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Do Individualists and Collectivists Cooperate Differently?*

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Abstract

Research in social science has shown the importance of individualism and collectivism (I/C) in human behavior. Individualists tend to see people in isolation, while collectivists are more prone to see people as interconnected members of groups, and this has consequences for behavior, governance, and economic outcomes. We examine the role of I/C on cooperation experimentally in infinitely repeated prisoner's dilemmas (IRPD) played with in- and out-group members. We predict that collectivists will be more cooperative, forgiving and defect less with in-group members than out-group members. Individualists are predicted to make similar strategic decisions for in- and out-group members. In an effort to causally affect the I/C scores of our subjects, as well as to strengthen in- and out-group connections, subjects completed a group-identity task prior to the I/C instrument and IRPD in the Strong Identity treatment. In our Weak Identity treatment, subjects completed a task on their own and were simply told they were assigned to groups. During the experiment, across supergames, subjects were randomly matched with in- and out-group partners. Findings reveal that our treatment effects are largely null. The only significant effect on strategic behavior was that larger defection payoffs led to more defection and less cooperation by subjects in all treatments.

JEL classifications: *C91, C92, C73*
Keywords: *Individualism, collectivism, cooperation, repeated games, strategy, experiments*

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1 Introduction

Cooperation is a critical component of economic activity. Effective work-place teams, neighborhoods, relationships, and government and non-profit organizations require cooperation between members. However, in many instances, selfish free-riding incentives dominate incentives for cooperation, even when cooperation is collectively more efficient. The temptation to cheat or defect on group members is too strong without some other force that binds group members together. One approach to solving cooperative dilemmas involves formal mechanisms that use explicit rules and combinations of reward and punishment; another approach relies on the strength of social bonds of mutual trust, kindness, and norms. In practice, all societies use some combination of both (to varying degrees). Neither laws nor contracts can account for all contingencies, such that social bonds often shore up this incompleteness. At the same time, cooperative arrangements based on social bonds are often limited in scope such that formal institutions can serve to extend the cooperative order. The development of and interaction between these mechanisms has thus become an important object of study.

An important line of research attributes a society's mix of formal, impartial, and impersonal mechanisms and informal, partial, and personal mechanisms to deep-rooted cultural variation in the nature and strength of ties among in-groups. Schulz *et al.* (2019), Fukuyama (2011, 2014), Akbari *et al.* (2019), and Enke (2019) relate the strength of group ties to family structure, suggesting that societies with tighter kin-networks tend to rely more on informal, partial and personal exchange rooted in group membership, while those societies with weaker family networks tend to rely more on formal, impartial and impersonal mechanisms.

These differences have often been understood through the lens of a distinction between *individualism* and *collectivism* (Greif, 2006). In this view, in collectivist societies, individuals typically favor interacting with in-group members in families, religious groups, and tribes. Collectivistic societies encourage longer-term commitments; individuals are expected to look after extended family and extended relationships. Within collectivist firms, offense is viewed as bringing shame of the entire firm. Hiring and promotion decisions are more likely to favor employees who are in-group members, and managers manage groups rather than individuals (Hofstede, 2019). Individualist societies are less concerned with in-group versus out-group distinctions. This leads to a wider sphere of interaction, increasing the potential gains from specialization and exchange, and improving economic outcomes. Within individualist firms, employees are expected to be self-reliant and display initiative. Hiring and promotion decisions are more likely to be based on merit or evidence of what work has been accomplished (Hofstede, 2019).

At the country level, individualism and collectivism (I/C) are measured through surveys (Hofstede, 2019). At the macro level, this measure shows links with, for instance, governance and economic development (Kyriacou, 2016) and economic growth (Gorodnichenko and Roland, 2017). We are interested in the micro-level impact of individualism and collectivism on cooperation in smaller groups.

In psychology, a sizable literature links individualistic and collectivistic cultures to differences in cognitive orientations. According to this literature, individualistic people assume that individuals are independent of one another. They prize personal control, autonomy, and individual accomplishments. Collectivistic people assume that groups bind and mutually obligate individuals. They emphasize loyalty and cohesion and impose mutual obligations in the context of in-groups (Oyserman *et al.*, 2002).

In experimental economics, very few studies examine the relationship between I/C and behavioral outcomes like cooperation and trust. A few studies examine the difference between subject pools in individualistic countries (e.g., USA, Australia, Canada) and a collectivistic country (Japan). For example, there is some evidence that other psychological measures (e.g. agency, assertiveness) covary across countries with individualism and collectivism (Kashima *et al.*, 1995). Trust is also found to be lower in a collectivistic country than in an individualistic country (Buchan *et al.*, 2002). Cadsby *et al.* (2007) explore culture and gender differences in a threshold public goods game. They find support for their argument that subjects from an individualistic country would be more successful at providing the public good than subjects from a collectivistic country, particularly among women.

We expand these experimental results relating I/C to behavioral outcomes by directly measuring an I/C score in the lab using the well-known Triad task (Talhelm *et al.*, 2014). In the first experimental-economics study to measure I/C scores, Hajikhameneh and Kimbrough (2019) examine subjects' willingness to trade with potentially-more-profitable outsiders vs. continuing to trade with insiders (match partners) with whom reputations can be established. They test the prediction that individualist subjects would be more willing to abandon an ongoing relationship with someone in order to seek potentially profitable trade with an outsider than would collectivist subjects. Hajikhameneh and Kimbrough (2019) generally find support for this prediction, as collectivists seem less prone to abandon exchange with insiders and have stronger negative reactions to being cheated by outsiders.

Using the same instrument to measure I/C scores in the lab, we are interested in the impact of I/C scores on subjects' willingness to cooperate when matched with in- versus out-group members. We use the infinitely repeated prisoner's dilemma (IRPD) to examine cooperation. IRPDs are of interest because, unlike finitely repeated PDs, cooperation and defection are both supported as equilibria. As our measure of cooperation, we elicit *strategy* choices from each subject, which specify a complete plan of action for all rounds of a supergame. We hypothesize that the strategic plans chosen by individualists will differ from the plans chosen by collectivists. In particular, collectivists will choose more cooperative/lenient/forgiving strategies than individualists. Importantly, though, collectivists should primarily display this behavior when they play IRPD with in-group members. Thus, in each session, we divide subjects into two groups and randomize whether, in a given supergame, each subject interacts with an in- or an out-group member. While collectivists' strategies are predicted to crucially depend on the relationship of the "other" they are matched with, individualistic subjects are predicted to choose similar strategic plans independent of group affiliation.

A second novel contribution of our paper is that we aim to alter I/C scores causally. Arguably, collectivism is "situationally malleable" and can be evoked by emphasizing the distinction between in-group and out-group members (Oyserman and Lee, 2008). We hypothesize that by first exposing subjects to a task meant to induce strong feelings of in-group identity, thereby making the in-group/out-group distinction more salient, that subjects will report a more collectivistic orientation in our I/C score elicitation. If we can exogenously influence I/C scores, we can identify a causal impact of this fundamental cultural trait on economic behavior. A successful manipulation would thus also have important methodological implications for future experiments examining the impact of I/C scores on economic outcomes. It would also provide interesting policy implications on how institutions can influence collectivism in a group or society.

