections proceed as follows:

1. Subjects simultaneously choose whether to be candidates or voters.[3] The list of candidates is then publicly announced. In the event that there are no candidates—or no voters—an election winner is randomly selected.

[3]This feature of our game is in line with citizen-candidate models such as Osborne and Slivinski (1996) and Besley and Coate (1997).

2. Candidates simultaneously choose how many eggs to pledge to the deciding voter. Candidates can only pledge freshly-laid eggs (i.e., eggs laid by their chickens in the current round). Candidates' pledges are then publicly announced.

3. Each voter chooses a candidate from the list; and one voter is then randomly selected to serve as the deciding voter.[4] The deciding voter's choice determines the election winner. The election winner is announced; votes are made public; and it is also made public which voter served as the deciding voter.

4. Finally, the election winner transfers the pledged amount to the deciding voter. Subjects keep the eggs that they do not transfer and accumulate them over the course of the game.

No-Patronage Version

The version of the game without patronage differs in only one respect: candidates cannot make pledges to voters. Hence, there are no egg transfers between players.

Discussion

Here, we discuss the election procedures in the patronage and no-patronage versions of the game, and we suggest some potential variants of interest.

Means of patronage. In the patronage game we consider, candidates can only pledge freshly-laid eggs to voters. This modeling choice reflects situations where people can use their current power (corresponding to chickens in our game) to bestow favors.[5] A version of the game where candidates can pledge "stale eggs" as well better reflects situations where wealth as well as power can be used to conduct patronage. It would be a natural next step to study this variant of the game.

"Gifts" versus pledges. Political patronage in real-world settings often involves relational contracts rather than explicit ones. The patron, rather than explicitly trading benefits for

[4]If there is only one candidate, all voters must choose that candidate, which ensures the candidate wins.

[5]There are reasons to think power might be a more effective means of patronage than wealth: for instance, it might be easy for a polity to ban explicit vote buying but hard to outlaw the granting of political favors.

support, will offer a "gift" to a client—a gift that comes with the expectation of support if it is accepted. In the patronage game we study, for the sake of simplicity, we have made contracts explicit, with candidates pledging eggs to voters in exchange for votes. It might be interesting to consider a variant of the game where candidates can make outright gifts to voters, in which case patronage might involve relational contracts.

Voting rule. In the versions of the game we study, election outcomes are determined by a deciding voter; moreover, the deciding voter receives the entirety of the election winner's pledge. We chose this electoral procedure because it reduces strategic complexity. For instance, if the election winner's pledge were divided between the winner's supporters, voters would need to take into account the likely split of the pledge. If, additionally, there were plurality voting, voters would need to factor in each candidate's chances of winning. One natural next step for future work might be to incorporate more strategically complex but familiar voting procedures such as plurality voting.

3 Theoretical Benchmark

Here, we characterize the equilibria of the game under some stark assumptions. These assumptions, while strong, serve as a natural benchmark. We show that, under these assumptions, outcomes are markedly different in the two versions of the game. A vicious circle arises in the patronage version, leading to an extreme pecking order where one player wins all of the chickens and all of the eggs. In the no-patronage version, there is no vicious circle and inequality is considerably lower.

Assumptions

For the purposes of our benchmarking exercise, we assume that players are self-interested and risk-neutral: they are motivated to maximize their own expected aggregate egg earnings. In addition, we focus on equilibria where strategies have the following properties.

Property I. Markov-perfection (Maskin and Tirole (2001)): players' strategies condition only on decision-relevant state variables (the chickens owned by players, the current-round candidates, and the current-round pledges).[6]

Property II. Index invariance: a player's index does not affect how they play or how they are treated by other players (see the Appendix for a more formal definition).

Property III. Even-handedness in voting: in any voting round, if a voter is indifferent between two candidates, they vote for each candidate with equal probability.

Equilibrium

Proposition 1 characterizes equilibria under these assumptions (for a formal proof, see the Appendix).

Proposition 1. *Suppose players are self-interested and risk neutral. If the number of players N is sufficiently large and chickens lay more than two eggs per round ($E > 2$), all equilibria with strategies satisfying I-III have the following form:*

1. *Patronage game:*
   - (a) *In the first round, all players run for election and one player wins at random.*
   - (b) *In subsequent rounds, only the first-round winner runs for election and no eggs are pledged to voters.*
   - (c) *Consequently, the first-round winner wins all of the elections and all of the eggs.*
2. *No-patronage game: in every round, all players run for election and one player wins at random.*

Equilibria of the type described in Proposition 1 also exist when chickens lay two eggs per round ($E = 2$); moreover, they are unique if we additionally assume that candidates pledge eggs if otherwise indifferent.

[6] Notice that players' past egg winnings are not decision-relevant state variables given that they have no effect on the continuation game.

Intuition. In the patronage game, voters succumb to the short-run logic of voting for the candidate who pledges the most. Consequently, a player who has won all past elections can, at minimal cost, continue to win elections: pledging one egg if they ever face a challenger. It follows that the first-round winner will win all subsequent elections. Moreover, since it does not pay to challenge, the first-round winner will run unopposed and win all of the eggs.

It would, of course, be in voters' collective interest to be more future-minded: sometimes voting for a chicken-poor candidate over a chicken-rich candidate who pledges more in order to generate electoral competition. However, it is difficult for voters to behave in this fashion if there is a severe free-rider problem (which is the case when N is large) or if they have trouble coordinating on a challenger to a chicken-rich candidate (which Properties I-III ensure).[7]

In the no-patronage version of the game, by contrast, voters do not have the opportunity to benefit from candidates' patronage (in the form of pledged eggs). At the same time, Properties I-III ensure that voters never favor one candidate over another, so any player that runs has an equal non-zero chance of winning a chicken. Consequently, it is a dominant strategy to run rather than vote.

Why our experimental results might differ from benchmark.

The outcomes described by Proposition 1 serve as a useful point of comparison for our experimental results. That said, there are important reasons why our experimental results might differ. We might expect chicken-rich subjects to be more *generous* than the proposition predicts; and we might expect chicken-poor subjects to engage in more *opposition* to the chicken-rich.

Concern with fairness. Players might be inequity averse or otherwise concerned with fairness. Such concerns might reduce inequality for two reasons. First, it might make chicken-rich players more *generous*. In both versions of the game, chicken-rich players might run less often so as to give other players a chance to win. In the patronage version, chicken-rich players might also pledge more eggs.

[7]They cannot use the past history to coordinate because of Properties I and III or players indexes because of Property II.

Second, concern with fairness might stoke *opposition* to chicken-rich players, increasing chicken-poor players' willingness to run and vote against them. In both versions of the game, the chicken-rich might lose some elections as a result. Additionally, in the patronage version, chicken-rich players might pledge instrumentally as a means of fending off challenges.

Small number of players. It is in voters' collective interest to be future-minded: sometimes opposing chicken-rich candidates in order to generate electoral competition. However, when there are a large number of players, as Proposition 1 assumes, the free-rider problem is severe and players succumb to the short-run logic of voting for the candidate who pledges the most. By contrast, when there are only a small number of players, voters may be willing to *oppose* chicken-rich candidates.

Coordination. Effective opposition to a chicken-rich candidate requires that the other players successfully coordinate on a challenger; but Proposition 1 rules out various coordination mechanisms that might marshal opposition to the chicken-rich. The Markov-perfect assumption (Property I) rules out coordination on past history of play while index invariance (Property III) rules out the possibility of players' indexes being used as a coordination device. Our experimental subjects may, by coordinating more effectively than Proposition 1 assumes, generate more *opposition* to chicken-rich candidates.

4 Experimental Design

Subjects in our experiment were randomly allocated to groups of six ($N = 6$), and each group was assigned to play either the patronage or the no-patronage version of the rule-the-roost game. Every group played for 30 rounds ($R = 30$), with chickens living for 5 rounds ($T = 5$) and laying two eggs per round ($E = 2$).

To preserve anonymity, while maintaining publicly observable actions, subjects were identified by gender-neutral pseudonyms such as "Mushroom," "Spinach," and "Leek." Note that subjects had no information about each other's genders.

The experiment was conducted at Nanyang Technological University in Singapore between August 2018 and September 2019 and was programmed in zTree (Fischbacher, 2007). Subjects were recruited by email from the undergraduate population and were drawn from a wide variety of majors (see Table A.2). 456 subjects participated in the experiment over 21 sessions (see Table 1). In total, there were 76 groups of subjects.[8]

Table 1: Treatment Descriptions

Treatment	Sessions	Sample size
Patronage	15	330
No Patronage	6	126
Total	21	456

Randomization into treatments took place at the session level. Each session contained at least three groups of six participants.

At the start of the experiment, subjects received written instructions (see Appendix), which were also read aloud, and played two non-incentivized practice rounds—one round as a voter and one round as a candidate. At the end of the experiment, subjects were asked to complete a non-incentivized survey about their motivations during the experiment.[9]

The eggs subjects accumulated were converted to Singapore dollars at the rate of 5 eggs to $1. Subjects also received a $5 show-up fee. The experiment lasted about 90 minutes and subjects earned an average of $14.20.

5 The Vicious Circle and Inequality

We start our examination of the experimental results by asking whether the game gives rise to a vicious circle, and relatedly, how much inequality emerges within groups.

[8]Based on power calculations, we determined that a larger sample size would be needed in the patronage treatment as we expected higher variance in outcomes.

[9]In our first three patronage-treatment sessions, subjects received a different survey with more open-ended questions. The results we report in the paper come from the later version of the survey.

5.1 Do we see vicious circles?

To examine whether the game gives rise to vicious circles, we test whether winning a chicken in one round of the game increases a subject's likelihood of winning chickens in future rounds. Our benchmark model predicts that there will be vicious circles in the patronage treatment but not in the no-patronage treatment. Notice that it is insufficient to look at the correlation between electoral success today and in the future, since such a correlation might be driven by subjects' unobservable characteristics. To formally test for vicious circles, we exploit two sources of randomness in election outcomes.

Our first test uses randomness arising out of tied elections in which multiple candidates receive the same number of votes. It compares the performance of tie winners and (equally-popular) tie losers in future elections. Column 1 of Table 2 shows that, in the patronage treatment, tie winners are estimated to have a 12.8 percentage point greater likelihood of winning future elections than tie losers; this estimate is significant at the one-percent level. Note that this is the estimated impact averaged over *all* future elections—not just the subsequent election. This test thus provides strong evidence of a vicious circle in the patronage treatment.

Table 2: Tied Elections

Dep Var: Future Win Rate	(1) Patronage Treatment	(2) No-Patronage Treatment
Won	0.128***	-0.069***
	(0.036)	(0.023)
Won x Three-way tie	-0.026	-0.004
	(0.094)	(0.040)
Constant	-0.046**	0.213***
	(0.018)	(0.011)
Election Fixed Effects	✓	✓
Observations	617	317

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$, OLS with standard errors clustered at the group level. The sample consists of candidates who tied in an election.

Column 2 performs an analogous exercise for the no-patronage treatment. In this case, tie winners are estimated to have a 6.9 percentage point *lower* likelihood of winning future elections than tie losers; this estimate is also significant at the one-percent level. Thus, it does not appear that there is a vicious circle in the no-patronage treatment; in fact, winning an election seems to *hurt*—rather than help—in subsequent rounds.

Our second test, which serves as a robustness check, exploits randomness arising out of the first election. In the first election, it is essentially random which subject wins among those who run given that all subjects look identical (there is no history of play and no subject owns chickens). Thus, we can test for a vicious circle by comparing the performance of first-round winners and first-round losers in future rounds. Column 1 of Table 3 shows that, in the patronage treatment, first-round winners are estimated to have a 15.8 percentage point greater likelihood of winning future elections than first-round losers; this estimate is significant at the one-percent level. This estimate is broadly in line with the first and lends further credence to the hypothesis that there is a vicious circle in the patronage treatment. Column 2 performs an analogous exercise for the no-patronage treatment. In this case, first-round winners have a 1.3 percentage point lower likelihood of winning future elections than first-round losers, although this effect is not statistically significant. Again, the estimate is broadly in line with the first and supports the conclusion that there is no vicious circle in the no-patronage treatment.

The only potential concern with this second test is that certain pseudonyms might be systematically favored over others (e.g. voters might systematically favor "Mushroom" over "Spinach"). This might lead the first-round winner to perform well in subsequent rounds for reasons other than a vicious circle. To deal with this issue, Columns 3 and 4 include pseudonym fixed effects. The estimated effects are roughly unchanged.[10]

[10]In columns 3 and 4, all pseudonym fixed effects are insignificant at the 5 percent level.

Table 3: First Elections

Dep Var: Future Win Rate	(1) Patronage Treatment	(2) No-Patronage Treatment	(3) Patronage Treatment	(4) No-Patronage Treatment
Won	0.158***	-0.013	0.153***	-0.012
	(0.046)	(0.011)	(0.049)	(0.010)
Constant	0.161***	0.173***	0.184***	0.167***
	(0.009)	(0.003)	(0.040)	(0.008)
Group Fixed Effects	✓	✓	✓	✓
Pseudonym Fixed Effects			✓	✓
Observations	231	95	231	95

$p < 0.10$ ** $p < 0.05$ *** $p < 0.01$, OLS with standard errors clustered at group level. The sample consists of candidates who ran in the first election.

5.2 Inequality

Next, we examine the amount of chicken and egg inequality within groups. Three findings emerge. The first is in line with the predictions of the benchmark model while the second and third are not. In Section 6, we will examine potential reasons for these divergences from benchmark.

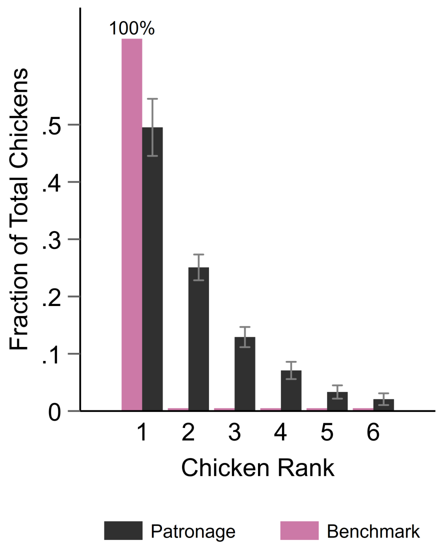
Inequality Finding 1: *There is substantial inequality in the patronage treatment and considerably less in the no-patronage treatment.*

Panels (a) and (b) of Figure 1 look at chicken inequality. They show that, in the patronage treatment, the top-ranked player wins 49.5 percent of the chickens on average, compared to just 20.2 percent in the no-patronage treatment. On the flip side, the bottom-ranked player wins only 2.1 percent of the chickens on average in the patronage treatment, compared to 12.8 percent in the no-patronage treatment. Panels (c) and (d) show similar results for egg inequality.[11]

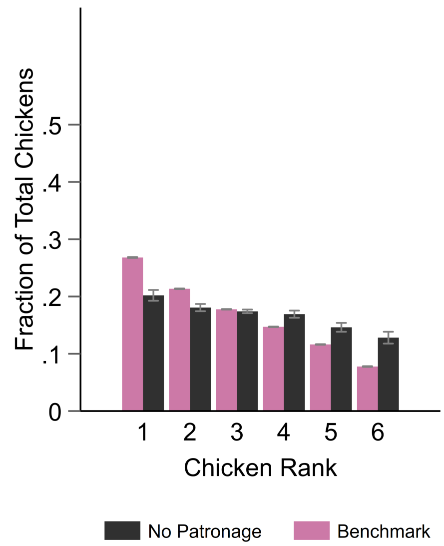
[11] Comparing panels (a) and (b), the performance of top-ranked players is significantly different ($p < 0.001$) and the performance of bottom-ranked players is significantly different ($p < 0.001$). The same is true comparing panels (c) and (d): $p < 0.001$ for both top- and bottom-ranked players.

Figure 1

Chicken Inequality

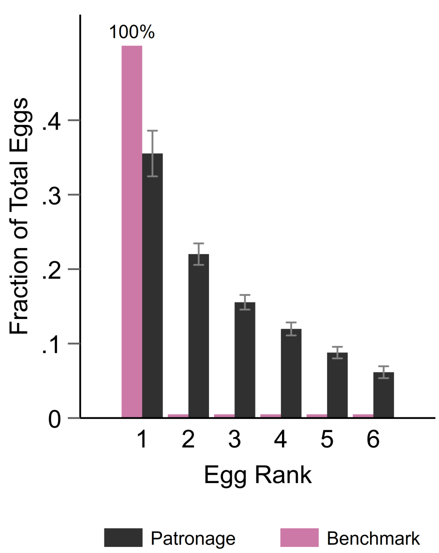


(a) Patronage Treatment

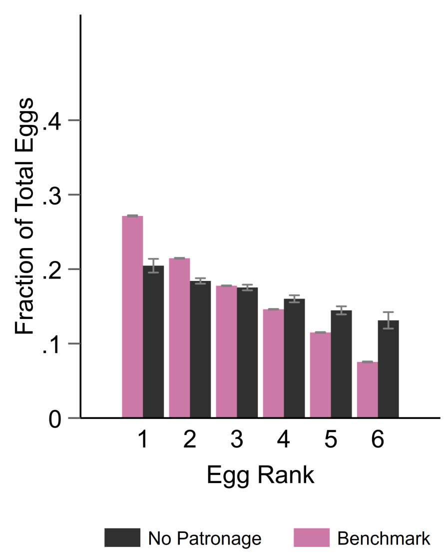


(b) No-Patronage Treatment

Egg Inequality



(c) Patronage Treatment



(d) No-Patronage Treatment

Inequality Finding 2: *Inequality is below benchmark.*

As illustrated in Figure 1, inequality in both treatments is below the amount predicted by the benchmark model. The difference is particularly large in the patronage treatment, where the model predicts that one player will win all of the chickens and eggs.[12,13]

Inequality Finding 3: *In the patronage treatment, egg inequality is less pronounced than chicken inequality.*

Figure 1 also shows that egg inequality is less pronounced than chicken inequality in the patronage treatment. For example, the top-ranked player in eggs wins on average 35.5 percent of the eggs, whereas the top-ranked player in chickens wins on average 49.5 percent of the chickens.[14] The benchmark model does not account for this result.

6 Differences from Benchmark

Our experimental findings line up well with two of the benchmark model's key predictions. As predicted, vicious circles arise in the patronage treatment but not in the no-patronage treatment; and inequality is substantially greater in the patronage treatment than in the no-patronage treatment.

In both treatments, however, inequality is below benchmark—the difference is particularly large in the patronage treatment. Moreover, the vicious circle in the patronage treatment is not as extreme as in the benchmark model. We will now focus on the patronage treatment and explore potential reasons for the differences from benchmark. As a first step, we will relate some further findings. With these findings in hand, we will present two potential explanations for the differences from benchmark.

[12] In the no-patronage treatment, the benchmark model predicts that there will be a random winner in each round. To work out the implications for inequality, we simulated play for 10,000 groups. The benchmarks reported in panels (b) and (d) of Figure 1 reflect the averages of these simulations.

[13] In each panel, the performance of the top-ranked player is significantly different from benchmark and the performance of the bottom-ranked player is significantly different from benchmark ($p < 0.001$ in all cases).

[14] In the patronage treatment, the egg fraction won by the top-ranked player is significantly less than the chicken fraction won by the top-ranked player ($p < 0.001$). Conversely, the egg fraction won by the bottom-ranked player is significantly greater than the chicken fraction won by the bottom-ranked player ($p < 0.001$).

6.1 Lords

The benchmark model predicts that, in each round of the patronage game except the first, there will be a dominant player who owns all of the living chickens. Moreover, the model predicts that the dominant player will retain their dominant position throughout the game, run unopposed in every round, and give away no eggs. Let us examine whether such players in fact emerge.

Recall that the number of living chickens grows in the first five rounds of the game; but from round six onward, there are exactly five chickens since each birth is offset by a death. In analyzing our experimental findings, we will focus on rounds 6-30 and we will refer to a subject as a "lord" if they own at least four of the five living chickens.

