Draft
mrigdon@umich.edu
dougecon@umich.edu

The Role of Solidarity and Reputation Building in Coordinating Collective Resistance

Mary L. Rigdon* Doug Smith

April 13, 2010

Abstract

Our research — building on experimental results of Cason and Mui (2007) — examines why a subordinate in a leader–subordinate relationship is willing to pay a cost to help prevent exploitation of another subordinate by the leader. Using a stylized game capturing essential features of the leader–subordinate relationship, Cason and Mui find that when the leader attempts to "divide-and-conquer" the subordinates, the subordinate not targeted for exploitation will still choose to challenge the leader's exploitation a significant fraction of the time, even though challenging is costly and there is no direct material benefit. As a result, subordinates achieve coordinated joint resistance more than equilibrium analysis would predict. While Cason and Mui suggest that coordinated resistance is due to a fairness norm — the non-targeted subordinate shows solidarity with the targeted subordinate — another motive may be at play: an incentive to gain a reputation for challenging. Each subordinate has an equal chance of being the victim of future leader exploitation. As a result, there is an incentive to create an expectation among leaders that "divide-and-conquer" style exploitation will be met with coordinated resistance: each subordinate secures a higher payoff on average if the leader chooses not to transgress. Furthermore, a subordinate has an incentive to challenge now if they think it will increase the likelihood that joint resistance will be successful in the future. Our experimental design systematically removes the incentive to reputation build. It is designed to test whether the willingness of subordinates to help resist exploitation of fellow subordinates is motivated by a solidarity preference specific to hierarchical relationships or as an

* Corresponding author, Rigdon: The University of Michigan, Institute for Social Research; Smith: The University of Michigan, Department of Economics. The authors would like to thank Tim Cason and Vai-Lam Mui for providing z-tree code for their experiment, their data, and extremely helpful comments on an earlier draft. For assistance with running the experimental sessions, we thank Kamry Bowman and Tsz Man Lin. Thanks to the National Science Foundation (Economics) and the Rackham School of Graduate Studies at Michigan for generous support of our research.

attempt to influence the behavior of the leader — and other subordinates — in the future. We find that the role of solidarity among subordinates best explains the data.

JEL: C91, D00, L14

1 Introduction

What motivates agents to resist when a leader attempts to gain or maintain influence via a divide-and-conquer strategy? Examples of leaders breaking up larger groups into smaller ones that have less power are prevalent — from the times of Machievelli (Zeitlin and Weyher, 2001), to Western countries using the strategy in Africa (Croucher, 2004), to Wal-mart's recent pledge to "go green" (Tasini, 2008), to management/labor disputes (LeDuff, 2000). Often the strategy is successful, but it also is often met by *coordinated joint resistance* — subordinates show solidarity, banding together at a personal cost to thwart the divide-and-conquer strategy. Examples include strikes and unionization (Horowitz, 1997; Zeitlin and Weyher, 2001; Gordon and Lenhardt, 2007; Oyogoa, 2009). Our research uses experimental methods to examine the extent to which this type of subordinate solidarity is driven by a fairness norm or driven by the desire to build expectations among both leaders and other subordinates that leader transgressions will be successfully resisted.

Weingast (1997) introduced a political model representing how exploitative leaders can effectively maintain power in a society where there are different interest groups. It also has natural applications to other situations where one individual has authority over multiple subordinates; for example, a manager and worker relationship. The situation can be modeled by the "coordinated resistance" (CR) game.[1] In the CR game, there are three players: one leader and two subordinates, A and B. The leader has four available actions: (i) transgress against both subordinates, (ii) transgress against neither, (iii) transgress against A, and (iv) transgress against B. These last two actions provide the leader an opportunity to "divide-and-conquer". The subordinates have two available actions: challenge or acquiesce. As long as both subordinates do not challenge, a "divide-and-conquer" strategy gains rewards for the leader at the expense of the targeted subordinate. The beneficiary of the transgression earns a higher payoff by acquiescing than by challenging, regardless of what action the targeted subordinate takes. For a small cost, though, the beneficiary can challenge the leader's transgression, and if the targeted subordinate also challenges they achieve *coordinated joint resistance*. At this outcome both subordinates earn what they would get if the leader did not transgress minus the small cost

[1] Weigast called it the" Sovereign-Constituency Transgression Game".

of challenging, and the leader earns zero, which is significantly less than if he had chosen transgress against neither. Social surplus is maximized when the leader chooses transgress against neither and both subordinates acquiesce. However, this outcome is not part of any equilibrium. Cason and Mui (2007) examine the CR game in a laboratory experiment, focusing on when communication does or does not allow subordinates to successfully work together to resist exploitation by a leader. They find that when the leader chooses to transgress against one subordinate, a significant fraction of the subordinates coordinate on joint resistance. This is despite the beneficiary paying a price in their own period payoff to help the targeted subordinate with no direct material benefit. Over time, some leaders adapt their strategy, choosing to transgress against neither. Cason and Mui interpret beneficiaries challenging, and hence coordinated joint resistance, as evidence of fairness: some subordinates are "altruistic punishers" (Fehr and Gächter, 2002; Boyd *et al.*, 2003; DeQuervain *et al.*, 2004; Fehr and Fischbacher, 2004; Gintis *et al.*, 2005). Subordinates choose to punish the leader — even at a personal cost — for having violated social norms.[2]

An alternative argument — not invoking an appeal to social preferences — is that subordinates have an individual incentive to create an expectation among leaders that "divide-and-conquer" style transgression will be met with coordinated joint resistance. After all, each subordinate has an equal chance of being the victim of transgression in the future. If there is a greater than $\frac{1}{4}$ probability of joint resistance, risk-neutral leaders will not want to transgress. With a low cost of resisting, subordinates may regard investing in a reputation for joint resistance as a worthwhile strategy. If the subordinates can get the leader to choose the transgress against neither option, they can secure a higher payoff than when they face a 50/50 chance of being the victim of the leader's transgression. This suggests a very different motive for joint resistance: a subordinate has a strategic motive to build a reputation as one who challenges in order to alter the leader's or the other subordinate's behavior in the future.

We use a novel experimental design to test the extent to which repeated interactions drive some subordinates to resist when they are the current beneficiaries of the leader's divide-and-conquer strategy. We do this by systematically reducing the strategic incentive to resist. The first treatment has leaders pre-commit to their behavior in all periods. Such leader commitment removes the ability for subordinates to influence the leaders' future behavior by their action today. The second treatment goes one step further: leaders pre-commit to their behavior in all periods, as in the first treatment,

[2]Evidence that individuals possess a taste for punishment has been provided across a variety of experimental games, including public goods (Fehr and Gächter, 2000, 2002), investment games (DeQuervain *et al.*, 2004; Rigdon, 2009), and ultimatum games (Güth *et al.*, 1985; Forsythe *et al.*, 1994; Xiao and Houser, 2005).

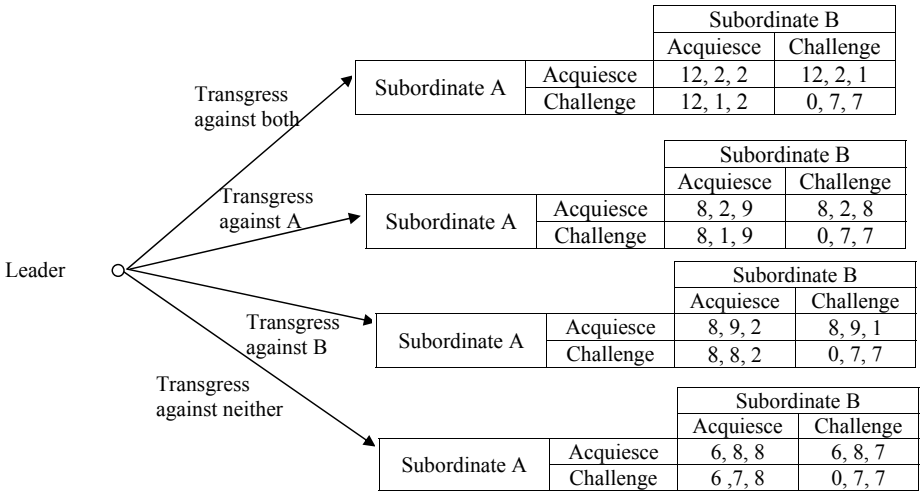


Figure 1: CR Game (payoffs are Leader, Subordinate A, and Subordinate B)

and one subordinate also pre-commits to their behavior in all periods. Such subordinate commitment removes the ability of subordinates to alter behavior of the leader or the behavior of the subordinate with whom they interact. Each of these treatments leave fairness considerations intact. We can then compare the rates of beneficiary challenge and coordinated joint resistance across the treatments. By comparing these treatments with a baseline treatment where both motivations may be at work, we aim to disentangle the effects of other-regarding motives from those of reputation-building and coordination incentives.

The next section describes the features of the CR game and experimental findings to date. Section 3 details the experimental design and outlines the empirical hypotheses. Section 4 describes the procedures in the experiment and Section 5 discusses the results. The final section concludes.

2 The Coordinated Resistance Game

Our experimental design uses the version of the leader-subordinate scenario drawn from prior experimental literature (Cason and Mui, 2007, 2009); see Figure 1. Of the leader's four actions, two treat the subordinates symmetrically (Transgress Against Both, Transgress Against Neither) and two treat the subordinates asymmetrically (Transgress Against A, Transgress Against B). If the leader chooses Transgress Against Both — rather than Transgress Against Neither — and the subordinates do not both challenge, the leader's payoff is increased by 6 and both subordinates' payoffs are lowered by 6 units. In the case of Transgress Against A, the leader gains 2 units and the subordinate transgressed against

(A) has her payoff reduced by 6 units, exactly as in the Transgress Against Both case; A is referred to as the *targeted* subordinate. The subordinate not transgressed against (B) has her payoff raised by 1 unit relative to the Transgress Against Neither case; this represents a bribe by the leader and so B is referred to as the *beneficiary*. The case of Transgress Against B works identically, except B is targeted and A is the beneficiary. A beneficiary's dominant strategy is to choose Acquiesce. However, if the transgression by the leader is to be resisted, both subordinates must choose challenge — *coordinated resistance* corresponds to the lower-right square in each matrix (payoffs: $0, 7, 7$).

There are three pure strategy Nash equilibria in the CR game: (i) the leader plays Transgress Against Both, and both subordinates play Acquiesce; (ii) the leader plays Transgress Against A and both subordinates play Acquiesce; and (iii) the leader plays Transgress Against B and both subordinates play Acquiesce. Importantly, there is no equilibrium of the game that involves the leader playing Transgress Against Neither, and there is no equilibrium that has the subordinates coordinating on the action Challenge when the leader attempts to divide and conquer the subordinates.