As our primary interests are on the impact of an identity manipulation on I/C scores and the impact of I/C scores on cooperation, the remaining treatment variation in our design is applied within-subjects. Within subjects, we vary the temptation payoff from defection in the PD payoff matrix and whether a subject is matched with an in- or out-group member. To increase statistical power, we elicit four strategies from each subject prior to each supergame (one for each combination of defection payoff and matching procedure), and then we randomly determine these variables. Our design examines interactions between these parameter variations and the strength of group identity.

Our experimental design had three Phases. In the first Phase, subjects were introduced to the IRPD and the variations in the payoff matrix. Subjects chose a strategic plan from a menu provided to them. They then played a number of supergames against a computer to familiarize themselves with the task. In Phase 2, subjects completed two tasks. The first was a picture task where subjects had to put pictures in the correct sequential order. In the Weak Identity version, subjects completed the task on their own and were simply told that they had been sorted into groups. In the Strong Identity version, groups of subjects could work together by communicating in a chat room. Following the picture task, we measured subjects' I/C scores by having them complete the "triad task" (Talhelm *et al.*, 2014). In the third and final Phase, subjects played 16

IRPD supergames, being re-matched with a new subject every supergame. Counterparts could be in-group or out-group, and subjects knew their counterpart's group affiliation.

We largely find that the experimental data do not support our hypotheses. We were unsuccessful at causally shifting the distribution of subjects' I/C scores. The Strong Identity task did not significantly alter I/C scores. We find evidence that subjects choose different strategies when interacting with in-group rather than out-group members. However, we find little evidence that this effect interacts significantly with subjects' I/C scores. Our strongest evidence supports the view that incentives matter for cooperation in the IRPD; subjects respond to a lower defection payoff by choosing more cooperative and less selfish strategies.

2 Literature Review

We examine the impact of individualism and collectivism on strategic decisions in an infinitely repeated prisoner's dilemma (IRPD). As far as we are aware, the causal link between individualism and collectivism has not been examined in an IRPD. However, some recent IRPD studies are related to the IRPD we used. Dal Bo and Frechette (2019) allow subjects to design their own strategies (plans of action) for each potential round in a supergame. These plans of action have "memory one", meaning actions in a particular round are conditional only on what happened in the previous round. In addition to creating their own strategies, Dal Bo and Frechette (2019) also provide a menu of strategies (with memory greater than one) that subjects could alternatively choose from. In one Phase of their experiment, subjects chose or created their own strategy plan of action before each supergame began, but then made direct-responses in each round. In the final Phase, the subjects' strategy plan of action was implemented in all rounds of a supergame, without any direct-response decisions. Across a variety of different parameterizations of the probability of continuation and the cooperation payoff, Dal Bo and Frechette (2019) find subjects favor tit-for-tat, always defect, and grim trigger strategies most frequently.

Fudenberg *et al.* (2012) and Cason and Mui (2019) examine noisy IRPDs in which a decision maker's action is probabilistically overridden and switched to the other action by the computer.

In the first Phase, decision-makers make direct response decisions. In the second Phase, decision-makers are provided with 20 strategy plans to choose from, and the chosen strategy is implemented in the supergame. Cason and Mui (2019) compared strategies by individuals to those of teams. We use the same set of 20 strategies in our study. Our study differs from these other IRPD studies in that our subjects select a strategy before each supergame interaction, but a random device determines whether the supergame is governed by the chosen strategy or by direct response, with a 50% chance of each.[1] This paper focuses on the choice of strategies rather than the direct response decisions.

We explore the potential of group identity to causally impact individualism and collectivism in our subjects. Group identity has been shown to impact decisions in a variety of games. For instance, group identity impacts individual social preferences (Chen and Li, 2009), improves coordination in the battle of sexes games (Charness *et al.*, 2007) and the weakest-link game (Chen and Chen, 2011), helps increase cooperation in public goods games with (Weng and Carlsson, 2015) and without (Eckel and Grossman, 2005) punishment opportunities, and mitigates hold-up problems in organizations (Morita and Servatka, 2013). Cason *et al.* (2019) examine one-shot inter-group Prisoner's Dilemma where groups of 3 make a joint decision to cooperate or defect. In the group identity treatment, both groups first play a coordination game together before the PD. Cooperation significantly increases in the group-identity treatment compared to a baseline where groups play the coordination game separately.

A related working paper that examines group identity in IRPD is Li and Liu (2017). They manipulate group identity using five pairs of paintings by Kandinsky and Klee, as in Chen and Li (2009). Participants studied the pairs of paintings for three minutes. Participants were then shown two additional paintings and were given 8 minutes to guess which artist made each painting. When group identity was induced, participants could communicate during the 8 minutes. In the control treatment that did not induce group identity, no communication was allowed. Following the painting tasks, participants played a series of blocks of IRPDs. Participants interacted with

[1] Romero and Rosokha (2018, 2019) also examine the construction and adjustments of strategies in IRPD.

a new counterpart every block. In group-identity treatments, sessions always paired participants with in-group counterparts or always with out-group counterparts. Treatments also varied the probability of continuation (1/2 or 2/3). Li and Liu (2017) find cooperation was higher with a larger probability of continuation. Also, as the blocks of infinitely repeated prisoner's dilemmas progressed, cooperation with in-group counterparts was higher than with out-group counterparts. Further, the higher cooperation rates with in-group counterparts were also more stable when the probability of continuation was higher (i.e., less influenced by their own and counterparts' previous decisions to cooperate).

The primary difference between our paper and Li and Liu (2017) is that we measure individualism and collectivism scores. We also test for a causal link between I/C scores and the choice of strategies in the IRPD by implementing the group-identity task prior to measuring I/C scores.[2]

3 Experimental Design

Our experiment was designed to address our main research question - "do collectivists and individualists cooperate differently?" In particular, we are interested in identifying a causal effect of the degree of individualism/collectivism on strategies for cooperation. One key reason that the causal effect of individualism and collectivism has not been widely studied is that individualism and collectivism are typically understood as cultural traits that individuals have acquired over the course of their lives. Thus, a substantial body of research has measured individualism and collectivism, but less work has been done in which researchers attempt to experimentally manipulate an individual's degree of individualism or collectivism. Nevertheless, several studies suggest that individualism and collectivism are "situationally malleable" and we attempt to follow best practices from the literature to produce exogenous variation. For example, Ross *et al.* (2002) reported an experiment in which Chinese students in Canada described their values in Chinese and English. These students

[2]Other differences between our paper and Li and Liu (2017) include that we vary the temptation payoff in the payoff matrix (45 and 65), use a different probability of continuation (0.75), use a different group-identity task (Zoom task described in more detail below), the number of IRPD interactions (16). Further, in-group and out-group interactions and temptation payoffs are varied within-subject.

exhibited collectivistic tendencies when using Chinese and individualistic tendencies when using English. Marian and Kaushanskaya (2004) reported similar findings with Russian immigrants to the US. In a meta-analysis of methods for priming individualism and collectivism, Oyserman and Lee (2008) showed that priming primarily impacted relationality and cognition.[3] The cognition effect is fundamental, to the degree that Oyserman *et al.* (2009) offered a "culture-as-situated-cognition" model in which they framed the individualistic- and collectivistic-cultural tendencies in terms of cognitive differences in primed mindsets at the moment of observation.