Definition 1. *In round $r \geq 6$, we will say that subject i is a "lord" if they own at least four of the five chickens.*

Four main findings emerge regarding lords.

Lords Finding 1: *Lords arise often but they are less prevalent than in the benchmark model.*

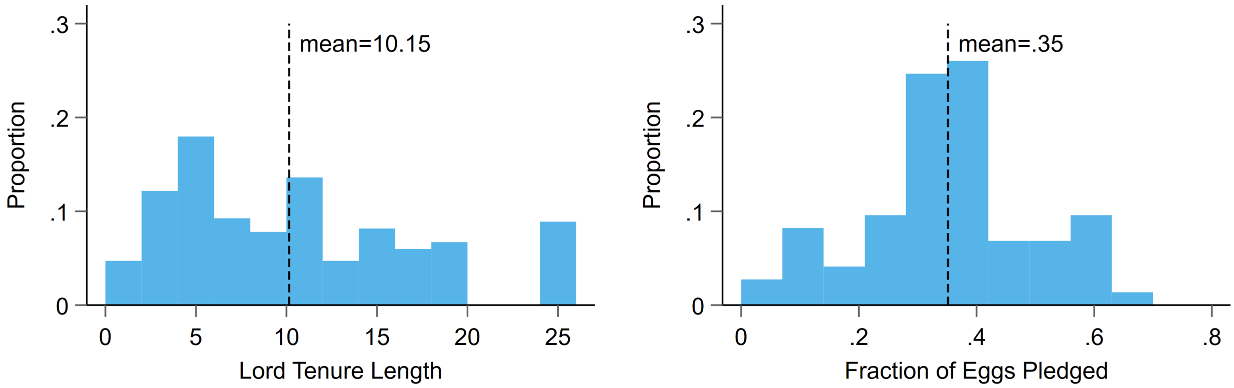
Lords arise often in the patronage treatment: 87 percent of groups have a lord in at least one round, and across all groups, 40 percent of rounds have a lord. By comparison, in the no-patronage treatment, lords do not arise in any group in any round. Lords do not arise in every round, however, so they are less prevalent than the benchmark model would predict.[15]

Lords Finding 2: *Lords' tenures are shorter than in the benchmark model.*

The model predicts that there will be a lord in round 6 who retains power until the end of the game (a tenure of 25 rounds). Panel (a) of Figure 2 shows the distribution of lord tenures in the experiment. There are some 25-round tenures (4.5 percent). However, the average tenure is only 10.1 rounds. 24.9 percent of tenures are 4 rounds or less. Furthermore, power

[15]The proportion of rounds with a lord is significantly different across treatments ($p < 0.001$), as is the proportion of groups with a lord in any round ($p < 0.001$).

Figure 2



(a) Distribution of Lords' Tenures

(b) Distribution of Lords' Pledges

Note: In panel (a), a tenure is defined as a continuous spell as a lord. Some subjects have multiple spells as a lord and appear more than once. Following the methodology of Clark and Summers (1979), the distribution is weighted by tenure length. In panel (b), the observations are the average fraction pledged by a subject over the rounds spent as a lord. Note that subjects are able to pledge in rounds where they run unopposed.

often changes hands. The first lord to emerge is toppled and replaced by another lord in 52.1 percent of groups where at least one lord emerges.

Lords Finding 3: *There are more opposing candidates than in the benchmark model.*

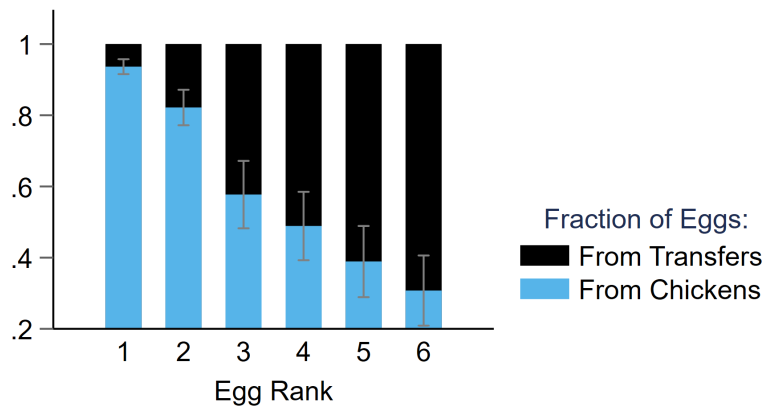
The benchmark model predicts that lords will run unopposed. In fact, we see a lot of opposition. When lords run, they are opposed 87.7 percent of the time. On average, there are 1.8 opposing candidates.

Lords Finding 4: *Lords pledge more eggs than in the benchmark model.*

In the benchmark model, lords do not pledge any eggs to voters. Panel (b) of Figure 2 shows the distribution of lords' pledges in the experiment. In fact, we find that lords pledge a substantial amount. On average, they pledge 35 percent of their eggs. If we restrict attention to elections where lords run unopposed, we find that they still pledge 23.4 percent on average.

Recall that egg inequality in the patronage treatment is less pronounced than chicken inequality (Inequality Finding 3). The large pledges that lords make to voters help explain this finding. Egg inequality is less pronounced than chicken inequality because the chicken-rich transfer some of their eggs to the chicken-poor. Figure 3 shows that, within groups, egg-rich subjects obtain most of their eggs from their own chickens whereas egg-poor subjects obtain most of their eggs from transfers.[16]

Figure 3: Sources of Eggs, by Rank within Group



Note: In Figure 3, observations are at the subject level. Error bars indicate 95% confidence intervals, with errors clustered at the group level. Ties in rank are broken at random.

6.2 Potential Explanations

There appear to be two potential explanations for the differences from the benchmark model.

Generosity of Lords. One possibility is that the differences reflect the generosity of lords. Perhaps lords voluntarily end their tenures, choosing not to run so as to give other subjects a chance to win chickens. Lords may also pledge eggs out of generosity.

Opposition to Lords. Another possibility is that the differences from benchmark reflect opposition to lords. Perhaps lord tenures end because other subjects are willing to run and vote against them. Lords' pledges to voters may be instrumental rather than generous: they may

[16]Transfers are quite substantial. On average, they make up 41.3 percent of total egg earnings. A one unit decrease in rank is associated with a drop in the proportion earned from own chickens of 12.9 percentage points ($p < 0.001$).

be a means of holding onto power in the face of opposition. As noted in Section 3, opposition to lords can arise if subjects are inequity averse or if they are able to coordinate.

Evidence Concerning Mechanisms

It is difficult to fully tease apart the roles that generosity and opposition play in explaining the differences from benchmark. Nonetheless, we present some suggestive evidence.

Table 4: How Lord Tenures End

The lord fails to run	15.7%
The lord runs and makes the strictly largest pledge	69.9%
The lord runs and ties for the largest pledge	8.4%
The lord runs and is strictly out-pledged	4.8%
Every group member runs (randomly-selected election winner)	1.2%

Table 4 examines how lord tenures end. Under the generosity story, we would expect a large share of tenures to end with the lord choosing not to run. In fact, only 15.7 percent of tenures end with a lord choosing not to run. Under the opposition story, by contrast, tenures end because other subjects run and vote against the lord. Consistent with this story, we find that in the majority of cases (69.9 percent), tenures end with the lord running and pledging the strictly largest amount.

Under the generosity story, subjects pledge eggs non-instrumentally—simply because they see it as fair. By contrast, under the opposition story, subjects pledge eggs to win support. At the end of the experiment, we surveyed subjects regarding their motivations for pledging eggs (see Table A.1 in the Appendix). Subjects agreed to a large extent with the statement "I pledged eggs because I wanted to win elections." The average level of agreement with this statement was 7.4 on a 10-point Likert scale. Subjects agreed to a lesser extent with the statement "I pledged eggs because I was concerned with fairness." The average level of agreement with this statement was only 4.4.[17]

[17] The difference in agreement of 3.0 points is significant in a paired t-test ($p<0.001$). We also find a strong

Under the opposition story, voters favor underdog candidates (i.e. candidates who are chicken-poor). Table 5 uses conditional logit regression to examine whether voters are more or less likely to vote for chicken-poor candidates. Column (1) shows that chicken-rich candidates are more likely to receive votes than chicken-poor candidates if we do not include any controls. However, Column (2) shows that chicken-rich candidates are less likely to receive votes when we control for the size of candidates' pledges. This result is suggestive that voters indeed favor underdogs. Table A.3 in the Appendix shows that underdogs also appear to be favored in the no-patronage treatment. In the no-patronage treatment, there is no pledging of eggs and we simply find that chicken-rich candidates are less likely to receive votes.[18]

In sum, while both mechanisms are likely at work, it appears that opposition to lords is particularly important for understanding the differences from benchmark.

Table 5: Determinants of Candidate Vote Share

Dep Var: Voted for Candidate	(1)	(2)
Candidate's Number of Chickens	0.425***	-0.096***
	(0.024)	(0.036)
Candidate's Pledge		0.507***
		(0.043)
Candidate Made Largest Pledge		0.482***
		(0.094)
Observations	9464	9464

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. Conditional logits (Rounds 6 - 29), grouped at the voter-election level, with candidate-voter-election-level observations. Standard errors are clustered at the group level.

7 Gender Differences

The rule-the-roost game provides a unique context to study power dynamics between men and women and the forces shaping them.

negative correlation between the number of chickens a candidate owns and the proportion of eggs pledged. Under the generosity story, one might expect a positive correlation.

[18]This underdog preference helps to explain the findings for the no-patronage treatment in Tables 2 and 3.

There are two channels through which gender differences in outcomes might arise. One channel is discrimination: for instance, voters might favor men over women. A second channel is style-of-play differences: men and women might simply play the game differently. Recall that we do not provide information about other subjects' genders. This rules out the possibility of explicit gender discrimination and allows us to isolate the role of style-of-play differences.

Several types of style-of-play differences have been documented in the literature which might be relevant here. For instance, women have been shown to shy away from competition (see Niederle and Vesterlund, 2011).[19] In our context, this might translate into a reluctance to run for election. Women are less pushy about seeking out job promotions (see Babcock and Laschever, 2003; Small et al., 2007; Dittrich et al., 2014; Leibbrandt and List, 2014; Card et al., 2015; Exley et al., 2020).[20] In our setting, this might mean that women less aggressively pursue lordships. Additionally, women appear to be more risk averse (see Croson and Gneezy (2009)). This might make women less willing to run for election or pledge eggs. While a number of studies document gender differences, differences appear to be smaller or nonexistent among managers and professionals (see, for instance, Atkinson et al. (2003)). In our context, differences in outcomes might be attenuated if there are sub-populations that are equally aggressive about seeking out lordships.

A feature of the patronage version of the rule-the-roost game that is particularly interesting to explore vis-a-vis gender is the vicious circle. The vicious circle has the potential to compound the effect of style-of-play differences. Intuitively, winning in one round raises the chances of winning in the next round, which in turn raises the chances of winning in the round after that. Consequently, a small difference in win probability in one round can have a large effect on the entire course of the game. Vicious circles are arguably an important feature of many real-world contexts of interest—such as the interactions between men and women within firms—where interactions are repeated rather than one-shot. Our setting offers a unique opportunity to examine the impact of vicious circles on gender outcomes.

[19]For instance, Niederle and Vesterlund (2007) find that women—of equal ability to men—are less than half as likely to enter a tournament.

[20]For instance, in a laboratory experiment, Small et al. (2007) find that men are nine times more likely than women to ask for higher compensation.

7.1 Main Findings

Table 6 relates our main findings.[21] In the patronage treatment, there are large gender differences in outcomes. Women obtain only 84.7 percent as many eggs as men and win elections only 70.4 percent as often. The differences are particularly striking in the tail of the distribution. Women are only 56.3 percent as likely as men to win the most eggs; they are only 45.6 percent as likely to ever become lords; and they are lords only 31.9 percent as often. All differences are significant at the one-percent level. In the no-patronage treatment, by contrast, there are no significant differences in outcomes between the genders.

Table 6: Gender Differences in Outcomes

	Patronage Treatment			No-Patronage Treatment		
	Female mean (sd)	Male mean (sd)	Difference (p-value)	Female mean (sd)	Male mean (sd)	Difference (p-value)
Total Eggs	41.467	48.971	-7.505***	44.333	45.549	-1.216
	(24.554)	(34.858)	(0.007)	(8.358)	(7.710)	(0.496)
Win Rate	0.138	0.196	-0.058***	0.162	0.170	-0.008
	(0.143)	(0.220)	(0.002)	(0.033)	(0.028)	(0.246)
Group member with the most eggs	0.120	0.213	-0.093**	0.167	0.169	-0.002
	(0.326)	(0.410)	(0.020)	(0.376)	(0.377)	(0.974)
Was ever a Lord	0.147	0.322	-0.175***	0.000	0.000	0.000
	(0.355)	(0.469)	(0.000)	(0.000)	(0.000)	(.)
Rounds as a Lord	0.793	2.483	-1.689***	0.000	0.000	0.000
	(2.400)	(5.085)	(0.000)	(0.000)	(0.000)	(.)
Observations	150	174		54	71	

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. Standard errors are clustered at the group level.

The fact that we only see differences in outcomes in the patronage treatment suggests that the vicious circle is playing a role. In the next section, we examine this question more carefully.

[21] Seven subjects chose not to disclose their gender (six subjects in the patronage treatment and one in the no patronage treatment). Our results on gender differences are based on the remaining 449 subjects who disclosed their gender.

7.2 The Role of the Vicious Circle

If gender differences in the patronage treatment are exacerbated by the vicious circle, we would expect to see *growing differences* over the course of the game. This is due to the compounding effect of the vicious circle: differences in any one round carry over and affect outcomes in future rounds.

Table A.4 compares gender differences in win rates at the beginning of the game to differences later in the game. In the first five rounds of the game, the difference in win rates is only 1.9 percentage points; moreover, this difference is not significantly different from zero. By contrast, the difference in win rates in the last five rounds of the game is 9.1 percentage points (which is significant at the one-percent level). In other words, women seem to win elections roughly as often as men initially, but their performance gets worse over time.

Column 1 of Table 7 looks at win-rate differences across all rounds of the game. It shows that, each round, the ratio of the female win rate to the male win rate declines by 1.3 percent. This means that, over the entire game, women's performance declines by a large amount: 37.7 percent relative to men.

Table 7: Female Outcomes Relative to Male in the Patronage Treatment, By Round

Dep Var:	(Female win rate)/ (Male win rate)	(Female avg. eggs obtained)/ (Male avg. eggs obtained)
Round	-0.013***	-0.012***
	(0.004)	(0.003)
Constant	0.911***	1.047***
	(0.067)	(0.054)
Observations	29	29

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. OLS on round-level variables for the patronage treatment. (Female win rate)/(Male win rate) is the win rate of women relative to men for a given round. (Female avg. eggs obtained)/(Male avg. eggs obtained) is the relative number of eggs obtained in a given round. "Eggs obtained" is the sum of eggs obtained in a given round from one's own chickens and from transfers. The independent variable "Round" is normalized to equal zero in the first round, which means that the constant term in each column reflects the ratio in the first round. In both columns, the constant term is not significantly different from 1 ($p = 0.194$ in column 1 and $p = 0.385$ in column 2). There are 29 observations in each column because the win rate is not defined in Round 30 and no subject obtains eggs in Round 1.

Column 2 of Table 7 looks at the number of eggs subjects obtained in a given round (from their own chickens or from transfers). In the initial rounds of the game, women obtain roughly the same number of eggs as men; but again, they do worse each round. The ratio of female eggs obtained to male eggs obtained declines by 1.2 percent each round, or 34.8 percent over the entire game.

It therefore appears that the vicious circle plays a major role in driving differences in outcomes. Women do almost as well as men initially; but as the vicious circle kicks in, differences become more and more severe.

7.3 Style-of-Play Differences

The differences in outcomes we observe in the patronage treatment must be driven by differences in style of play. It is possible that these style-of-play differences are quite small, however, since outcomes are similar early in the game and only seem to diverge later because of compounding. Here, we examine the extent to which there are meaningful style-of-play differences.

Table 8 presents our findings. It shows how often women run for election compared to men, and how much women pledge when they run compared to men. It should be noted that, after the first round of the game, outcome differences (such as number of chickens owned) might lead to differences in run rates or pledging behavior. In other words, causality might run in reverse, from outcomes to behavior rather than behavior to outcomes. The results in Table 8 should therefore be taken with a grain of salt.

The most meaningful result in Table 8 is probably the first-round difference in run rates—since there is no issue of reverse causality. We find that the first-round run rate of women is 12.5 percentage points less than that of men (a difference which is significant at the five-percent level). The overall difference in run rates is 5.5 percentage points (also significant at the five-percent level). While these run-rate differences are far from zero, they are considerably less than in Niederle and Vesterlund (2007), where women are half as likely as men to enter a

Table 8: Gender Differences in Style-of-Play in the Patronage Treatment

	Female mean (sd,n)	Male mean (sd,n)	Difference (p-value)
Run Rates			
Round 1	0.633	0.759	-0.125**
	(0.484, n=150)	(0.429, n=174)	(0.015)
Overall	0.492	0.547	-0.055**
	(0.199, n=150)	(0.231, n=174)	(0.035)
Proportion Pledged Conditional on Running and Chickens Owned†			
1 Chicken	0.854	0.905	-0.051*
	(0.240, n=107)	(0.189, n=115)	(0.058)
2 Chickens	0.774	0.839	-0.065*
	(0.201, n=71)	(0.188, n=90)	(0.053)
3 Chickens	0.540	0.610	-0.070**
	(0.173, n=45)	(0.239, n=69)	(0.046)
4 Chickens	0.342	0.409	-0.067*
	(0.124, n=22)	(0.171, n=51)	(0.061)
5 Chickens	0.306	0.287	0.019
	(0.128, n=11)	(0.157, n=31)	(0.680)

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. For tests of differences, standard errors are clustered at the group level.
†Data is from Rounds 6 - 29. Observations are at the subject level; variables are averaged for each subject.

tournament.[22]

Unfortunately, no pledging takes place in round 1 since no subject has any chickens. Consequently, it is harder to deal with reverse causality when it comes to pledging. We do our best, though, by reporting pledge rates conditional on number of chickens owned. The results suggest that women pledge slightly less than men when they have chickens. For instance, women with three chickens pledge 7 percent less of their eggs than men (a difference which is significant at the five-percent level). While it is hard to draw firm conclusions about what this finding means, it is possible that it is similar to the finding that women are less aggressive about seeking out job promotions. Perhaps women in our context are less proactive about

[22]In the no patronage treatment, there are no significant differences in run rates. In the first round, women's run rate is 3.2 percentage points greater than that of men but the difference is insignificant ($p = 0.6534$). Overall, women's run rate is 3.5 percentage points lower than that of men, but again, the difference is insignificant ($p = 0.2931$).

seizing power, which pledging helps to achieve.

7.4 An Additional Experiment

To further explore the role of gender, we ran a follow-up experiment. This experiment addresses two questions: (i) how do gender differences compare when subjects know each other's genders (as they do in most real-world contexts of interest)? and (ii) are there traits (e.g. competitiveness) that help account for the gender differences in outcomes we observe?

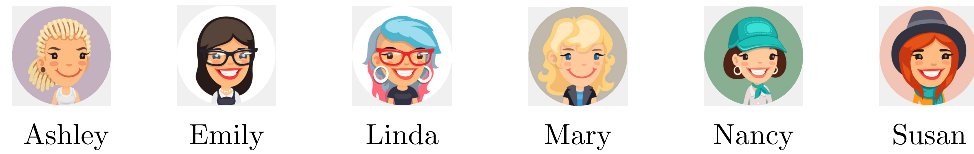
The experiment consisted of two treatments: a "Gender Blind" treatment and a "Gender Reveal" treatment. In both treatments, subjects played the patronage version of the game; and, in both treatments, subjects were identified by avatars (see Figure 4). What differed between treatments were the avatars subjects received. In the Reveal treatment, subjects received gendered avatars, corresponding to their self-reported genders, while in the Blind treatment, subjects received gender-neutral avatars (specifically, vegetables). In both treatments, we measured a variety of traits before subjects played the game: competitiveness, confidence, risk aversion, and altruism. These traits have been shown to account for gender differences in other experimental contexts. For a more detailed description of the design, see Appendix C.