2.1 Prior Experimental Results

Cason and Mui (2007) have subjects play the CR game with the same payoffs we use, and examine the effects of communication on the level of coordinated resistance achieved by subordinates. In the *baseline*, subordinates do not communicate with the leader or each other prior to making their decisions. There is a low frequency of both coordinated resistance and leaders choosing Transgress Against Neither. In the *ex-post communication* treatment, subordinates observe the leader's action and then send signals to the other subordinate indicating what action they intend to take given the leader's action. The likelihood of coordinated resistance was higher than with no communication, with beneficiaries challenging roughly half of the time when both subordinates signaled an intention to challenge. Additionally, leaders played Transgress Against Neither significantly more often in the last thirty periods, roughly 25%. In the *private ex-ante* communication treatment, prior to observing the leader's choice, subordinates send signals to each other indicating what choice they intend to make for each of the four leader's actions; subordinates then learn of the leader's action, and the subordinates simultaneously decide on an action which could be the same or different from their intended choice. Beneficiaries challenged about 33.2% of the time when both indicated an intent to challenge, and leaders played Transgress Against Neither at a significantly higher rate compared to any other treatment, roughly 37%.

Cason and Mui (2009) extend the experimental design, examining how repeated matching with various ending rules interacts with the form of communication allowed between subordinates to impact rates of coordinated resistance and leader transgression. Overall, they find that communication is better than repetition in coordinating resistance. They suggest this is because "it makes it easier for subordinates to identify others who have social preferences and are willing to incur the cost to punish a violation of social norms (p. 1)". Next, we describe such a hypothesis more clearly and put forward an alternative hypothesis that explains the current data equally well.

2.2 Why Do Beneficiaries Challenge Transgression?

One hypothesis for the high rate of beneficiaries challenging is that some subordinates have a preference for fairness. They care about the outcomes of the other players, and hence are willing to challenge when they are a beneficiary because they prefer the outcome in that case (lower payoff for leader, higher payoff for victim, slightly lower payoff for themselves) to the outcome when they acquiesce (higher payoff for leader, lower payoff for victim, slightly higher payoff for themselves). Hence, they are willing to pay an economic cost to challenge the leader's transgression against the victim. Such subordinates have a social preference reflecting solidarity with other subordinates, and are willing to punish a leader viewed as violating a social norm when he attempts to divide-and-conquer. This form of punishment can aid in the maintenance of norms (Ostrom, 1990; Fehr and Gächter, 2002; Fehr and Fischbacher, 2003; Egas and Riedl, 2008).

This paper introduces another hypothesis: the high rate of beneficiaries challenging — and high rate of coordinated joint resistance — is due to strategic decision-making by the subordinates. There are at least two strategic reasons for a beneficiary to challenge transgression. The first reason is vertical in nature, and the hypothesis is that the beneficiary choosing challenge aims to change the expectations of a leader and hence alter his decision to one more beneficial in the future. The second reason is horizontal in nature, and the hypothesis is that the beneficiary choosing challenge aims to change the expectations of the other subordinate and hence alter her behavior in the future. In both cases, there is strategic incentive to create an expectation that transgression will be met with resistance. This relies on the argument that the observations of anonymous individuals' play can affect beliefs about the *distribution of types* in the population, and hence change future behavior through updating. The first reason — vertical in nature — is that if the leader's divide-and-conquer strategy gets met with resistance, then the leader may change his strategy in the future to one where he chooses the Transgress

Against Neither option. Under this option, subordinates can secure a higher payoff than when they face a 50/50 chance of being the victim of the leader's transgression. Subordinates receive a certain payoff of 8 units under Transgress Against Neither compared to an expected payoff of $\frac{1}{2}(9)+\frac{1}{2}(2) = 5.50$ units from Transgress Against A or Transgress Against B. The second reason — horizontal in nature — is that by challenging, a subordinate can signal to the other subordinate that resistance can be successful in an effort to alter the other subordinates behavior in the future.[3] Observing a beneficiary challenging is a very strong signal, and can influence another subordinate's strategy from one of acquiescing to one of challenging. If so, then the pair can reach coordinated joint resistance more often in the future and thereby earn higher payoffs. Both kinds of strategic decision-making could be at work in the standard CR game. As a result, it is unclear the extent to which coordinated resistance is motivated by expectation building and the extent to which it is motivated by social preferences of subordinates. Our experiment systematically removes each of the strategic reasons for a beneficiary to challenge transgression while leaving in tact the motives for solidarity. Each treatment involves some portion of the subjects pre-committing their actions. We explain this in more detail in the next section.

3 Experimental Design and Hypotheses

The baseline (B) treatment is a replication of the *private ex-ante* communication treatment implemented by Cason and Mui (2007). One treatment — Leader Commitment (LC) — has leaders pre-commit to their decisions in all periods. Such leader commitment removes the ability for subordinates to influence the leaders' future behavior by their action today. The second treatment — Subordinate Commitment (SC) — goes one step further: leaders pre-commit to their decisions in all periods as in LC and one subordinate also pre-commits to their intended actions and decisions in all periods. Subordinate commitment removes the ability of the freely choosing subordinate to alter behavior of the leader *and* the ability to alter the behavior of the subordinate with whom they interact. Each of these treatments leave fairness considerations intact.

The interaction between the leader and the two subordinates is as follows. The leader chooses an action. Prior to learning the leader's decision, subordinates are able to communicate a message indicating their intended choice of challenge or acquiesce for each of the four possible actions by the leader. Each subordinate then observes the four intended choices signaled by the other subordinate.

[3]The expected future benefit to subordinates will be smaller under random rematching than under repeated interactions since it may be many periods before interacting with the same leader or same subordinate again, and with complete anonymity the subordinate will not know when they do.

Then, the subordinates learn the leader's decision, and simultaneously choose an action to challenge or acquiesce; the subordinate's chosen action can be the same or different from the intended choice specified under that action. The leader and subordinates learn all of the decisions and the respective payoffs. This concludes the interaction. Each experimental session consists of two phases, Phase 1 and Phase 2.[4] Phase 1 is identical across all of the treatments — subjects interact as described above for 10 periods and are randomly re-matched at the end of each period. Phase 2 consists of the treatment portion of the experiment.

In B, Phase 2 is identical to Phase 1 except subjects participate in 40 periods in the phase, being randomly re-matched at the end of each period. The choice of this treatment as our baseline is based on two considerations. First, it is Cason and Mui's treatment with the highest level of coordinated resistance by subordinates, and also the highest fraction of leaders who choose the Transgress Against Neither action in later periods. Since we are interested in comparing the rates of coordinated resistance across treatments, it makes sense to select a baseline with the highest rate. Second, there is a similarity in the decision-making environments for private ex-ante signals and our treatment SC where one subordinate will pre-commit to signals and conditional actions in future periods before any others' actions are observed. In both cases signals are chosen ex-ante, before the leader's action can be observed.

In LC, the baseline treatment is modified to remove the vertical nature of the strategic incentives from repeated play. This is accomplished by having the leaders pre-commit to a strategy for the duration of the experiment. Subjects begin with Phase 1. In Phase 2, leaders choose *all their actions* for the 40 periods of the phase before any further periods are played. Both subordinates respond each period to the leader's pre-committed strategy. Since the leaders are pre-committed to a course of action regardless of subordinates' choices, this removes the incentive subordinates may have to produce a expectation for resistance among the leaders. Consequently, under the hypothesis that subordinates are challenging to influence the leader's behavior in the future, we predict that beneficiary resistance — and hence coordinated resistance — will be lower in LC than in B. Subordinates will perceive no reputation-building motivation if the leaders are already committed to their future course of action, even though they will play further rounds of the game. Therefore, fewer beneficiaries will choose challenge, and this is our first hypothesis.

[4]The two phase structure of all of our treatments is slightly different from Cason and Mui, where they have subjects participate in one phase consisting of 50 periods total. We implemented Phase 1 so that subjects would have experience interacting in the CR game before having to commit to strategies in the future. It is a variation that we do not expect to make a difference. The instructions and protocol are otherwise identical in the baseline.

Hypothesis 1 (Leader Commitment)**.** Beneficiary resistance will be lower in LC than in B.

The LC treatment leaves open the possibility that subordinates' actions will still reflect their repeated interaction *with other subordinates*; that is, it leaves open the horizontal nature of strategic decision-making. There is still an incentive to coordinate on resistance during any one period where only one subordinate is targeted because the beneficiary of the transgression may find herself targeted by the leader in a future period. In this sense, there is room for subordinates to influence the expectation of other subordinates. To disentangle this expectation building incentive from other-regarding preferences, we conduct an additional treatment. The SC treatment is identical to LC with the additional constraint that half of the subordinates are also pre-committed to a strategy in Phase 2. One subordinate chooses all of her intended actions and actual actions for the remaining periods before observing any actions by the others. The matching is such that each group contains one pre-committed leader, one pre-committed subordinate, and one subordinate who is free to choose her action period-by-period. The "free" subordinate knows that they will never interact with a leader or a subordinate whose behavior is not pre-committed. This removes all strategic incentives for the "free" subordinate, but still leaves open the possibility of beneficiary challenging due to other-regarding preferences. Given that the "free" subordinate interacts with players who have already committed to their future course of action, she will perceive no incentive to change the leader's or the subordinate's expectations as this cannot change either's behavior in the future, even though they will play further rounds of the game. Therefore, we expect that beneficiary resistance will be even lower in this treatment than the others, and this is our second hypothesis.

Hypothesis 2 (Subordinate Commitment)**.** Beneficiary resistance by the "free" subordinates will be lower in SC than by the "free" subordinates in LC.

These are our two primary hypotheses. Define $R(T)$ as the rate of beneficiary resistance under treatment T. Then H_1 and H_2 imply the following predicted ranking:

$$R\,(\textsc{b}) > R\,(\textsc{lc}) \geq R\,(\textsc{sc})$$

These rankings arise from the general hypothesis that by systematically removing strategic incentives in repeated play, a subordinate's willingness to engage in beneficiary resistance will be reduced. Since

beneficiary resistance is necessary for subordinates to obtain joint resistance, we also hypothesize that rates of joint coordinated resistance will follow the same pattern across treatments.

4 Procedures

The experimental sessions were conducted at the Robert Zajonc's Laboratory in the Institute for Social Research at the University of Michigan.[5] We completed a total of 24 independent sessions with 8 sessions for each of the three experimental conditions. The experiment was computerized using z-tree (Fischbacher, 2007). Participants were undergraduates and were recruited using standard experimental procedures. They participated in only one session. Each session required 1.5 to 2.5 hours to complete.