In our design, we chose to focus on manipulating I/C tendencies via relationality. As noted above, a prominent feature of collectivism is the preferential treatment of in-group versus out-group others (Oyserman *et al.*, 2002). Crucially, "[c]ollectivism does not imply that one engages in a connected and related way with all others, just with in-group others. When the in-group is not relevant, one is free to compete with others, express oneself, and follow one's desires" (Sorensen and Oyserman, 2009, p. 235). Thus, it was important to choose a group-building task that would make group membership salient. Previous evidence suggests that collaboration on a common project is an effective group-building exercise.[4] Thus, we manipulated group identity by allowing subjects to do a puzzle-solving task collectively or individually, and then, using a cognitive test, we measured each subject's individualistic/collectivistic propensity (Talhelm *et al.*, 2014).

After the puzzle-solving task and the cognitive test, subjects played a series of indefinitely repeated prisoner's dilemmas that varied in two aspects (1) whether subjects are matched with an in-group or out-group other and (2) whether the defection payoff is high or low. Table 1 presents the outline of the experiment. In what follows, we provide the details of each experiment phase.

3.1 Between-Subject Treatments: Group Identity Manipulation

24 subjects who were randomly assigned to 2 groups of 12 participated in each session. In the puzzle-solving task, we give each subject a binder containing 16 illustrations from children's books

[3]They report that the effect size for relationality and cognition were moderate and for self-concept and values were small.

[4]Pan and Houser (2013) offer an exception, in which they find that collaborative group work reduces out-group discrimination.

Group Identity

Weak

		Defection Payoff	
		Low	High
Other	In-group	In-Low	In-High
	Out-group	Out-Low	Out-High

Strong

		Defection Payoff	
		Low	High
Other	In-group	In-Low	In-High
	Out-group	Out-Low	Out-High

Table 1: **Outline of the experiment**.

Zoom and *Re-Zoom*(Banyai, 1998b,a). Employing a zooming-out visualization method, these books produce a sequence of pictures in which each $illustration_{i+1}$ contains the prior $illustration_i$. Knowing that 2 out of 16 illustrations in the binder were irrelevant, subjects had 7 minutes to find and submit the correct sequence of 14 illustrations on their screen (see Appendix A.2 for the instructions of this phase). We informed subjects at the end of the experiment whether they found the correct sequence. Each subject who solved the puzzle correctly earned $5.

Like Jiang and Li (2019), in the Strong Identity treatment, we allow subjects to chat with in-group others when solving the puzzle. Using Brandts *et al.* (2019) criteria, our implementation of communication is a one-time, multiple-way, free-form chat. The only communication limits are that subjects should not identify themselves or use offensive language. In the Weak Identity treatment, subjects solved the puzzle individually and could not chat with anyone.

3.2 Measuring Individualism and Collectivism

One of the psychological outcomes central to the individualism-collectivism distinction is analytic versus holistic thinking (Henrich, 2014). The prominent role of in-group/out-group dynamics in collectivist cultures leads to a relational awareness and a context-dependent/holistic approach to problem-solving. However, the independence of individuals in individualistic cultures diminishes the importance of relationality in favor of an analytical approach to problem-solving in which individuals are "breaking things down into their constituent parts and assigning properties to those parts. Similarities are judged according to rule-based categories" (Henrich, 2014, p. 593).

A cognitive test successfully capturing holistic versus analytic thinking is the triad task, due to Talhelm *et al.* (2014). There are 20 questions in this task, of which 8 are key questions that measure individualism-collectivism, and the remaining 12 are fillers to avoid subjects' pattern recognition. Each question includes a triad of words, with subjects receiving the simple instruction to pair two words out of the triad that they deem "most closely related." For example, in the triad "Seagull, Sky, Dog", a collectivist would choose {seagull, sky}, focusing on a holistic relationship between a bird and the sky, while an individualist would choose {seagull, dog}, focusing on the category "animal."

Talhelm *et al.* (2014) showed that their triad task discerns the cultural differences between the collectivist people of rice farming regions of south China and the individualist people of wheat farming regions of north China.[5] More recently, the same triad task was successfully used in predicting political orientation (Talhelm *et al.*, 2015), social status (Zhang *et al.*, 2021), and interdependence (Talhelm *et al.*, 2023). Using the same triad task, Hajikhameneh and Kimbrough (2019) and Hajikhameneh (Forthcoming) showed that this cognitive measure of individualism and collectivism correlates with the willingness to seek out novel, risky trade opportunities and the choice of the enforcement mechanism that governs trade relationships.

After the group-identity task, subjects completed the triad task. We use subjects' responses to the key questions to calculate their disposition to individualism/collectivism: a collectivistic response scores a -1, and an individualist response scores a +1. The sum over all 8 responses is the I/C score of the subjects.

3.3 Within-Subject Treatments: Indefinitely Repeated Prisoner's Dilemma

In this phase, we used a random termination method to induce an indefinitely repeated game/supergame (Roth and Murnighan, 1978; Murnighan and Roth, 1983). We guaranteed that each supergame lasts at least one round and set the termination probability at 0.75. That is, the expected duration of each supergame is 4 rounds.

[5] Using a public goods game with punishment, Zhou *et al.* (2023) show rice farming strongly correlates with prosocial and cooperative behaviors.

Subjects played a sequence of 16 supergames. In a 2×2 design, we vary (1) the group composition (i.e., a subject is matched with an in-group or out-group other) and (2) the defection payoff (i.e., low or high; see Table 2 for details of the stage game).[6] As such, each supergame was one of the four possible treatments: (1) in-group other and low-payoff defection (In-Low), (2) in-group other and high-payoff defection (In-High), (3) out-group other and low-payoff defection (Out-Low), and (4) out-group other and high-payoff defection (Out-High). We implemented a perfect-stranger matching protocol so that no two subjects were paired in more than one supergame. We used the same set of 16 supergames for all sessions, with the order randomized at the session level and one session in each Identity conditions starting with each of the four within-subject treatments. The lengths of the supergames were randomly generated ex ante, and we ensured that there were at least 3 supergames observed for each of the four treatments.