How might revealing gender change gender dynamics? On the one hand, knowing other subjects' genders could mitigate gender differences if it leads subjects to try to redress the balance. On the other hand, gender differences might become even more extreme if, for instance, male lords are seen as more legitimate than female lords.

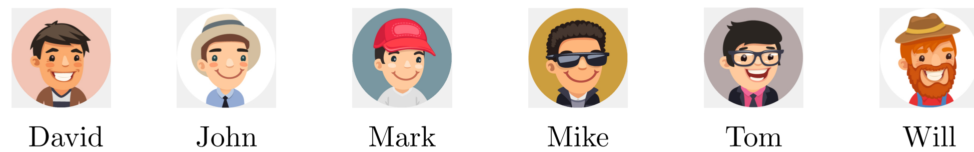
Our follow-up experiment suggests that these countervailing forces have at most a limited effect on net on gender differences in outcomes. Table C.2 in the Appendix presents our findings. In the Blind treatment, gender differences roughly replicate our results from the patronage treatment of the original experiment. For instance, women earn 9.4 fewer eggs than men on average, compared to 7.5 in the original experiment; and women are lords for 1.7 fewer rounds, which is exactly comparable to the original experiment. In the Reveal treatment, gender differences are slightly lower than the Blind treatment: for instance, women earn 6.6

Figure 4 Avatars

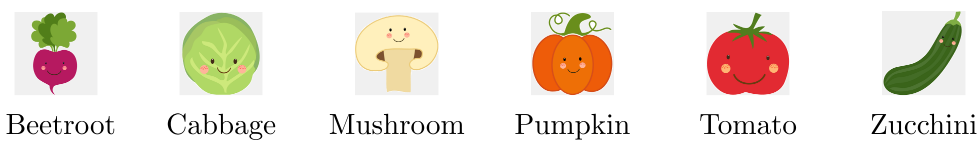
(a) Female Avatars



(b) Male Avatars



(c) Vegetable Avatars



fewer eggs than men in the Reveal treatment versus 9.4 in the Blind; and women are lords for 0.9 fewer rounds versus 1.7 in the Blind. However, the difference between treatments is not statistically significant.[23]

Table C.3 analyzes how the traits we measured (competitiveness, confidence, risk aversion, and altruism) differ by gender and Table C.4 analyzes whether they help explain differences in outcomes. Interestingly, these traits are not predictive of performance, with the possible exception of altruism which may be slightly predictive of total egg earnings. Thus, while these traits explain gender differences in other experiments, they do not account for the gender differences in our context.

[23]In unreported regressions, we do not see a relationship between opposition to lords and the gender of the lord. Specifically, the gender of the lord is uncorrelated with the number of opposing candidates and the fraction of votes received.

8 Conclusion

In this paper, we construct a new game—the "rule-the-roost game"—to study the forces shaping the distribution of power and wealth. We find that, in the patronage game, there is a vicious circle and substantial inequality. At the same time, the powerless take actions to oppose the powerful. This meaningfully reduces the prevalence of "lords" and also induces the powerful to transfer some of their eggs.

Gender differences are small in early rounds of the patronage game but grow over time. The ratio of the female win rate to the male win rate declines by 1.3 percent each round, or 37.7 percent over the entire game. We argue that the growing difference is due to the vicious circle, which compounds the effect of small style-of-play differences.

The forces that arise in our game are arguably relevant in a variety of contexts: electoral politics (of course), but also families and firms. Our game hints at the role that vicious circles play in generating pecking orders in these settings—in addition to differences in physical and human capital.

In future work, it would be interesting to explore the forces that affect opposition to lords, which in turn may affect the degree of inequality and who comes out on top. For instance, Hoff and Pandey (2006) find that subjects of low caste hold back when competing against subjects of higher caste. Does this suggest that, in a version of our game where caste is known, there might be less opposition to lords of higher caste? In our follow-up experiment, the gender of lords did not impact the level of opposition; but perhaps this reflected the relatively progressive undergraduate population in which the experiment was conducted. It would be interesting to vary the cultural context, and with it the legitimacy of female leadership, and see how this impacts gender differences.

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A Tables

Table A.1: Survey Results

I. Patronage Treatment

	Mean Response (SD)
Pledging Strategies Ranked by Importance	
(1) I pledged eggs because I wanted to win elections.	7.409 (2.989)
(2) I pledged eggs because I was concerned with fairness.	4.424 (3.440)
Voting Strategies Ranked by Importance	
(1) I voted for the candidate who pledged the most eggs.	6.432 (2.873)
(2) I voted against the candidate with the most chickens because I thought more competition would increase pledges to voters.	5.652 (3.327)
(3) I voted against the candidate with the most chickens because it was the fair thing to do.	4.924 (3.211)
(4) I voted for candidates who pledged a large share of their eggs, even if they did not pledge the most.	4.811 (3.252)
(5) I voted for candidates who voted for me in the past.	4.436 (3.600)
(6) I was easily bored so I voted more or less randomly.	2.443 (2.976)
Running Strategies Ranked by Importance	
(1) I chose whether to be a candidate or voter depending on what I thought would get me the most eggs.	6.833 (2.791)
(2) I sometimes chose to vote because I wanted to support/oppose a particular candidate, even when I thought it would not get me the most eggs.	5.523 (3.514)
(3) I sometimes chose to be a candidate because I wanted to oppose someone I wanted to see lose, even when I thought it would not get me the most eggs.	4.674 (3.519)
(4) I sometimes chose to vote because I felt it was unfair to be a candidate too often or win too many chickens.	4.580 (3.719)
(5) I was easily bored so I chose whether to be a voter or a candidate more or less randomly.	2.466 (2.965)
Luck?	
To what extent do you think winning chickens was a matter of luck?	6.614 (2.826)

Responses are on a Likert scale from 0 to 10.

II. No-Patronage Treatment

	Mean Response (SD)
Voting Strategies Ranked by Importance	
(1) I voted against the candidate with the most chickens because it was the fair thing to do.	6.976 (3.525)
(2) I voted for candidates who voted for me in the past.	6.720 (3.340)
(3) I was easily bored so I voted more or less randomly.	1.632 (2.441)
Running Strategies Ranked by Importance	
(1) I sometimes chose to vote because I wanted to support/oppose a particular candidate.	6.432 (3.342)
(2) I chose whether to be a candidate or voter depending on what I thought would get me the most eggs.	6.256 (3.255)
(3) I sometimes chose to vote because I felt it was unfair to be a candidate too often or win too many chickens.	6.064 (3.512)
(4) I sometimes chose to be a candidate because I wanted to oppose someone I wanted to see lose	3.504 (3.585)
(5) I was easily bored so I chose whether to be a voter or a candidate more or less randomly.	1.336 (2.016)
Luck?	
To what extent do you think winning chickens was a matter of luck?	5.256 (2.932)

Responses are on a Likert scale from 0 to 10. As the result of entering an incorrect ID number, one subject out of the 126 subjects in the no-patronage treatment did not complete the survey.

Table A.2: Breakdown of Demographics

	Patronage mean(sd)	No Patronage mean(sd)	Difference b(p-value)
Gender			
Female	0.455	0.429	0.026
	(0.499)	(0.497)	(0.618)
Male	0.527	0.563	-0.036
	(0.500)	(0.498)	(0.489)
Other/Prefer not to say	0.018	0.008	0.010
	(0.134)	(0.089)	(0.345)
Major classification†			
Engineering and Computer Science	0.408	0.369	0.038
	(0.492)	(0.484)	(0.445)
Natural Sciences and Mathematics	0.165	0.162	0.003
	(0.371)	(0.369)	(0.933)
Economics	0.078	0.115	-0.037
	(0.269)	(0.321)	(0.239)
Social Sciences (excluding Economics)	0.052	0.038	0.014
	(0.222)	(0.193)	(0.513)
Business and Accounting	0.182	0.262	-0.079*
	(0.386)	(0.441)	(0.072)
Arts and Humanities	0.084	0.054	0.030
	(0.278)	(0.227)	(0.229)
Other Technical and Professional Disciplines	0.032	0.000	0.032***
	(0.176)	(0.000)	(0.001)
Nationality			
Chinese	0.030	0.024	0.006
	(0.172)	(0.153)	(0.696)
Filipino	0.003	0.000	0.003
	(0.055)	(0.000)	(0.318)
Indian	0.033	0.040	-0.006
	(0.180)	(0.196)	(0.752)
Indonesian	0.058	0.079	-0.022
	(0.233)	(0.271)	(0.427)
Korean	0.000	0.008	-0.008
	(0.000)	(0.089)	(0.319)
Malaysian	0.121	0.111	0.010
	(0.327)	(0.316)	(0.762)
Myanmar	0.003	0.000	0.003
	(0.055)	(0.000)	(0.318)
Singapore PR	0.009	0.000	0.009*
	(0.095)	(0.000)	(0.083)
Singaporean	0.739	0.738	0.001
	(0.440)	(0.441)	(0.978)
Vietnamese	0.003	0.000	0.003
	(0.055)	(0.000)	(0.318)
Year of study	2.494	2.373	0.121
	(1.078)	(1.115)	(0.297)
Observations	330	126	456

* 0.05 ** 0.01 *** 0.001. †16 subjects in the Patronage treatment and 4 subjects in the No Patronage treatment, whose double majors span two categories, are counted twice. Means for Gender, Major and Nationality reflect proportions in the population.

Table A.3: Determinants of Candidate Vote Share in the No-Patronage Treatment

Dep Var: Voted for Candidate	
Candidate's Number of Chickens	-1.598***
	(0.224)
Observations	3690

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. Conditional logits (Rounds 6 - 29), grouped at the voter-election level, with candidate-voter-election-level observations. Standard errors are clustered at the group level.

Table A.4: Win Rates in the Patronage Treatment

	Female mean (sd)	Male mean (sd)	Difference (p-value)
Win Rate: Rounds 1-5	0.159	0.178	-0.019
	(0.251)	(0.287)	(0.529)
Win Rate: Rounds 25-29	0.120	0.211	-0.091***
	(0.215)	(0.322)	(0.003)
Win Rate: All Rounds	0.138	0.196	-0.058***
	(0.143)	(0.220)	(0.002)
Observations	150	174	

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. Standard errors are clustered at the group level. Excludes six subjects who did not disclose their gender.

B Theoretical Analysis

Definition of Index Invariance (Property II)

A history $h \in H$ is the sequence of realized events up to some node of the game tree; for example,

$$h_0 = \begin{cases} \text{all players choose to run} \\ \downarrow \\ (\dots) \\ \downarrow \\ i \text{ and } j \text{ choose to run, } k \text{ and } \ell \text{ choose to vote} \\ \downarrow \\ k \text{ votes for } j,\ \ell \text{ votes for } i \\ \downarrow \\ k \text{ is randomly chosen to be the deciding voter} \end{cases}$$

History h' is an extension of h (denoted $h' \sqsupset h$) if (i) h' is consistent with the events of h and (ii) h' ends at a later game node than h. Each strategy profile, by specifying the probabilities of action profiles being taken at every decision node, uniquely identifies the conditional probability $\Pr[h'|h]$ that history h' occurs given h, for all h and all $h' \sqsupset h$.

Notice that events contain references to player indices. Let π be a permutation of the set of players, and let $P_\pi(\cdot) : H \to H$ denote the transformation that acts on histories by permuting the indexes of players according to π. For instance, under the permutation

$$\pi(i) = j, \quad \pi(j) = k, \quad \pi(k) = \ell, \quad \pi(\ell) = i,$$

the history h_0 is transformed into

$$P_\pi(h_0) = \begin{cases} \text{all players choose to run} \\ \downarrow \\ (\dots) \\ \downarrow \\ j \text{ and } k \text{ choose to run, } \ell \text{ and } i \text{ choose to vote} \\ \downarrow \\ \ell \text{ votes for } k, i \text{ votes for } j \\ \downarrow \\ \ell \text{ is randomly chosen to be the deciding voter} \end{cases}$$

We say that a strategy profile is index invariant if $\Pr[h'|h] = \Pr[P_\pi(h')|P_\pi(h)]$ for all histories h and $h' \sqsupset h$, and all permutations π. In words, histories that are equivalent up to a re-labelling of the players are equally likely to occur. This notion of index invariance captures two notions of symmetry. First, each player treats other players identically regardless of their indexes. Second, players play identical strategies.

Proof of Proposition 1

Let us start with the patronage game. Consider the following sequence of statements indexed by the round number t.

> Statement $S(t)$: Suppose h is a history up to the start of round $t \geq 2$ in which a single player owns all of the living chickens in round t. In any equilibrium, on the continuation path of h, the same player wins all future rounds, as the sole candidate, and gives away no eggs.

We will show that $S(2)$ holds, from which our proposition follows. To do so, we will proceed by induction: we will show that for any round $2 \leq t < R-1$, if statement $S(t+1)$ holds, then the following four claims hold for round t—which will then imply that statement $S(t)$ holds as well. We then show that $S(R-1)$ holds, which completes the argument.

In the following discussion, suppose that $t < R-1$ and that $S(t+1)$ holds. Unless otherwise stated, the current round is t and the history prior to t is as described in the statement of $S(t)$.

Claim A: a chicken-less voter strictly prefers to vote for a candidate who makes the largest pledge. Let's calculate the continuation payoff for a chicken-less voter, starting with the current round t. (i) If the chicken-less voter is not the deciding voter, they receive zero eggs this round. Further, from round $t+1$ onward they receive some continuation payoff v which is independent of their voting choice in this round (by Property I, their non-deciding vote does not affect the distribution of continuation play). (ii) If they are the deciding voter, then they receive the eggs pledged by the election winner, denoted g, in the current round. What about their continuation payoff in subsequent rounds? By Properties I and II, they receive the same continuation payoff in equilibrium as all other chicken-less players, of which there are $N-1$. Given that there are no more than TE eggs laid per round in the remaining $R-t$ rounds, the continuation payoff in subsequent rounds is at most $TE(R-t)/(N-1)$, which is vanishingly small for large N (asymptotically, $o_{N\to\infty}(1)$).

Let the number of voters in this round be m, so that the chicken-less voter is the deciding voter with probability $1/m$. Averaging over cases (i) and (ii), the chicken-less voter's continuation payoff is $v\frac{m-1}{m} + (g + o_{N\to\infty}(1))/m$. For N sufficiently large (so that the $o(1)$ term is less than one), the chicken-less voter strictly prefers to vote for the candidate who pledges the most eggs g. Claim A thus holds.

Claim B: Suppose there is at least one voter and there are at least two candidates, one of which is the only player with chickens. Then the chicken-owning candidate will pledge one egg. Consider the pledging decision of the chicken-owning candidate. Suppose they pledge one or more eggs. No other candidate has any eggs to pledge. By Claim A, the chicken-owning candidate will win all votes, and thus will win the election. Given that $S(t+1)$ holds, they will also win all subsequent elections without pledging any eggs. It is thus strictly suboptimal for them to pledge more than one egg.

Suppose instead they pledge zero eggs. By our stated assumptions, all voters are chicken-less; by Property II, they pursue the same voting strategy. Let the probability under this strategy of voting for the chicken-owning candidate be p. Let us consider several potential values p could take.

Suppose $p = 1$, in which case the chicken-owning candidate always wins. Given that statement $S(t+1)$ holds, no voter will ever receive any chickens or eggs in subsequent rounds; thus each voter *weakly* prefers to vote for a candidate without chickens. Property III (even-handedness in voting) therefore requires that voters vote for chicken-less candidates with weakly greater probability than the chicken-owning candidate; but this contradicts the statement that $p = 1$.

Now suppose $0 \leq p < 1$. Either $p = 0$, or each voter must be indifferent between voting for the chicken-owning candidate and some other candidate. Given Property III, we must have $p \leq 1/2$, and thus the chicken-owning candidate wins with some probability less than 1/2. If the chicken-owning candidate pledges one egg and thus wins the round-t election, they receive all eggs laid in subsequent rounds; if they lose, they will lose out on at least E of these eggs – because then the round-t election winner can guarantee themselves at least E eggs by keeping all eggs laid by the round-t chicken in round $t+1$, and thus must receive at least E eggs in expectation. This leads to an expected loss of at least $E/2 > 1$ future eggs for the chicken-owning candidate if he pledges zero eggs instead of one. This loss outweighs the one round-t egg that the chicken-owning candidate gains if he pledges zero eggs instead of one. Thus the chicken-owning candidate will pledge one egg. (If $E = 2$, the chicken-owning candidate weakly prefers to pledge one egg and so will do so if candidates pledge when they are otherwise indifferent.)

In sum, there is no case where it is optimal for the chicken-owning candidate to pledge zero eggs; hence Claim B holds.

Claim C: In round t, the chicken-owning player always chooses to run. Consider the running decision of the chicken-owning player in round t. We claim that they are strictly better off running than voting. Let v be the probability that all other players run, and let w be the probability that no other players run. Observe that $v = p^{N-1}$ and $w = (1-p)^{N-1}$, where p is the probability that a given chicken-less player runs.

Suppose that the chicken-owning player chooses not to run. With probability w/N, the chicken-owning player wins because nobody else runs and the chicken-owning player is randomly selected as winner. Denote the chicken-owning player's continuation payoff under this outcome as y. With probability $1 - w/N$, some other player receives the chicken. Denote the chicken-owning player's continuation payoff under this outcome as x. Averaging over the two possible outcomes, the chicken-owning player's continuation payoff is $y - (1 - w/N)(y - x)$.

Note that $y \geq x + E$. If the chicken-owning player wins the chicken, then (given that $S(n+1)$ holds) they receive all eggs laid by chickens in the future. By losing the round-t chicken, the chicken-owning player loses at least E eggs in expectation to the round-t election winner. In what follows, we rely only on the weaker bound $y \geq x + 1$.

Suppose that the chicken-owning player chooses to run. With probability v, all other players run, and the chicken-owning player pledges no eggs; they are randomly selected to win the election (and receive y) with probability v/N and lose (and receive x) with probability $v(1 - 1/N)$. With probability w, no other players run, so the chicken-owning player wins and receives continuation payoff y. With probability $1 - v - w$, some players run and some players vote, so (by Claim B) the chicken-owning player pledges one egg, wins, and receives continuation payoff $y-1$. The chicken-owning player's continuation payoff from running is

$$\begin{aligned}(1-v-w)(y-1)+vy/N+vx(N-1)/N+wy \\ &= y-v(1-1/N)(y-x)-(1-v-w) \\ &\geq y-v(1-1/N)(y-x)-(1-v-w)(y-x) \\ &= y-(1-v/N-w)(y-x) \\ &> y-(1-w/N)(y-x),\end{aligned}$$

and thus is strictly larger than the continuation payoff from not running.

Claim D: In round t, each chicken-less player chooses to vote. Consider the running decision of a given chicken-less player (denoted CL) in round t. We seek to show that CL never runs. Suppose that CL runs with probability $0 < p \leq 1$. By Properties I and II, all other chicken-less players also run with probability p. By Claim C, the chicken-owning player will run. Thus, the probability v that all other players besides CL run is strictly positive: $v = p^{N-2} > 0$. We will compare CL's payoff from running versus voting.