An experimental session ran as follows. Subjects received a $10 show-up payment and were seated in the laboratory. Two sessions were conducted simultaneously with each session having 3 leaders and 6 subordinates.[6] Once all subjects had completed a consent form, the instructions were read aloud. The instructions used were the same as those used by **?**. The instructions used neutral terms for the roles of leader and subordinates as well as their available actions: "Person 1" (the leader) chooses from "earnings squares" A, B, C or D and "Persons 2 and 3" (the subordinates) simultaneously choose X or Y. Subjects in each treatment received the same instructions for Phase 1 of the session, being told that Phase 1 would last 10 periods (see Appendix A for the instructions). Subjects were informed that there would be a second phase to the experiment as follows: "Phase 2 will be a similar decision-making task, and you will have the same role in it that you have in Phase 1. Further instructions will be provided before Phase 2 begins."[7] Subjects were required to complete a quiz which included payoff calculations for all roles and questions to check their understanding about the interaction; the experimenter checked the quizzes for accuracy. The quiz used was the same as that used by **?**.[8] Subjects were then randomly assigned a role as either a leader or a subordinate, and they kept this role throughout the session. Subjects were randomly re-matched each period. Subjects first participated in Phase 1, consisting of 10 periods of the baseline version of the CR game. Then, prior to beginning

[5] We ran the first session in late November 2007 and completed the last session in late April 2009. There were some coding issues that extended the length of time necessary to complete the treatments.

[6] Subjects were not aware that the re-groupings only happened among the 9 subjects in their particular session. This is in keeping with Cason and Mui's protocol.

[7] This deviates from Cason and Mui's procedures, which had only one phase of 50 total periods. Our aim is to give subjects experience in the CR game — with decisions counting for monetary payment — prior to selecting pre-committed actions.

[8] Subjects were asked true/false questions about the interaction; for example, "You remain grouped with the same two other participants in all decision-making periods" and "If you are Person 2 or Person 3, you must make the same choice on your decision screen as you indicated in the relevant intention screen" and "If you are Person 2 or Person 3, your intentions are shown to all three people in your group (Person 1, Person 2 and Person 3) before anyone makes actual decisions."

Phase 2, further instructions were given: in B subjects were informed they would participate in 40 more periods, identical to those in Phase 1 (see Appendix B); in LC the instructions provided additional information that the leader would pre-commit to a strategy for all 40 periods before any more periods were played (see Appendix C); and in SC the instructions provided additional information that in each three-person group, both the leader and one of the subordinates would be pre-committed while the other subordinate would make decisions as in Phase 1 (see Appendix D). Subjects then participated in Phase 2, completing an additional 40 periods of one treatment, being randomly re-matched each period. Participants earned points that were exchanged for dollars at the exchange rate of \$0.09/point. Once the session finished, subjects were paid their accumulated earnings in private. Average earnings (excluding the show-up payment) in B were \$29.76 for the leaders and \$27.51 for subordinates; in LC earnings were \$30.26 for the leaders and \$27.01 for subordinates; and in SC earnings were \$25.05 for the leaders and \$30.36 for subordinates.

5 Results

In this section, we begin by analyzing the extent to which the baseline data is similar to the *private ex-ante* treatment conducted by Cason and Mui (2007). As we demonstrate, the results are statistically indistinguishable. We then turn to analyzing the rates of beneficiary and coordinated resistance, examining behavior under two sets of conditions: (i) when *both* subordinates signal an intent to challenge and (ii) when the leader chooses a divide-and-conquer strategy, irrespective of the signals sent by the beneficiary and victim. We test our two main hypotheses under each of these sets of conditions.

Our focus is on Phase 2 behavior. Recall that Phase 1 is identical across treatments — subjects participate in the baseline version of the CR for 10 periods. We are interested in differences across treatments so the discussion will center on the results in Phase 2.[9] Periods of Phase 2 are labeled 11–50. We further restrict analysis to periods 21–50 to allow time for subjects to learn — in both treatment conditions, the decision environment has changed significantly from the baseline version of Phase 1.

[9] We estimated probit models to check whether or not the rates of leader transgression, beneficiary challenge, and joint resistance were similar in Phase 1 across the experimental conditions. The results provide evidence that behavior was similar across the conditions and therefore, any differential behavior across the conditions cannot be due to differences in experiences in Phase 1.

5.1 Replication

The baseline treatment uses instructions and procedures nearly identical to those in Cason and Mui's *private ex-ante* treatment. We compare the results along a number of important behavioral dimensions, and find that the two are statistically indistinguishable with respect to the following: the rate at which beneficiaries resist when both indicate an intention to challenge ($p = 0.7476$); the rate of joint resistance when both indicate an intention to challenge ($p = 0.4704$); the rate at which beneficiaries resist given any signal ($p = 0.3728$); the rate of joint resistance given any signal ($p = 0.1510$); and the rate of leader non-transgression ($p = 0.56$).[10] As a result, we conclude that behavior in the baseline is indistinguishable from that reported by Cason and Mui (2007). We now turn to discussing differences across treatments and testing our hypotheses.

5.2 Resistance Rates When Both Subordinates Indicate Challenge

In this section, we begin by examining our first hypothesis that the rates of beneficiary resistance, and hence coordinated resistance, will be lower in LC than in B. We restrict attention to the case that is the most favorable condition for successful joint resistance to occur: both subordinates have indicated an intention to challenge. Table 1 reports the rates of beneficiary and joint coordinated resistance in Phase 2.[11] Periods 11–20 are data from the first 10 periods, Periods 21–30 are data from the second set of 10 periods, and so on. The bottom two rows report overall rates. The pattern over time is similar across treatments — beneficiary resistance is at its highest point in the first set of periods and gradually declines over time with a resurgence in periods 31–40 following the first decline. The only treatment where the rate is fairly steady is LC. In terms of overall frequency, in B the average is 27.1%. In LC the average is higher at 44.1%, and is significantly different from B ($p = 0.0007$). How does this translate into rates of joint resistance? The rate of joint resistance when both indicate challenge is also significantly higher in LC than B — 36% versus 24.6% ($p = 0.0181$).

Result 1. The rate of beneficiary and joint resistance when both subordinates indicate an intention to challenge is significantly *higher* in LC than in B.

[10] Statistical analysis based on a two-tailed t-test; similar results were obtained using ANOVA and Mann-Whitney tests (unless otherwise noted).

[11] Estimating a fixed effects regression on the decision of a victim to challenge and on the decision of a beneficiary to challenge, conditional on the messages sent, provides strong evidence that coordinated resistance to a CR transgression is much more successful when the beneficiary indicates an intention to challenge.

	Baseline		Leader Commit		Sub Commit Free Targeted		Sub Commit Committed Targeted	
	Ben Chall	Joint	Ben Chall	Joint	Ben Chall	Joint	Ben Chall	Joint
11–20	$\frac{27}{53}$	$\frac{24}{53}$	$\frac{24}{58}$	$\frac{17}{58}$	$\frac{7}{9}$	$\frac{7}{9}$	$\frac{9}{18}$	$\frac{9}{18}$
%	50.9	45.3	41.4	29.3	77.8	77.8	50	50
21–30	$\frac{13}{64}$	$\frac{11}{64}$	$\frac{25}{55}$	$\frac{20}{55}$	$\frac{4}{8}$	$\frac{4}{8}$	$\frac{4}{16}$	$\frac{4}{16}$
%	20.3	17.2	45.5	36.4	50	50	25	25
31–40	$\frac{24}{72}$	$\frac{23}{72}$	$\frac{25}{51}$	$\frac{20}{51}$	$\frac{9}{13}$	$\frac{9}{13}$	$\frac{4}{17}$	$\frac{4}{17}$
%	33.3	31.9	49	39.2	69.2	69.2	23.5	23.5
41–50	$\frac{18}{67}$	$\frac{16}{67}$	$\frac{21}{55}$	$\frac{18}{55}$	$\frac{13}{20}$	$\frac{13}{20}$	$\frac{1}{16}$	$\frac{1}{16}$
%	26.9	23.9	38.2	32.7	65	65	6.3	6.3
21–50	$\frac{55}{203}$	$\frac{50}{203}$	$\frac{71}{161}$	$\frac{58}{161}$	$\frac{26}{41}$	$\frac{26}{41}$	$\frac{9}{49}$	$\frac{9}{49}$
%	27.1	24.6	44.1	36.0	63.4	63.4	18.4	18.4

Table 1: Resistance Rates Given Both Indicate Challenge

This result is in the *opposite* direction from that stated in H_1. According to the expectation-building hypothesis, once the strategic incentive to influence the leader's actions is removed in LC, the rates of resistance are predicted to be lower. One potential explanation is that with the vertical strategic incentive being removed, the horizontal strategic incentive becomes more important to the subordinates' behavior. Once subordinates no longer have an opportunity to influence and change the leader's behavior to the Transgress Against Neither option in the future, the subordinates can only influence other subordinates' behavior and respond to this by following through on their commitment to challenge.

In SC the rate at which beneficiaries challenge and the rate at which it is successful significantly depends on whether it is the pre-committed or free subordinate who is targeted by the leader's divide-and-conquer strategy. Our second hypothesis states that a free subordinate will not challenge transgression since she cannot impact either the leaders' or subordinates' future behavior. Lacking the strategic incentive to challenge, the hypothesis is that the rates of beneficiary and coordinated resistance will be lower in LC than in B. Notice in Table 1 that when the committed subordinate is targeted — and the free subordinate is the beneficiary — the rate of beneficiary challenging drops to a megar 18.4%, which is marginally significantly lower than in the baseline ($p = 0.1047$). In terms of joint resistance, the rate is not significantly different from B ($p = 0.1774$). Overall, then, we only have

	Baseline			**Leader Commit**		
Message: Challenge	Victim Challenges	Beneficiary Challenges	Joint Resistance	Victim Challenges	Beneficiary Challenges	Joint Resistance
Only Victim	52/185	5/185	2/185	60/238	2/238	1/238
	28.1	2.7	1.1	25.2	0.8	0.4
Only Beneficiary	24/57	6/57	2/57	22/52	12/52	7/52
	42.1	10.5	3.5	42.3	23.1	13.5
Both	145/203	55/203	50/203	115/161	71/161	58/161
	71.4	27.1	24.6	71.4	44.1	36.0
Neither	16/91	2/91	0/91	13/115	1/115	0/115
	17.6	2.2	0.0	11.3	0.9	0.0

	Subordinate Commit (Free Sub Targeted)			**Subordinate Commit (Commited Sub Targeted)**		
Message: Challenge	Victim Challenges	Beneficiary Challenges	Joint Resistance	Victim Challenges	Beneficiary Challenges	Joint Resistance
Only Victim	35/69	15/69	12/69	6/28	1/28	0/28
	50.7	21.7	17.4	21.4	3.6	0.0
Only Beneficiary	1/3	0/3	0/3	13/39	11/39	4/39
	33.3	0.0	0.0	33.33	28.2	10.3
Both	40/41	26/41	26/41	47/49	9/49	9/49
	97.6	63.4	63.4	95.9	18.4	18.4
Neither	1/38	0/38	0/38	0/36	0/36	0/36
	2.6	0.0	0.0	0.0	0.0	0.0

Table 2: Action by Subordinates Conditional on Message of Challenge (Periods 21–50)

weak evidence in favor of H_2. Though, we have evidence of a large fraction of subordinates whose talk is certainly cheap.