(a) **Low-Payoff Defection**

		Other's Choice	
		Cooperate	Defect
Your Choice	Cooperate	40,40	12,45
	Defect	45,12	25,25

(b) **High-Payoff Defection**

	Other's Choice	
	Cooperate	Defect
Cooperate	40,40	12,65
Defect	65,12	25,25

Table 2: **Stage games**

We utilized a combination of a strategy method and direct decision-making to elicit strategies employed by the subjects. Prior to each supergame, before we revealed which treatment would be imposed, subjects chose one strategy for each combination of In- vs. Out-group match and High vs. Low defection payoff, from a list of twenty possible strategies. Table 3 presents the strategies available to the subjects (Fudenberg *et al.*, 2012; Cason and Mui, 2019). Subjects knew that with a 50% probability, their supergame would be played out according to the strategy they chose and the strategy chosen by their counterpart, for the randomly selected treatment.[7] Subjects also knew that,

[6] Grim-trigger-fully-cooperative equilibria exist for low and high-defection payoffs with $\delta = 0.75$. As we report in Section 5, similar to Dal Bó and Fréchette (2011), we found that cooperative behavior is responsive to change in payoffs.

[7] At the end of each round, subjects received a full report of their strategy for the round according to their chosen plan, the strategy of the other, and the corresponding payoffs.

with a 50% probability, the super-game would instead be played out via direct-response decisions in which both parties decide to cooperate or defect simultaneously in each round.

At the very beginning of the experiment, we ran an extensive practice phase (for detailed instructions, see Appendix A.1). In this phase, first, subjects took a quiz to ensure they understood the possible strategies and the strategy method. We generated a history of 3 rounds of play, and subjects were to determine the action in round 4 if strategy plan i for $i \in \{1, \dots, 20\}$ was chosen. Subjects saw strategies sequentially, one per page. After subjects picked an action, on the following page, they saw whether their choice of action was correct. They could go back to double-check the question and their answer. Second, subjects played four supergames with computerized counterparts. They were informed that the computer would randomly pick and implement one of the twenty possible strategies. These practice supergames focused on low versus high defection payoff treatments, as there was no in-group versus out-group dynamic with the computer players. They gave subjects an opportunity to familiarize themselves with the set of strategies and the mechanics of choosing a strategy, conditionally for different treatments. They also got to see how the outcome of a strategy method supergame would be revealed.

We recruited 24 subjects per session from the student body of two universities. 8 sessions, equally divided between treatments and locations, were conducted at Appalachian State University and Chapman University. Instructions were read out loud in front of the subjects. Sessions, on average, lasted 2 hours and 10 minutes. The overall payment included a \$7 show-up fee, the payment for the Zoom task $\in \{\$0, \$5\}$, and the cumulative earnings from all 16 supergames. The payment range for the 192 subjects was between \$23 and \$38, with an average of \$31.

4 Hypotheses

We begin with our hypotheses about the effect of our Strong Identity treatment on individualism and collectivism. Then we discuss the predicted impact of our other treatments on the strategies subjects choose. In this paper, our analysis focuses on the set of strategies chosen by subjects for the four possible treatments into which they could be assigned in each supergame. We focus on play in the

Strategy Number	Name (Abbreviation)
1	Always cooperate (AllC)
2	Tit-for-tat (TFT)
3	Tit-for-2-tats (TF2T)
4	Tit-for-3-tats (TF3T)
5	2-tits-for-tat (2TFT)
6	2-tits-for-2-tats (2TF2T)
7	T2 (T2)
8	Win-Stay-Lose-Shift (PTFT)
9	WSLS with 2 rounds punish (2PTFT)
10	Grim Trigger (Grim)
11	Lenient Grim (Grim2)
12	More Lenient Grim (Grim3)
13	False cooperator (C-to-ALLD)
14	Always defect (ALLD)
15	Exploitative tit-for-tat (D-TFT)
16	Exploitative tit-for-2-tats (D-TF2T)
17	Exploitative tit-for-3-tats (D-TF3T)
18	Exploitative Grim2 (D-Grim2)
19	Exploitative Grim3 (D-Grim3)
20	Alternator (DC-Alt)

Table 3: **The Strategy List**: See Table A1 for a detailed description of the strategies

direct-response games in another manuscript in preparation. Note that subjects chose strategies for all four treatments (High/Low×In-Group/Out-Group) simultaneously. Following Fudenberg *et al.* (2012), we classify the strategies into clusters: Selfish, Cooperative, Forgiving, Lenient, and Starts-with-Cooperate. They classify as Selfish the strategies Always Defect and Exploitative tit-for-tat. Cooperative strategies are all strategies besides AD & D-TFT. Forgiving strategies are TFT, TF2T, TF3T, 2TFT, and 2TF2T. Lenient strategies are TF2T, TF3T, 2TF2T, Grim2, and Grim3. Starts-with-Cooperate includes any strategy that cooperates in the first interaction of a supergame.

Hypothesis 1: The Strong Identity treatment will reduce I/C scores (i.e. make subjects more collectivistic).

Hypothesis 2: Subjects will exhibit in-group favoritism, such that they will choose more cooperative/forgiving/lenient strategies and fewer defector strategies when playing with in-group members than when playing with out-group members.

Hypothesis 3: Selfish strategies will be less common when the returns to unilateral defection are Low than when they are High.

Hypothesis 4a: An increase in collectivism, as induced by the Strong Identity treatment, will cause an increase in in-group favoritism (e.g. more cooperative/forgiving and fewer selfish/exploitative strategies).

Hypothesis 4b: Regardless of treatment, subjects who are more collectivistic should exhibit more in-group favoritism and so choose more cooperative/forgiving and fewer selfish/exploitative strategies.

5 Results

Finding 1: Contra Hypothesis 1, the Strong Identity treatment has no significant impact on I/C scores.

Evidence: Figure 1 shows the distribution of I/C scores in each treatment. We regress an individual's I/C score $\in [-8, 8]$ on a treatment dummy variable that takes a value of 1 if subjects were in the Strong Identity treatment and 0 otherwise, with standard errors clustered at the session level. A negative and significant coefficient on the dummy variable would indicate that subjects' became more collectivistic in the Strong Identity treatment. On average, the subjects' responses reveal a tendency towards collectivism, with a negative and significant Constant term equal to -2.9 (p-value < 0.001). The coefficient on the Strong Identity dummy equals -0.15, but it is far from statistically significant (p-value $= 0.85$). Thus, the treatment did not successfully induce an increase in collectivism.