Suppose CL runs. If all players run for office, so that there are no voters: with probability $1/N$, CL wins and their continuation payoff is bounded above by $TE(R-t)$ (there are at most TE eggs laid in each round, so $TE(R-t)$ is an upper bound for the total number of eggs remaining after round t). With complementary probability $1-1/N$, CL does not win, and (given that all chicken-less players receive the same continuation payoff) their payoff is bounded above by $TE(R-t)/N$. If not all players run, Claims A-C imply that CL never wins the election (the chicken-owning player wins) and so CL's continuation payoff is zero. Since all players run with probability v, CL's continuation payoff from running is bounded above by $v(TE(R-t)/N+(1-1/N)(TE(R-t)/N)) \leq 2vTE(R-t)/N$.

Suppose CL doesn't run. With probability v, all other players run for office. In this event, the chicken-owning player pledges one egg, and CL always votes for the chicken-owning player (Claim A). CL's continuation payoff is thus at least v, which exceeds $2vTE(R-t)/N$ for

$N > 2TE(R - t)$. That is, for large N, CL is strictly better off not running than running. This establishes claim D.

Notice that for any round $2 \leq t < R - 1$, Claims A-D together with statement $S(t+1)$ jointly imply statement $S(t)$. It is also easy to establish that statement $S(R-1)$ holds. Consequently, $S(2)$ holds by induction: the player who wins the first-round chicken wins every subsequent election without facing any candidates and without pledging any eggs.

It remains to show that all players run in the first round of the patronage game. Given $S(2)$, on the equilibrium path, the player who wins in the first round will acquire all of the eggs in the game; whereas all other players will receive zero eggs. Each player thus seeks to maximize the probability of winning the first round. Given the lack of prior history, all candidates in the first round are indistinguishable; so, given Properties I and II, all candidates in the first round have an equal and strictly positive probability of winning (whereas the probability of winning as a voter is of course zero). It is thus strictly optimal for each player to run in the first round.

We now turn to the no-patronage version of the game. Notice that the game is memoryless, in the sense that at the start of each round, the continuation game does not depend on the past history of play. This observation leads to two implications. First, given Properties I and II, each voter is equally likely to vote for each candidate, and thus, each candidate has an equal (and strictly positive) chance of winning the election. Second, each player's choice of whether to run has no effect on their expected winnings in subsequent rounds. Given that, with certainty, each voter earns zero chickens in the current round, it is strictly optimal for each player to run rather than vote. The proposition follows. ■

C Follow-up Experiment

C.1 Experimental Design

The follow-up experiment was conducted at Nanyang Technological University in Singapore between September and November 2023. Subjects were recruited by email from the student population and were drawn from a wide variety of majors. 450 subjects participated over 20 sessions (see Table C.1).

Table C.1: Follow-Up Experiment Treatment Descriptions

Treatment	Sessions	Sample size
Gender Blind	9	210
Gender Reveal	11	240
Total	20	450

Randomization into treatments took place at the session level. Each session contained at least three groups of six participants.

Subjects were either allocated to the "Gender Blind" treatment or the "Gender Reveal" treatment. In both treatments, subjects played the patronage version of the game. As in the original experiment, subjects received written instructions (see Appendix E), which were read aloud, and played two non-incentivized practice rounds. In the Gender Blind treatment, subjects were randomly assigned gender-neutral, vegetable avatars that were used to identify them throughout the experiment (see Figure 4).

In the Gender Reveal treatment, subjects were assigned avatars corresponding to their self-reported genders. In the event a subject identified as non-binary (which only occurred in one instance out of 450), they were given the choice of a male or female avatar.[24]

Before subjects played the game, we measured a variety of traits: altruism, risk aversion, competitiveness, and confidence. To measure altruism, subjects were asked to allocate 1000 tokens between themselves and another randomly-chosen experimental participant. To measure

[24] In the Gender Reveal treatment, we did not explicitly tell subjects that the avatars of other subjects corresponded to their self-reported genders. We did not make this explicit because we feared doing so might induce an experimenter demand effect.

risk aversion, we utilised the standard Holt-Laury procedure where they were given a series of ten incentivized decision problems. Their risk aversion score is based upon the switchover point from the lower risk lottery to the higher risk lottery. To measure competitiveness and confidence, we first asked subjects to complete a "slider task" (see screenshots for details). Subjects were then asked to decide between a piece rate (in which case they would receive 25 tokens for each correct answer at the slider task) and a tournament (in which case they would receive 100 tokens for each correct answer if they were the top scorer in a randomly matched group of four participants, and 0 tokens otherwise). We define competitiveness as the difference between a subject's choice and the expected choice given their score.[25] To measure confidence, we asked subjects their expected rank in their randomly matched group of four participants. We define overconfidence as the difference between a subject's expectation of their rank and the actual expected rank given their score at the slider task.[26] One of these tasks was randomly selected for payment.

The eggs and tokens subjects accumulated were converted to Singapore dollars at the rate of 5 eggs to \$1 and 250 tokens to \$1. Subjects also received a \$5 show-up fee. The experiment lasted about 90 minutes and subjects earned an average of \$18.

[25]Expected choice is based on an OLS regression of subjects' choices on their scores.

[26]To calculate a subject's "actual expected rank," we ran 5000 simulations in which the subject was assigned to a random group of four in each simulation. "Actual expected rank" is equal to their average rank across these simulations.

C.2 Tables for Follow-up Experiment

Table C.2: Gender Differences in Outcomes

	Total Eggs	Win Rate	Group member with the most eggs	Was ever a Lord	Rounds as a Lord
Female	-9.360**	-0.075***	-0.106**	-0.144**	-1.688***
	(3.664)	(0.024)	(0.048)	(0.055)	(0.417)
Gender Reveal	-1.205	-0.013	-0.018	-0.053	-0.088
	(2.323)	(0.015)	(0.029)	(0.047)	(0.492)
Female × Gender Reveal	2.766	0.030	0.042	0.031	0.775
	(5.142)	(0.033)	(0.065)	(0.069)	(0.684)
Constant	49.145***	0.200***	0.214***	0.316***	2.291***
	(1.683)	(0.011)	(0.021)	(0.040)	(0.367)
Observations	450	450	450	450	450

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$, OLS with individual-level observations. Standard errors are clustered at the group level.

Table C.3: Gender Differences in Traits

	Male Mean(SD)	Female Mean(SD)	Difference (p-value)
Altruism	19.020	25.050	-6.030***
	(21.055)	(23.414)	(0.004)
Competitiveness	0.049	-0.062	0.111**
	(0.495)	(0.493)	(0.018)
Risk Aversion	6.084	6.180	-0.096
	(2.261)	(2.064)	(0.642)
Overconfidence	0.424	0.456	-0.032
	(1.046)	(1.098)	(0.752)
Observations	250	200	450

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$.

Table C.4: Outcomes by Traits

	Total Eggs	Win Rate	Group member with the most eggs	Was ever a Lord	Rounds as a Lord
Female	-6.391**	-0.050***	-0.068**	-0.114***	-1.069***
	(2.509)	(0.016)	(0.033)	(0.034)	(0.353)
Altruism	-0.094*	-0.000	-0.001*	-0.001	-0.011
	(0.054)	(0.000)	(0.001)	(0.001)	(0.008)
Competitiveness	3.100	0.024	0.029	0.014	-0.246
	(2.718)	(0.017)	(0.038)	(0.040)	(0.371)
Risk Aversion	0.299	0.002	0.007	0.002	-0.014
	(0.783)	(0.005)	(0.008)	(0.010)	(0.117)
Overconfidence	0.129	0.001	-0.002	0.022	0.099
	(1.340)	(0.009)	(0.018)	(0.022)	(0.189)
Observations	450	450	450	450	450

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$, OLS with individual-level observations. Standard errors are clustered at the group level. All regressions control for performance at the slider task.

D Instructions and Screenshots: Main Experiment

D.1 Instructions (Patronage Treatment)

Ground Rules

Welcome to the experiment. Please read the instructions below carefully.

Communication between participants is not allowed. Also, please refrain from using any communication devices. If you have any questions at any time, please raise your hand and an experimenter will come over to see you.

If you need to write anything, please use the paper and pen provided. Please do not write anything on this instruction sheet.

Groups and Privacy

The computer will randomly assign you to a group of *six* participants. You will interact only with the participants in your group. The computer will randomly select an ID for you, such as "Cabbage" or "Potato." You will keep the same ID throughout the experiment.

Your decisions in the experiment will be anonymous, and your anonymity will be strictly preserved. Participants will interact with each other using only their IDs. For example, you may learn that "Cabbage has voted for you"; but you will not be told the real name of "Cabbage."

Chickens and Eggs

In this experiment, you may win *chickens* that lay *eggs* for you. You may give some of your eggs to other participants. At the end of the experiment, your eggs will be converted into dollars at the rate of 5 eggs to $1.

Rounds

The experiment will consist of 30 rounds.

In each round, except the final round, an election will take place. The winner of the election receives a chicken. Chickens lay eggs for five rounds, and then retire.

Your Coop and Your Basket

Your chickens live in your chicken *coop*. At the start of each round, each of your chickens lays two eggs in the coop. You may give some of these eggs to other participants.

At the end of the round, the eggs in your coop are transferred to your egg *basket*.

Details of Elections

In each round except the final round, there is an election to determine who will win a chicken. You will have a choice whether to 1) be a candidate in the election or 2) a voter in the election. One voter will be selected at random by the computer to be the *deciding voter*. The election outcome will be determined by the deciding voter's vote.

The election will proceed as follows:

Step 1: If you are a candidate, you may pledge to give some eggs from your coop to the deciding voter if he/she votes for you.

Step 2: If you are a voter, you will choose whom to vote for after observing the candidate's pledges. The computer will then randomly select the deciding voter.

Step 3: At the end of the election, the election winner's pledge will be transferred to the deciding voter's basket.

If nobody chooses to be a candidate or nobody chooses to be a voter, the computer randomly allocates the chicken to one participant.

Final Round

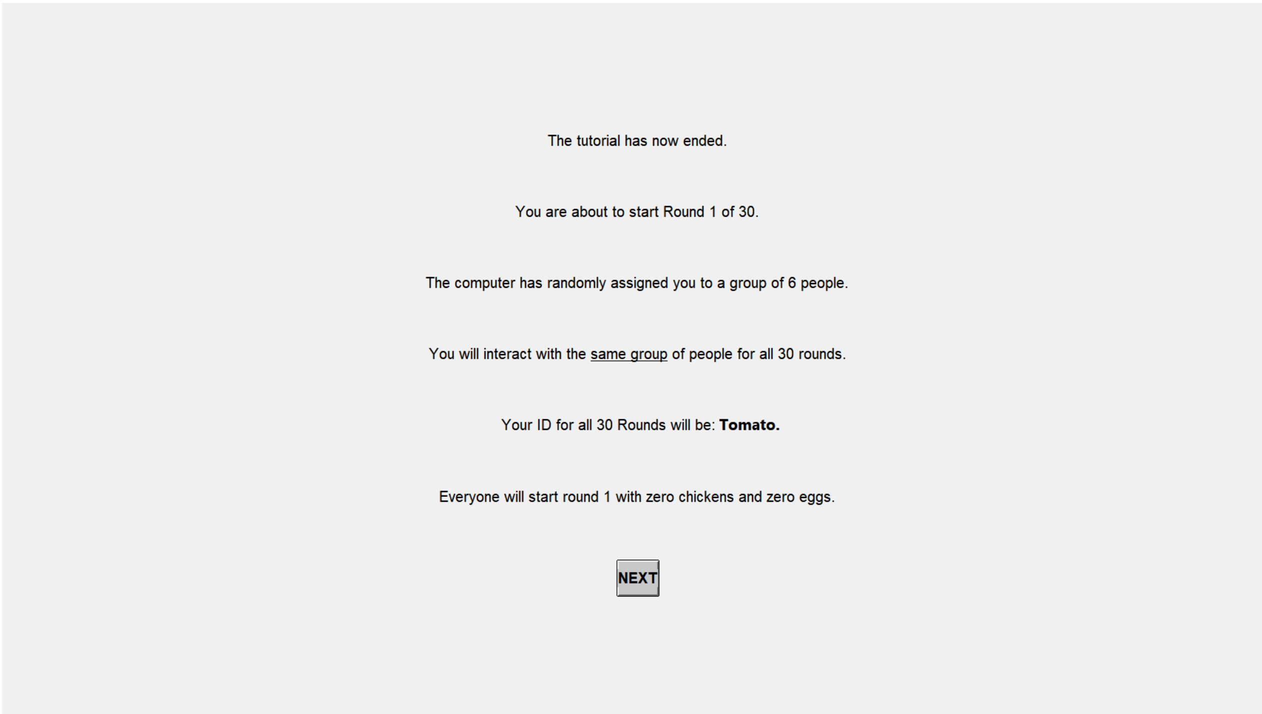
In the final round, there is no election. Each chicken's eggs are immediately placed in its owner's basket.

Payment

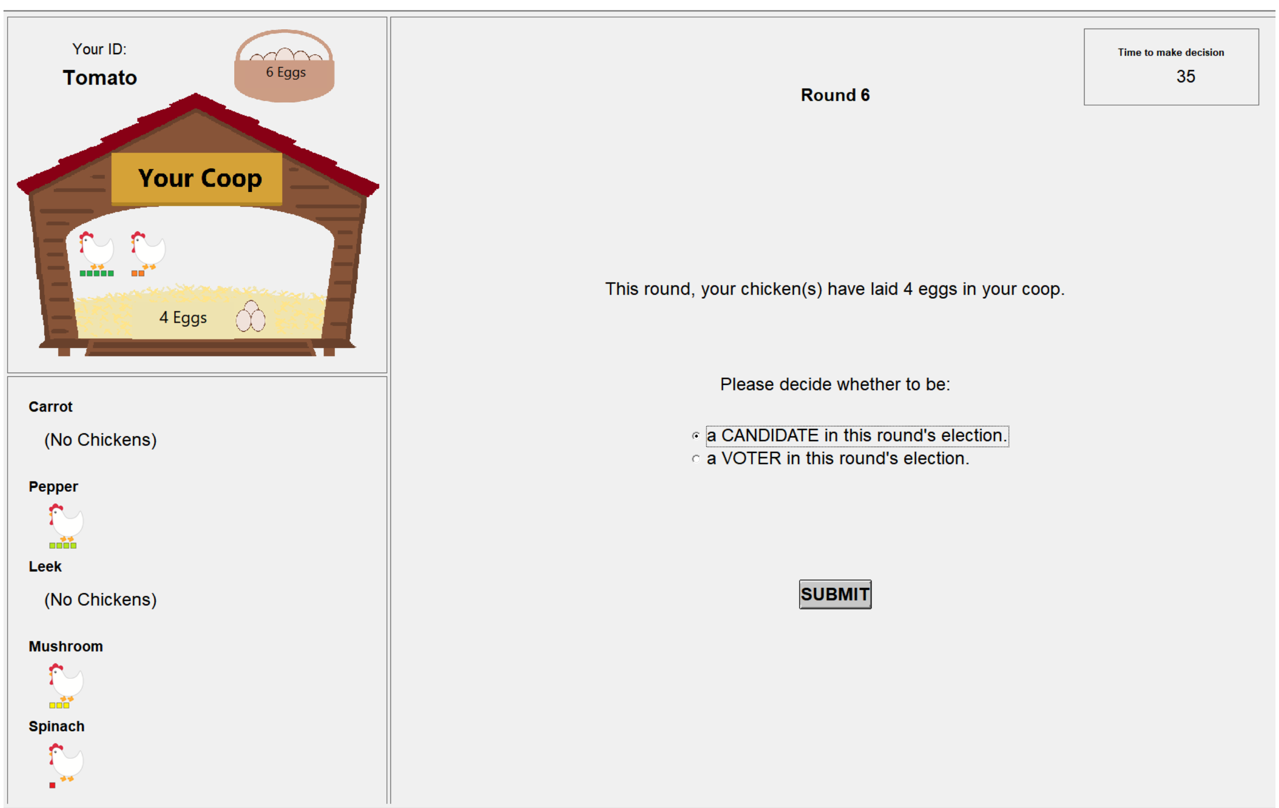
At the end of the experiment, the eggs in your basket will be converted into dollars at the rate of 5 eggs to $1. You will also receive a show-up fee of $5. You will be paid privately and confidentially.

You will be asked to fill in a short questionnaire before being paid.

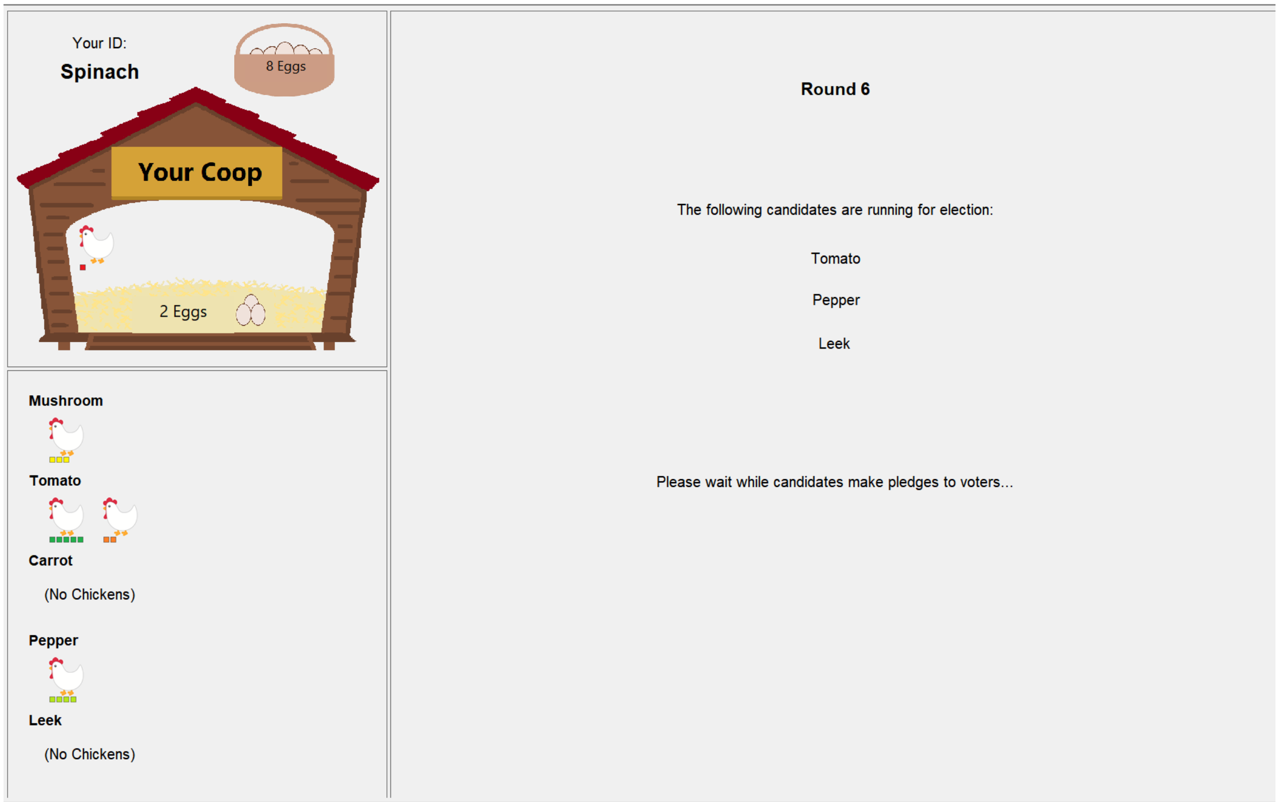
D.2 Screenshots (Patronage Treatment)