Result 2. The rate of beneficiaries challenging given both indicate an intention to challenge is marginally *lower* in SC when the target of the leader's transgression is the committed subordinate.

On the other hand, when the free subordinate is targeted by the leader, the rate of pre-committed beneficiaries challenging rises to 63.4%, significantly higher than the overall rate in B ($p = 0.0000$). This is an extremely high rate of subordinates whose action matches the intended action. The rate of coordinated resistance is also higher: 63.4% versus 24.6% ($p = 0.0000$). One potential explanation is psychological in nature — these subjects follow through at a much higher rate in an effort to avoid cognitive dissonance. Subordinates who are pre-committed to all of their actions select their intended actions for all possible decisions by the leader and conditional on the intended choice of the free subordinate, and then immediately record their actual action for each possible message from the other. As a result, they may be more likely to follow through on what they said was their intended

action to avoid saying one thing and then doing another. Another potential explanation for high beneficiary resistance among committed subordinates is that they gambled on the free subordinates being willing to reciprocate. Because the committed subordinates are not able to observe whether free subordinates were engaging in beneficiary resistance, they may pay the relatively small cost to engage in it themselves in the hope that doing so will sustain mutual cooperation.

Result 3. When the target of the leader's transgression is the free subordinate, the rate at which pre-committed beneficiaries challenge — given both indicate an intention to challenge — is significantly *higher* than the rate of beneficiary challenge in B.

5.3 Resistance Given Any Signal

This section looks at the frequency of beneficiary resistance and coordinated resistance when the leader attempts to divide-and-conquer, irrespective of the signals sent by the beneficiary and victim. This broader measure is harder to interpret since a number of circumstances are treated the same. For example, it treats the case of a beneficiary who does not challenge after the victim indicates an intent to acquiesce the same as a beneficiary who does not challenge after the victim indicates intent to challenge. Nonetheless it captures some features of the data that the measure used in the previous section does not. These are cases where successful joint resistance would be less likely to occur, so it is interesting to see how such a factor impacts the rate at which beneficiaries resist. Table 3 reports the frequencies for each treatment. Not surprisingly, the frequencies are lower than when both indicate challenge, but show a similar a pattern. Comparing within treatment, in B, the frequency of beneficiary challenging under any signal is lower than when both indicate an intention to challenge — 12.7% versus 27.1% ($p = 0.0000$); it is also lower in LC — 15.2% versus 44.1% ($p = 0.0000$); and lower in SC when the free subordinate is targeted — 27.2% versus 63.4%($p = 0.0000$). The only case where the two rates are not statistically different is in SC when the committed subordinate is targeted — 13.8% versus 18.4%($p = 0.2650$). Interestingly, this provides evidence that the messages sent do not alter the beneficiary resistance behavior of the free subordinate; that is some cheap talk!

Using the measures of resistance conditional on any signal to test our hypotheses, we find that beneficiary resistance rates in LC are not significantly different from B — 15.2% versus 12.7% ($p = 0.1152$). The rates are also not different in SC for actions taken by the free subordinate — 13.8% versus 12.7% ($p = 0.3574$). The only rate that is significantly different from B is for actions taken by the committed subordinate when the free subordinate is the one targeted in SC — 27.2% versus 12.7%

	Baseline		Leader Commit		Sub Commit Free Targeted		Sub Commit Committed Targeted	
	Ben Chall	Joint	Ben Chall	Joint	Ben Chall	Joint	Ben Chall	Joint
11–20	$\frac{38}{172}$	$\frac{27}{172}$	$\frac{37}{185}$	$\frac{24}{185}$	$\frac{13}{49}$	$\frac{12}{49}$	$\frac{12}{50}$	$\frac{11}{50}$
%	22.1	15.7	20	13.0	26.5	24.5	24	22.0
21–30	$\frac{18}{179}$	$\frac{13}{179}$	$\frac{31}{189}$	$\frac{23}{185}$	$\frac{10}{44}$	$\frac{8}{44}$	$\frac{8}{53}$	$\frac{5}{53}$
%	10.1	7.3	16.8	12.4	22.7	18.2	15.1	9.4
31–40	$\frac{26}{179}$	$\frac{23}{179}$	$\frac{31}{189}$	$\frac{24}{189}$	$\frac{15}{52}$	$\frac{15}{52}$	$\frac{8}{53}$	$\frac{5}{53}$
%	14.5	12.8	16.4	12.7	28.8	28.8	15.1	9.4
41–50	$\frac{24}{178}$	$\frac{18}{178}$	$\frac{24}{192}$	$\frac{19}{192}$	$\frac{16}{55}$	$\frac{15}{55}$	$\frac{5}{46}$	$\frac{3}{46}$
%	13.5	10.1	12.5	9.9	29.1	27.3	10.9	6.5
21–50	$\frac{68}{536}$	$\frac{54}{536}$	$\frac{86}{566}$	$\frac{66}{566}$	$\frac{41}{151}$	$\frac{38}{151}$	$\frac{21}{152}$	$\frac{13}{152}$
%	12.7	10.1	15.2	11.7	27.2	25.2	13.8	6.5

Table 3: Resistance Rates Given Any Signal

($p = 0.0000$). All of these results also hold for the rates of joint resistance. As a result, using this less restrictive measure for resistance rates, we find no evidence in favor of the expectation-building hypotheses.

Result 4. The rate of beneficiary and joint resistance given any signal in B are not significantly different from the rates in LC or in SC.

Overall, then, the results are *not* supportive of the expectation-building hypothesis. We introduced the hypothesis that the high rate of beneficiaries challenging — and high rate of coordinated joint resistance — observed in the CR game could be due to strategic decision-making by the subordinates. Thus our results provide support for the hypothesis that beneficiaries who challenge a leader's transgression are exhibiting solidarity with the victim.

6 Conclusions

The coordinated resistance game provides a fruitful framework in which to explore a range of motivations for the observed solidarity among subordinates. In our experiment, subjects repeatedly play the CR game under random and anonymous re-matching and with different types of pre-commitment. We investigate the extent to which the observed coordinated joint resistance — which is not predicted by game theoretic analysis of the game — can be explained by several potential motivations. One potential explanation appeals to norms for fairness: when facing a leader attempting to divide-and-conquer, the

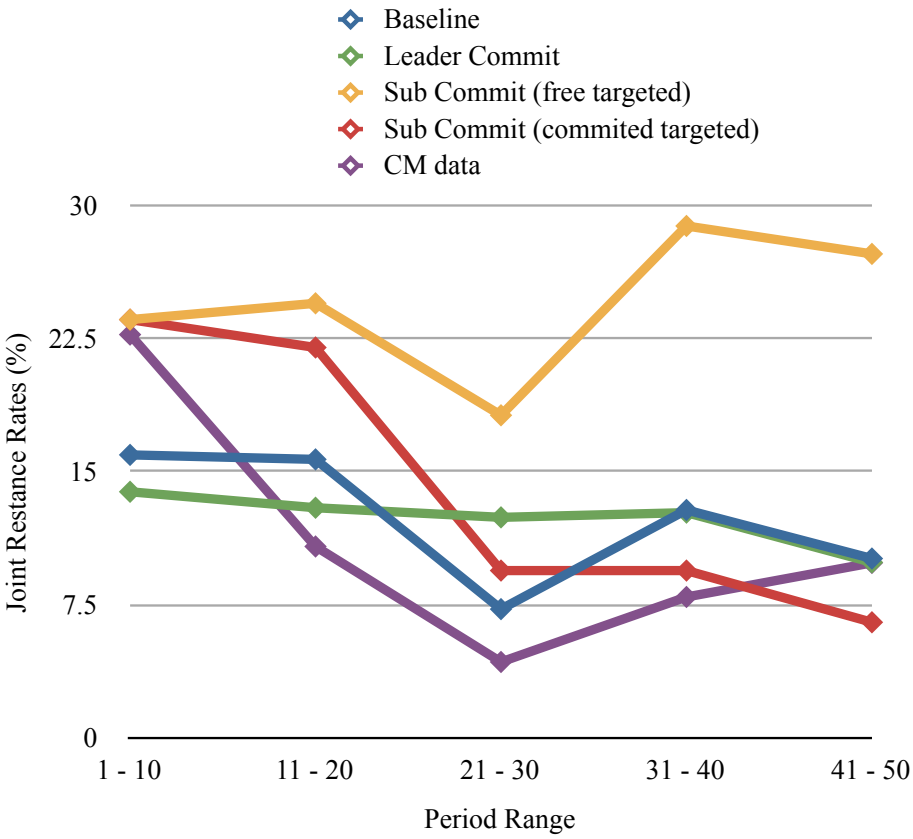


Figure 2: Joint Resistance Rates Across Treatments

subordinate who would benefit by choosing to acquiesce, instead chooses to challenge due to fairness considerations. Another explanation appeals to reputation-building behavior: there is an individual incentive for building a group reputation in an effort to achieve more efficient outcomes in the future. Overall our results provide additional support for the hypothesis that beneficiaries who challenge are exhibiting solidarity with the victim, rather than attempting to strategically expectation build.

Bibliography

Boyd, R., Gintis, H., Bowles, S. and Richerson, P. (2003) The evolution of altrusitic punishment, *Proceedings of the National Academy of Sciences*, **100**, 3531–3535.

Cason, T. N. and Mui, V.-L. (2007) Communication and coordination in the laboratory collective resistance game, *Experimental Economics*, **10**, 251–267.

Cason, T. N. and Mui, V.-L. (2009) Coordinating collective resistance through communication and repeated interaction, working Paper.

Croucher, S. L. (2004) *Globalization and Belonging: The Politics of Identity in a Changing World*, Rowman & Littlefield, Lanham, MD.

DeQuervain, D., Fischbacher, U., Treyer, V., Schellhammer, M., Schnyder, U., Buck, A. and Fehr, E. (2004) The neural basis of altruistic punishment, *Science*, **305**, 1254–1258.

Egas, M. and Riedl, A. (2008) The economics of altruistic punishment and the maintenance of cooperation, *Proceedings of the Royal Society B*, **275**, 871–878.