Unfortunately, this means that our main between-subjects manipulation did not have its intended effect, despite our adoption of methods from previous work that were shown to have the strongest impact on individualism/collectivism. One possible explanation is that the group sizes in our design were quite large compared to those in previous work. This was influenced by our desire to employ perfect stranger matching across supergames, but it resulted in a large group within

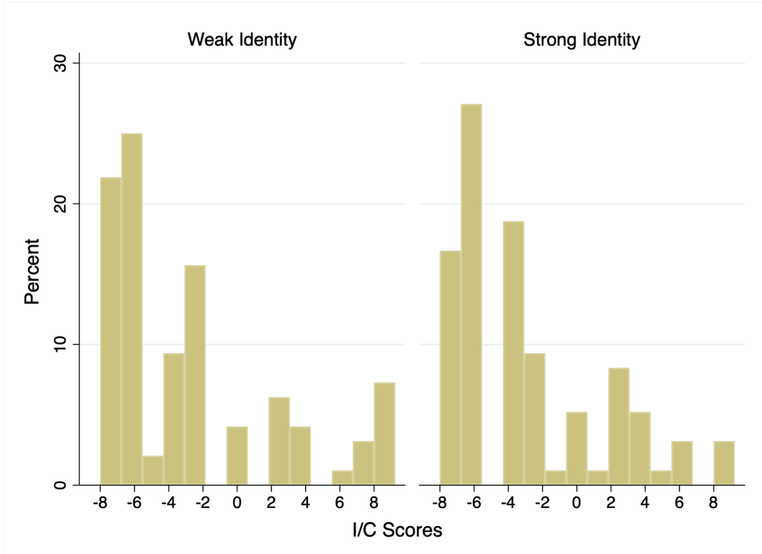

Figure 1: Distribution of I/C Scores by Identity Treatment

which it may have been difficult to develop any kind of "group feeling" in the course of working on the Zoom task over a chat room. One piece of evidence for this is that the amount of chat per group (and per person) was quite low (see Table 4). On average, each subject produced only 2.6 lines of chat during the Zoom task, which suggests that there was little discussion upon which they could build a group identity.

Strong Identity Treatment		
Session	Group	Chat Lines
1	1	7
	2	26
2	1	30
	2	5
3	1	16
	2	52
4	1	57
	2	54

Table 4: Frequency of chat lines by session and group in the strong group identity treatment

Given that our Strong Identity treatment failed to induce more collectivism among students, we pool data over the Strong and Weak Identity treatments for the remainder of the analysis. Thus, our data consist of four strategy choices (one for each group$\times$defection payoff combination) made by each subject for each supergame, for a total of 192 subjects $*$ 16 supergames $*$ 4 strategies $= 12,288$ observations. All treatment effects reported below are identified via within-subject variation.

Finding 2: Consistent with Hypothesis 2, there is some evidence that subjects behave differently, on average, when interacting with in- and out-group members.

Finding 3: Consistent with Hypothesis 3, subjects are more likely to choose cooperative and less likely to choose selfish strategies when the payoff from unilateral defection is lower.

Evidence: In order to get an overall idea of the impact of different temptation payoffs and being matched with an in- or out-group partner, Figure 2 presents histograms of strategic plans chosen, pooled across subjects, sessions, and Identity treatments. Strategy Plan #14 is the modal choice in all scenarios. However, it is clear that Always Defect is chosen with a lower frequency when the defection payoff is low. Visually, it does not appear that there is a difference in the in-group/out-group dimension.

We estimate a series of mixed-effects linear probability models in which the dependent variable takes a value of 1 if the player chose a strategy from a pre-defined category and zero otherwise. Following Cason and Mui (2019), we consider the following categories (a) All Defect (Plan 14), (b) Cooperative (Any Plan except 13 or 14), (c) Forgiving (Plans 2-6), (d) Lenient (Plans 3, 4, 6, 11, and 12), and (e) Starts-with-C (Plans 1-13). Our independent variables include supergame fixed effects, a dummy equal to 1 if the chosen strategy was for an interaction with an out-group member and 0 otherwise, a dummy equal to 1 if the unilateral defection payoff was Low, and an interaction between out-group and Low. We include nested random effects for each supergame-subject-session to control for repeated measures and we cluster standard errors at the session level. Table 5 reports the results.

The constant term captures the probability of choosing a particular strategy type in the first supergame, when playing with an In-Group member in the High defection payoff condition. Statistically significant main effects reveal that, on average, subjects are 2.1pp more likely to choose the strategy "All Defect", 2.3pp less likely to choose a "Cooperative" strategy and 3pp less likely to choose a strategy that cooperates in the first round, when playing with an out-group member. Moreover, when the returns to unilateral defection are Low, we see that subjects are 8pp less likely to choose "All Defect", 8.4pp more likely to choose a "Cooperative" strategy, 7.8pp more likely to choose a "Forgiving" strategy, 3.4pp more likely to choose a "Lenient" strategy, and 12.9pp more likely to choose a strategy that cooperates in the first round of an interaction. Thus, although the effects are not especially large, we see evidence of differential treatment of in- and out-group members, and we also see evidence that subjects respond to the weaker incentive to defect in the Low treatment.

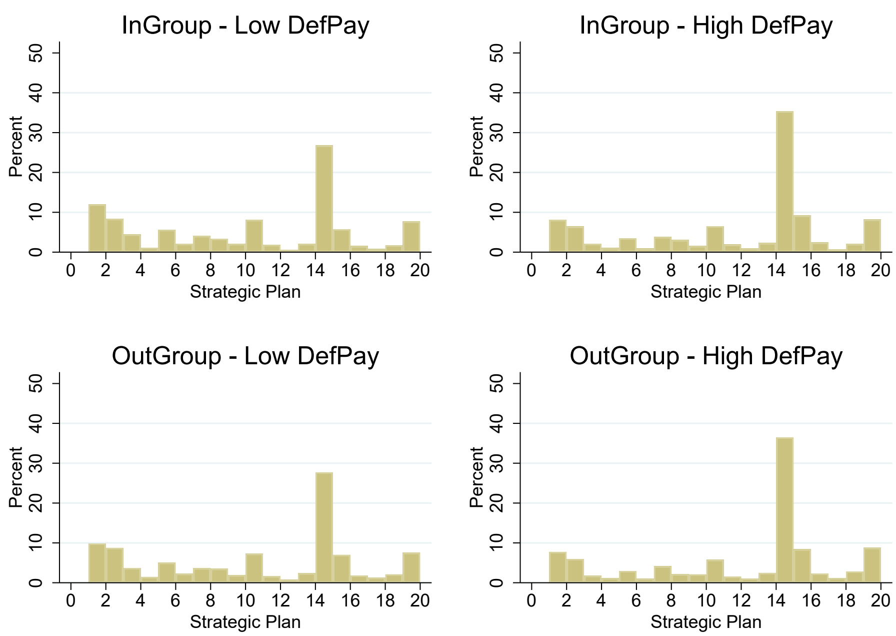

Figure 2: Frequency Strategy Plans Chosen by Defection Payoff and In- vs. Out-Group

Finding 4A: The Strong Identity treatment has no significant effect on subjects' strategy choices.