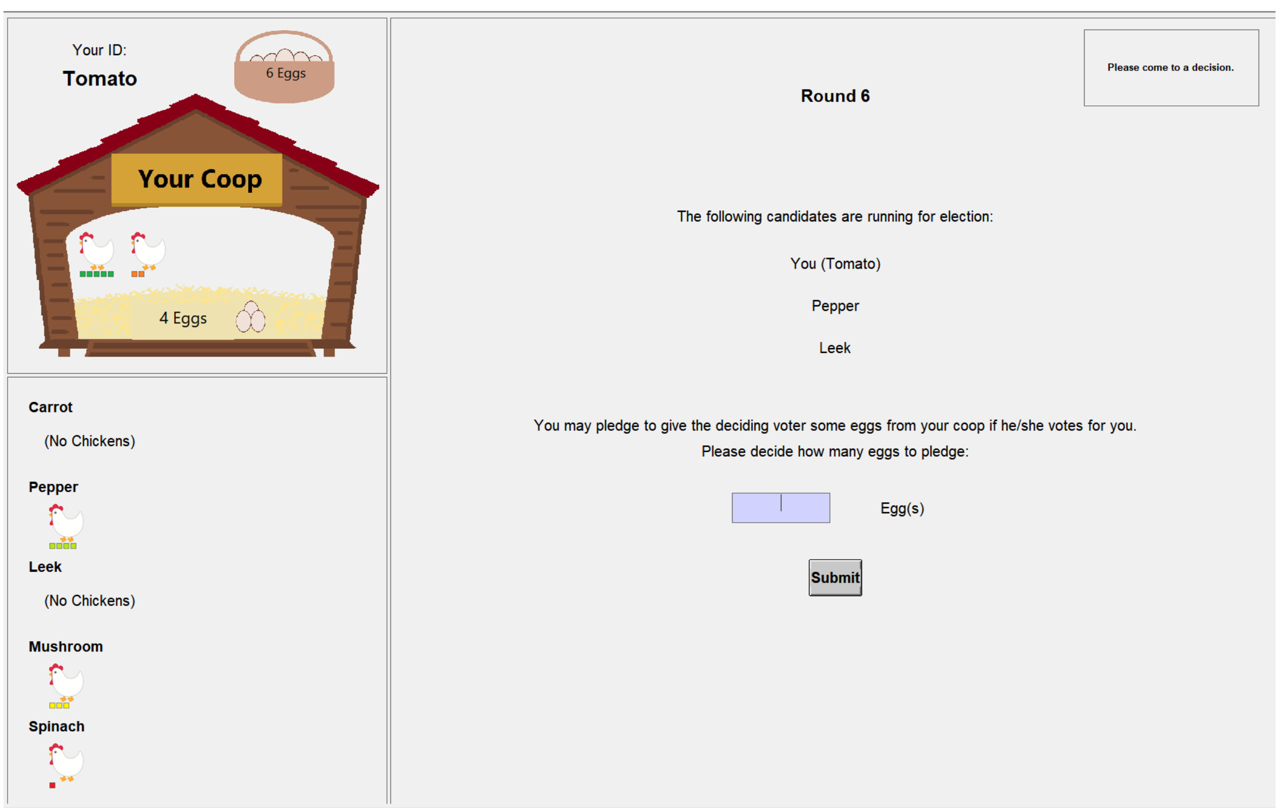
Start Screen



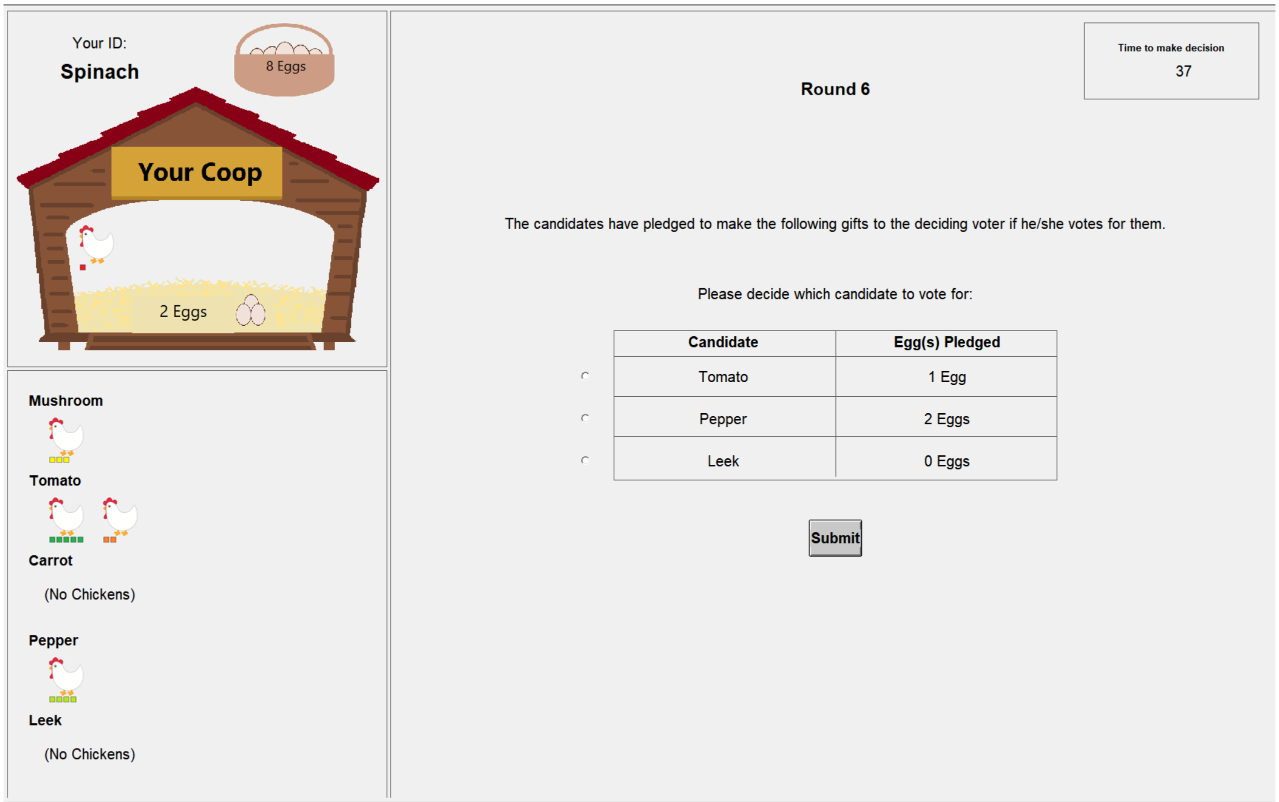
Screen 1



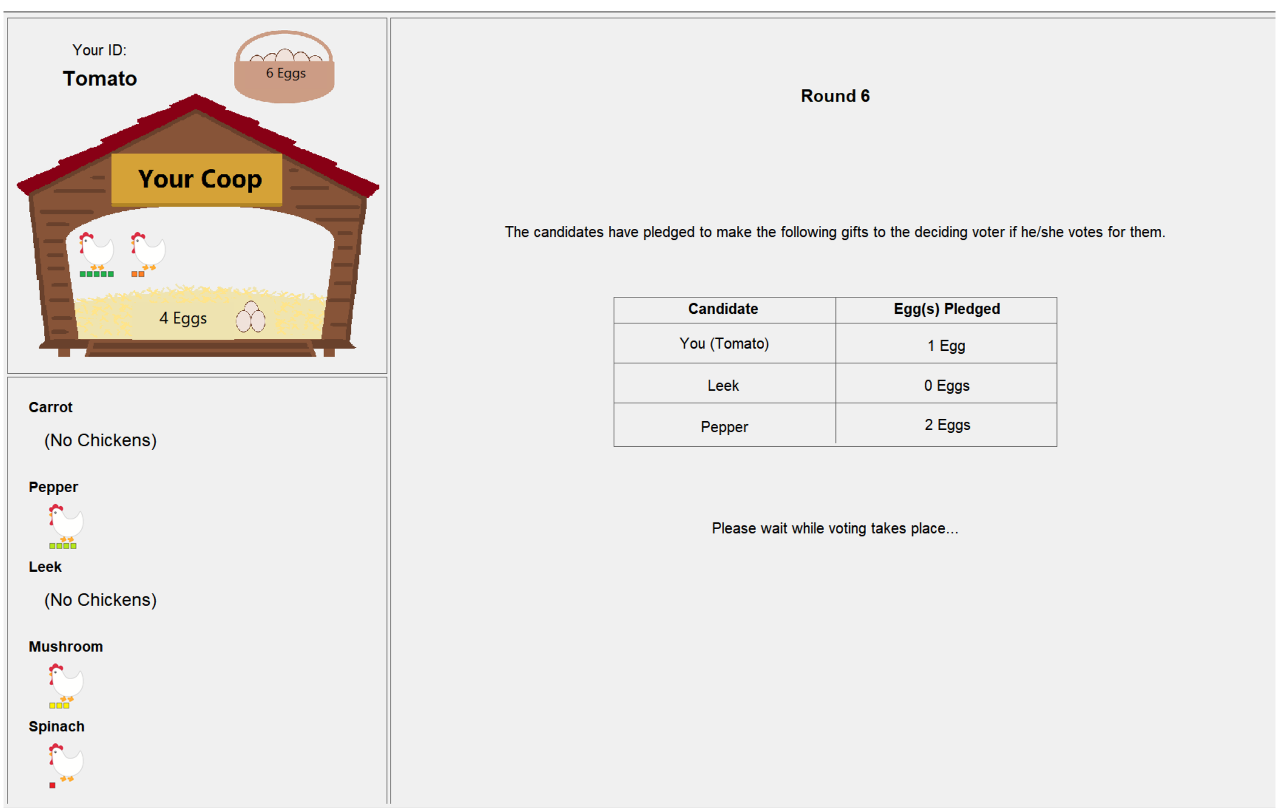
Screen 2 (Voter)



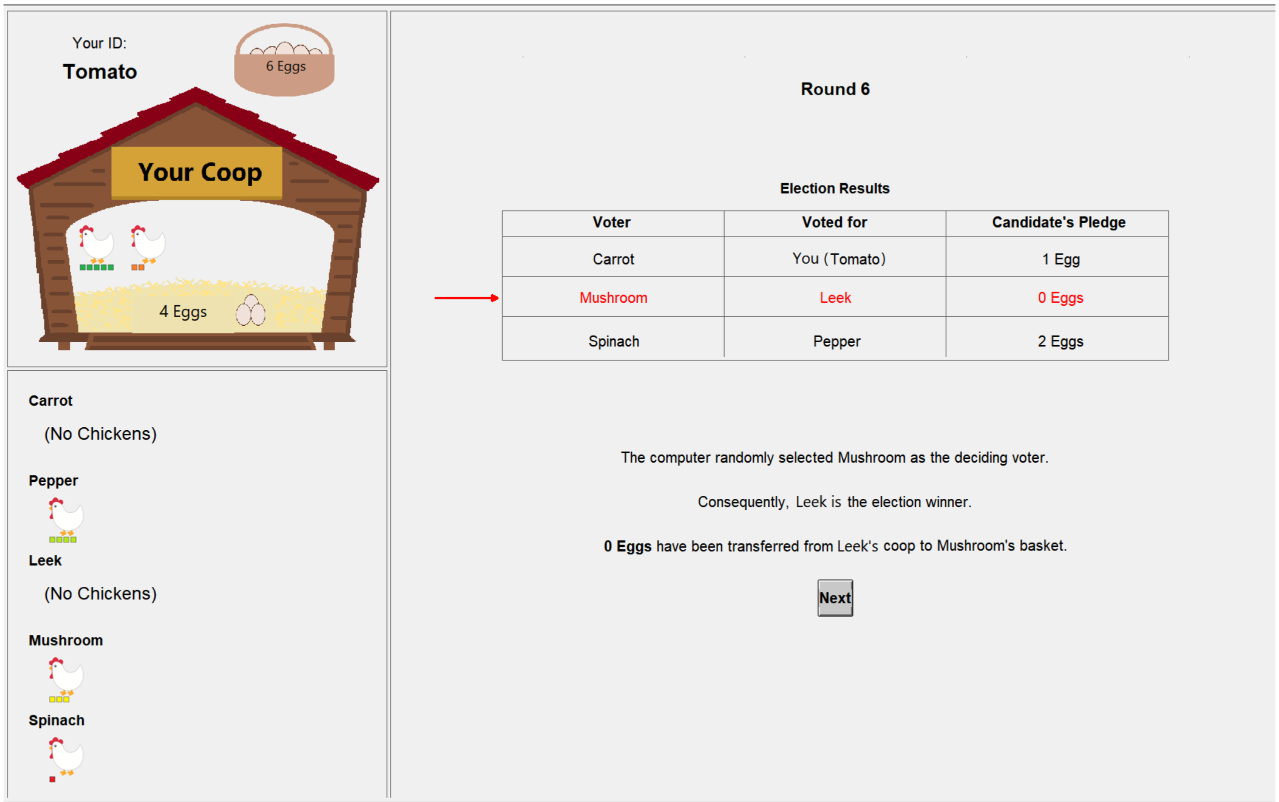
Screen 2 (Candidate)



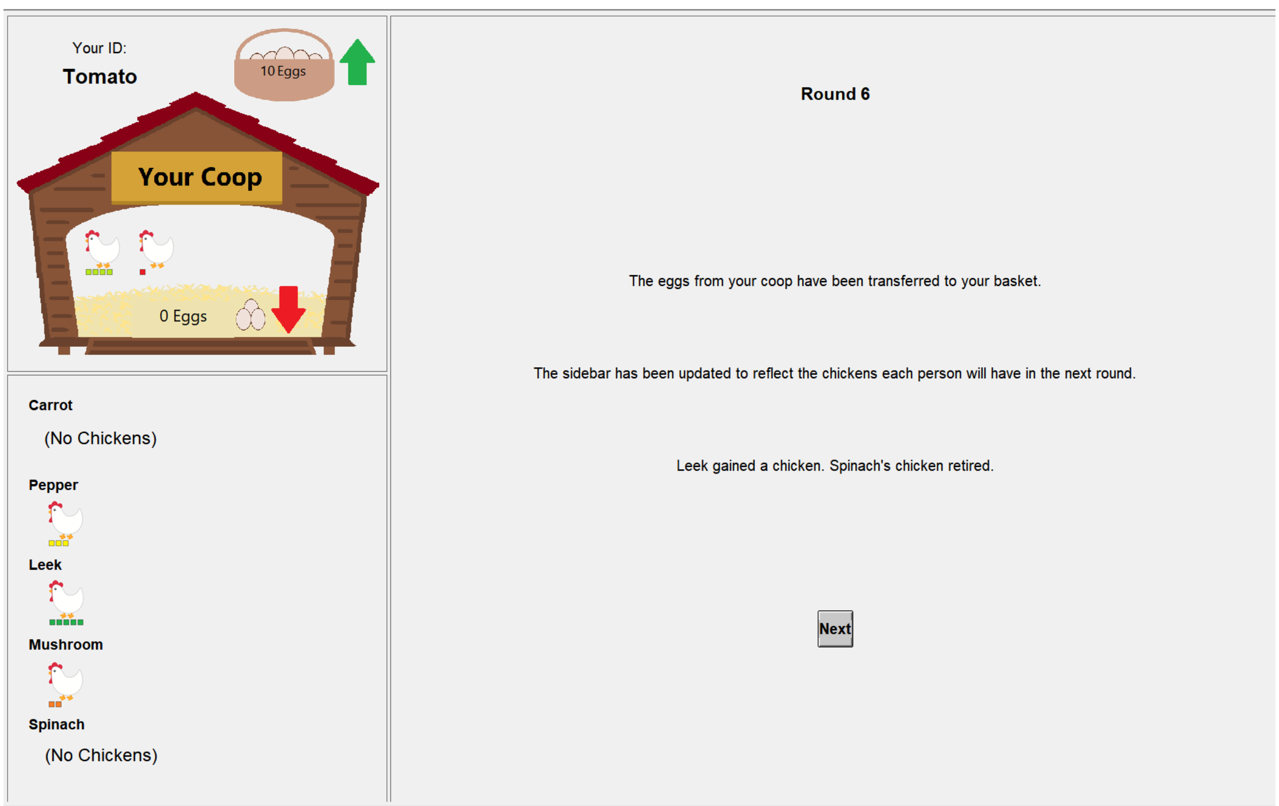
Screen 3 (Voter)



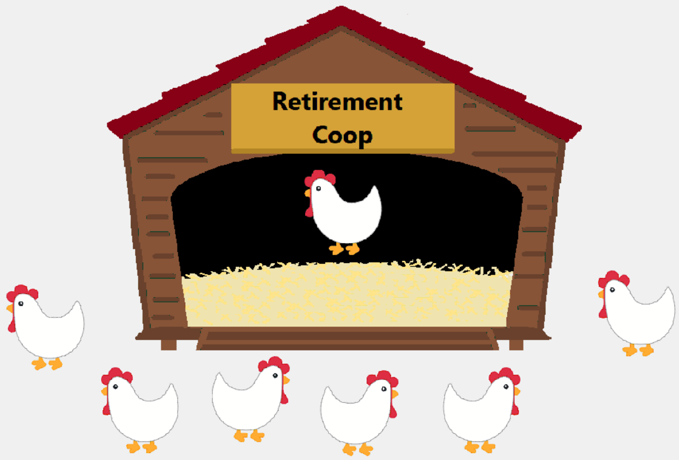
Screen 3 (Candidate)



Screen 4



Screen 5



The experiment is now over.

No chickens were harmed in the making of this experiment.

Next

End Screen 1

Final Egg Totals

	Amount in Basket
You (Tomato)	130.00 Eggs
Mushroom	20.00 Eggs
Carrot	26.00 Eggs
Leek	30.00 Eggs
Pepper	30.00 Eggs
Spinach	34.00 Eggs

Your eggs will be converted into dollars at the rate of 5 eggs to 1 dollar.

Next

End Screen 2

D.3 Instructions (No-Patronage Treatment)

Ground Rules

Welcome to the experiment. Please read the instructions below carefully.

Communication between participants is not allowed. Also, please refrain from using any communication devices. If you have any questions at any time, please raise your hand and an experimenter will come over to see you.

If you need to write anything, please use the paper and pen provided. Please do not write anything on this instruction sheet.

Groups and Privacy

The computer will randomly assign you to a group of *six* participants. You will interact only with the participants in your group. The computer will randomly select an ID for you, such as “Cabbage” or “Potato.” You will keep the same ID throughout the experiment.

Your decisions in the experiment will be anonymous, and your anonymity will be strictly preserved. Participants will interact with each other using only their IDs. For example, you may learn that “Cabbage has voted for you”; but you will not be told the real name of “Cabbage.”

Chickens and Eggs

In this experiment, you may win *chickens* that lay *eggs* for you. At the end of the experiment, your eggs will be converted into dollars at the rate of 5 eggs to $1.

Rounds

The experiment will consist of 30 rounds.

In each round, except the final round, an election will take place. The winner of the election receives a chicken. Chickens lay eggs for five rounds, and then retire.

Your Coop and Your Basket

Your chickens live in your chicken *coop*.

At the start of each round, each of your chickens lays two eggs. These eggs are put in your *basket*.

Details of Elections

In each round except the final round, there is an election to determine who will win a chicken. You will have a choice whether to 1) be a candidate in the election or 2) a voter in the election.

If you choose to be a voter, you will cast a vote for one of the candidates. The computer will then randomly select a *deciding voter*. The election outcome will be determined by the deciding voter's vote.

If nobody chooses to be a candidate or nobody chooses to be a voter, the computer randomly allocates the chicken to one participant.