Fehr, E. and Fischbacher, U. (2003) The nature of human altruism, *Nature*, pp. 785—791.

Fehr, E. and Fischbacher, U. (2004) Third-party punishment and social norms, *Evolution and Human Behavior*, **25**, 63–87.

Fehr, E. and Gächter, S. (2000) Cooperation and punishment in public goods experiments, *American Economic Review*, **90**, 980–994.

Fehr, E. and Gächter, S. (2002) Altruistic punishment in humans, *Nature*, **415**, 137–140.

Fischbacher, U. (2007) z-tree: Zurich toolbox for ready-made economic experiments, *Experimental Economics*, **10**, 171–178.

Forsythe, R., Horowitz, J. L., Savin, N. E. and Sefton, M. (1994) Fairness in simple bargaining experiments, *Games and Economic Behavior*, **6**, 347–369.

Gintis, H., Bowles, S., Boyd, R. and Fehr, E. (Eds.) (2005) *Moral Sentiments and Material Interests: Origins, Evidence, and Consequences*, MIT Press, Cambridge, MA.

Gordon, J. and Lenhardt, R. A. (2007) Conflict and solidarity between african american and latino immigrant workers, Report filed for The Chief Justice Earl Warren Institute on Race, Ethnicity, and Diversity University of California, Berkeley Law School.

Güth, W., Schmittberger, R. and Schwarze, B. (1985) An experimental analysis of ultimatum bargaining, *Journal of Economic Behavior and Organization*, **3**, 367–388.

Horowitz, R. (1997) *'Negro and White, Unite and Fight!' A Social History of Industrial Unionism in Meatpacking, 1930–90*, University of Illinois Press, Champaign–Urbana.

LeDuff, C. (2000) At a slaughterhouse, some things never die: Who kills, who cuts, who bosses can depend on race, New York Times, June 16, 2000.

Ostrom, E. (1990) *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press, New York.

Oyogoa, F. (2009) Conquered then divided on the high seas: International working class solidarity in the vacation cruise ship industry, working Paper.

Rigdon, M. L. (2009) Trust and reciprocity in incentive contracting, *Journal of Economic Behavior and Organization*, **70**, 93–105.

Tasini, J. (2008) The wal-mart divide-and-conquer strategy, Huffington Post, January 25, 2008.

Weingast, B. R. (1997) The political foundations of democracy and the rule of law, *American Political Science Review*, **91**, 245–263.

Xiao, E. and Houser, D. (2005) Emotion expression in human punishment behavior, *Proceedings of the National Academy of Sciences*, **102**, 7398–7401.

Zeitlin, M. and Weyher, L. F. (2001) Black and white, unite and fight: Interracial working-class solidarity and racial employment equality, *American Journal of Sociology*, **107**, 430–467.

A Instructions for Phase 1

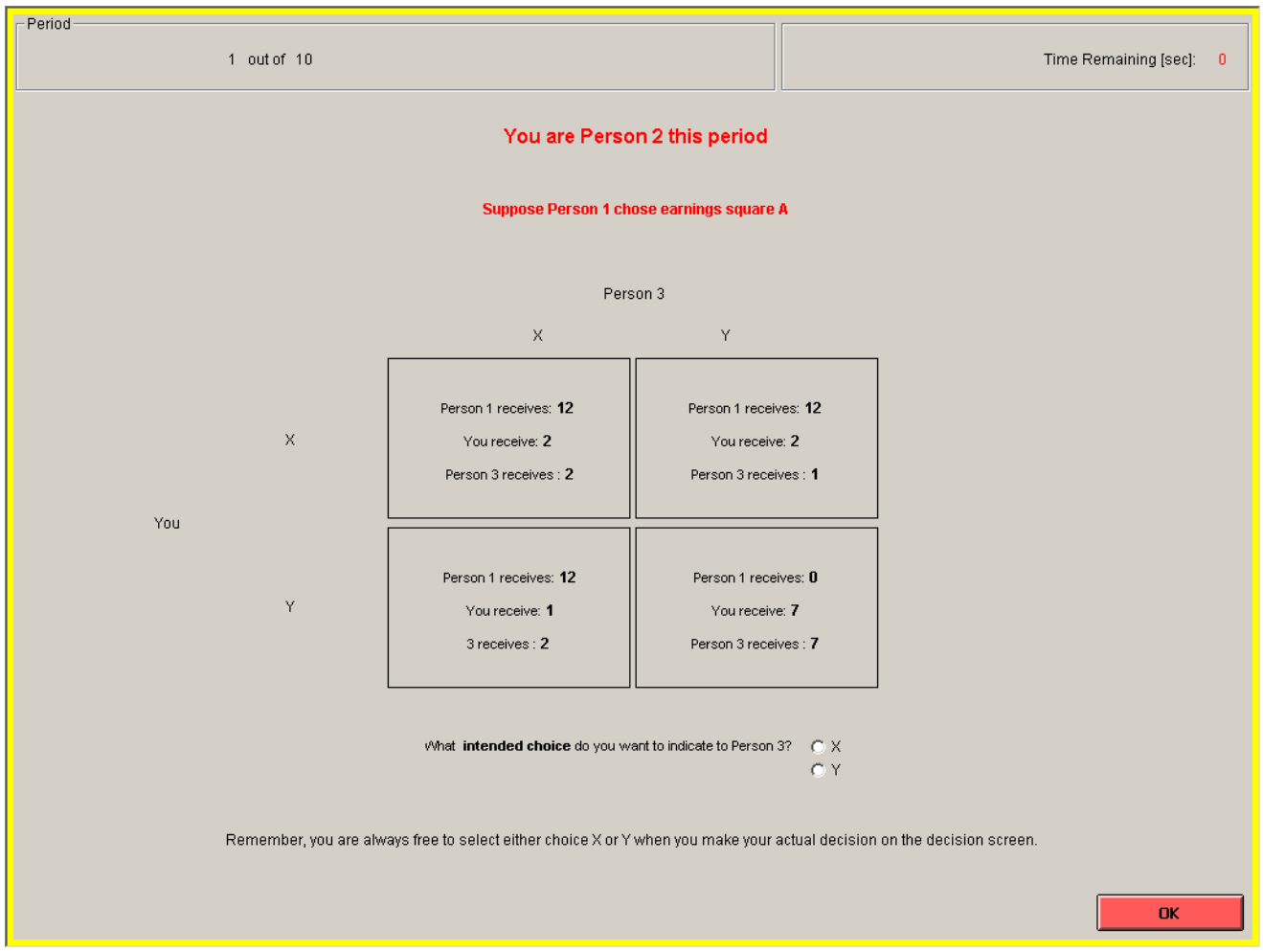
There are two types of decision-making experiments: psychology and economics. In psychology experiments, sometimes the researchers deceive participants involved in the study. When this happens, they are required, before the end of the experiment, to debrief everyone about the nature of the deception. Deception is not permitted in an economics experiment. This is an economics experiment.

Please read the following instructions carefully. If you have a question at any time please raise your hand and an experimenter will come by to answer your question.

Instructions for Phase 1

This is an experiment in the economics of multi-person strategic decision-making. If you follow the instructions and make appropriate decisions, you can earn an appreciable amount of money. The currency used in the experiment is points. Your points will be converted to U.S. Dollars at a rate of $0.09 dollars to one point. At the end of todays session, you will be paid in private and in cash. It is important that you remain silent and do not look at other peoples work. If you have any questions, or need assistance of any kind, please raise your hand and an experimenter will come to you. If you talk, laugh, exclaim out loud, etc., you will be asked to leave and you will not be paid. We expect and appreciate your cooperation. There will be **two phases** to the experiment: Phase 1 and Phase 2. Phase 1 will consist of 10 periods. The 18 participants in todays experiment will be randomly split each period between three equal-sized groups, designated as **Person 1**, **Person 2** and **Person 3** groups. If you are designated as a Person 1, then you remain in this same role throughout both phases of the experiment. Participants who are not designated as a Person 1 switch randomly between the Person 2 and Person 3 roles in different decision-making periods throughout both phases of the experiment. Phase 2 will be a similar decision-making task, and you will have the same role in it that you have in Phase 1. Further instructions will be provided before Phase 2 begins. At the beginning of each decision-making period you will be randomly re-grouped with two other participants to form a three-person group, with one person of each type in each group. The groupings change every period, since you will be randomly re-grouped in each and every period.

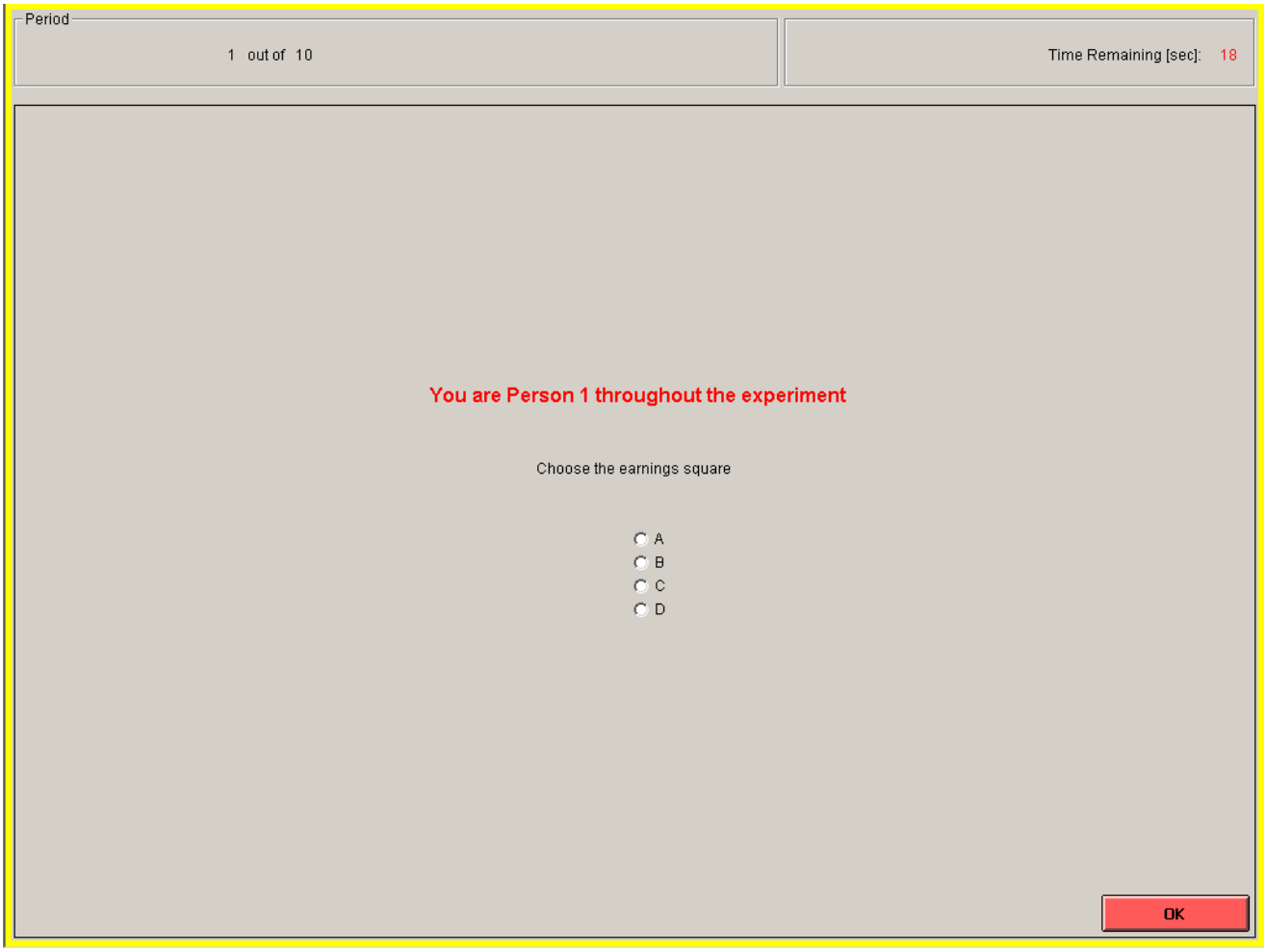
Your Choice During each period, you and all other participants will make one choice. Earnings tables are provided on separate papers, which tell you the earnings you receive given the choices that you and others in your group make. If you are **Person 1** then you choose the earnings square, either **A**, **B**, **C** or **D**. You make this choice before the other two people in your group make their choices, on a