Evidence: As noted above, our Strong Identity treatment failed to induce changes in I/C scores, which justified pooling the data. Here, we confirm that the Strong Identity treatment also fails to significantly alter the strategies played by our subjects. Table 6 reports no significant treatment effect of Strong Identity for any of our strategy categories. This implies that group identity might

	(1) All Defect	(2) Cooperative	(3) Forgiving	(4) Lenient	(5) Starts-with-C
Out-Group	0.021*	-0.023*	-0.013	-0.006	-0.030***
	(0.012)	(0.013)	(0.010)	(0.004)	(0.009)
Low Defection Payoff	-0.081***	0.084***	0.078***	0.034**	0.129***
	(0.015)	(0.012)	(0.017)	(0.013)	(0.029)
Out-Group × Low Defection Payoff	-0.011	0.008	0.005	0.003	-0.003
	(0.014)	(0.016)	(0.008)	(0.008)	(0.013)
Constant	0.274***	0.697***	0.170***	0.105***	0.490***
	(0.043)	(0.042)	(0.022)	(0.011)	(0.024)
Observations	12288	12288	12288	12288	12288
Supergame Fixed Effects	Y	Y	Y	Y	Y

Clustered standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Regression Analysis of Strategy Choice, by Opponent and Defection Payoff

	(1) defector	(2) cooperative	(3) forgiving	(4) lenient	(5) start_with_c
Strong Identity	-0.066	0.061	0.017	0.018	0.063
	(0.094)	(0.089)	(0.037)	(0.019)	(0.061)
Constant	0.352***	0.628***	0.167***	0.074***	0.445***
	(0.068)	(0.067)	(0.019)	(0.011)	(0.032)
Observations	51456	51456	51456	51456	51456

Mixed-effects panel regression models with nested random effects for each subjects and sessions.
Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Regression Analysis of Strong Identity on Strategy Choice

not have a strong impact in IRPD, at least in the parameterizations we examine (Li and Liu, 2017). This rejects Hypothesis 4A and reinforces the decision to pool the data across the Strong and Weak Identity treatments.

Finding 4B: Contra Hypothesis 4, there is limited evidence that individuals' I/C scores are related to strategy choice.

Next, we test Hypothesis 4B in the entire sample to assess whether I/C scores are related to strategy choice, conditional on treatment variables. We estimate the same set of models reported in Table 5, and we include the subject's I/C score (where higher values indicate more individualistic), and its interaction with the treatment variables as additional independent variables. The results are shown in Table 7. The coefficient on the I/C score is statistically insignificant in 4 of 5 models suggesting that there is limited association between I/C scores and strategy choice, conditional on treatment. Moreover, while 2/15 of the interactions are statistically significant, there is no consistent pattern, except that the I/C score interactions with Out-Group variables typically go in the opposite direction of our hypothesis (i.e. if anything, those with higher I/C scores seem to exhibit more in-group favoritism). The coefficients on the treatment variables are qualitatively quite similar to those reported above, though they gain some significance.

	(1) All Defect	(2) Cooperative	(3) Forgiving	(4) Lenient	(5) Starts-with-C
Out-Group	0.024**	-0.030**	-0.016	-0.009*	-0.029**
	(0.011)	(0.014)	(0.010)	(0.005)	(0.014)
Low Defection Payoff	-0.075***	0.081***	0.096***	0.037***	0.124***
	(0.016)	(0.013)	(0.023)	(0.013)	(0.038)
Out-Group × Low Defection Payoff	-0.015	0.020	-0.003	-0.005	-0.008
	(0.013)	(0.017)	(0.008)	(0.009)	(0.018)
I/C Score	0.003	-0.004	0.003*	0.002	0.002
	(0.006)	(0.007)	(0.002)	(0.002)	(0.007)
Out-Group × I/C Score	0.001	-0.002*	-0.001	-0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Low Defection Payoff × I/C Score	0.002	-0.001	0.006	0.001	-0.002
	(0.003)	(0.004)	(0.004)	(0.001)	(0.005)
Out-Group × Low Defection Payoff × I/C Score	-0.002	0.004	-0.003	-0.003**	-0.002
	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)
Constant	0.283***	0.684***	0.180***	0.111***	0.495***
	(0.038)	(0.034)	(0.027)	(0.016)	(0.032)
Observations	12288	12288	12288	12288	12288
Supergame Fixed Effects	Y	Y	Y	Y	Y

Clustered standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Regression Analysis of Strategy Choice, Including I/C Score

6 Conclusion

In this paper, we used a laboratory experiment to examine how individualism and collectivism (I/C) cultural disposition affect the willingness to cooperate in an infinitely repeated prisoner's dilemma (IRPD). I/C predicts people will change their willingness to cooperate with (and conversely cheat on) other people based on group affiliation. Collectivists assume that groups bind and mutually obligate individuals. Individualists assume that individuals are independent of one another. In the context of an IRPD, collectivists would be more cooperative, lenient, and forgiving and therefore defect less with in-group members. Individualists, on the other hand, are predicted to behave more similarly between in- and out-group members. As the I/C predictions depend critically on the in- vs. out-group dimension, we also attempted to causally affect I/C scores through a group-identity task. Our conjecture was, by creating stronger ties to the in-group, I/C scores would be more collectivistic compared to I/C scores in our Weak Identity treatment, where subjects completed the group-identity task on their own. Finally, within-subject, we varied the defection payoff from not defecting on their partner when he/she was cooperating.

In the experiment, subjects first completed the group-identity task and completed the I/C scores instruction. Subjects then played multiple supergames with the parameterizations of the defection payoff, being randomly re-matched with a new subject in each supergame. Subjects knew whether their partner was an in-group or out-group member.

Our results are largely null. We were not able to successfully alter I/C scores through the group-identity task. The group-identity task on its own did not significantly affect strategic behavior across our sample. Using the natural variation in the I/C scores, we found that I/C scores do not play a large role in strategic behavior either. Variations of the defection payoff were the only significant treatment effect we found. The smaller defection payoff led to higher rates of cooperation, forgiving, and lenient behavior and less defection. This is perhaps unsurprising since our within-subject tests of the effects of in- and out-group matching and of incentives were the comparisons for which we would expect to have the most statistical power.

From a policy perspective, our results suggests that reforms intended to "get the incentives right" may be sufficient to overcome cultural factors and encourage cooperation. Our evidence suggests that strategic plans in indefinitely repeated social dilemmas do not vary across the range of I/C scores that we observe. In our sample, the primary factor when choosing strategic plans appears to be relative payoffs of cooperation and defection. Subjects are somewhat responsive to whether they interact with an in- or an out-group member, but this effect does not seem to vary with I/C tendencies at the individual level. Thus, our evidence suggests that cultural tendencies might have a smaller effect in indefinitely repeated games than is predicted by theories that foreground cultural tendencies as explanations of variation in economic behavior. It's worth noting that prior studies showing a significant effect of I/C tendencies on economic decision-making examined one-shot interactions, and so one possibility is that cultural variation is more important for anonymous one-shot interactions than it is for repeated interactions. That said, it may be that we lack sufficient variation in I/C scores or that some other treatment would have more successfully shocked their distribution. Thus, further research is needed to understand the interaction between strategic behavior, I/C, and group identity in IRPD.

In related games, (Romero and Rosokha, 2019) found that cooperative strategies are more likely to emerge when subjects are allowed to revise their strategic plans. Our paper focuses on the strategy method decisions subjects made during our experiment. However, subjects made additional decisions in our experiment that we are examining as part of ongoing research. After subjects chose their strategy plan for the supergame for each of four possible combinations of in-/out-group and defection payoffs, "nature" randomly determined whether their plans would be implemented or they would need to make direct-response decisions in a round of the supergame. By analyzing these decisions in a separate paper, we will be able to determine how willing and often subjects stuck with their plan or revised their decisions as the games progressed. We will examine these possibilities in the context of I/C, in-/out-group, Strong Identity, and variations of payoff defections. Such analysis will provide additional insights into strategic thinking in IRPDs. It may be the case that, while strategic plans are not influenced strongly by the factors we examine, direct-response decisions are significantly impacted. Flexibility in strategic behavior, after initially committing to a strategy, may prove to be an important policy implication for individuals, firms, and countries who want to increase cooperation.