Final Round

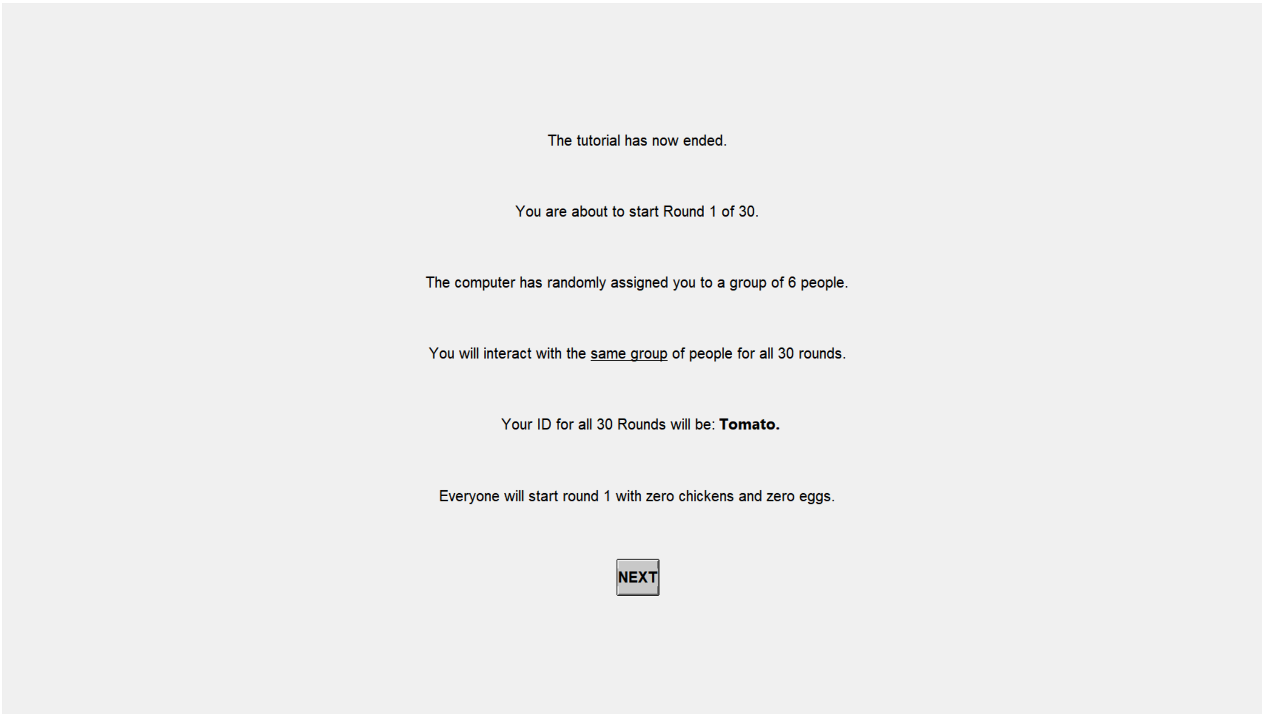
In the final round, there is no election. You will simply receive the eggs laid by your chickens.

Payment

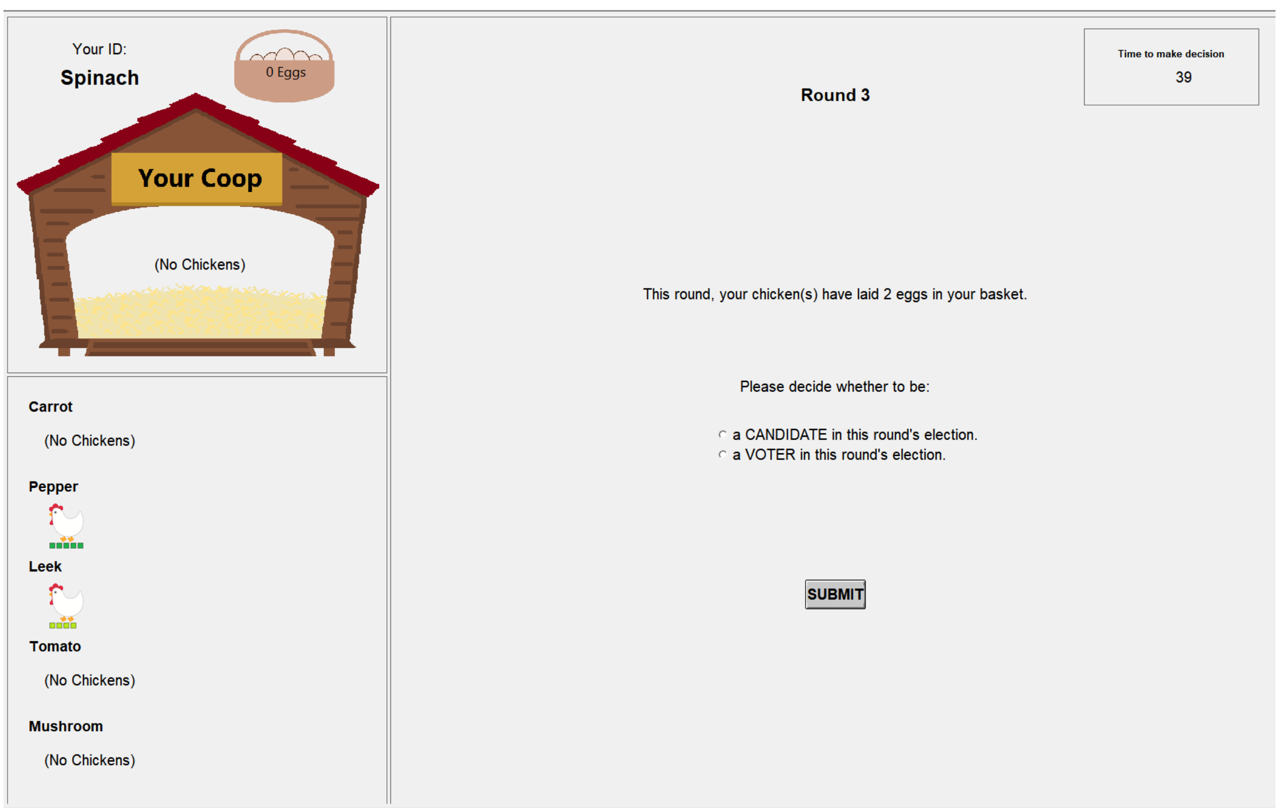
At the end of the experiment, the eggs in your basket will be converted into dollars at the rate of 5 eggs to $1. You will also receive a show-up fee of $5. You will be paid privately and confidentially.

You will be asked to fill in a short questionnaire before being paid.

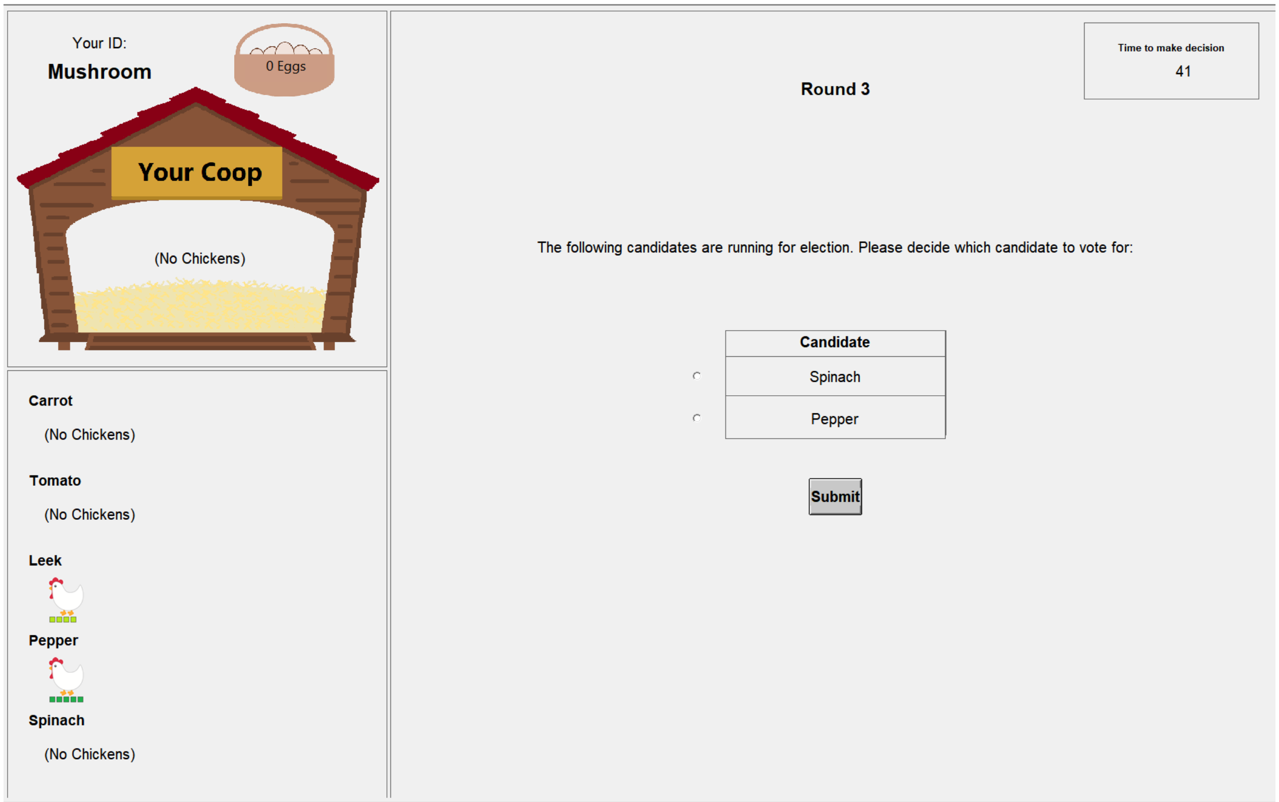
D.4 Screenshots (No-Patronage Treatment)



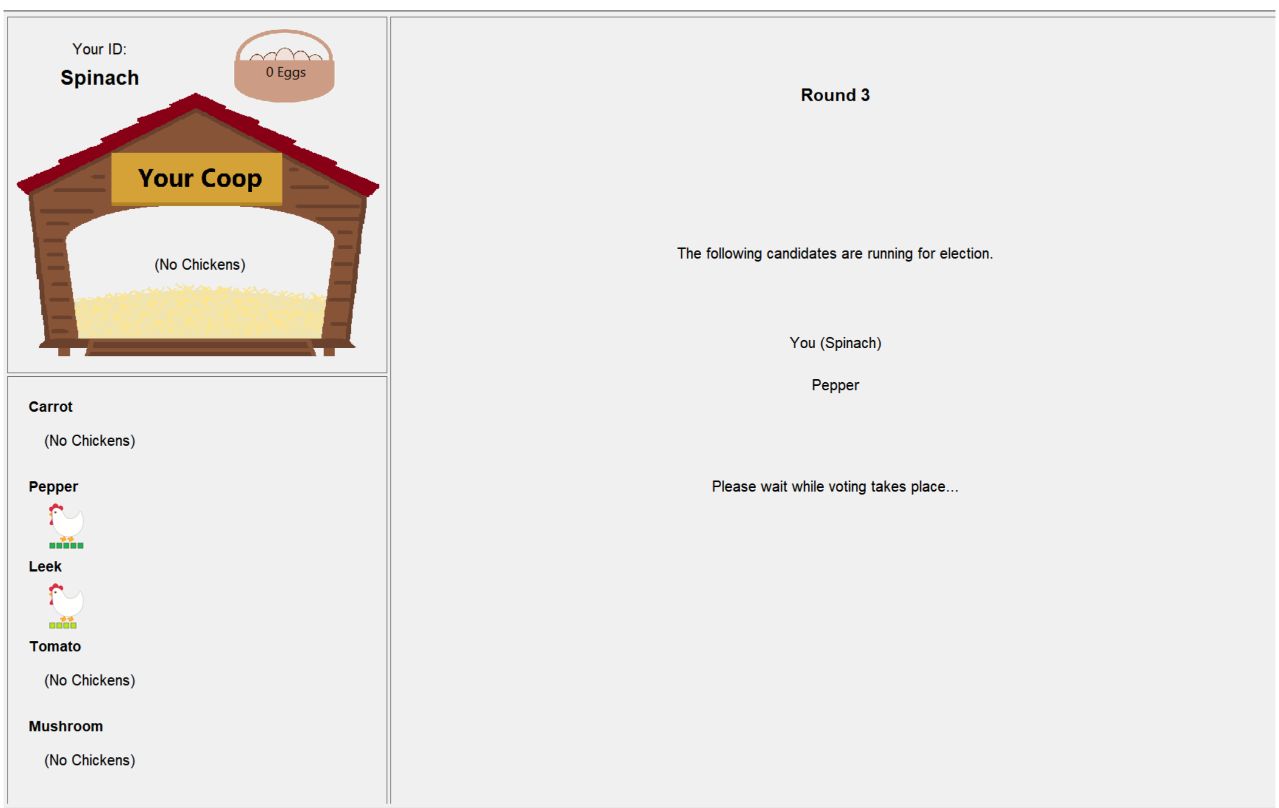
Start Screen



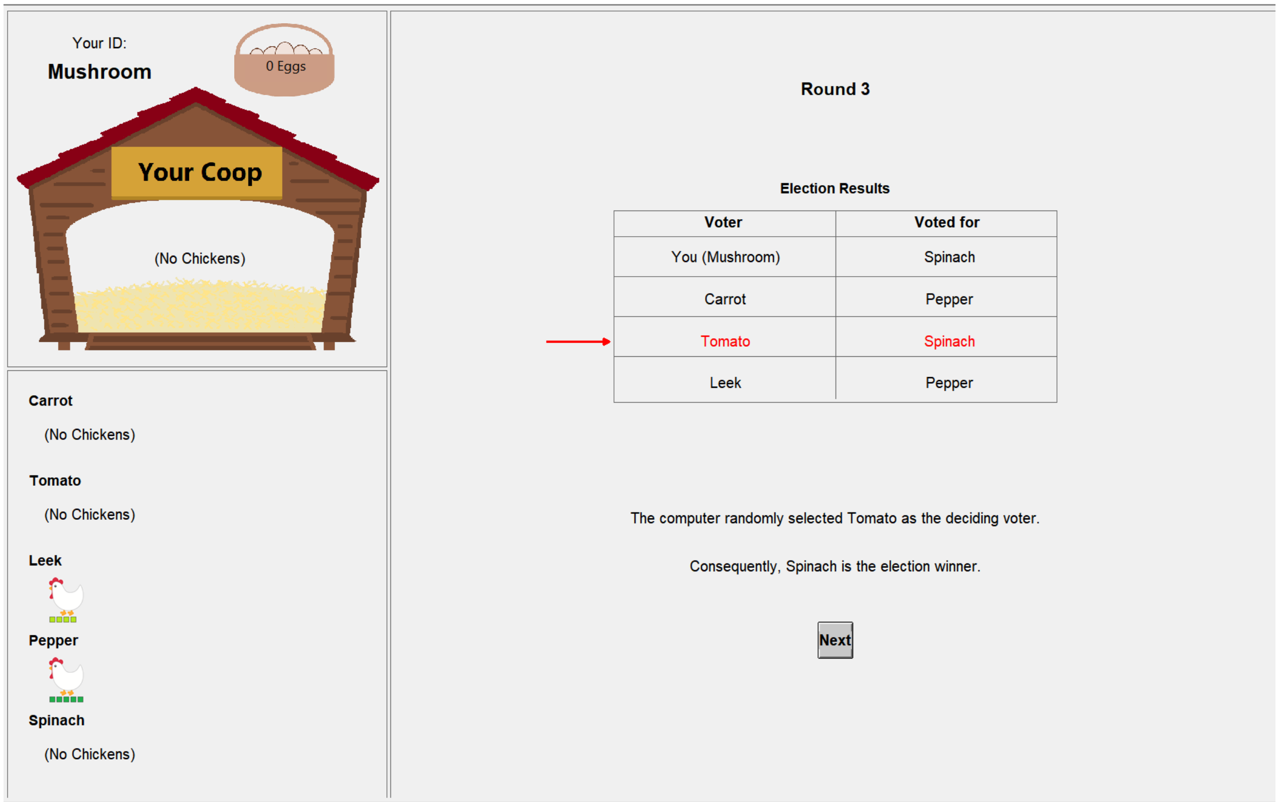
Screen 1



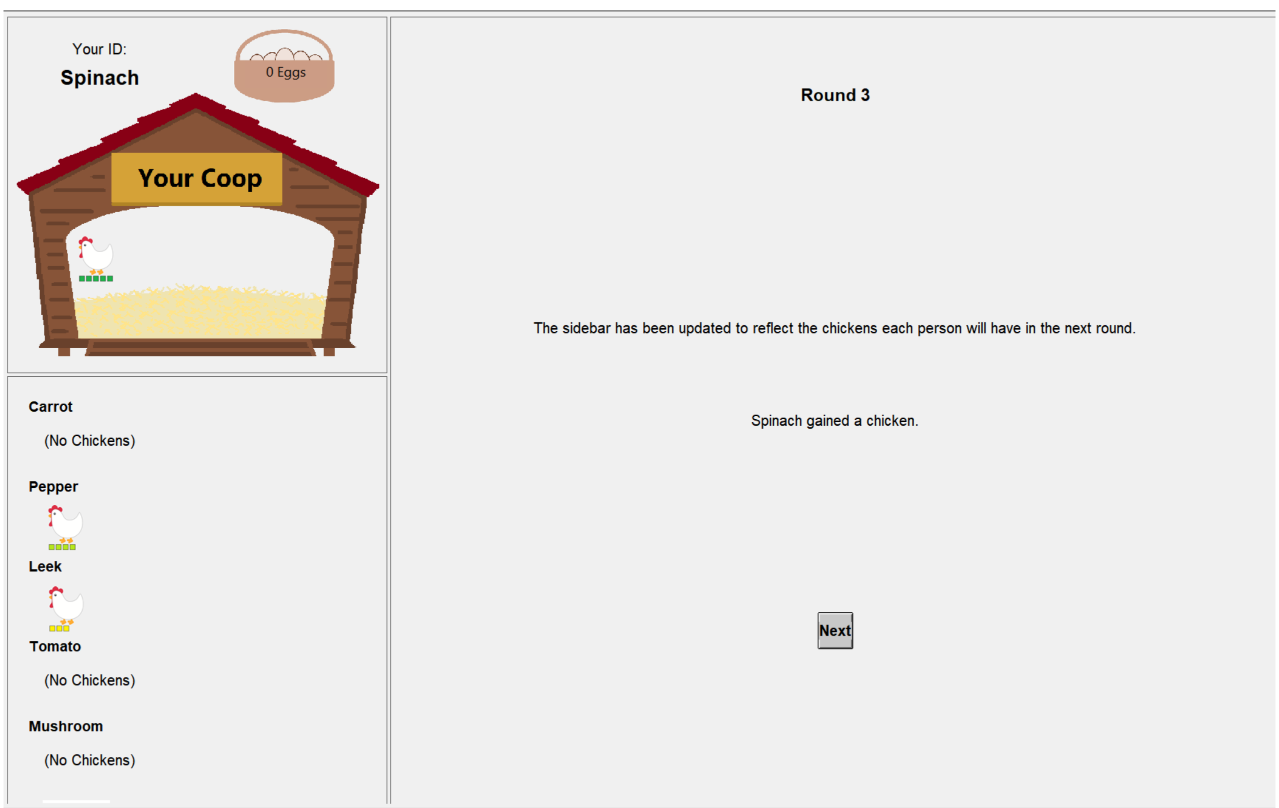
Screen 2 (Voter)



Screen 2 (Candidate)



Screen 3



Screen 4

D.5 Post-Experiment Survey Questions

Demographic questions

What is your age? *(If you would prefer not to answer, please leave it blank.)*
What is your year of study? [1st Year, 2nd Year, 3rd Year, 4th Year, Postgraduate]
What is your nationality?
What is your course of study?
What is your gender? [Male, Female, I'd prefer not to answer, Other (Please describe if you wish)]

Voting behaviour*
How well do the following statements describe the strategies you followed as a voter? *Note: if you never voted, please indicate how you think you would have voted.* [0: Not well at all— 10: Extremely well]

- I voted for the candidate who pledged the most eggs.†
- I voted for candidates who pledged a large share of their eggs, even if they did not pledge the most.†
- I voted against the candidate with the most chickens because I thought more competition would increase pledges to voters.†
- I voted against the candidate with the most chickens because it was the fair thing to do.
- I voted for candidates who voted for me in the past.
- I was easily bored so I voted more or less randomly.

Are there other strategies you followed? If so, please describe below.