decision screen as shown on page 4. While **Person 1** chooses the earnings square, however, **Persons 2 and 3** have an opportunity to communicate to each other an intended choice for every one of the four possible earnings squares. Persons 2 and 3 indicate their intended choices simultaneously; for example, if you are Person 3 then you do not learn the intended choices of Person 2 until after you indicate all your intended choices. As noted on the example Intention Screen for Person 2 below, Persons 2 and 3 are not required to make the same actual choice as corresponding to their intended choice, and they are always free to select either choice X or Y when they make their actual decision.

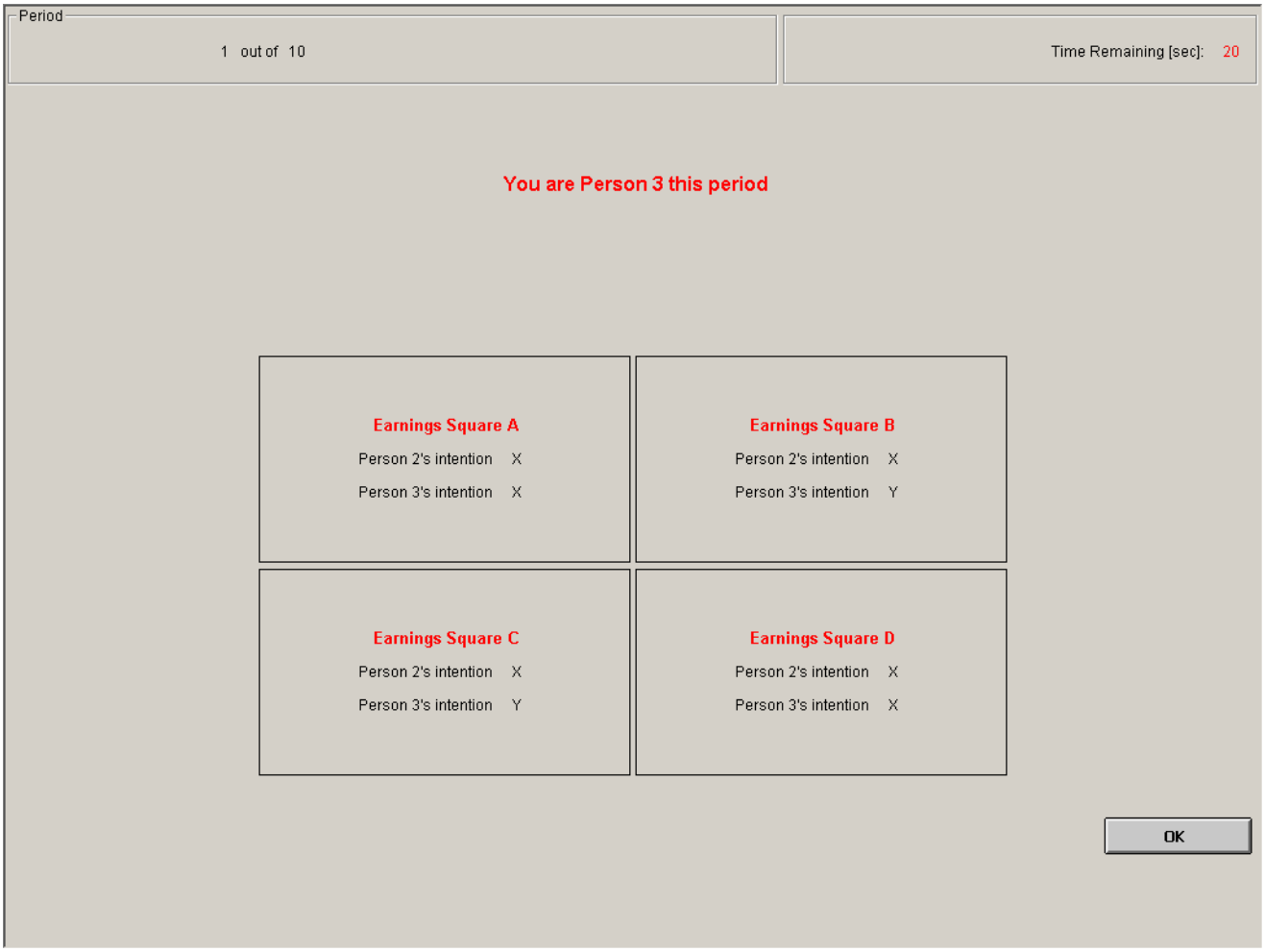
While Persons 2 and 3 are indicating their intended choices, Person 1 chooses the earnings square using the Person 1 Decision Screen as shown below.

After both Persons 2 and 3 have finished indicating their intended choices, the computer program displays all the intended choices to both Person 2 and Person 3 as shown on the next page (page 5).



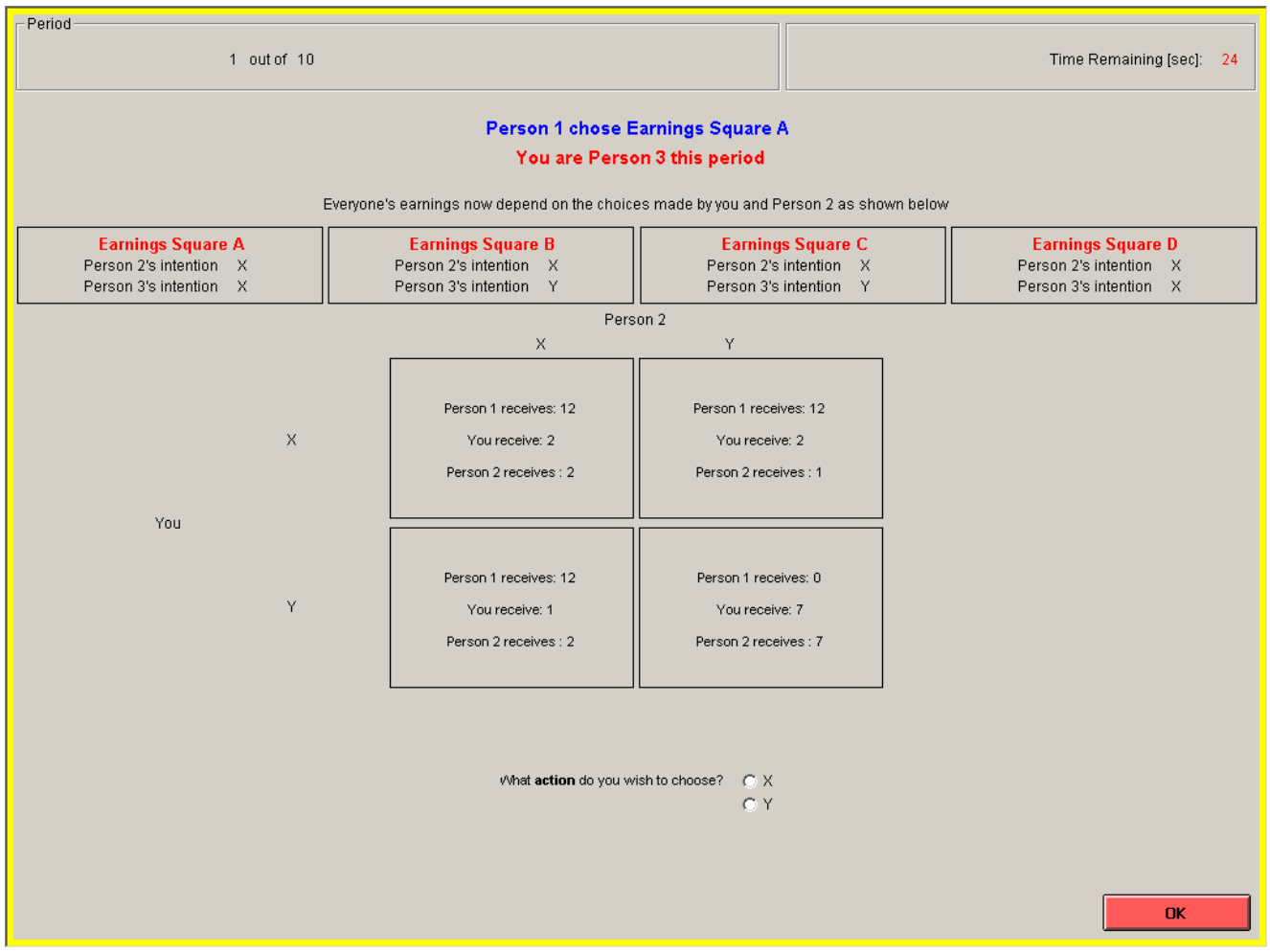
The intentions and Person 1s earning square choice are also shown on the Decision Screen for Persons 2 and 3, as shown on page 6. Persons 2 and 3 then make their actual choice simultaneously; for example, if you are Person 2 then you do not learn the actual choice of Person 3 until after you make your choice. Both Persons 2 and 3 may choose either **X** or **Y**.