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APPENDICES

A Experiment Instructions

A.1 Phase 1

This is an experiment in the economics of strategic decision making. If you follow the instructions and make appropriate decisions, you can earn an appreciable amount of money. At the end of today's session, you will be paid via PayPal.

It is important that you remain silent and do not look at other people's work. If you have any questions, or need assistance of any kind, please raise your hand but do not say anything. An experimenter will come to you to answer your question or provide assistance in private. 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.

This experiment is divided into three Phases. These are the instructions for Phase 1, and instructions for the other Phases will be made available later.

<u>The task:</u>

This Phase of the experiment is divided into a series of interactions between you and a computer, which will play the role of another participant to help you get acquainted with how the experiment works.

In each interaction, you will interact with the computer for a random number of rounds. In each round, you and the computer can choose one of two actions. Once the interaction ends, you will interact with the computer for another interaction. Note that you should not expect the computer to behave the same way in every interaction. Interactions will continue in this manner for the remainder of the Phase.

The setup will now be explained in more detail.

<u>The round:</u>

In each round of Phase 1, the same two possible actions are available to both you and the computer: A or B. Your earnings are determined by the combination of actions taken by you and the computer.

The earnings of the actions (in cents)

Your Choice	Other Participant's Choice A	Other Participant's Choice B
A	40, 40	12, R
B	R, 12	25, 25

The first entry in each cell represents your earnings in cents, while the second entry represents the earnings for the computer player. Note, in this Phase when you interact with a computer, you will not be paid for your earnings. However, in a later Phase when you interact with other human participants, your cash payment at the end of the session will be based on your earnings resulting from actions you and the other human participants make.

Your earnings in the bottom-left cell of the table and the computer's earnings in the top-right cell of the table are denoted by R. In each interaction, R will be 45 or 65. Both possible values of R have a 50% chance of being chosen in each interaction.

Example of how earnings are determined in a round:

Suppose in a round, you choose action A and the computer chooses action B. In that round, based on the table above, your earnings would be 12 and the computer's earnings would be R.

Random Number of Rounds in Each Interaction

After each round, there is a 3/4 chance of another round, and a 1/4 chance that the interaction will end. Successive rounds will occur with probability 3/4 each round, until the interaction ends (with probability 1/4). This is as if we rolled a four-sided, pyramid-shaped die and if 1, 2, or 3 come up, the interaction continues. If 4 comes up, the interaction ends. So, for instance, if you are in round 2, the probability there will be a third round is 75%. Also, if you are in round 9, the probability there will be a tenth round is 75%.

Decision-Making Procedures

There are two possible decision-making procedures. In one of the decision making procedures, you will make a decision in each round (round-by-round). In the other procedure, you will choose a plan that avoids the need to make decisions round-by-round (plan). Prior to starting each interaction, you will choose a plan for each possible value of R (45 & 65) in the earnings table. After choosing a plan, there is a 50% chance that your plan will make decisions for you for the entire interaction. There is also a 50% chance your plan will not be implemented and you will make decisions in each round. For the practice phase, the computer will make choices according to one of the plans in each interaction; the plan is randomly chosen prior to the start of the interaction and will be followed until the end of the interaction, but you will not be told which plan the computer is implementing.

Possible Plans

The plan procedure will now be described in more detail. For each interaction, you will choose one of 20 possible plans. After you choose your plan, you will receive a confirmation screen that restates your chosen plan and gives you the opportunity to revise it if you want. *Once you confirm your choice of plan for the interaction, this plan cannot be changed in later rounds within that interaction.* You will only be able to choose a new plan at the beginning of the next interaction.

The following table describes possible plans for interaction. Some plans specify different actions based on the outcomes of previous rounds. Note that whenever a plan prescribes an action other than A, it implements action B (since that is the only other choice available in a round). Plans 1-13 start round 1 by choosing action A. Plans 1-9 start with A, but switch to action B based on actions in one or more previous rounds. These plans indicate scenarios in which a participant would switch back to action A. Plans 10-13 also start with A, but they indicate that once a switch to B occurs, B will be chosen thereafter for the remainder of the interaction.

Plans 14-20 start round 1 by choosing action B.

After you choose your plan, if the "plan" procedure is randomly chosen to be implemented in that interaction, you will be shown the outcome of each round of the interaction. This includes your action, the computer's action, and your earnings in each round.

Table A1: Plans for Interaction

Plan Number	Description
1	Always choose A in all rounds
2	Start by choosing A, then always choose A *unless* the other participant's action is B in the previous round.
3	Start by choosing A, then always choose A *unless* the other participant's action is B in the *two* previous rounds.
4	Start by choosing A, then always choose A *unless* the other participant's action is B in the *three* previous rounds.
5	Start by choosing A, then always choose A *unless* the other participant's action is B in *either* of the *two* previous rounds. If your choice is B because the other participant's action was B previously, then always choose two consecutive rounds of B; but switch back to A if, and only if, the other participant's actions are two consecutive rounds of A.
6	Start by choosing A, then always choose A *unless* the other participant's action is B in *two* out of the *three* previous rounds. If your choice is B because the other participant's actions were two consecutive B actions, then always choose two consecutive rounds of B before switching back to choose A.
7	Start by choosing A, then continue choosing A until *either* your action *or* the other participant's action is B in the previous round. If this occurs, then choose B twice before switching back to choose A.
8	Start by choosing A, and choose A whenever both participants' actions match (A-A or B-B) in the previous round; otherwise choose B.
9	Start by choosing A, and choose A whenever both participants' actions match (A-A or B-B) for *two* consecutive previous rounds; otherwise choose B.
10	Start by choosing A, and continue to choose A until *either* participant's action is B in the previous round. If either participant's previous action is B, then choose B for every remaining round of the interaction.
11	Start by choosing A, and continue to choose A until *either* participant's action is B for *two* consecutive previous rounds. If this occurs, then choose B for every remaining round of the interaction.
12	Start by choosing A, and continue to choose A until *either* participant's action is B for *three* consecutive previous rounds. If this occurs, then choose B for every remaining round of the interaction.
13	Start by choosing A, then choose B for every remaining round of the interaction.
14	Always choose B in all rounds.
15	Start by choosing B, then always choose A *unless* the other participant's action is B in the previous round.
16	Start by choosing B, then always choose A *unless* the other participant's action is B in the *two* previous round.
17	Start by choosing B, then always choose A *unless* the other participant's action is B in the *three* previous round.
18	Start by choosing B, then switch to choose A until either participant's action is B for *two* consecutive previous rounds. If this occurs, then choose B for for every remaining round of the interaction.
19	Start by choosing B, then switch to choose A until either participant's action is B for *three* consecutive previous rounds. If this occurs, then choose B for for every remaining round of the interaction.
20	Start by choosing B, then switch to A, then switch to B, etc., alternating between A and B for every round of the interaction, regardless of what the other participant's actions are in previous rounds.