Pledging behaviour*
How well do the following statements describe your reasons for pledging eggs when you were a candidate? *Note: if you were never a candidate, please indicate how you think you would have pledged.* [0: Not well at all - 10: Extremely well]

- I pledged eggs because I was concerned with fairness.†
- I pledged eggs because I wanted to win elections†.
- Are there other reasons you pledged eggs? If so, please describe below.†

Running behaviour*
How well do the following statements describe your reasons for choosing whether to be a candidate or a voter in each round? [0: Not well at all - 10: Extremely well]

- I chose whether to be a candidate or voter depending on what I thought would get me the most eggs.
- I sometimes chose to vote because I felt it was unfair to be a candidate too often or win too many chickens.
- I sometimes chose to vote because I wanted to support/oppose a particular candidate.‡
- I sometimes chose to vote because I wanted to support/oppose a particular candidate, even when I thought it would not get me the most eggs.†
- I sometimes chose to be a candidate because I wanted to oppose someone I wanted to see lose.‡
- I sometimes chose to be a candidate because I wanted to oppose someone I wanted to see lose, even when I thought it would not get me the most eggs.†
- I was easily bored so I chose whether to be a voter or a candidate more or less randomly.

Are there other reasons why you chose to be a candidate or voter? If so, please describe below.

Miscellaneous questions
To what extent do you think winning chickens was a matter of luck? [0: Not Luck - 10: Mostly Luck]
Was there anything unclear about the instructions?

Authority Preference
How much do you value having authority over other people? [0: Not at all - 10: A lot]

Disadvantageous inequity aversion
In each row below, you will have to choose between hypothetical allocations of experimental Coins between yourself and another. Please select, for each row, which option you prefer.

(1)	Option A: You: 12.5 Coins, Other: 15 Coins	Option B: You: 10 Coins, Other: 26 Coins
(2)	Option A: You: 11.5 Coins, Other: 15 Coins	Option B: You: 10 Coins, Other: 26 Coins
(3)	Option A: You: 10.5 Coins, Other: 15 Coins	Option B: You: 10 Coins, Other: 26 Coins
(4)	Option A: You: 9.5 Coins, Other: 15 Coins	Option B: You: 10 Coins, Other: 26 Coins
(5)	Option A: You: 8.5 Coins, Other: 15 Coins	Option B: You: 10 Coins, Other: 26 Coins
(6)	Option A: You: 7.5 Coins, Other: 15 Coins	Option B: You: 10 Coins, Other: 26 Coins
(7)	Option A: You: 6.5 Coins, Other: 15 Coins	Option B: You: 10 Coins, Other: 26 Coins
(8)	Option A: You: 5.5 Coins, Other: 15 Coins	Option B: You: 10 Coins, Other: 26 Coins
(9)	Option A: You: 4.5 Coins, Other: 15 Coins	Option B: You: 10 Coins, Other: 26 Coins
(10)	Option A: You: 3.5 Coins, Other: 15 Coins	Option B: You: 10 Coins, Other: 26 Coins

Advantageous inequity aversion

In each row below, you will have to choose between hypothetical allocations of experimental Coins between yourself and another. Please select, for each row, which option you prefer.

(1)	Option A: You: 18.5 Coins, Other: 9 Coins	Option B: You: 17 Coins, Other: 5 Coins
(2)	Option A: You: 17.5 Coins, Other: 9 Coins	Option B: You: 17 Coins, Other: 5 Coins
(3)	Option A: You: 16.5 Coins, Other: 9 Coins	Option B: You: 17 Coins, Other: 5 Coins
(4)	Option A: You: 15.5 Coins, Other: 9 Coins	Option B: You: 17 Coins, Other: 5 Coins
(5)	Option A: You: 14.5 Coins, Other: 9 Coins	Option B: You: 17 Coins, Other: 5 Coins
(6)	Option A: You: 13.5 Coins, Other: 9 Coins	Option B: You: 17 Coins, Other: 5 Coins
(7)	Option A: You: 12.5 Coins, Other: 9 Coins	Option B: You: 17 Coins, Other: 5 Coins
(8)	Option A: You: 11.5 Coins, Other: 9 Coins	Option B: You: 17 Coins, Other: 5 Coins
(9)	Option A: You: 10.5 Coins, Other: 9 Coins	Option B: You: 17 Coins, Other: 5 Coins
(10)	Option A: You: 9.5 Coins, Other: 9 Coins	Option B: You: 17 Coins, Other: 5 Coins

*Order of questions was randomised within section.
†Only included in patronage treatment survey.
‡Only included in no-patronage treatment survey.

E Instructions and Screenshots: Follow-up Experiment

E.1 Instructions

Gender Blind Treatment

Ground Rules

Welcome to the study. Please read the instructions below carefully.

Communication between participants is not allowed. Also, please refrain from using any communication devices. If you have any questions at any time, please raise your hand and an experimenter will come over to see you.

If you need to write anything, please use the paper and pen provided. Please do not write anything on this instruction sheet.

This study will consist of two stages.

In Stage 1, you will be asked to complete a series of decision tasks.

In Stage 2, you will play a game with other participants and then complete a short questionnaire.

Stage 1

In Stage 1, you will be given a series of decision tasks.

Your earnings in this stage will depend on your decisions in these tasks. Earnings for this stage will be denominated in tokens. At the end of the experiment, your tokens will be converted into dollars at the rate of 250 tokens to $1.

Detailed instructions for each task and how your earnings will be determined will appear on your computer screen.

Stage 2

Groups and Privacy

In this stage, you will play a game in a group consisting of six participants. You will randomly be assigned to a group. Your anonymity will be strictly preserved. Each group member will be identified only by an avatar and screen name (see examples below). For instance, you might learn that "Brinjal has voted for you"; but you will not be told the real name of "Brinjal".

Brinjal

Broccoli

Chickens and Eggs

In the game, you may win *chickens* that lay *eggs* for you. You may give some of your eggs to other participants. At the end of the game, your eggs will be converted into dollars at the rate of 5 eggs to $1.

Rounds

The game will consist of 30 rounds.

In each round, except the final round, an election will take place. The winner of the election receives a chicken. Chickens lay eggs for five rounds, and then retire.

Your Coop and Your Basket

Your chickens live in your chicken *coop*. At the start of each round, each of your chickens lays two eggs in the coop. You may give some of these eggs to other participants.

At the end of the round, the eggs in your coop are transferred to your egg *basket*.

Details of Elections

In each round except the final round, there is an election to determine who will win a chicken. You will have a choice whether to 1) be a candidate in the election or 2) a voter in the election. One voter will be selected at random by the computer to be the *deciding voter*. The election outcome will be determined by the deciding voter's vote.
The election will proceed as follows:

Step 1: If you are a candidate, you may pledge to give some eggs from your coop to the deciding voter if they vote for you.

Step 2: If you are a voter, you will choose whom to vote for after observing the candidate's pledges. The computer will then randomly select the deciding voter.

Step 3: At the end of the election, the election winner's pledge will be transferred to the deciding voter's basket.

If nobody chooses to be a candidate or nobody chooses to be a voter, the computer randomly allocates the chicken to one participant.

Final Round

In the final round, there is no election. Each chicken's eggs are immediately placed in its owner's basket.

Payment

At the end of the game, the eggs in your basket will be converted into dollars at the rate of 5 eggs to $1. At this time, you will also be paid your earnings from Stage 1 and you will receive a completion fee of $5. You will be paid privately and confidentially.

You will be asked to fill in a short questionnaire before being paid.

Gender Reveal Treatment

Ground Rules

Welcome to the study. Please read the instructions below carefully.

Communication between participants is not allowed. Also, please refrain from using any communication devices. If you have any questions at any time, please raise your hand and an experimenter will come over to see you.

If you need to write anything, please use the paper and pen provided. Please do not write anything on this instruction sheet.

This study will consist of two stages.

In Stage 1, you will be asked to complete a series of decision tasks.

In Stage 2, you will play a game with other participants and then complete a short questionnaire.

Stage 1

In Stage 1, you will be given a series of decision tasks.

Your earnings in this stage will depend on your decisions in these tasks. Earnings for this stage will be denominated in tokens. At the end of the experiment, your tokens will be converted into dollars at the rate of 250 tokens to $1.

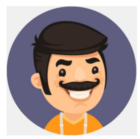
Detailed instructions for each task and how your earnings will be determined will appear on your computer screen.

Stage 2

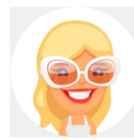
Groups and Privacy

In this stage, you will play a game in a group consisting of six participants. You will randomly be assigned to a group. Your anonymity will be strictly preserved. Each group member will be identified only by an avatar and screen name (see examples below). For instance, you might learn that "Brian has voted for you"; but you will not be told the real name of "Brian".

Brian



Donna



Chickens and Eggs

In the game, you may win *chickens* that lay *eggs* for you. You may give some of your eggs to other participants. At the end of the game, your eggs will be converted into dollars at the rate of 5 eggs to $1.

Rounds

The game will consist of 30 rounds.

In each round, except the final round, an election will take place. The winner of the election receives a chicken. Chickens lay eggs for five rounds, and then retire.

Your Coop and Your Basket

Your chickens live in your chicken *coop*. At the start of each round, each of your chickens lays two eggs in the coop. You may give some of these eggs to other participants.

At the end of the round, the eggs in your coop are transferred to your egg *basket*.

Details of Elections

In each round except the final round, there is an election to determine who will win a chicken. You will have a choice whether to 1) be a candidate in the election or 2) a voter in the election. One voter will be selected at random by the computer to be the *deciding voter*. The election outcome will be determined by the deciding voter's vote.
The election will proceed as follows:

Step 1: If you are a candidate, you may pledge to give some eggs from your coop to the deciding voter if they vote for you.

Step 2: If you are a voter, you will choose whom to vote for after observing the candidate's pledges. The computer will then randomly select the deciding voter.

Step 3: At the end of the election, the election winner's pledge will be transferred to the deciding voter's basket.

If nobody chooses to be a candidate or nobody chooses to be a voter, the computer randomly allocates the chicken to one participant.

Final Round

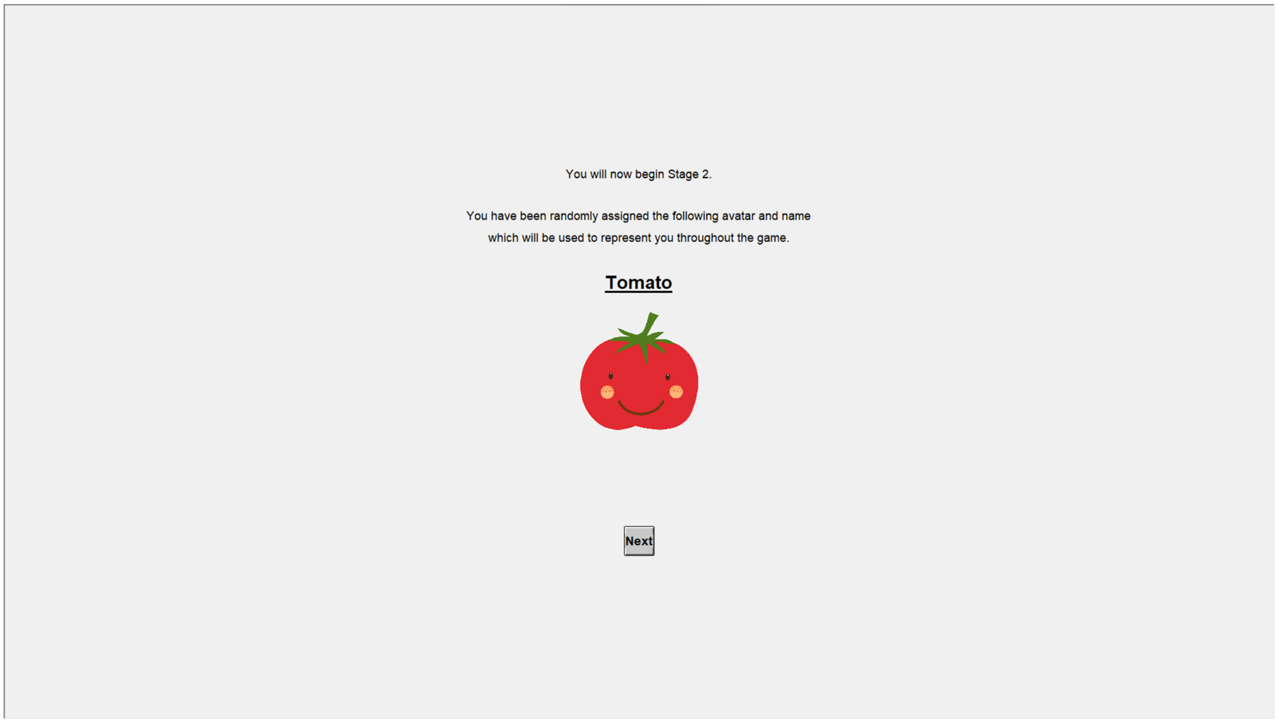
In the final round, there is no election. Each chicken's eggs are immediately placed in its owner's basket.

Payment

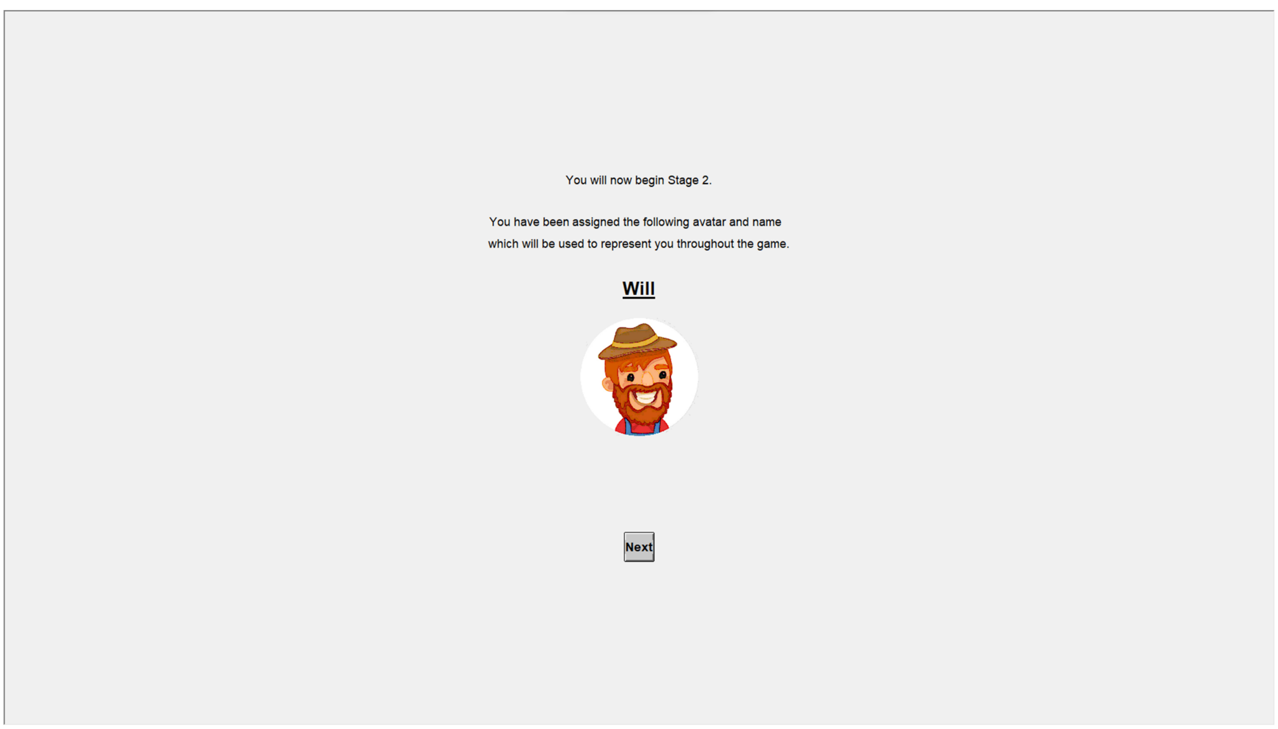
At the end of the game, the eggs in your basket will be converted into dollars at the rate of 5 eggs to $1. At this time, you will also be paid your earnings from Stage 1 and you will receive a completion fee of $5. You will be paid privately and confidentially.

You will be asked to fill in a short questionnaire before being paid.

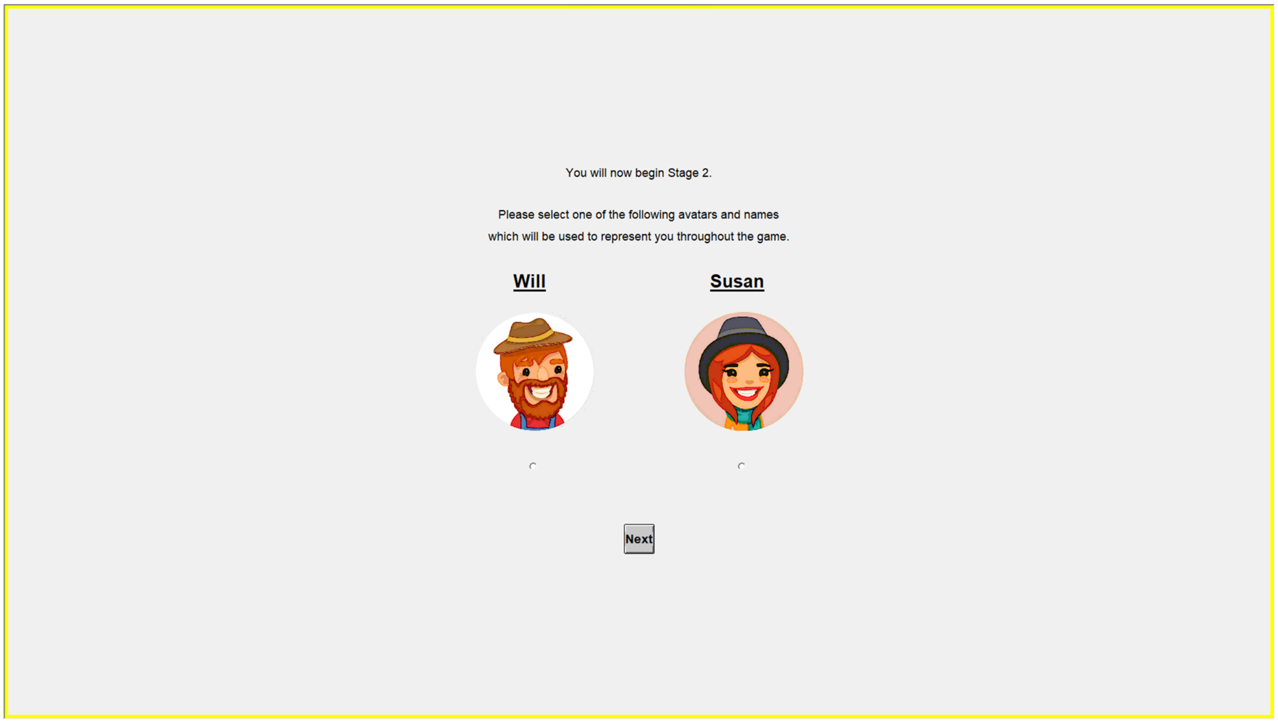
E.2 Screenshots



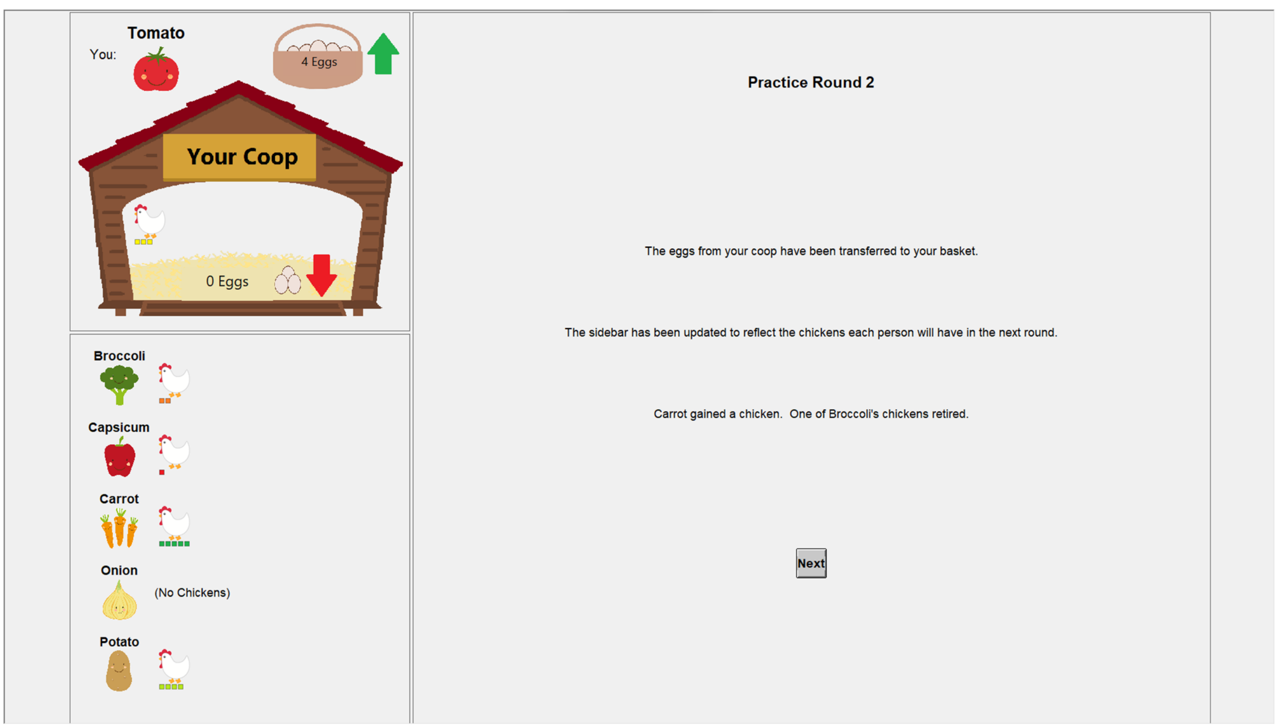
Avatar Assignment Screen (Gender Blind)