Your earnings from the choices each period are found in the box determined by you and the other two people that you are grouped with for the current decision making period. If both Persons 2 and 3 choose **X**, then earnings are paid as shown in the box in the upper left on the screen. If both Persons 2 and 3 choose **Y**, then earnings are paid as shown in the box in the lower right on the screen. The other two boxes indicate earnings when one chooses **X** and the other chooses **Y**. To illustrate with a random example: if Person 1 chooses earnings square **A**, Person 2 chooses **X** and Person 3 chooses **Y**, then Person 1 earns 12, Person 2 earns 2, and Person 3 earns 1. You can find these amounts by



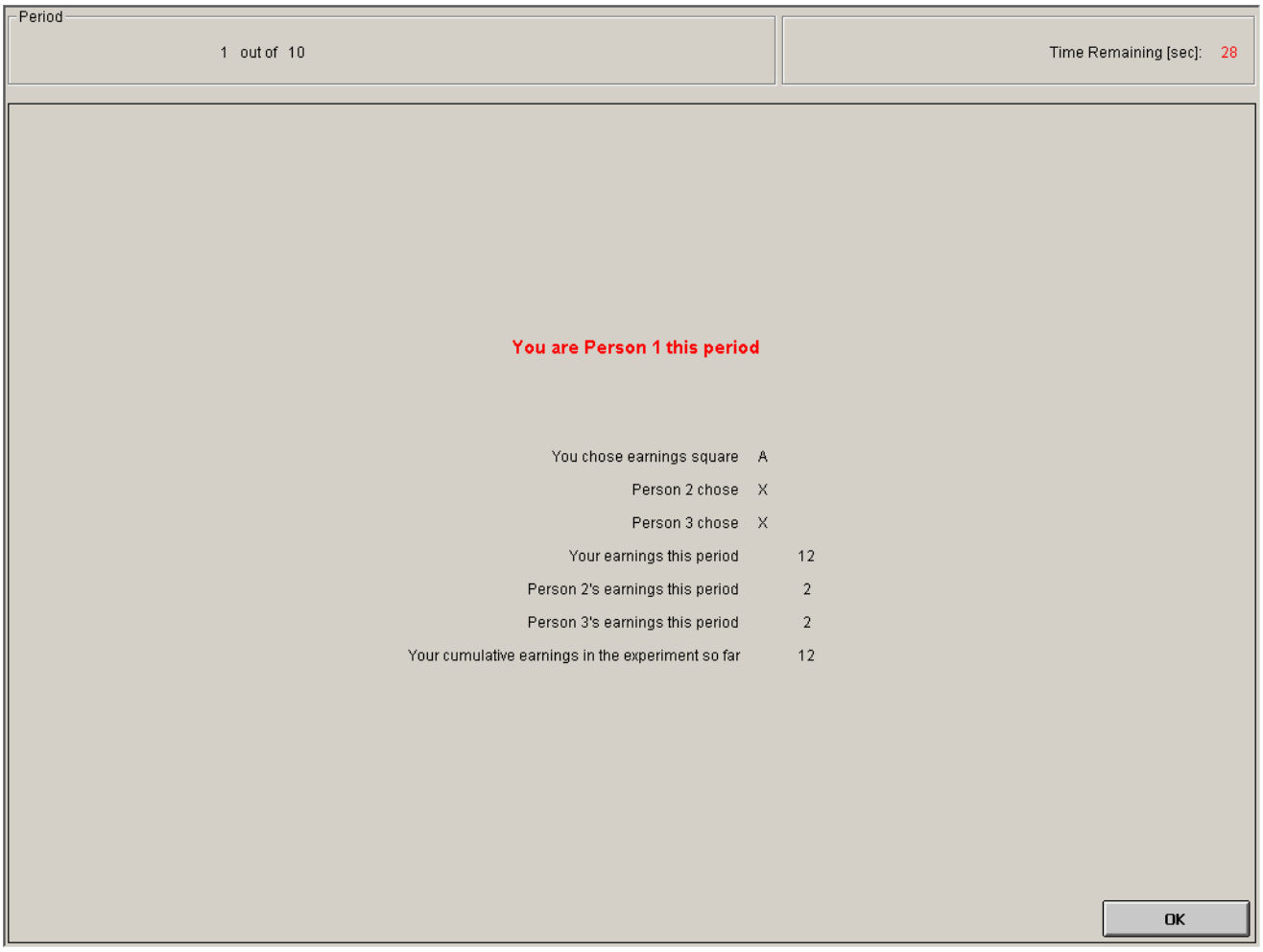
looking at the appropriate square and box in your page of earnings tables. In summary, Persons 2 and 3 indicate simultaneously their intended choice for each of the four earning squares that Person 1 can choose, while Person 1 chooses the earnings square. When both Persons 2 and 3 have finished indicating their intentions, the computer program displays all the intended choices to both Person 2 and Person 3. The computer program also displays the earnings square chosen by Person 1. Persons 2 and 3 then simultaneously make their choices of X and Y. Remember, Persons 2 and 3 are not required to make the same actual choice corresponding to their intended choice, and they are always free to select either choice X or Y when they make their actual decision.

The End of the Period After everyone has made choices for the current period you will be automatically switched to the outcome screen, as shown below. This screen displays your choice as well as the choices of the people you are grouped with for the current decision making period. It also shows



your earnings for this period and your earnings for the experiment so far.

Once the outcome screen is displayed you should record your choice and the choice of the others in your group on your Personal Record Sheet. Also record your current and cumulative earnings. Then click on the *OK* button on the lower right of your screen. Remember, at the start of the next period all participants are randomly re-grouped, and you are randomly re-grouped each and every period of the experiment. We will now pass out a questionnaire to make sure that all participants understand how to read the earnings tables and understand other important features of these instructions. Please fill it out now. Raise your hand when you are finished and we will collect it. If there are any mistakes on any questionnaire, I will summarize the relevant part of the instructions again. Do not put your name on the questionnaire.



B Instructions for Phase 2: Baseline

We are entering the second and final phase of the experiment.

This phase will last for 40 periods.

Each of these 40 periods is identical to those in Phase 1.

Please continue to record all decisions on the Personal Record Sheet for your role; they are attached to Phase 2 instructions.

C Instructions for Phase 2: Leader Commitment

We are entering the second and final phase of the experiment.

This phase will last for 40 periods.

The only difference between periods in this phase and periods in the previous phase is that each Person 1 will choose **all of their actions** for the next 40 periods now, before any more periods are played. That means in the next 40 periods, each Person 1 will be pre-committed to actions that they will specify for each period after they finish reading this screen.

Those in the roles of Person 2 and Person 3 will make choices identically to how they did in Phase 1. Persons 2 and 3 will now have a few minute wait while those in the role of Person 1 make their next 40 choices.

Please continue to record all decisions on the Personal Record Sheet for your role; they are attached to Phase 2 instructions.

D Instructions for Phase 2: Both Commitment

We are entering the second and final phase of the experiment.

This phase will last for 40 periods.

There are **two important differences** between periods in this phase and periods inthe previous phase:

1. All Persons 1 will choose **all of their actions** for the next 40 periods now, before any more periods are played.

   That means in the next 40 periods, each Person 1 will be pre-committed to actions that they will specify for each period after they finish reading this.

2. Half of those in the roles of Person 2 and Person 3 will indicate their **intended choices and choose all of their actions for all periods without observing any choices made by either Person 1 or Person 2 and 3.**

   That means in the next 40 periods, half of the Persons 2 and 3 will be pre-committed to intended choices and actions that they will choose before any more periods occur.

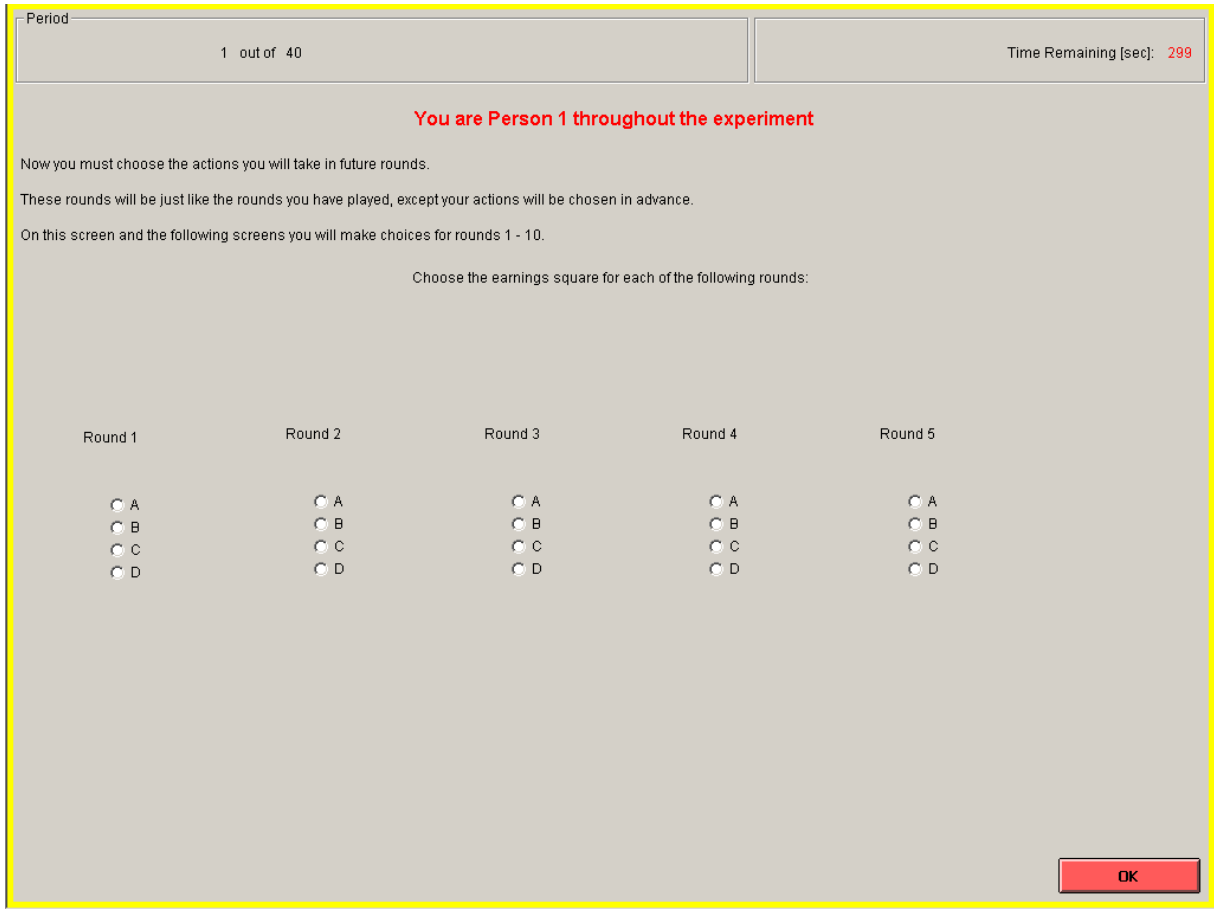
The other half of the Persons 2 and Person 3 will make their choices in each period as in Phase 1.