If the "round-by-round" procedure is randomly chosen for an interaction, after each round, you will be shown your action, the computer's action, and your earnings from that round.

Summary

You will make decisions in multiple interactions with the computer. Prior to each interaction, you will choose a plan for each possible value of R from the earnings table. Plans specify how actions will be implemented in the interaction. After choosing your plan, the decision-making procedure for that interaction will be chosen randomly. Each procedure, "round-by-round" and "plan", has an equal chance (50%) of being chosen. After the decision-making procedure is randomly chosen, the value of R in the earnings table used in that interaction will also be randomly chosen. Each value of R, 45 & 65, has an equal chance (50%) of being chosen.

If the "plan" procedure is implemented, then the plan you chose for the randomly chosen value of R will be carried out in every round of the interaction. You will observe the outcomes in all rounds at the end of the interaction.

If the "round-by-round" procedure is implemented, you will choose action A or B in every round. In other words, your plan will not be implemented. After each round, you will observe the outcomes from that round.

After each round in each interaction, there is a 75% chance the interaction will continue and a 25% chance the interaction will end. After an interaction ends, you will start a new interaction with another participant.

In Phase 1, you will make decisions numerous times while interacting with the computer. These interactions are practice for interactions with other human participants in later Phases of the experiment. You will not be paid for your decisions in Phase 1.

Review Questions

Before you make decisions in Phase 1, you will answer review questions to ensure you understand how the possible plans can impact the decisions you make. In particular, you will use the plans of interaction to answer questions. Once everyone has correctly answered the questions, Phase 1 will begin.

A.2 Phase 2

In Phase 2 everyone has received a binder that contains 16 pictures. Among these 16 pictures, 14 pictures can be used to form a sequence while 2 other pictures are irrelevant. Your task is to find these 14 pictures and order them in their correct sequence within 7 minutes. When you have the correct sequence you will use the numbers on the pictures to record their order on the screen. List the pictures in order from the most zoomed-in image to the most zoomed-out image. Starting in the upper left corner of the screen, input the picture number of the most zoomed-in image, and so on.

We have divided the session into two groups of 12 people. You can use a group chat program to get help from or offer help to other members in your own group. Messages will be shared only among all the members from your own group. You will not be able to see the messages exchanged among the other group. People in the other group will not see the messages from your own group either.

You are free to submit your answer when you are ready. If you get the order of images correct, you earn $5. Raise your hand if you have any questions. Please keep the pictures in the plastic sheeting so that they do not get damaged. You may use these instructions and the pencil provided to make notes.

If interested, other topics may be discussed using chat. There are, however, two restrictions

1. Please do not identify yourself or send any information that could be used to identify you (e.g. age, race, professional background, etc.).
2. Please refrain from using obscene or offensive language.

A.3 Phase 3

Phase 3 is very similar to Phase 1. That is, you will choose an action, A or B, in each round of each interaction. You can refer to your instructions from Phase 1, in addition to these instructions, to refresh your memory if needed. The difference between this Phase and Phase 1 is that you will interact with human participants, rather than with a computer.

As in Phase 1, in each round of the experiment, the same two possible actions are available to both you and the participant you interact with: A or B. Your earnings are determined by the combination of actions taken by you and the other participant.

The earnings of the actions (in cents)

	Other Participant's Choice	
Your Choice	A	B
A	40, 40	12, R
B	R, 12	25, 25

Possible Plans

The same set of plans is available to you as was available in Phase 1. Please review your instructions from Phase 1 if you need a refresher on the plans. The other participant has the same set of plans to choose from.

Instead of choosing 2 plans per interaction, you will now choose 4 plans per interaction. This is because the other participant may be from your group from Phase 2 or from the other group. Thus, there are 4 possible kinds of interactions, one for each value of R and for each group membership of your counterpart. You will choose a plan for each possible kind of interaction.

Summary

You will make decisions in multiple interactions with other participants. Prior to each interaction, each participant will choose a plan for each possible value of R from the earnings table, with the possibility to choose a different plan depending on whether the other participant is from your group from Phase 2 or from the other group.

Plans specify how actions will be implemented in the interaction. After choosing your plan, the computer will randomly determine which decision-making procedure will be used in that interaction. Each procedure, "round-by-round" and "plan", have an equal chance (50%) of being chosen. After the decision-making procedure is randomly chosen, the value of R in the earnings table used in that interaction will also be randomly chosen. Each value of R, 45 & 65, has an equal chance (50%) of being chosen.

If the “plan” procedure is implemented, then the plan will be carried out in every round of the interaction. You will observe the outcomes in all rounds at the end of the interaction.

If the “round-by-round” procedure is implemented, you will choose action A or B in every round. In other words, your plan will not be implemented. After each round, you will observe the outcomes from that round.

After each round in each interaction, there is a 75% chance the interaction will continue and a 25% chance the interaction will end. After an interaction ends, you will start a new interaction with another participant.

You will participate in 16 interactions, interacting with a different participant in each interaction. You will have exactly one interaction with each participant. Half (8) of the participants you interact with will be participants who were in your group in Part 2. In the other half of the interactions, you will interact with participants who were in the other group in Part 2.

There are four possible types of interactions: R= 45 with a participant from your group, R= 65 with a participant from your group, R= 45 with a participant from the other group, and R= 65 with a participant from the other group. You are guaranteed to have at least three interactions of each of the four possible types of interactions. The remaining 4 interactions will be randomly determined.

At the end of the experiment, you will be paid the sum of your earnings from Phase 2 ($5 if you completed the task correctly), and your earnings from all interactions of Phase 3.

B The Triad Task

The beginning In the following lists, among the three things listed together, please indicate which two of the three are most closely related.

1.	Seagull	Sky	Dog
2.	Black	White	Blue
3.	Doctor	Teacher	Homework
4.	Apple	Orange	Pear
5.	Shoes	Boots	Slippers
6.	Train	Bus	Tracks
7.	Computer monitor	Antenna	Television
8.	Hospital	Bank	Cinema
9.	Carrot	Eggplant	Rabbit
10.	Cloud	Wind	Rain
11.	Panda	Banana	Monkey
12.	Shirt	Hat	Pants
13.	Kite	Basketball	Tennis
14.	Farmer	Corn	Bread
15.	Shampoo	Hair	Beard
16.	Bridge	Tunnel	Highway
17.	Piano	Violin	Guitar
18.	Child	Man	Woman
19.	Postman	Policeman	Uniform
20.	Letter	Stamp	Postcard

(In the experiment, subjects saw the questions one by one. The questions used to compute the I/C score are 1,3,6,7,9,11,14,15. For example, in (1) a collectivist would choose {seagull, sky}, focusing on a holistic relationship between a bird and the sky, while an individualist would choose {seagull, dog}, focusing on the category "animal".)