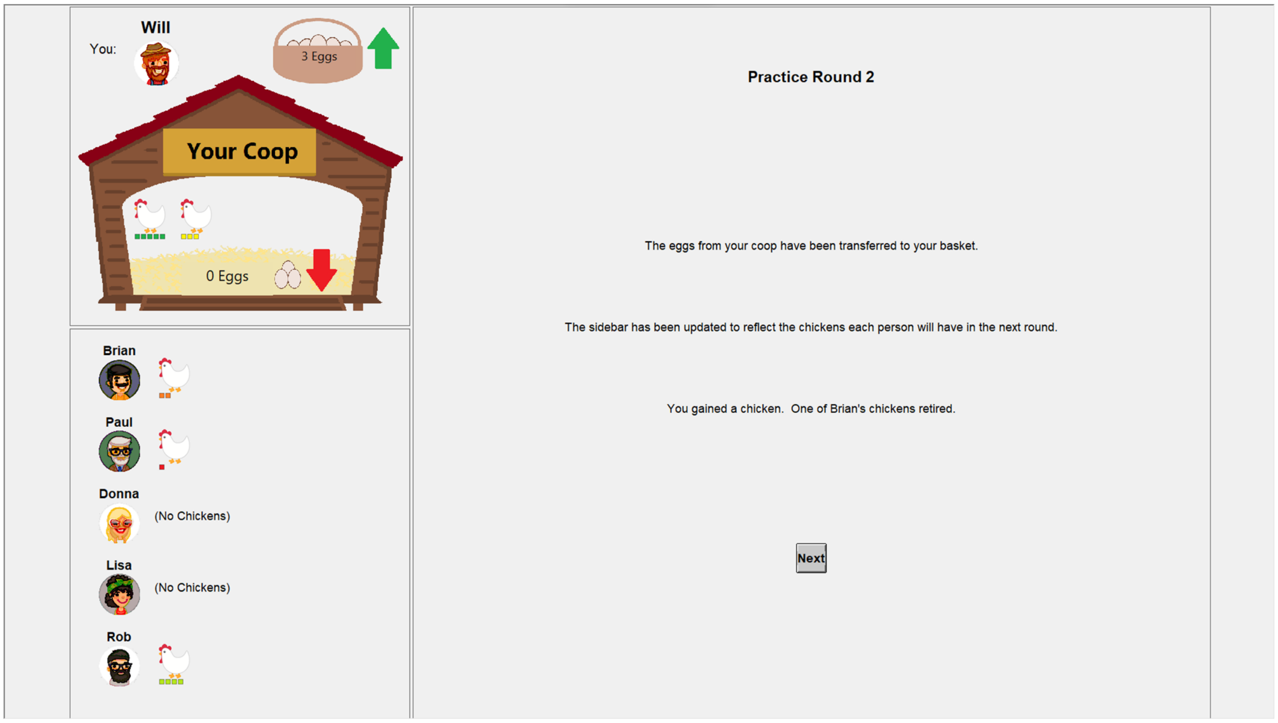
Avatar Assignment Screen (Gender Reveal)



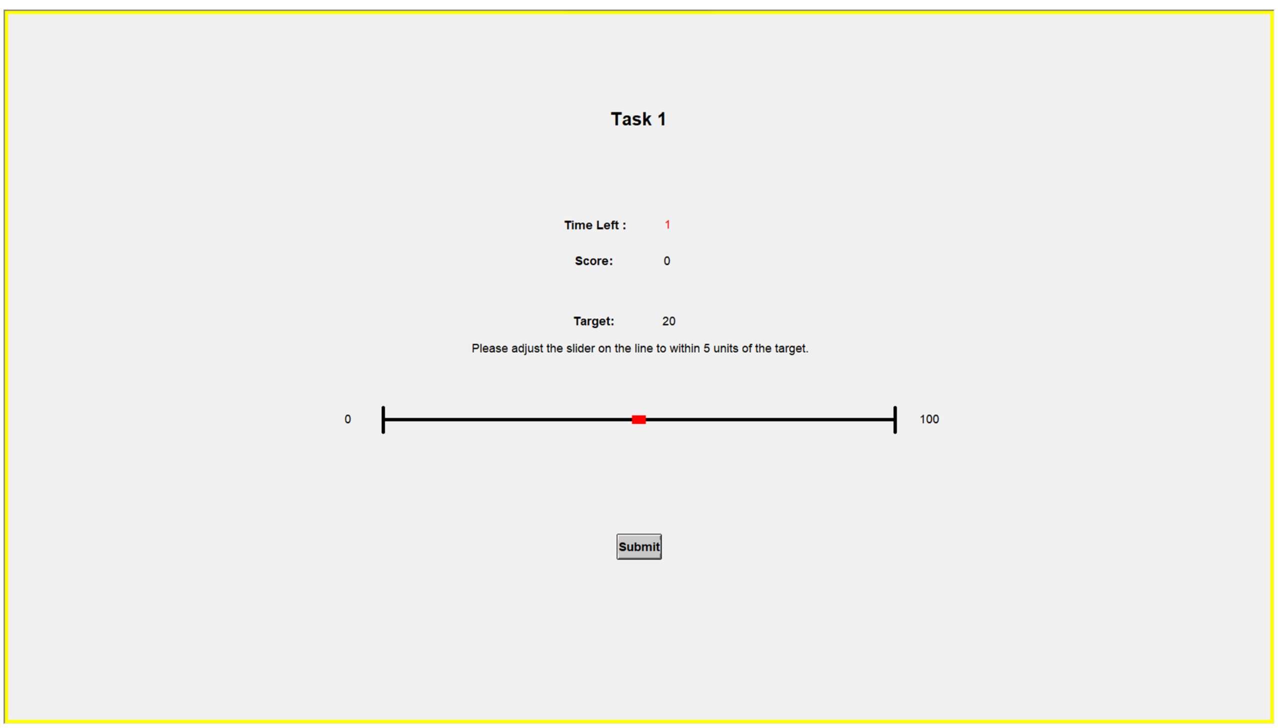
Avatar Assignment Screen (Gender Reveal, non-binary subjects)



Example of Interface (Gender Blind)

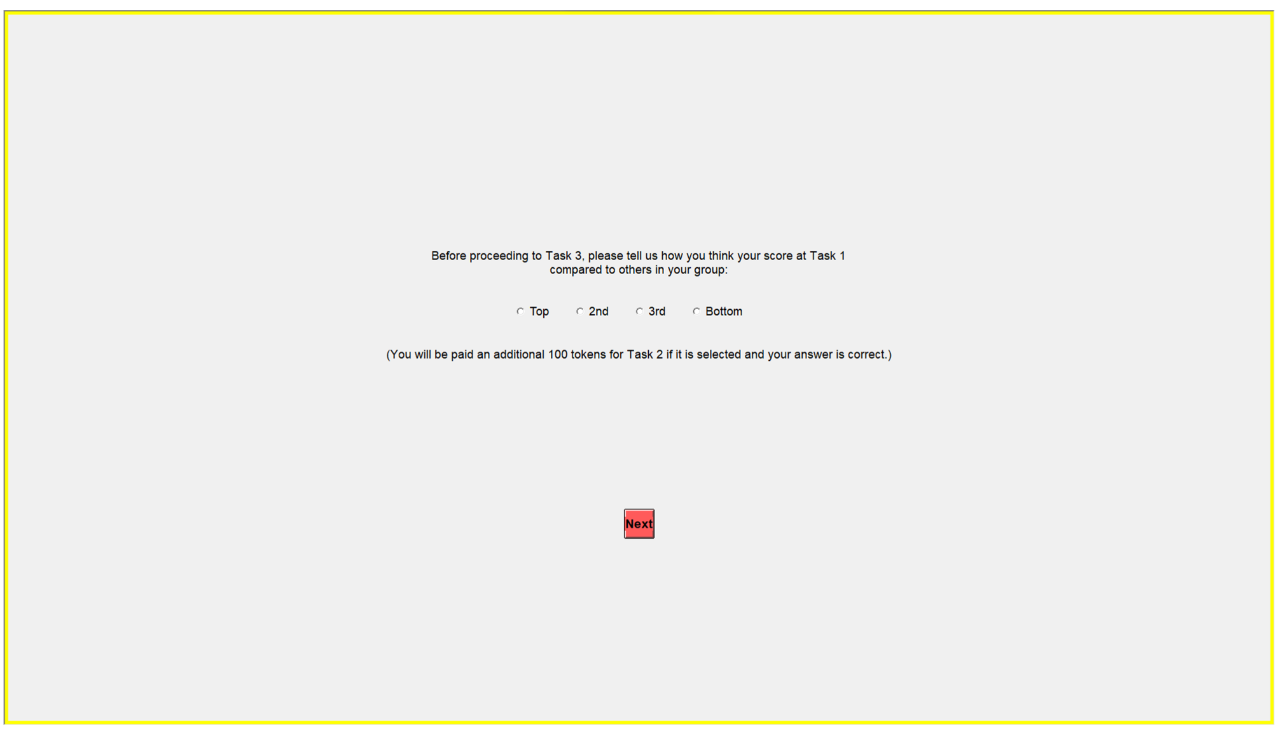


Example of Interface (Gender Reveal)

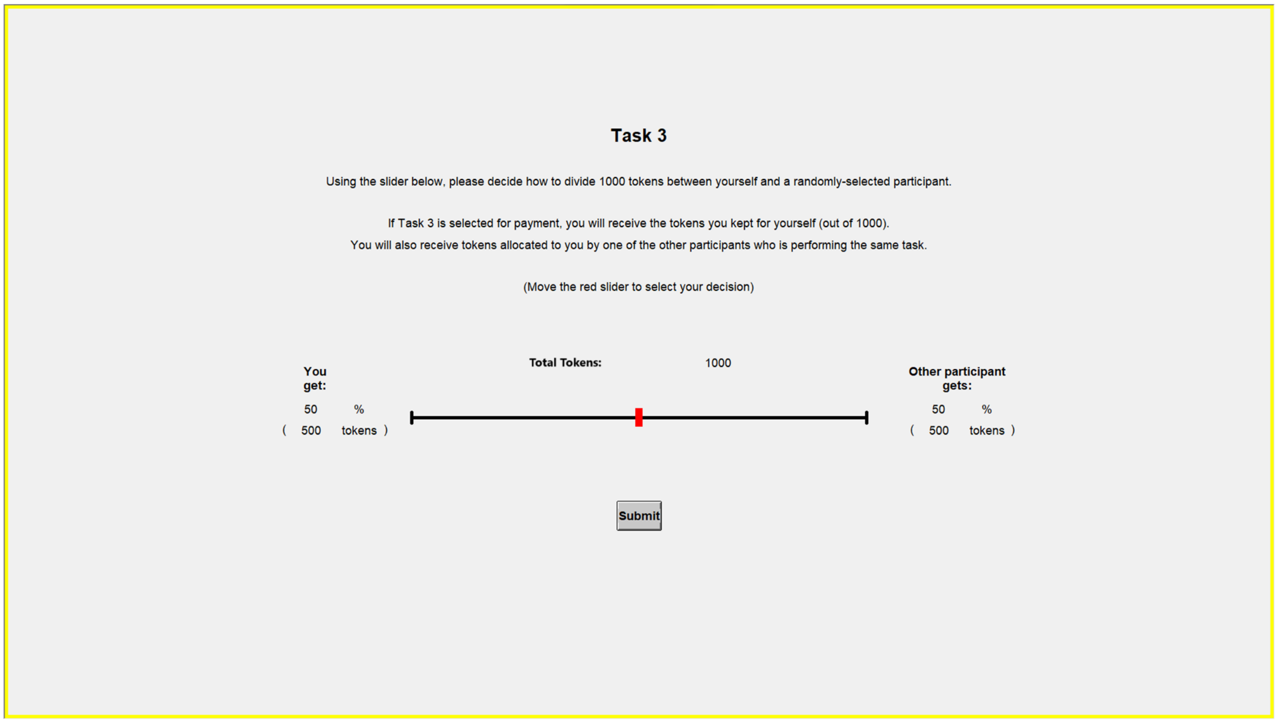


Trait Measurement - Slider Task

Trait Measurement - Competitiveness



Trait Measurement - Overconfidence



Task 3

Using the slider below, please decide how to divide 1000 tokens between yourself and a randomly-selected participant.

If Task 3 is selected for payment, you will receive the tokens you kept for yourself (out of 1000).
You will also receive tokens allocated to you by one of the other participants who is performing the same task.

(Move the red slider to select your decision)

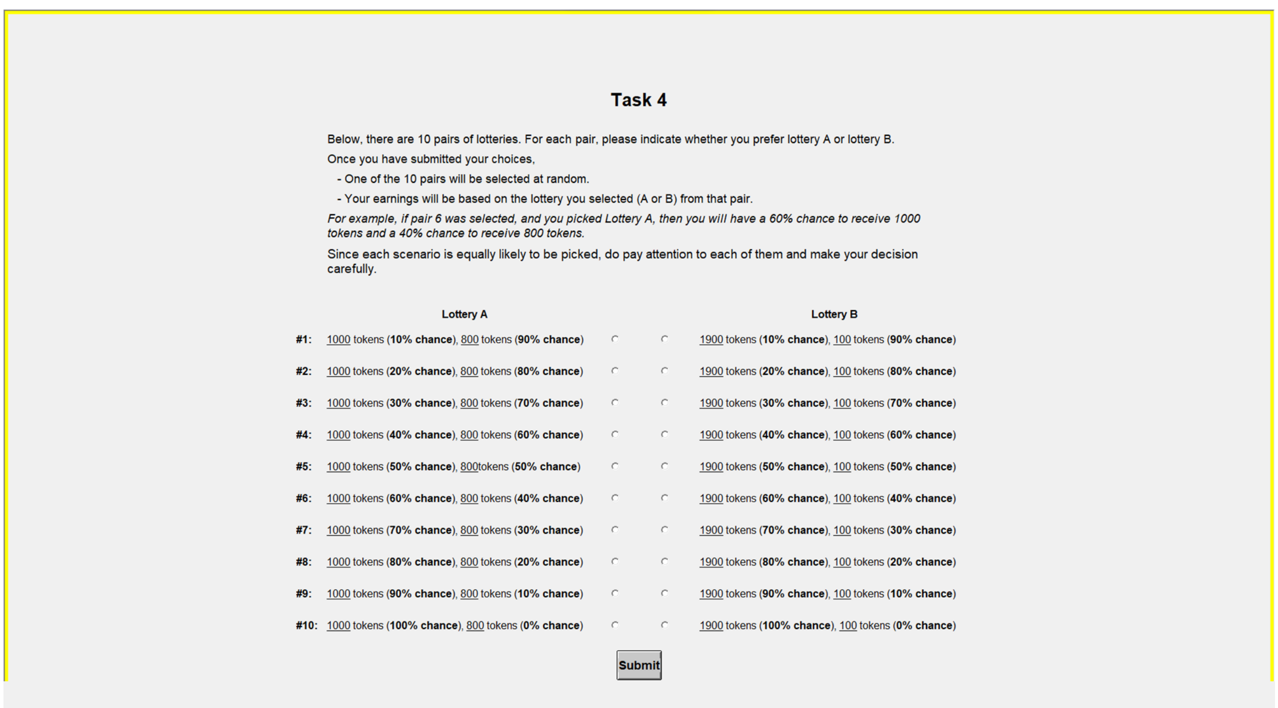
Total Tokens: 1000

You get: 50 % (500 tokens)

Other participant gets: 50 % (500 tokens)

Submit

Trait Measurement - Altruism



Task 4

Below, there are 10 pairs of lotteries. For each pair, please indicate whether you prefer lottery A or lottery B.
Once you have submitted your choices,
- One of the 10 pairs will be selected at random.
- Your earnings will be based on the lottery you selected (A or B) from that pair.

For example, if pair 6 was selected, and you picked Lottery A, then you will have a 60% chance to receive 1000 tokens and a 40% chance to receive 800 tokens.

Since each scenario is equally likely to be picked, do pay attention to each of them and make your decision carefully.

	Lottery A			Lottery B
#1:	1000 tokens (**10% chance**), 800 tokens (**90% chance**)	○	○	1900 tokens (**10% chance**), 100 tokens (**90% chance**)
#2:	1000 tokens (**20% chance**), 800 tokens (**80% chance**)	○	○	1900 tokens (**20% chance**), 100 tokens (**80% chance**)
#3:	1000 tokens (**30% chance**), 800 tokens (**70% chance**)	○	○	1900 tokens (**30% chance**), 100 tokens (**70% chance**)
#4:	1000 tokens (**40% chance**), 800 tokens (**60% chance**)	○	○	1900 tokens (**40% chance**), 100 tokens (**60% chance**)
#5:	1000 tokens (**50% chance**), 800tokens (**50% chance**)	○	○	1900 tokens (**50% chance**), 100 tokens (**50% chance**)
#6:	1000 tokens (**60% chance**), 800 tokens (**40% chance**)	○	○	1900 tokens (**60% chance**), 100 tokens (**40% chance**)
#7:	1000 tokens (**70% chance**), 800 tokens (**30% chance**)	○	○	1900 tokens (**70% chance**), 100 tokens (**30% chance**)
#8:	1000 tokens (**80% chance**), 800 tokens (**20% chance**)	○	○	1900 tokens (**80% chance**), 100 tokens (**20% chance**)
#9:	1000 tokens (**90% chance**), 800 tokens (**10% chance**)	○	○	1900 tokens (**90% chance**), 100 tokens (**10% chance**)
#10:	1000 tokens (**100% chance**), 800 tokens (**0% chance**)	○	○	1900 tokens (**100% chance**), 100 tokens (**0% chance**)

Submit

Trait Measurement - Risk Aversion