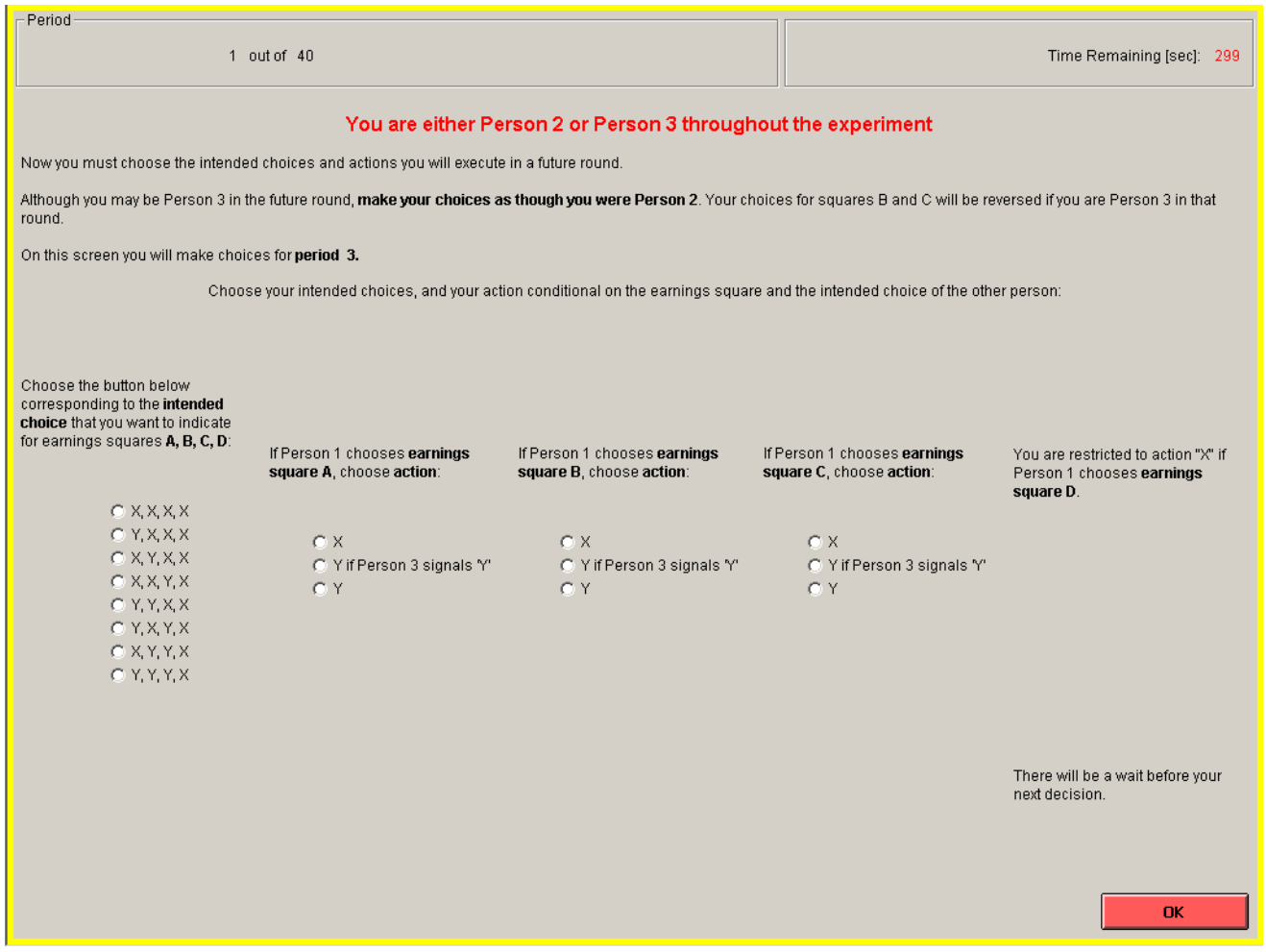
Note: for earnings square D, all Persons 2 and 3 will be restricted to intended choice "X" and action "X".

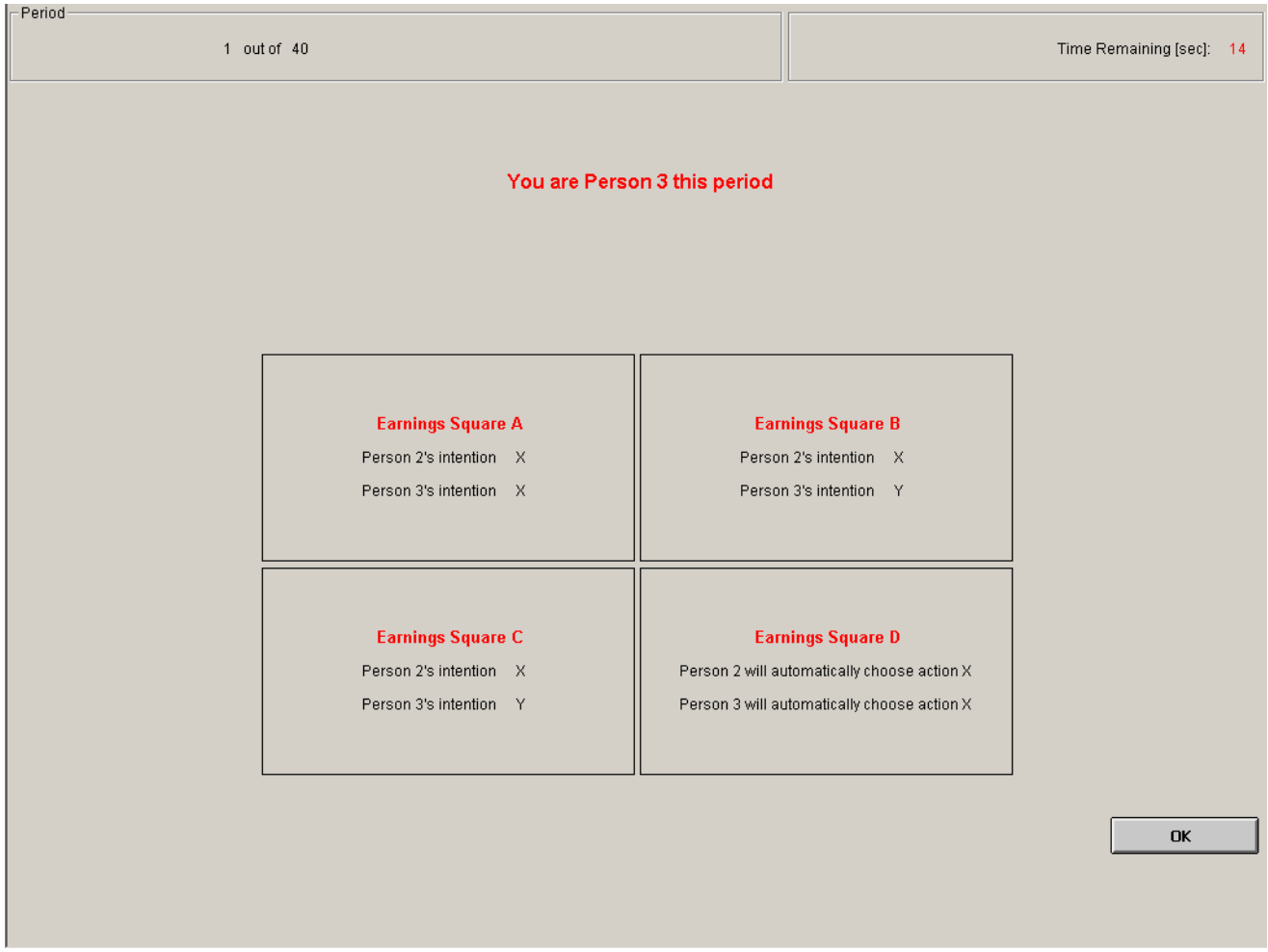
The division of the Persons 2 and 3 into these two categories will remain constant across all 40 periods of this phase.

All participants will continue to be randomly re-grouped in each and every period.

Additionally, in each and every period, each Person 1 will be grouped with **one** Person 2 or 3 who is **pre-committed**, i.e. has already indicated an intended choice and chosen an action for the period without observing any choices by others, and **one** Person 2 or 3 who is **not pre-committed**, i.e. indicates his/her intended choice and action for each period as in Phase 1.


Period
1 out of 40
Time Remaining [sec]: 299
You are Person 1 throughout the experiment
Now you must choose the actions you will take in future rounds.
These rounds will be just like the rounds you have played, except your actions will be chosen in advance.
On this screen and the following screens you will make choices for rounds 1 - 10.
Choose the earnings square for each of the following rounds:
Round 1
Round 2
Round 3
Round 4
Round 5
A
B
C
D
OK


Period
1 out of 40
Time Remaining [sec]: 299
You are either Person 2 or Person 3 throughout the experiment
Now you must choose the intended choices and actions you will execute in a future round.
Although you may be Person 3 in the future round, make your choices as though you were Person 2. Your choices for squares B and C will be reversed if you are Person 3 in that round.
On this screen you will make choices for period 3.
Choose your intended choices, and your action conditional on the earnings square and the intended choice of the other person:
Choose the button below corresponding to the intended choice that you want to indicate for earnings squares A, B, C, D:
X, X, X, X
Y, X, X, X
X, Y, X, X
X, X, Y, X
Y, Y, X, X
Y, X, Y, X
X, Y, Y, X
Y, Y, Y, X
If Person 1 chooses earnings square A, choose action:
X
Y if Person 3 signals 'Y'
Y
If Person 1 chooses earnings square B, choose action:
X
Y if Person 3 signals 'Y'
Y
If Person 1 chooses earnings square C, choose action:
X
Y if Person 3 signals 'Y'
Y
You are restricted to action "X" if Person 1 chooses earnings square D.
There will be a wait before your next decision.
OK


Period
1 out of 40
Time Remaining [sec]: 14
You are Person 3 this period
Earnings Square A
Person 2's intention X
Person 3's intention X
Earnings Square B
Person 2's intention X
Person 3's intention Y
Earnings Square C
Person 2's intention X
Person 3's intention Y
Earnings Square D
Person 2 will automatically choose action X
Person 3 will automatically choose action X
OK